# Standards Council Meeting

**SUPPLEMENTAL AGENDA**

August 2 (Noon) 3-5, 2010  
NFPA Headquarters  
1 BATTERYMARCH PARK  
Quincy, MA 02169  
617-770-3000

<table>
<thead>
<tr>
<th>10-8-1</th>
<th>Act on the issuance of NFPA 70, <em>National Electrical Code</em>[^1], with an issuance date of August 5, 2010 and an effective date of August 25, 2010, as acted on at the Association Meeting, with amendments as follows:</th>
</tr>
</thead>
</table>
| 10-8-1-a | Amendment No. 70-1 (CAM 70-1): Reject an identifiable part of Comment 1-101. The rejection of the identifiable part results in the rejection of the last 5 words of the accepted text in the third paragraph of 110.14(A) in Comment 1-101 as follows:  
Connectors and terminals for conductors more finely stranded than Class B and Class C stranding as shown in Chapter 9, Table 10 shall be identified for the specific conductor class or classes and the number of strands.  
(*Passed Panel ballot, Passed TCC ballot*) |
| 10-8-1-b | Appeal of P. Keleher, Paul Keleher Electrical Services requesting that the Council overturn the Association action, and accept an identifiable part of Proposal 2-193. The acceptance of the identifiable part results in accepting the following new text:  
210.19(A) Branch Circuits Not More than 600 Volts.  
(5) Permissible Voltage Drop. The circuit conductors of a 15 or 20-ampere/120-volt branch circuit shall be sized such that voltage-drop measured at the rated ampacity of the circuit shall be 5% or less at any outlet.  
This motion (CAM 70-3) failed on the floor of the Association Meeting. See Attachment 10-8-1-b |
| 10-8-1-c | Appeal of M. Flegel, Reliance Controls requesting that the Council overturn the Association action, and accept Comment 3-69. This motion (CAM 70-6) failed on the floor of the Association meeting. See Attachment 10-8-1-c |
| 10-8-1-d | Amendment No. 70-2 (CAM 70-5): Reject Comment 3-22. (*Failed Panel ballot, Failed TCC ballot*) See Attachment 10-8-1-d  
See Supplemental Attachment 10-8-1-d |
| 10-8-1-e | Appeal of C. Turner, Generac Power Systems requesting that the Council grant an extension to the implementation date described in the new requirement to Article 590.6 from January 2, 2011 to January 1, 2012 so that the manufacturers can redesign their products to comply with the new requirement to Article 590.6. See Attachment 10-8-1-e |
| 10-8-1-f | Appeal of C. Compagnone, Jr., CompaCovers requesting that the Council overturn |

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[^1]: *National Electrical Code* refers to the code issued by the National Fire Protection Association (NFPA) that sets standards for electrical systems and installations.
<table>
<thead>
<tr>
<th>Appeal</th>
<th>the Association action, and accept Comment 9-26. This motion (CAM 70-12) failed on the floor of the Association Meeting. See Attachment 10-8-1-f  See Supplemental Attachment 10-8-1-f</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-8-1-f-1</td>
<td>Comment received on the appeal filed by C. Compagnone to overturn the Association action, and accept Comment 9-26 (CAM 70-12). See Attachment 10-8-1-f-1</td>
</tr>
<tr>
<td>10-8-1-g</td>
<td>Amendment No. 70-3 (CAM 70-16): Return a portion of a Report in the form of a Proposal 11-107a and related Comments 11-43a, 11-44, 11-45, 11-46 and 11-47. <strong>(Passed Panel ballot, Passed TCC ballot)</strong> See Attachment 10-8-1-g</td>
</tr>
<tr>
<td>10-8-1-h</td>
<td>Amendment No. 70-4 (CAM 70-17): Accept as Modified by Panel for Comment 13-96. <strong>(Passed Panel ballot, Passed TCC ballot)</strong> See Attachment 10-8-1-h See Supplemental Attachment 10-8-1-h</td>
</tr>
<tr>
<td>10-8-1-i</td>
<td>Amendment No. 70-5 (CAM 70-20): Reject Comment 15-101. <strong>(Failed Panel ballot, Failed TCC ballot)</strong> See Attachment 10-8-1-i See Supplemental Attachment 10-8-1-i</td>
</tr>
<tr>
<td>10-8-1-i-1</td>
<td>Appeal of D. Mercier, Southwire Company requesting that the Council overturn the Association action, and accept Comment 15-101. This motion (CAM 70-20) passed on the floor of the Association Meeting. <strong>(Failed Panel ballot, Failed TCC ballot)</strong> See Attachment 10-8-1-i-1</td>
</tr>
<tr>
<td>10-8-1-i-1-a</td>
<td>Three comments received on the appeal filed by D. Mercier to overturn the Association action, and accept Comment 15-101. See Supplemental Attachment 10-8-1-i-1-a</td>
</tr>
<tr>
<td>10-8-1-j</td>
<td>Amendment No. 70-6 (CAM 70-22): Accept Comment 17-86. <strong>(Failed Panel ballot, Failed TCC ballot)</strong> See Attachment 10-8-1-j See Supplemental Attachment 10-8-1-j-1-a</td>
</tr>
<tr>
<td>10-8-1-j-1</td>
<td>Appeal of W. Robinson, Lothian, MD requesting that the Council uphold floor action and accept Comment 17-86. This motion (CAM 70-22) passed on the floor of the Association Meeting. <strong>(Failed Panel ballot, Failed TCC ballot)</strong> See Attachment 10-8-1-j-1 See Supplemental Attachment 10-8-1-j-1</td>
</tr>
<tr>
<td>10-8-1-j-1-a</td>
<td>Six comments received on the appeal filed by W. Robinson to uphold floor action, and accept Comment 17-86 (CAM 70-22). See Attachment 10-8-1-j-1-a See Supplemental Attachment 10-8-1-j-1-a</td>
</tr>
<tr>
<td>10-8-1-k</td>
<td>Appeal of M. Haag and T. Schaupp, Kaco New Energy requesting that the Council remove Article 690.11 from the proposed 2011 edition of NFPA 70 or to modify it to allow for a future effective-date that awaits the availability of a relevant standard and accounts for a reasonable time frame thereafter for the industry to develop a robust and commercially viable solution. See Attachment 10-8-1-k</td>
</tr>
<tr>
<td>10-8-1-l</td>
<td>Appeal of J. Krehnke, SMA Solar Technology America, LLC requesting that the Council remove Article 690.11 from the proposed 2011 edition of NFPA 70 or issue a modification to the original Proposal 4-205 that allows for a future effective date that awaits the availability of a relevant UL standard and accounts for a reasonable time frame thereafter to allow the industry to develop a robust and commercially viable solution. See Attachment 10-8-1-l</td>
</tr>
<tr>
<td>10-8-1-k/l</td>
<td>One comment received on the appeals filed by M. Haag and J. Krehnke requesting the Council remove Article 690.11 from the proposed 2011 edition of NFPA 70 or issue a modification to Proposal 4-205. See Supplemental Attachment 10-8-1-k/l</td>
</tr>
<tr>
<td>10-8-2-a</td>
<td>Appeal of M. Greiner, Hazard Control Technologies, Inc. requesting that the Council overturn the Association action, and reject an identifiable part of Comment 18-4. This motion (CAM 18-1) failed on the floor of the Association meeting. See Attachment 10-8-2-a.</td>
</tr>
<tr>
<td>10-8-2-a-1</td>
<td>Three comments received on the appeal filed by M. Greiner requesting that the Council overturn the Association action, and reject an identifiable part of Comment 18-4. See Supplemental Attachment 10-8-2-a-1</td>
</tr>
<tr>
<td>10-8-3</td>
<td>Act on the issuance of NFPA 25, <em>Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems</em>, with an issuance date of August 5, 2010 and an effective date of August 25, 2010, as acted on at the Association Meeting, with amendments as follows:</td>
</tr>
<tr>
<td>10-8-3-a</td>
<td>Amendment No. 25-1(CAM 25-11): Accept Comment 25-41. <em>(Failed ballot)</em> See Attachment 10-8-3-a See Supplemental Attachment 10-8-3-a</td>
</tr>
<tr>
<td>10-8-3-a-1</td>
<td>Appeal of R. Ray, Cybor Fire Protection Company requesting that the Council uphold the Association action, and accept Comment 25-41. This motion (CAM 25-11) passed on the floor of the Association meeting. <em>(Failed ballot)</em> See Attachment 10-8-3-a-1</td>
</tr>
<tr>
<td>10-8-3-b</td>
<td>Amendment No. 25-2(CAM 25-15): Accept Comment 25-104. <em>(Passed ballot)</em> See Attachment 10-8-3-b See Supplemental Attachment 10-8-3-b</td>
</tr>
<tr>
<td>10-8-3-b-1</td>
<td>Appeal of R. Fleming, National Fire Sprinkler Association, requesting that the Council uphold the Association action, and accept Comment 25-104. This motion (CAM 25-15) passed on the floor of the Association meeting. <em>(Passed ballot)</em> See Attachment 10-8-3-b-1</td>
</tr>
<tr>
<td>10-8-3-c</td>
<td>Amendment No. 25-3(CAM 25-19): Accept Comment 25-101. <em>(Failed ballot)</em> See Attachment 10-8-3-c See Supplemental Attachment 10-8-3-c</td>
</tr>
<tr>
<td>10-8-3-c-1</td>
<td>Appeal of L. Larrimer, US Department of Veterans Affairs requesting that the Council uphold the Association action, and accept comment 25-101. This motion (CAM 25-19) passed on the floor of the Association meeting. <em>(Failed ballot)</em> See Attachment 10-8-3-c-1</td>
</tr>
<tr>
<td>10-8-3-d</td>
<td>Appeal of J. Elvove, U.S. General Services Administration requesting that the Council overturn the Association action, and accept Comment 25-11. This motion (CAM 25-4) failed on the floor of the Association meeting. See Attachment 10-8-3-d</td>
</tr>
<tr>
<td>10-8-3-e</td>
<td>Appeal of J. Elvove, U.S. General Services Administration requesting that the Council overturn the Association action, and accept Comment 25-24. This motion (CAM 25-7) failed on the floor of the Association meeting. See Attachment 10-8-3-e See Supplemental Attachment 10-8-3-e</td>
</tr>
<tr>
<td>10-8-3-f</td>
<td>Appeal</td>
</tr>
<tr>
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<tr>
<td>10-8-5-a</td>
<td>Appeal</td>
</tr>
<tr>
<td>10-8-6</td>
<td>Act on the issuance of NFPA 58, <em>Liquefied Petroleum Gas Code</em>, with an issuance date of August 5, 2010 and an effective date of August 25, 2010, as acted on at the Association Meeting, with amendments as follows: <em>(SEE RELATED TIA ITEM 10-8-23)</em></td>
</tr>
<tr>
<td>10-8-6-a</td>
<td>Amendment No. 58-1(CAM 58-3): Accept Comment 58-30. <em>(Passed ballot)</em> See Attachment 10-8-6-a</td>
</tr>
<tr>
<td>10-8-6-b</td>
<td>Amendment No. 58-2(CAM 58-5): Accept Comment 58-49. <em>(Failed ballot)</em> See Attachment 10-8-6-b See Supplemental Attachment 10-8-6-b</td>
</tr>
<tr>
<td>10-8-6-b-1</td>
<td>Appeal</td>
</tr>
<tr>
<td>10-8-6-b-1-a</td>
<td>Two comments received on the appeal filed by M. Gomez to uphold the Association action, and accept Comment 58-49 See Attachment 10-8-6-b-1-a See Supplemental Attachment 10-8-6-b-1-a</td>
</tr>
<tr>
<td>10-8-6-c</td>
<td>Amendment No. 58-3(CAM 58-7): Accept a modified motion to Proposal 58-154. The modified motion deleted the following sentence from Proposal 58-154: This requirement shall apply to all new installations and to all existing installations within one year of adoption of this code. <em>(Passed ballot)</em> See Attachment 10-8-6-c</td>
</tr>
<tr>
<td>10-8-7</td>
<td>Act on the issuance of NFPA 86, <em>Standard for Ovens and Furnaces</em>, with an issuance date of August 5, 2010 and an effective date of August 25, 2010, as acted on at the Association Meeting, without amendments. <em>(SEE RELATED TIA ITEMS 10-8-26 and 10-8-27)</em></td>
</tr>
<tr>
<td>10-8-7-a</td>
<td>Appeal</td>
</tr>
<tr>
<td></td>
<td>Description</td>
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<tr>
<td>10-8-7-a-1</td>
<td>Five comments received on the appeal filed by M. Hirschler to overturn the Association action, and accept Comment 86-5 (CAM 86-1). See Attachment 10-8-7-a-1 See Supplemental Attachment 10-8-7-a-1</td>
</tr>
<tr>
<td>10-8-9</td>
<td>Act on the issuance of NFPA 204, <em>Standard for Smoke and Heat Venting</em>, with an issuance date of August 5, 2010 and an effective date of August 25, 2010, as acted on at the Association Meeting, with amendments as follows:</td>
</tr>
<tr>
<td>10-8-9-a</td>
<td>Amendment No. 204-1(CAM 204-1): Reject Comment 204-8. Acceptance of this motion was followed by an accepted motion to return the document to the responsible TC for further study. <em>(Passed) ballot on return of document</em> See Attachment 10-8-9-a</td>
</tr>
<tr>
<td>10-8-9-a-1</td>
<td>Informational ballot results from the Committee on the return revision cycle of the document. See Supplemental Attachment 10-8-9-a-1</td>
</tr>
<tr>
<td>10-8-10-a</td>
<td>Appeal of M. Hirschler, GBH International, requesting that the Council overturn the Association action, and reject Comment 214-1. This motion (CAM 214-1) failed on the floor of the Association Meeting. See Attachment 10-8-10-a</td>
</tr>
<tr>
<td>10-8-12</td>
<td>Act on the issuance of NFPA 502, <em>Standard for Road Tunnels, Bridges, and Other Limited Access Highways</em>, with an issuance date of August 5, 2010 and an effective date of August 25, 2010, as acted on at the Association Meeting, with amendments as follows:</td>
</tr>
<tr>
<td>10-8-12-a</td>
<td>Amendment No. 502-1(CAM 502-1): Accept Comment 502-45. <em>(Passed) ballot</em> See Attachment 10-8-12-a</td>
</tr>
<tr>
<td>10-8-13</td>
<td>Act on the issuance of NFPA 654, <em>Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids</em>, with an issuance date of August 5, 2010 and an effective date of August 25, 2010, as acted on at the Association Meeting, with amendments as follows:</td>
</tr>
<tr>
<td>10-8-13-a</td>
<td>Amendment No. 654-1(CAM 654-9): Return Entire Report. <em>(Failed) ballot on return of document</em> See Attachment 10-8-13-a</td>
</tr>
<tr>
<td>10-8-13-a-1</td>
<td>Informational ballot results from the Committee on the return revision cycle of the document. See Supplemental Attachment 10-8-13-a-1</td>
</tr>
</tbody>
</table>
| 10-8-13-a-2 | Appeal of W. Frank, Frank Risk Solutions, Inc., requesting that the Council overturn the Association action to return the entire report. This motion (CAM 654-9) passed on the floor of the Association Meeting. *(Failed) ballot on return of...
<table>
<thead>
<tr>
<th>Date</th>
<th>Document Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-8-13-a-3</td>
<td>Appeal</td>
<td>Appeal of S. Lancey, American Forest and Paper Association, requesting that the Council uphold the Association action to return the entire report. This motion (CAM 654-9) passed on the floor of the Association Meeting. <strong>(Failed ballot on return of document)</strong> See Attachment 10-8-13-a-3</td>
</tr>
<tr>
<td>10-8-13-a-4</td>
<td>Appeal</td>
<td>Appeal of H. Castles, EEI Loss Control/Fire Protection Task Group, requesting that the Council uphold the Association action to return the entire report. This motion (CAM 654-9) passed on the floor of the Association Meeting. <strong>(Failed ballot on return of document)</strong> See Attachment 10-8-13-a-4</td>
</tr>
<tr>
<td>10-8-13-a-5</td>
<td>Appeal</td>
<td>Appeal of B. Chastain, Global Health and Safety, Georgia-Pacific, requesting that the Council uphold the Association action to return the entire report. This motion (CAM 654-9) passed on the floor of the Association Meeting. <strong>(Failed ballot on return of document)</strong> See Attachment 10-8-13-a-5</td>
</tr>
<tr>
<td>10-8-13-a-5-1</td>
<td>Appeal</td>
<td>One comment received on the appeal filed by B. Chastain requesting that the Council uphold the Association action to return the entire report. See Supplemental Attachment 10-8-13-a-5-1</td>
</tr>
<tr>
<td>10-8-13-a-6</td>
<td>Appeal</td>
<td>Appeal of S. Francis, American Forest and Paper Association, requesting that the Council uphold the Association action to return the entire report. This motion (CAM 654-9) passed on the floor of the Association Meeting. <strong>(Failed ballot on return of document)</strong> See Attachment 10-8-13-a-6</td>
</tr>
<tr>
<td>10-8-13-a-6-1</td>
<td>Appeal</td>
<td>One comment received on the appeal filed by S. Francis requesting that the Council uphold the Association action to return the entire report. See Supplemental Attachment 10-8-13-a-6-1</td>
</tr>
<tr>
<td>10-8-13-a-7</td>
<td>Appeal</td>
<td>Appeal of J. Cholin, J.M. Cholin Consultants, Inc., requesting that the Council uphold the Association action to return the entire report. This motion (CAM 654-9) passed on the floor of the Association Meeting. <strong>(Failed ballot on return of document)</strong> See Attachment 10-8-13-a-7</td>
</tr>
<tr>
<td>10-8-13-a-7-1</td>
<td>Appeal</td>
<td>One comment received on the appeal filed by J. Cholin requesting that the Council uphold the Association action to return the entire report. See Supplemental Attachment 10-8-13-a-7-1</td>
</tr>
<tr>
<td>10-8-13-b</td>
<td>Appeal</td>
<td>Appeal of J. Cholin, J.M. Cholin Consultants, Inc., requesting that the Council uphold the Association action to accept Comment 654-5. This motion (CAM 654-1) had passed on the floor of the Association Meeting before the motion to return the Document to Committee. See Attachment 10-8-13-b</td>
</tr>
<tr>
<td>10-8-13-b-1</td>
<td>Appeal</td>
<td>Appeal W. Frank, Frank Risk Solutions, Inc., requesting that the Council overturn the Association action to accept Comment 654-5. This motion (CAM 654-1) had passed on the floor of the Association Meeting before the motion to return the Document to Committee. See Attachment 10-8-13-b-1</td>
</tr>
<tr>
<td>10-8-13-b-1-a</td>
<td>Appeal</td>
<td>One comment received on the appeal filed by J. Cholin requesting that the Council uphold the Association action to return the entire report. See Supplemental Attachment 10-8-13-b-c-d/e-1-a</td>
</tr>
<tr>
<td>10-8-13-c</td>
<td>Appeal</td>
<td>Appeal of J. Cholin, J.M. Cholin Consultants, Inc., requesting that the Council uphold the Association action to return a portion of a Report in the form of <strong>See Attachment 10-8-13-c</strong></td>
</tr>
</tbody>
</table>
identifiable part of Proposal 654-15 and related Comment 654-10. The identifiable part that is to be returned is the new proposed Section 6-1. This motion (CAM 654-3) had passed on the floor of the Association Meeting before the motion to return the Document to Committee. See Attachment 10-8-13-c

<table>
<thead>
<tr>
<th>10-8-13-c-1</th>
<th>Appeal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appeal of W. Frank, Frank Risk Solutions, Inc., requesting that the Council overturn the Association action to return a portion of a Report in the form of identifiable part of Proposal 654-15 and related Comment 654-10. The identifiable part that is to be returned is the new proposed Section 6.1. This motion (CAM 654-3) had passed on the floor of the Association Meeting before the motion to return the Document to Committee. See Attachment 10-8-13-c-1-a</td>
<td></td>
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</tbody>
</table>

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<thead>
<tr>
<th>10-8-13-c-1-a</th>
<th>Appeal</th>
</tr>
</thead>
<tbody>
<tr>
<td>One comment received on the appeal filed by J. Cholin requesting that the Council uphold the Association action to return the entire report. See Supplemental Attachment 10-8-13-b-c-d/e-1-a</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10-8-13-d</th>
<th>Appeal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appeal of J. Cholin, J.M. Cholin Consultants, Inc., requesting that the Council accept Comment 654-33. This motion (CAM 654-6) had been tabled on the floor of the Association Meeting before the motion to return the Document to Committee. See Attachment 10-8-13-d</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10-8-13-e</th>
<th>Appeal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appeal of J. Cholin, J.M. Cholin Consultants, Inc., requesting that the Council accept Comment 654-7 and 654-10. This motion (CAM 654-8) had been tabled on the floor of the Association Meeting before the motion to return the Document to Committee. See Attachment 10-8-13-e</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10-8-13-d/e</th>
<th>Appeal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two comments received on the appeals filed by J. Cholin to accept Comment 654-33, Comment 654-7 and 654-10 (CAMs 86-6 and 86-8). These motions were tabled at the Association Meeting. See Attachment 10-8-13-d/e See Supplemental Attachment 10-8-13-b-c-d/e-1-a</td>
<td></td>
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<table>
<thead>
<tr>
<th>10-8-14</th>
<th>Appeal</th>
</tr>
</thead>
<tbody>
<tr>
<td>The 2010 Revision Cycle Consent Documents were letter balloted by the Council with an issuance date of June 1, 2010 and an effective date of June 21, 2010, as shown below: No action is necessary</td>
<td></td>
</tr>
</tbody>
</table>

| 30B | Code for the Manufacture and Storage of Aerosol Products |
| 33 | Standard for the Spray Application Using Flammable or Combustible Materials |
| 34 | Standard for Dipping and Coating Processes Using Flammable or Combustible Liquids |
| 40 | Standard for the Storage and Handling of Cellulose Nitrate Film |
| 73 | Electrical Inspection Code for Existing Dwellings |
| 87 | Recommended Practice for Fluid Heaters (New) |
| 88A | Standard for Parking Structures |
| 160 | Standard for the Use of Flame Effects Before an Audience |
| 307 | Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves |
| 312 | Standard for Fire Protection of Vessels During Construction, Conversion, Repair, and Lay-Up |
The following documents received Certified Amending Motions but CAMS were not pursued by their submitters, therefore, they become consent documents. These documents have an issuance date of July 2, 2010 and effective date of July 22, 2010

276 *Standard Method of Fire Tests for Determining the Heat Release Rate of Roofing Assemblies with Combustible Above-Deck Roofing Components*

409 *Standard on Aircraft Hangars*

505 *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations*

**10-8-15** Act on the issuance of a proposed Tentative Interim Amendment (TIA) to 7.6.1, of the 2010 edition of NFPA 13, *Standard for the Installation of Sprinkler Systems*, (TIA No. 998). Comment closing date was July 23, 2010. See Supplemental Attachment 10-8-15

**10-8-15-a** Text of proposed TIA No. 998. See Attachment 10-8-15-a

**10-8-15-b** Ballot results of proposed TIA No. 998. **Passed** TC ballot on both emergency nature and technical merit. **Passed** TCC ballot on emergency nature and **Failed** on correlation issues. See Attachment 10-8-15-b See Supplemental Attachment 10-8-15-b

**10-8-15-c** Four comments have been received on proposed TIA No. 998. See Supplemental Attachment 10-8-15-c See Supplemental Attachment 10-8-15-c

**10-8-15-d** Presentation by S. Wolin, Code Consultants on fire test data for sprinkler systems with various antifreeze concentrations. This presentation will be related to the total of six Tentative Interim Amendments proposed to NFPA 13, NFPA 13D, and NFPA 13R. See Attachment 10-8-15-d

**10-8-16** Act on the issuance of a proposed Tentative Interim Amendment (TIA) to 7.6.1, of the 2010 edition of NFPA 13, *Standard for the Installation of Sprinkler Systems*, (TIA No. 1000). Comment closing date was July 23, 2010.

**10-8-16-a** Text of proposed TIA No. 1000. See Attachment 10-8-16-a

**10-8-16-b** Ballot results of proposed TIA No. 1000. **Passed** TC ballot on emergency nature and **Failed** TC on technical merit. **Passed** TCC ballot on emergency nature and **Failed** on correlation issues. See Attachment 10-8-16-b See Supplemental Attachment 10-8-16-b

**10-8-16-c** Three comments have been received on proposed TIA No. 1000. See
<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10-8-16-d</strong> Appeal</td>
<td>Appeal of D. Hague, Liberty Mutual, requesting that the Council issue the proposed TIA to NFPA 13 (TIA No. 1000) No Attachment</td>
</tr>
<tr>
<td><strong>10-8-17</strong></td>
<td>Act on the issuance of a proposed Tentative Interim Amendment (TIA) to 4.1.4, 8.3.3, and Table 8.3.3.2.3 of the 2010 edition of NFPA 13D, <em>Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes</em>, (TIA No. 996). Comment closing date was July 23, 2010.</td>
</tr>
<tr>
<td><strong>10-8-17-a</strong></td>
<td>Text of proposed TIA No. 996. See Attachment 10-8-17-a</td>
</tr>
<tr>
<td><strong>10-8-17-b</strong></td>
<td>Ballot results of proposed TIA No. 996. <strong>Passed</strong> TC ballot on emergency nature, <strong>Failed</strong> TC on technical merit. <strong>Passed</strong> TCC ballot on emergency nature and <strong>Failed</strong> on correlation issues. See Attachment 10-8-17-b See Supplemental Attachment 10-8-17-b</td>
</tr>
<tr>
<td><strong>10-8-17-c</strong></td>
<td>Five comments have been received on proposed TIA No. 996. See Supplemental Attachment 10-8-17-c</td>
</tr>
<tr>
<td><strong>10-8-17-d</strong> Appeal</td>
<td>Appeal of K. Isman, NFSA, requesting that the Council issue the proposed TIA to NFPA 13D (TIA No. 996) No Attachment</td>
</tr>
<tr>
<td><strong>10-8-18</strong></td>
<td>Act on the issuance of a proposed Tentative Interim Amendment (TIA) to 3.3.9.1, 4.1.4, 5.2.7, and 8.3.3 of the 2010 edition of NFPA 13D, <em>Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes</em>, (TIA No. 994). Comment closing date was July 23, 2010.</td>
</tr>
<tr>
<td><strong>10-8-18-a</strong></td>
<td>Text of proposed TIA No. 994. See Attachment 10-8-18-a</td>
</tr>
<tr>
<td><strong>10-8-18-b</strong></td>
<td>Ballot results of proposed TIA No. 994. <strong>Passed</strong> TC ballot on emergency nature and <strong>Failed</strong> technical merit. <strong>Passed</strong> TCC ballot on emergency nature and <strong>Failed</strong> on correlation issues. See Attachment 10-8-18-b See Supplemental Attachment 10-8-18-b</td>
</tr>
<tr>
<td><strong>10-8-18-c</strong></td>
<td>Five comments have been received on proposed TIA No. 994. See Attachment 10-8-18-c See Supplemental Attachment 10-8-18-c</td>
</tr>
<tr>
<td><strong>10-8-18-d</strong> Appeal</td>
<td>Appeal of M. Pilette, Mechanical Designs Ltd., requesting that the Council issue the proposed TIA to NFPA 13D (TIA No. 994). No Attachment</td>
</tr>
<tr>
<td><strong>10-8-19</strong></td>
<td>Act on the issuance of a proposed Tentative Interim Amendment (TIA) to 4.7 and 5.4.3 of the 2010 edition of NFPA 13R, <em>Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height</em>, (TIA No. 995). Comment closing date was July 23, 2010.</td>
</tr>
<tr>
<td><strong>10-8-19-a</strong></td>
<td>Text of proposed TIA No. 995. See Attachment 10-8-19-a</td>
</tr>
<tr>
<td><strong>10-8-19-b</strong></td>
<td>Ballot results of proposed TIA No. 995. <strong>Passed</strong> TC ballot on emergency nature, <strong>Failed</strong> technical merit. <strong>Passed</strong> TCC ballot on emergency nature and <strong>Failed</strong> on correlation issues. See Attachment 10-8-19-b See Supplemental Attachment 10-8-19-b</td>
</tr>
<tr>
<td><strong>10-8-19-c</strong></td>
<td>Three comments have been received on proposed TIA No. 995. See Supplemental Attachment 10-8-19-c</td>
</tr>
<tr>
<td><strong>10-8-19-d</strong> Appeal</td>
<td>Appeal of M. Pilette, Mechanical Designs Ltd., requesting that the Council issue the proposed TIA to NFPA 13R (TIA No. 995). No Attachment</td>
</tr>
</tbody>
</table>
| **10-8-20** | Act on the issuance of a proposed Tentative Interim Amendment (TIA) to 4.7 of
<table>
<thead>
<tr>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td><strong>10-8-20-a</strong></td>
<td>Text of proposed TIA No. 997. See Attachment 10-8-20-a</td>
</tr>
<tr>
<td><strong>10-8-20-b</strong></td>
<td>Ballot results of proposed TIA No. 997. <strong>Passed</strong> TC ballot on emergency nature, <strong>Failed</strong> technical merit. <strong>Passed</strong> TCC ballot on emergency nature and <strong>Failed</strong> on correlation issues. See Attachment 10-8-20-b See Supplemental Attachment 10-8-20-b</td>
</tr>
<tr>
<td><strong>10-8-20-c</strong></td>
<td>Five comments have been received on proposed TIA No. 997. See Supplemental Attachment 10-8-20-c</td>
</tr>
<tr>
<td><strong>10-8-20-d</strong></td>
<td>Appeal of K. Isman, NFSA, requesting that the Council issue the proposed TIA to NFPA 13R (TIA No. 997) No Attachment</td>
</tr>
<tr>
<td><strong>10-8-21</strong></td>
<td>Act on the issuance of a proposed Tentative Interim Amendment (TIA) to 3.3.x Alcohol Blended Motor Fuel, 6.2.3, and Table B.1 of the 2008 edition of NFPA 30A, <em>Code for Motor Fuel Dispensing Facilities and Repair Garages</em>, (TIA No. 985). Comment closing date was June 18, 2010.</td>
</tr>
<tr>
<td><strong>10-8-21-a</strong></td>
<td>Text of proposed TIA No. 985. See Attachment 10-8-21-a</td>
</tr>
<tr>
<td><strong>10-8-21-b</strong></td>
<td>Ballot results of proposed TIA No. 985. <strong>Failed</strong> TC ballot on both technical merit and emergency nature. See Attachment 10-8-21-b</td>
</tr>
<tr>
<td><strong>10-8-21-c</strong></td>
<td>Three comments were received on proposed TIA No. 985. See Attachment 10-8-21-c</td>
</tr>
<tr>
<td><strong>10-8-22</strong></td>
<td>Act on the issuance of a proposed Tentative Interim Amendment (TIA) to 8.3 of the 2009 edition of NFPA 54, <em>National Fuel Gas Code</em>, (TIA No. 984R). Comment closing date was July 16, 2010. See related Agenda Item 10-8-38</td>
</tr>
<tr>
<td><strong>10-8-22-a</strong></td>
<td>Text of proposed TIA No. 984R. See Attachment 10-8-22-a</td>
</tr>
<tr>
<td><strong>10-8-22-b</strong></td>
<td>Ballot results of proposed TIA No. 984R. <strong>Passed</strong> TC ballot on both technical merit and emergency nature. See Attachment 10-8-22-b See Supplemental Attachment 10-8-22-b</td>
</tr>
<tr>
<td><strong>10-8-22-c</strong></td>
<td>Five comments were received on proposed TIA No. 984R. See Attachment 10-8-22-c See Supplemental Attachment 10-8-22-c</td>
</tr>
<tr>
<td><strong>10-8-23</strong></td>
<td>Act on the issuance of a proposed Tentative Interim Amendment (TIA) to 5.2.1.11, 6.6.6, A.6.6.6 and 14.3.1.4 of the proposed 2011 edition of NFPA 58, <em>Liquefied Petroleum Gas Code</em>, (TIA No. 986). Comment closing date was May 14, 2010.</td>
</tr>
<tr>
<td><strong>10-8-23-a</strong></td>
<td>Text of proposed TIA No. 986. See Attachment 10-8-23-a</td>
</tr>
<tr>
<td><strong>10-8-23-b</strong></td>
<td>Ballot results of proposed TIA No. 986. <strong>Passed</strong> TC ballot on both technical merit and emergency nature. See Attachment 10-8-23-b</td>
</tr>
<tr>
<td><strong>10-8-23-c</strong></td>
<td>No comments were received on proposed TIA No. 986. No Attachment</td>
</tr>
<tr>
<td><strong>10-8-24</strong></td>
<td>Act on the issuance of a proposed Tentative Interim Amendment (TIA) to 90.2(B)(5)(b) of the 2008 edition of NFPA 70, <em>National Electrical Code</em>, (TIA No. 990). Comment closing date was June 18, 2010.</td>
</tr>
<tr>
<td><strong>10-8-24-a</strong></td>
<td>Text of proposed TIA No. 990. See Attachment 10-8-24-a</td>
</tr>
<tr>
<td><strong>10-8-24-b</strong></td>
<td>Ballot results of proposed TIA No. 990. <strong>Passed</strong> TCC ballot on correlation issues</td>
</tr>
</tbody>
</table>
and emergency nature. **Passed** Panel ballot on both technical merit and emergency nature. See Attachment 10-8-24-c

| 10-8-24-c | One comment was received on proposed TIA No. 990. See Attachment 10-8-24-c |
| 10-8-25-a | Text of proposed TIA No. 989. See Attachment 10-8-25-a |
| 10-8-25-b | Ballot results of proposed TIA No. 989. **Failed** TC ballot on both technical merit and emergency nature. **Failed** TCC ballot on both correlation issues and emergency nature. See Attachment 10-8-25-b |
| 10-8-25-c | One comment was received on proposed TIA No. 989. See Attachment 10-8-25-c |
| 10-8-26 | Act on the issuance of proposed Tentative Interim Amendment (TIA) to 7.4.10.2 of the proposed 2011 edition of NFPA 86, *Standard on Ovens and Furnaces*, (TIA No. 987). Comment closing date was May 14, 2010. |
| 10-8-26-a | Text of proposed TIA No. 987. See Attachment 10-8-26-a |
| 10-8-26-b | Ballot results of proposed TIA No. 987. **Passed** TC ballot on both technical merit and emergency nature. See Attachment 10-8-26-b |
| 10-8-26-c | No comments were received on proposed TIA No. 987. No Attachment |
| 10-8-27 | Act on the issuance of proposed Tentative Interim Amendment (TIA) to 14.5.1.7.4 and A.14.5.1.7.4 of the proposed 2011 edition of NFPA 86, *Standard on Ovens and Furnaces*, (TIA No. 988). Comment closing date was May 14, 2010. |
| 10-8-27-a | Text of proposed TIA No. 988. See Attachment 10-8-27-a |
| 10-8-27-b | Ballot results of proposed TIA No. 988. **Passed** Committee ballot on both technical merit and emergency nature. See Attachment 10-8-27-b |
| 10-8-27-c | No comments were received on proposed TIA No. 988. No Attachment |
| 10-8-28-a | Text of proposed TIA No. 982. See Attachment 10-8-28-a |
| 10-8-28-b | Ballot results of proposed TIA No. 982. **Passed** TC ballot on technical merit and **Failed** on emergency nature. See Attachment 10-8-28-b |
| 10-8-28-c | No comments were received on TIA No. 982. No Attachment |
| 10-8-28-d | Appeal of G. Pecht, Senior Flexonics, requesting that the Council issue the proposed TIA to NFPA 850 (TIA No. 982). See Attachment 10-8-28-d |
| 10-8-29 | Consider the request of the Technical Correlating Committee on Automatic Sprinkler Systems to revise the scopes for the Technical Committee on Sprinkler Systems Installation (AUT-SSI) and the Technical Committee on Sprinkler System Discharge (AUT-SSD) by transferring the responsibilities for Chapter 22 and Chapter 23. **AUT-SSD Current Scope:** This Committee shall have primary responsibility for those portions of NFPA 13 that pertain to the |
classification of various fire hazards and the determination of associated discharge criteria for sprinkler systems employing automatic and open sprinklers.

**AUT-SSD Proposed Scope:** This Committee shall have primary responsibility for those portions of NFPA 13 that pertain to the classification of various fire hazards and the determination of associated discharge criteria for sprinkler systems employing automatic and open sprinklers, sprinkler system plans and calculations, and water supplies.

**AUT-SSI Current Scope:** This Committee shall have the primary responsibility for those portions of NFPA 13 that pertain to the criteria for the use and installation of sprinkler systems components (with the exception of those components used for supporting of piping), position of sprinklers, types of systems, plans and calculations, water supplies, and acceptance testing.

**AUT-SSI Proposed Scope:** This Committee shall have the primary responsibility for those portions of NFPA 13 that pertain to the criteria for the use and installation of sprinkler systems components (with the exception of those components used for supporting of piping), position of sprinklers, types of systems, plans and calculations, water supplies, and acceptance testing.

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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</table>
| **10-8-30** | Consider the request of the Technical Committee (TC) on Fire Service Training to have NFPA establish a new document on fire service training on thermal imaging. At the March 2010 Standards Council Meeting the Council directed that the TC on Fire Service Training and the TC on Electronic Safety work together to come to a joint decision on how best to address the issue of fire service training on thermal imagers. The TC on Fire Service Training and the TC on Electronic Safety are reporting back to the Council with a decision that a Task Group composed of members from both TCs produce a draft document and then the Fire Service Training Committee will assume primary responsibility for the management of the document. They propose the scope of the document be as follows: 
**Proposed Committee Scope:** This standard shall contain minimum requirements for training fire service personnel in the selection, operation, care, use and maintenance of thermal imagers. |
| **10-8-31** | At the March, 2010 Standards Council Meeting, the Council considered the request of the International Association of Fire Chiefs to have establish a new project on organization and deployment of fire investigation operations, code enforcement operations and public education operations to the public by career |

See Attachment 10-8-29  See Supplemental Attachment 10-8-30
fire department. Action on this item was deferred from the August 2009, administratively withdrawn from the October 2009 Agenda, and deferred to the March 2010 meeting while additional information was being sought. The Council voted to publish a notice of receipt of the request soliciting opinions on the need for the document, information on resources available on the subject matter, those interested in participating if approved, and other organizations that may be actively involved with the subject matter. Sixty-one responses were received which consisted of support for the proposed project and volunteering to become members of the Committee when formed.

**Proposed Committee Title:** Fire Prevention Organization and Deployment

**Proposed Committee Scope:** This Committee shall have primary responsibility for documents on the organization, operation, deployment, and evaluation of code enforcement, public fire and life safety education, and fire investigation operations.

See Attachment 10-8-31 and related Agenda Item 10-8-47-b See Supplemental Attachment 10-8-31

| 10-8-32 | At its March 2010, meeting the Council considered the request of D. Forsman, Chief, Champaign Fire Department, Champaign, Illinois, that NFPA consider the establishment of a new proposed technical committee and document on professional qualifications for emergency responders working on roadways. This request was administratively withdrawn from the October 2009 Agenda and deferred to the March 2010 meeting while additional information was being sought. After review of all the information before them, the Council voted to publish a notice of receipt of the request soliciting opinions on the need for the document, information on resources available on the subject matter, those interested in participating if approved, and other organizations that may be actively involved with the subject matter. Forty-four responses were received which consisted of support for the proposed project and volunteering to become members of the Committee when formed.

If established the proposed document scope and title will be:

**Proposed Committee Title:** Traffic Control Incident Management Professional Qualifications

**Proposed Committee Scope:** This standard identifies the minimum job performance requirements (JPRs) necessary to perform temporary traffic control duties at emergency incidents on, or near an active roadway.

See Attachment 10-8-32 and Related Agenda Item 10-8-47-a

See Supplemental Attachment 10-8-32

| 10-8-33 | Consider the request of the Technical Committee (TC) on Special Operations Protective Clothing and Equipment for a new document on Contaminated Water Operations Protective Clothing and Equipment. At the March 2009 Standards Council Meeting the Council directed the TC to review its membership and make any membership recommendations necessary to assure that the TC has |
10-8-34  
At its March, 2010 meeting, the Council considered the request of the Technical Committee on Hazardous Materials Response Personnel, that NFPA consider the establishment of a new recommended practice on minimum requirements for the organization and management of hazardous materials/weapons of mass destruction (WMD) emergency response program. After review of all the information before them, the Council voted to publish a notice of receipt of the request soliciting opinions on the need for the document, information on resources available on the subject matter, those interested in participating if approved, and other organizations that may be actively involved with the subject matter. Five responses were received which consisted of support for the proposed project when formed. If established the proposed document scope will be:

**Proposed Document Scope:** This recommended practice establishes a common set of criteria for the organization, management, and deployment of personnel, resources, and programs for those public or private entities that are responsible for the hazardous materials/weapons of mass destruction emergency preparedness function.

See Attachment 10-8-34  See Supplemental Attachment 10-8-34

10-8-35  
At the March 2010 meeting, the Council considered the request of S. Pitts, Marine Corps Systems Command, that NFPA consider the establishment of a new proposed document on power air purifying respirator (PAPR). Action on this item was deferred from the August 2009 meeting. This request was administratively withdrawn from the October 2009 Agenda and deferred to the March 2010 meeting while clarifying information was being sought. After review of all the information before them, the Council voted to publish a notice of receipt of the request soliciting opinions on the need for the document, information on resources available on the subject matter, those interested in participating if approved, and other organizations that may be actively involved with the subject matter. Six responses were received which mostly consisted of support for the proposed project if formed. If established the proposed document could report to the Technical Committee on Respiratory Protection Equipment and the scope will be:

**Proposed Document Scope:** Specify minimum requirements for the design, performance, testing, NIOSH certification, and independent third-party certification for high air flow powered air purifying respirators (PAPRs) for emergency services operations at incidents involving chemical warfare agents, toxic industrial chemicals/toxic industrial materials, biological warfare agents, and radioactive particulates.

See Attachment 10-8-35  See Supplemental Attachment 10-8-35
| 10-8-36 | At the March 2010 meeting, the Council acted on a request from NFPA staff on the possibility of combining the four combustible dust committees and five documents they are responsible for into one committee and document. The Council voted to publish a notice regarding this combination and solicit comments from committee members and the public. The comment period has passed and the responses are included as well as a memo from the NFPA staff. See Attachment 10-8-36 See Supplemental Attachment 10-8-36 |
| 10-8-37 | Consider the request of the Chair of the NEC Technical Correlating Committee (TCC) and the Chair of the Electrical Safety in the Workplace that the Council consider the effective date of the 2010 edition of NFPA 70E not become effective until 180 days from the date of issuance by the Standards Council. See Attachment 10-8-37 |
| 10-8-38 | Consider the request from NFPA Staff to establish a new Committee and Document on Gas Process Safety. This Committee shall be responsible for defining safe practices associated with gas process safety that would include the various practices related to use of gaseous media to clean, purge, or charge gas piping. See Attachment 10-8-38 and related Agenda Item 10-8-22 |
| 10-8-40 | Consider the request of the Technical Committee on Fire Department Apparatus for a one time revision cycle change for NFPA 1906, *Standard for Wildland Fire Apparatus* to move from F2010 to F2011. This document will not reopen for new proposals. See Attachment 10-8-40 |
| 10-8-41 | Consider the request of the Technical Committee on Fire Service Occupational Safety and Health for a one time revision cycle change for the following documents: NFPA 1583, *Standard on Health-Related Fitness Programs for Fire Department Members*; and NFPA 1584, *Standard on Health-Related Fitness Programs for Fire Department Members* to move from A2014 to F2014. See Attachment 10-8-41 |
| 10-8-42 | Consider the request of the Technical Committee on Fire Service Training for a one time revision cycle change for NFPA 1451, *Standard for a Fire Service Vehicle Operations Training Program* from F2011 to F2012. See Attachment 10-8-42 |

| 10-8-44 | Consider the request of the Technical Committee Static Electricity for a one time revision cycle change for NFPA 77, *Recommended Practice on Static Electricity* to move from A2011 to F2012. See Attachment 10-8-44 |
| 10-8-45 | Consider the request of the Technical Committee on Structural and Proximity Fire Fighting Protective Clothing for a one time revision cycle change for NFPA 1851, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting* to move from A2012 to F2012. The Committee is also requesting that the proposal closing date be November 30, 2010. See Attachment 10-8-45 |
| 10-8-46 | Policy and Procedures Task Group (S. Clary, Chair). See Supplemental Attachment 10-8-46 |
| 10-8-47 | Report of the Membership Task Group (K. Bell, Chair). |
| 10-8-47-a | Committee Membership. See Attachment 10-8-47-a See Supplemental Attachment 10-8-47-a |
| 10-8-47-b | Start-up Roster and Scope of proposed Committee on Fire Prevention Organization and Deployment **Proposed Committee Scope:** This Committee shall have primary responsibility for documents on the organization, operation, deployment, and evaluation of code enforcement, public fire and life safety education, and fire investigation operations. See Attachment 10-8-47-b |
| 10-8-47-c | Start-up Roster of Committee on Fluid Heaters. See Attachment 10-8-47-c |
| 10-8-48 | Report on the Minutes of March 2010. No Attachment |
| 10-8-49 | Dates and places of upcoming meetings:  
August 2 (noon Task Group)  
Full Council August 3-5, 2010 Quincy, MA  
Full Council October 19-20, 2010 San Antonio, TX (Task Group 8AM on Oct 19)  
February 28 (noon Task Group)  
March 1-2 San Juan, PR |
| 10-8-50 | Consider the request of the Committee on Respiratory Protection Equipment for |
Item 10-8-1
ASSOCIATION AMENDMENT
BALLOT RESULTS

DATE: July 13, 2010

AMENDMENT

Document: NFPA 70®, National Electrical Code®

Motion: To Reject an Identifiable Part of Comment 1-101

NEC TCC FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment *HAS* achieved the necessary \( \frac{3}{4} \) majority vote needed to recommend approval of the Association Action by the Technical Correlating Committee.

The number of affirmative votes needed for the report to be published is 9.

\[
12 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 11 \times 0.75 = 8.25
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
12 \text{ eligible} \div 2 = 6 + 1 = 7 \text{ (this is the simple majority)}
\]

<table>
<thead>
<tr>
<th>12 Eligible to Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Not Returned (Drake)</td>
</tr>
<tr>
<td>11 Agree</td>
</tr>
<tr>
<td>0 Do Not Agree</td>
</tr>
<tr>
<td>0 Abstain</td>
</tr>
</tbody>
</table>

Final Action: PASS

CMP-1 FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment *HAS* achieved the necessary \( \frac{2}{3} \) majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the amendment to be issued is 8.

\[
12 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 11 \times 0.66 = 7.27
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
12 \text{ eligible} \div 2 = 6 + 1 = 7 \text{ (this is the simple majority)}
\]

<table>
<thead>
<tr>
<th>12 Eligible to Vote</th>
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</thead>
<tbody>
<tr>
<td>1 Not Returned (McCarver)</td>
</tr>
<tr>
<td>10 Agree</td>
</tr>
<tr>
<td>1 Does Not Agree</td>
</tr>
<tr>
<td>0 Abstentions</td>
</tr>
</tbody>
</table>

Final Action: PASS
NFPA 70
TC BALLOT for Code Making Panel 1
June 2010 ASSOCIATION AMENDMENT
(To Reject an Identifiable Part of Comment 1-101)

Amendment: Reject an Identifiable Part of Comment 1-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text. In this case, the result is the deletion of the identifiable part of 110.14(A), which is the text "and the number of strands" since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
X Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

For fine stranded wire, specially rated connectors are required. Presently, ANSI/UL 486A-486B Par. 10.12 states: "A connector, a unit container, or an information sheet packed in the unit container for a connector tested with conductors other than Class B, SiW, or Class C stranded (see 9.1.5.4) shall also be marked with the conductor class or classes and the number of strands." Based on this, the number of strands is presently specified as part of the listing for connectors rated for fine stranded wire. Whether or not Sec.110.14(A) addresses number of strands, it is addressed in the listing of the connectors, and Sec. 110.3(B) still would cover the general concept of use in accordance with the ratings. However, removal of the identified text about strands in Sec. 110.14(A) would reduce clarity in the Code about the necessary safety considerations.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:
Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: __________________________

Name - Please Print: Ken Boyce

Date: __6/11/2010________

June 2010
Amendment: Reject an Identifiable Part of Comment 1-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text. In this case, the result is the deletion of the identifiable part of 110.14(A), which is the text “and the number of strands” since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree X

☐ Do Not Agree*

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Comment on affirmative: We agree with the NFPA floor action to remove the stranding count, as the “class” (A, B or C) contains the necessary information.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature:

June 2010
NFPA 70
TC BALLOT for Code Making Panel 1
June 2010 ASSOCIATION AMENDMENT
(To Reject an Identifiable Part of Comment 1-101)

Amendment: Reject an Identifiable Part of Comment 1-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regulations"). Under the Regulations, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regulations 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text. In this case, the result is the deletion of the identifiable part of 110.14(A), which is the text “and the number of strands” since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regulations, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for consideration of the Council.

Agree

We agree with the deletion of the words “and the number of strands” but note that these words are in 110.14 per the Panel Action on Comment 1-101 rather than in 110.14(A) as noted by the submitter of the association amendment.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: ___________________________

Name: Palmer Hickman
Date: 6/14/10
Add a new Table 10 in Chapter 9 as follows:

<table>
<thead>
<tr>
<th>Conductor Stranding</th>
<th>Number of strands</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWG or kcmil</td>
<td>Copper A</td>
</tr>
<tr>
<td>24 – 30</td>
<td>0.20 – 0.05</td>
</tr>
<tr>
<td>22</td>
<td>0.32</td>
</tr>
<tr>
<td>20</td>
<td>0.32</td>
</tr>
<tr>
<td>18</td>
<td>0.82</td>
</tr>
<tr>
<td>16</td>
<td>1.3</td>
</tr>
<tr>
<td>14 – 2</td>
<td>2.1 – 33.6</td>
</tr>
<tr>
<td>1 – 4/0</td>
<td>42.4 – 107</td>
</tr>
<tr>
<td>250 – 500</td>
<td>127 – 253</td>
</tr>
<tr>
<td>600 – 1000</td>
<td>304 – 508</td>
</tr>
<tr>
<td>1250 – 1500</td>
<td>635 – 759</td>
</tr>
<tr>
<td>1750 – 2000</td>
<td>886 – 1016</td>
</tr>
</tbody>
</table>

* Number of strands vary.

*Aluminum 14 AWG (2.1 mm²) is not available.

Substantiation: The term “fine stranded conductor” has no meaning in the NEC or in the product standards. If the panel is intent on adding a rule for specification of terminals for other than the standard conductor stranding, it will be necessary to use the same terminology as the product standard. This comment would revise the added paragraph to specifically reference Class B and C stranding. The added paragraph is consistent with 10.12 of UL 486A-B which requires that connectors for other than Class B or C stranding be marked with the conductor class and the number of strands.

In order to define Class B and C stranding, it is necessary to add a table to the NEC that is consistent with the product standards. A new Table 10 to Chapter 9 is proposed. This table comes from UL 486A-B - Table 14. Without this table, Class B and C stranding will have no meaning unless you have a copy of the product standard.

Without providing the full details that can be applied in the field and by the AHJ, the requirement should not appear at all in the NEC.

Panel Meeting Action: Accept in Principle

The panel accepts the placement of the additional text to address fine stranded conductors.

The panel moves the text of the comment from 110.14(A) to the parent paragraph of 110.14 following the existing paragraph.

In addition, the existing FPN will follow the newly recommended text.

Table 10 will be placed in Chapter 9 as proposed by the submitter.

Panel Statement: The recommended text improves clarity and enhances usability.

The placement of this information in 110.14 is more appropriate as it pertains to electrical connections generally.

The panel notes that “Table 10 - Conductor Stranding” is the copyrighted property of UL, and permission for usage has been requested.
motions.

CHAIR BELL: Thank you, Mr. Carpenter. We will now proceed with the motions on NFPA 70 in the order of the motion sequence presented in the report. But before we do that, I did want to make a comment about getting key information on the record. I know that when you come to the microphone, you have a lot of things on your mind. But it's very important that we get your name, affiliation, and a statement of whether you're speaking for or against the motion on the floor.

So what I'd like to do here is provide a challenge to you. Let's see if we can have ten speakers come to the microphone consecutively and state your name, affiliation, and whether or not you're speaking for or against the motion on the floor. And if we do that, we'll probably set a record. Linda is going to keep track, and we're going to see if we can set a record here for the NEC.

Is there a motion on Sequence Number 70-1?

MR. MANCHE: My name is Alan Manche, and I'm the submitter of 70-1. I am associated with Square D Company and Schneider Electric.

CHAIR BELL: Do you have a motion?

MR. MANCHE: I do. I would like to move to
reject an identifiable part of Comment 1-101.

CHAIR BELL: Okay. The motion on the floor is to reject an identifiable part of Comment 1-101. Please proceed.

MR. MANCHE: The text that we're seeking to remove is the last five words of the information that was newly put into the document that is presented on the screen. The last five words are, "and the numbers of strands."

Now, the new text accurately seeks to provide some information with regards to termination compatibility with the stranding of conductors. So the information that's been put together here by the code panel is accurate and good.

These additional words, though, are redundant. So what we end up with is a class of stranding, and then we end up marking the number of strands. So there's really no need to have the class marking and the number of strands marked on the terminal.

So this simply seeks to simplify it to the class of strands. The table will remain in the annex or in Table 10 in Chapter 9. So the folks need to look at the stranding of the conductor and understand the compatibility with the class marking on the...
terminal that can be done. So I just seek your
support for this NITMAM.

CHAIR BELL: Thank you, Mr. Carpenter.

MR. CARPENTER: I would like to defer to

MR. MANCHE: Thank you, Chair. Neil
Labrach. I'm a principal member of Code-making
Panel 1. And I'm speaking on the record for Panel 1
to the issue in opposition to the motion on the
floor.

The motion incorrectly identifies Section
110.14A. The action taken by Code-making Panel 1
moved the recommended Comment 1-101 to the parent
paragraph of 110.14 following the existing paragraph.

Code Panel 1 received three proposals. They
were 1-148, 1-149, and 1-151 for the record. They
recommend text be placed in 110.14 to address the
termination of fine stranded conductors. Code Panel
1 recognized these rules are already enforceable
under 110.3B but concluded that specific text in
Article 110 would be useful to the code user.

With 12 members eligible to vote, the ballot
results for all three proposals were 11 affirmative
and one negative. The statement accompanying the
negative vote raised the issue of how would the code
user define "fine stranded." As a result of that
statement of negative vote, Code Panel 1 received
three comments -- 1-100, 1-101 and 1-102 -- proposing
various means of identifying "fine stranded."
Comment 1-100 recommended the substance of 1-148,
which identified these conductors as more finely
stranded than Class B and Class 3 conductors for
copper.

Comment 1-101, which is the subject of this
certified amended motion, recommended adding text to
110.14 and a table to Chapter 9. The proposed table
and text is consistent with 10.12 of UL 486 A-B. And
Code Panel 1 voted 11 affirmative and one negative to
accept in principle Comment 1-101.

Code Panel 1 placed the recommended text in
110.14 because it pertains to electrical connections
generally. The number of strands was not
specifically addressed during these proceedings but
later raised in the voting statement of the only
negative vote, which pointed out that ANSI class
designations include more than one stranding count.

Thank you very much.

CHAIR BELL: Thank you. Further discussion?

Microphone 5.

MR. MCKLOWSKI: Vince McKlowski, National
1 Electrical Manufacturers Association, speaking in
2 support of the motion. Mr. Chairman, NEMA does
3 support the motion. Thank you.
4
5 CHAIR BELL: Microphone 1.
6
7 MR. ODEE: My name is Mark Odee. I
8 apologize for my voice. I'm in the process of losing
9 it or getting it back. I'm not sure which. But I
10 work for Underwriters Laboratories, and I'm in
11 support of the motion.
12
13 UL 46A and 46B already require that the
14 class of stranding be marked on the connector. Plus,
15 a new Table 10 added to Chapter 9 of the NEC contains
16 this same information. Requiring the connector to be
17 marked with all the number of strands permissible
18 would be unrealistic since often this would amount to
19 many different markings such that the connector would
20 not be large enough for that marking.
21
22 The idea is that the information should be
23 available. And it is. And if I have a Class A or
24 Class B or Class C marking, I can go back to the
25 Chapter 9, Table 10, and it provides me with that
26 information. Marking it on the actual connector
27 would be unreasonable.
28
29 CHAIR BELL: Thank you. Microphone 7.
30
31 MR. MERCERE: Dave Mercere with Southware
speaking in favor of the motion. As a wire and cable manufacturer, we have a multiple number of strands that we use for specific classes. It would be a great effort for us to go through and add this to our wire and cable products and not add anything to the user. It would only confuse the user to see different strand counts for the same class.

CHAIR BELL: Thank you. Any additional comments, Mr. Carpenter?

MR. CARPENTER: No.

CHAIR BELL: Seeing no one else at the microphone, we'll move to the vote on the motion to reject an identifiable Part of Comment 1-101.

All those in favor of the motion, please raise your hand. All those opposed. Motion carries.

Is there a motion related to Motion Sequence Number 70-2?

MR. MANCHE: Alan Manche, Schneider Electric and Square D. I'm the submitter of 70-2.

CHAIR BELL: Do you have a motion?

MR. MANCHE: I'm going to return a portion of the report in the form of Proposal 1-183 and to related Comments 1-114 through 1-125.

CHAIR BELL: The motion on the floor is to return a portion of the report in the form of
Per NFPA Regulations Governing Committee Projects: 1.6

(1) Appellant: Paul A. Keleher, representing Paul Keleher Electrical Services, Berlin, MA
(2) Statement identifying the particular action to which the appeal relates:
   2011 ROP: proposal# 2-193
   2011 ROC: Comment# 2-108
   Assoc Tech Mtg: CAM 70-3

(3) Argument setting forth the grounds for the appeal:

Proposal 2-193, Comment #2-108 and CAM 70-3 all seek to propose a new paragraph (5) under 210.19(A) that would, if accepted, limit voltage-drop in 120V branch circuits to 5% or less at any outlet. Unlike previous proposals to mandate a 5% limit on voltage-drop, this proposal is substantiated by a significant quantity of field test data explicitly documenting that standard circuit breakers do not consistently protect certain branch circuits from overheating under short-circuit conditions. The data also demonstrates a correlation between these failures and excessive voltage-drop.

The failure of standard circuit breakers to provide consistent protection under all conditions to which a circuit breaker might be exposed when installed has been publicly acknowledged by a major circuit breaker manufacturer at the December 2009 ROC meetings. During a presentation to CMP-2 in which the manufacturer presented a slide which asked the following rhetorical question, “Can standard circuit breakers always protect against parallel arcing faults in home runs?”, the presenter answered his own question in 1 word: “No.”1 The circuit breaker manufacturer was referring to 120V outlets where excessive voltage drop inhibits the magnetic trip mechanism in the circuit breaker from operating to clear fault-level overcurrent instantaneously. Under such conditions, a thermal/magnetic circuit breaker responds to a short-circuit or ground-fault with its default response, an intentionally-delayed thermal mechanism that has been designed and is tested by UL-489 for low levels of overload current in the range of 1-2 times the rating of the circuit. The thermal trip mechanism in a thermal/magnetic circuit breaker is not designed to protect circuits from short-circuits or ground-faults; and UL-489 does not test its ability to do so. When excessive voltage-drop limits the available short-circuit or fault current at an outlet to a level that is below that which is necessary to trigger the magnetic trip in the circuit breaker protecting the circuit, the magnetic trip will not operate and the breaker’s intentionally-delayed, thermal mechanism is its only active response to a short-circuit or ground-fault at such high-impedance outlets. The test data substantiating 2-193 documents that at 20% of outlets with voltage-drop in excess of 5% in the test sample, I2T conductor heating exceeded maximum safe limits for #14AWG copper insulated wire as published in the only recognized standard for short-circuit withstand ratings of copper cables. In January 2009 at the 2011 ROP meeting of CMP-2 the submitter presented the data and proposal 2-193 to address the problem2.

The Code panel voted 12-0 to reject proposal 2-193 stating, “The panel reaffirms their position taken on similar proposals in previous Code cycles that voltage drop is a design consideration that must be dealt with by the installer/designer for each installation and can be specific to the involved equipment.” The panel was shown more than 1000 field short-circuit tests documenting that circuit breakers do not consistently prevent conductors from overheating under short-circuit conditions at 120V outlets with excessive voltage-drop. Ignoring evidence presented to the contrary, the rejection statement by CMP-2 has continued to refuse to recognize that the failure of a circuit breaker to adequately protect conductors from overheating is a safety issue.

At the same ROC meeting at which a major manufacturer of circuit breakers publicly admitted that standard circuit breakers cannot always protect from parallel faults, CMP-2 again rejected the public comment of the submitter (#2-108) 12-0 by stating, “The submitter has not provided data that shows that conductors are damaged in the circumstances claimed.” In the face of field test data to the contrary, such a statement by itself without substantiation or explanation is inadequate.

At the NFPA’s Annual Technical Meeting on June 10, 2010, CAM 70-3 moved an identifiable part of proposal 2-193. Speaking for CMP-2, the panel chair reiterated the panel’s original assertion that voltage-drop is a design consideration, implying that it is not a safety issue and a limit on voltage-drop should not be mandated. 43% of the

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1 CMP2_Schneider Electric_Home Run Presentation_slide 12.pdf
Association Technical Meeting voted to accept CAM 70-3 to limit voltage-drop to 5%. While CAM 70-3 did fail by a small margin, a significant minority voted to amend the NEC to limit voltage-drop to enable proper circuit breaker performance while with no evidence to support its position CMP-2 continues to maintain its position that excessive voltage-drop is not a safety issue. It continues to deny that excessive voltage drop is a safety problem despite field test data indicating that excessive voltage drop inhibits circuit breakers from operating as designed and further evidence that this failure results in conductors being overheated under short-circuit conditions.

The submitter maintains the position that when a proposal is submitted with evidence substantiating the existence of a problem, the TC must consider the proposal in light of the evidence presented to support it. Proposal 2-193 has shown evidence that a hidden but legitimate and critical safety issue exists and has existed for many years, while CMP-2 has failed to present any evidence to support its position that no such problem exists. The submitter appeals the rejection by CMP-2 on the basis that the position taken by CMP-2 ignores the substantiating evidence presented to it and this refusal to acknowledge the substantiating evidence constitutes a denial of due process.

(4) Statement of the precise relief requested:
The submitter seeks as relief acceptance of the CAM 70-3 text to be added to the NEC under section 210.19 Conductors- Minimum Ampacity and size, sub-section (A) Branch Circuits Not More Than 600 Volts, a new paragraph (5):

(5) Permissible Voltage-Drop. The circuit conductors of a 15 or 20-ampere/120-volt branch circuit shall be sized such that voltage-drop measured at the rated ampacity of the circuit shall be 5% or less at any outlet.

In view of the requested relief, the submitter offers a few reasons why passing this proposal makes “good code”:

1. The nature of the problem: It is important to understand what happens when a short-circuit or ground-fault occurs in a 120V branch circuit. First, several attempts to reset the circuit breaker may occur before the fault is found and fixed. Each time this happens, the damage repeats itself. Electrical decay from repeated exposure to overcurrent is progressive. So, each time the circuit exposed to prolonged fault current, the condition of the circuit may degrade further with each successive exposure. Standard procedure is to repair the damage at the point of the fault, and restore the circuit to service. Rarely if ever is the entire circuit checked for its safety following repair of a point fault. The concern raised by the data is not so much that a sluggish breaker response to a short-circuit or ground-fault will cause an immediate fire, but rather that damage to circuit components such as insulation or termination integrity can occur as a result of I2T heating during the fault, leaving the circuit vulnerable after power is restored following repair. The problem is that if the breaker’s designed instantaneous response to fault conditions does not operate, the safety of the entire circuit between the breaker and the point of the fault may be invisibly compromised during the fault. Because many 120V branch circuits contain duplex receptacle outlets whose terminations are often screw terminals connected in series, any short-circuit or ground-fault current affects all ungrounded conductor receptacle terminations and in the case of a short-circuit, all neutral terminations as well between the branch breaker and the point of the fault.

Worst of all, the damage goes unseen and no one is likely to know whether the circuit’s integrity has been compromised during the fault or not. No one knows if there has been some level of insulation damage, or if the screw terminals have been loosened by a short-circuit or ground-fault during a high-impedance fault with a thermal breaker response. Months or perhaps years later if a significant load is connected to this circuit, a terminal loosened by an earlier short-circuit glows, or 1/2-dried out insulation is subjected to prolonged heating, and a fire happens, perhaps years later. Because of the time that may have elapsed between a fire and its original cause, one could possibly link the cause of the fire to a short-circuit or ground-fault event that may have happened years before and was quickly repaired.

Substantiation data Summary (the problem in a nutshell):3

- ~60% of 120V outlets exhibit voltage drop of more than 5%

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3 RESIDENTIAL CIRCUIT BREAKER RESPONSE DATA.pdf (substantiating doc for ROP 2-193)
• In ~60% of the tests a short-circuit produced a thermal circuit breaker response. (Correlation exists between voltage-drop > 5% and thermal breaker responses.)
• In 10% of the tests, I2T exceeded ICEA P32-382 acceptable limits for short-circuit withstand ratings
• 23 tests in the sample of 1017 tests (2.3%), I2T heating reached 85% of the temperature at which a #14 AWG conductor will become loose under its termination as a result of the heat generated by a short-circuit test.4
• In all tests (43%) in which the circuit breaker’s magnetic response operated, I2T conductor heating was limited to less than ½ of the maximum safe limit as established in ICEA P32-382.

2. Acceptance of CAM 70-3 in conjunction with passage of a proposal pending before UL/STP 489 to standardize magnetic pick-up settings in molded-case circuit breakers will ensure instantaneous breaker protection from faults and eliminate all of the problems and questions raised by the data substantiating proposal 2-193 and its documentation.

3. Acceptance of CAM 70-3 will resolve the longstanding inability of circuit breakers to respond instantaneously as they are designed under high-impedance fault conditions and complement AFCI protection

4. Acceptance of CAM 70-3 will reduce the potential exposure of people to energized metal parts of electrical equipment during a ground-fault to 1-cycle or less.

5. Acceptance of CAM 70-3 will reduce energy lost through wiring infrastructure losses by 50% or more. Although not a safety issue, with increasing pressure on all industries to conserve energy wherever possible, and with expansion of electrical use in transportation coming in a few years, the electrical industry and the NFPA will benefit from the positive PR that could be generated if this requirement is accepted.

4 Soares Grounding and Bonding- pp. 203-207.pdf (substantiating doc for ROP 2-193)
**TECHNICAL REBUTTAL ARGUMENTS:**

1. **Re standard used for determination: ICEA P32-382 has precedent in the NEC and other industry references:**
   1. ICEA P32-382 is the standard used in the substantiating data to proposal 2-193 as the reference standard against which the maximum safe limit of I^2T heating is measured. No reference to the ICEA standard will appear in the proposed new NEC text.
   2. ICEA P32-382 is already referenced in the following locations in the NEC:
      1. 240.92(B) requires the withstand formula in ICEA P32-382 be used when calculating short-circuit withstand capabilities of tap conductors under supervised industrial installations.
      2. Section 240.4 of the 2011 NEC will contain a Fine Print Note referencing ICEA P32-382.
      3. On protection of conductors: From the 2008 NEC Handbook following 110.7 Wiring Integrity: "Insulation integrity must be maintained during overcurrent conditions. Overcurrent protective devices must be selected and coordinated using tables of insulation thermal withstand ability to ensure the damage point of an insulated conductor is never reached. These tables entitled ‘allowable short-circuit currents for copper or aluminum conductors’ are contained in the Insulated Cable Engineers Association publication ICEA P32-382. See 110.10 for additional information.” Paragraph 110.10 requires circuits to be designed so that an OCPD can clear a fault without damaging the circuit.
   3. ICEA P32-382 is the reference used by Eustice Soares in his widely cited Book on Grounding and Bonding to establish limits on what he calls the “validity ratings” of equipment-grounding terminations. These are limits Mr. Soares has established using ICEA P32-382 on how much heat an equipment-grounding termination can withstand without annealing or loosening under the terminal during a short-circuit. In the sample of 1000 short-circuit tests presented, I^2T heating in one test reached this limit. Any circuit that heats to 90,000 amps-squared-seconds is likely to have loosened connections throughout the circuit following repair of the fault.
   4. ICEA P32-382 is a conservative standard, as standards must be. The same critic argues in ROC 2-107 that the assumption in the ICEA standard of the initial temperature for conductor heating during a short-circuit is its maximum operating temperature is too stringent because in a residential environment conductors operate at less than their maximum operating temperature. Such a standard might not adequately protect the air conditioning circuit running through the attic of the home in a Phoenix or Las Vegas in summer or the fully loaded commercial lighting circuit might overheat under fault conditions because they have high initial temperatures. The list of common circuit applications whose normal operating temperature is elevated, either due to heavy loading or high ambient temperature or some combination of both, is a long one. The NEC must adequately protect conductors under worst-case operating conditions, not just under “best-case” conditions as this argument suggests. This standard is conservative, as all standards for protection should be, calculated to protect wire under even severe operating conditions, not just under ideal conditions.

6. **I^2T heating and insulation damage:** CAM 70-14 at the 2010 NFPA ATM was a motion by Ed Larssen of Schneider Electric (Square D) to overturn CMP-10’s decision to add a FPN reference to ICEA P32-382. In that discussion Mr. Larssen defended his motion-saying, “I will alert the membership to the fact that dating back to 1980, Dr. Mittendorf from the University of Cincinnati conducted tests to determine what the actual short-circuit withstand capability of conductors is. And those tests revealed that conductors can withstand anywhere from four to six times the amount of energy that the ICEA formula would lead one to believe.” The submitter and his electrical engineer, Robert K. Waite, who happens to be a life-long member of IEEE, are familiar with the study by Dr. Mittendorf published in 1985 by IEEE to which Mr. Larssen refers. Figures 1 and 2 of Dr. Mittendorf’s study plot the dielectric breakdown of THWN insulation on a #14AWG conductor when subjected to currents ranging from ~940A~1265A for durations of 100 to 250 milliseconds. Depending on whether the starting current was 20A or 30A, the conductor insulation was degraded to ~1/2 of its original strength at 160,000 – 180,000 Amps-Squared-Seconds. (ie, rendered unusable.) “The value of 12t which reduces the breakdown strength to half the value of untested wire is defined as the critical value and used to...
describe the results.” In Dr. Middendorf’s words.5 Mr. Larssen failed to point out that the plots of dielectric breakdown in Figures 1 and 2 of this study confirm that, for #14AWG THWN wire, degradation of dielectric strength begins as soon as I2T rises above 50,000 A2S and worsens steadily up to the failure point. In simpler terms, dielectric breakdown occurs in #14AWG wire without visible damage long before the conductor is destroyed at the value incorrectly alluded to by Mr. Larssen as its “maximum withstand value”. It is worth noting that 50,000 I2T is also the maximum safe permissible I2T value for #14AWG copper in ICEA P32-382, thus corroborating the validity of this particular point in the ICEA standard. In our opinion, Mr. Larssen’s characterization of this study is inaccurate, and it makes me wonder where he finds his information when he says, also in ROC 2-107, “But actual laboratory testing on #14 copper wire at room temperature confirms that it can withstand as much as 250,000 I2t without insulation damage.” He has not shown us the “actual laboratory testing” he refers to. Whatever it may be, it does not conform to our understanding of the Middendorf study.

7. I2T heating loosens screw terminals.6 Another problem that arises from I2T heating that is of greater concern than insulation degradation is loosening of bolted terminations, in this case the side-wire screw terminals of duplex receptacles. This problem is of greater concern because it occurs at a lower value of I2T. According to Figure 11-14, column 7 (calculated from the Electrical Engineer’s Handbook) of the Soares Book on Grounding and Bonding, a #14 wire under a screw-terminal will loosen if I2T reaches 100,000 A2S. 2.5% or 23/1017 of the tests in the sample exhibited I2T heating of 85,000 or more, approaching this level. When this happens, receptacle screw-terminals can be loosened, causing the problems described above un “The Nature of the Problem”. A dangerous latent condition.

8. Lack of evidence: Several representatives of major circuit breaker manufacturers have asserted that their companies regularly test circuit breakers “to the Standard”. The Standard they are referring to is UL 489. However, UL 489 does not test the ability of a standard circuit breaker to respond to a short-circuit or a ground-fault in its thermal mode, which is precisely the condition proposal 2-193 is addressing and why the NEC needs to accept this proposal. Circuit breaker manufacturers test to UL 489, and UL 489 does not test the performance of standard circuit breakers in the range of overcurrents found at 120V outlets with excessive voltage-drop. It is possible, therefore, that the circuit breaker manufacturers and UL may have not documented tests on the performance of standard circuit breakers when responding to fault current in thermal mode, as is the case at ~ 60% of all 120V outlets.

9. Contradictions: With no evidence to support his statement a circuit breaker manufacturer claimed in ROC 2-107 that “circuit breakers protect circuits very well.”7 Yet, the same person admitted in a presentation at the December 2009 ROC meeting that standard circuit breakers cannot protect from all parallel faults8…Which of these two statements do you believe?

10. AFCI: The opponents of this proposal are mainly the circuit breaker manufacturers, some of whom have commented that the AFCI will address most of the submitter’s concerns. Since an AFCI responds only to arcing conditions and the problem proposal seeks to address is cause by excessive conductor heating, it is unlikely that AFCI protection will mitigate the problem in any significant way. Arguments that “the AFCI addresses most of the concerns of the submitter” are false. It is well known that heating effects of fault current can damage circuits; an arc is not necessary for conductor and circuit damage to occur during a short-circuit or ground-fault. An AFCI will do nothing to prevent these conditions.

11. Enforcement: Some from the inspection community have questioned the enforceability of this requirement. All that is needed is for enforcement is a standard voltage-drop tester at a final inspection when circuits to be inspected are energized. Because lighting and power circuits are in proximity to one another is most occupancies, an inspector would need only proceed to the 120-volt duplex receptacle outlet that is furthest from the panel serving it. Set the voltage-drop tester to the rating of the circuit to be tested and make a voltage-drop measurement. Voltage drop of > 5% measured at any 120V outlet constitutes grounds for failure.

12. Compliance: An electrician needs to make a voltage-drop measurement at the panelboard or load center where the branch circuits needing to comply will originate. Using readily available voltage-drop calculators, or simply by measuring distance and knowing loss/foot of cable run, the total voltage-drop to the furthest outlet of a branch circuit can be calculated and added to the initial voltage drop measurement taken at the panelboard or loadcenter.

13. Other NEC Requirements:

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7 ROC 2-107
8 CMP2_SchneiderElectric_Home Run Presentation_slide12.pdf
The language in Section 250.4(A)(5) and related sections has been interpreted by the Chairman of CMP-5 to require overcurrent protection devices to operate "as quickly as possible" in response to a fault to the equipment-grounding conductor. For a thermal/magnetic circuit breaker "as quickly as possible" means without intentional delay, which means instantaneously, or magnetically.

The NEC already contains maximum permissible voltage-drop requirements in 647.4(D) and 695.7.

Recognizing its intention is to prohibit the use of motor overload relays as overcurrent protection for circuit conductors, the fact that the prohibitions in 240.9 are included in Article 240 covering general overcurrent protection requirements and not in article 430 covering motor circuits speaks to its inclusive intention. The mandatory language of NEC 240.9 regarding the use of thermal devices is clear and unequivocal: "...devices not designed to open short-circuits or ground-faults shall not be used for the protection of conductors against overcurrent due to short-circuits or ground-faults." Although circuit breakers are listed for use as overcurrent protection devices, the thermal response mechanism in standard circuit breakers is clearly described in manufacturer literature as intended to protect from low-level overloads on an inverse-time delay basis, not from fault conditions.
Conclusion

- The Code must take into account worst case conditions if they are likely to occur
  - Not averages and most favorable conditions

- Can standard circuit breakers always protect against parallel arcing faults in home runs?
  - No, therefore, 2-99 should be rejected
Voltage Drop as a Design Issue...

There is no limit in the NEC as to how far a 15 or 20A/120V branch circuit can be run from a service to supply an outlet. This would be merely a design issue, except that at a certain point, the circuit breaker may not function as required if a ground-fault or short-circuit occurs.
Thermal/magnetic circuit breakers...

- **Thermal**: Inverse time response
  - Always engaged
  - Time shortens as overcurrent increases
  - Intended as protection against low-level overcurrents

- **Magnetic**: Instantaneous response
  - Engages when a preset overcurrent is reached
  - When engaged, magnetic response clears circuit in 1-cycle or less

"Magnetic Tripping Characteristics:

The lower right portion of each trip curve displays the magnetic tripping response of the circuit breaker. This takes place when overcurrents of sufficient magnitude operate an internal magnetic armature which unlatches the mechanism. Magnetic tripping occurs with no intentional time delay."

-Schneider/Square D- Characteristic Trip Curve #730-2: QO 15A/1-pole
The Problem...

- Short-circuit field test data reveals that the magnetic response in the circuit breaker protecting the majority of installed 15A/120V receptacle outlets is not triggered by a short-circuit or ground-fault, leaving those outlets with **thermal overload protection only, in violation of NEC 250.4(A)(5) and other NEC requirements.**

- Among those outlets in which a thermal mechanism is the breaker’s only available response to a short-circuit or ground-fault, **nearly 1 in 5 circuits incur insulation damage** when a short-circuit or ground-fault occurs, creating an unsafe wiring condition in those circuits.

  *ICEA, P32-382, Short-Circuit Ratings for Insulated Cables*
### Substantiation: Test Data

<table>
<thead>
<tr>
<th>CIRCUIT BREAKER RESPONSE SUMMARY DATA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAGNETIC RESPONSES</strong> (&lt;=1 cycle):</td>
<td>43%</td>
</tr>
<tr>
<td><strong>HIGHEST I2T VALUE OF ANY MAGNETIC RESPONSE IN SAMPLE:</strong> (amps-squared-seconds)</td>
<td>20,358</td>
</tr>
<tr>
<td><strong>THERMAL RESPONSES</strong> (&gt; 1 cycle):</td>
<td>57%</td>
</tr>
<tr>
<td><strong>POTENTIAL INSULATION DAMAGE:</strong></td>
<td>18%</td>
</tr>
<tr>
<td># THERMAL RESPONSES &gt; ICEA limit (47,000 amps-squared-seconds = ICEA limit on I2T heating for #14 cable*)</td>
<td></td>
</tr>
<tr>
<td><strong>INSULATION DAMAGE:</strong></td>
<td>88,804</td>
</tr>
<tr>
<td>Highest recorded I^2T conductor heating value</td>
<td></td>
</tr>
</tbody>
</table>

Substantiation: Fire Data...

“One-half of 2002-2005 non-confined home structure fires involving wiring involved an unspecified short-circuit arc or unclassified electrical failure… These 2 leading factors lack details on the nature of the failure.”

“One-third of 2002-2005 non-confined home structure fires involving wiring began with ignition of wire or cable insulation.”

HOME STRUCTURE FIRES INVOLVING ELECTRICAL DISTRIBUTION OR LIGHTING EQUIPMENT
National Fire Protection Association
March 2008
250.4(A)(5) requires instantaneous breaker response to ground-faults...

“Electrical equipment and other electrically conductive material likely to become energized shall be installed in a manner that creates a permanent, low-impedance circuit facilitating the operation of the overcurrent device [underlining added] or ground detector for high-impedance grounded systems. It shall be capable of safely carrying the maximum ground-fault current likely to be imposed on it from any point on the wiring system where a ground-fault may occur to the electrical supply source. The earth shall not be considered as an effective ground-fault current path.”

By the use of the phrase, “...facilitating the operation of the overcurrent device...”, CMP-5 intends that a thermal/magnetic circuit breaker must respond magnetically to a fault to the equipment-grounding conductor of the circuit.

-CMP-5 re intent of 250.4(A)(5)
There is a Simple Solution ...

Limiting voltage-drop will assure that sufficient fault current is available to trigger instantaneous breaker response to fault current.
### Voltage Drop & Available Short-Circuit Current

#### 15A/120V

<table>
<thead>
<tr>
<th>OUTLET DISTANCE</th>
<th>114V</th>
<th>120V</th>
<th>126V</th>
</tr>
</thead>
<tbody>
<tr>
<td>15A VD</td>
<td>50</td>
<td>52</td>
<td>55</td>
</tr>
<tr>
<td>ASCII</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>MULTIPLE</td>
<td>298</td>
<td>301</td>
<td>299</td>
</tr>
<tr>
<td>$I^2T$ (max safe = 47,000)</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>1,480</td>
<td>1,508</td>
<td>1,491</td>
</tr>
</tbody>
</table>

#### 20A/120V

<table>
<thead>
<tr>
<th>OUTLET DISTANCE</th>
<th>114V</th>
<th>120V</th>
<th>126V</th>
</tr>
</thead>
<tbody>
<tr>
<td>15A VD</td>
<td>59</td>
<td>62</td>
<td>65</td>
</tr>
<tr>
<td>ASCII</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>MULTIPLE</td>
<td>400</td>
<td>401</td>
<td>401</td>
</tr>
<tr>
<td>$I^2T$ (max safe = 120,000)</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>2,677</td>
<td>2,684</td>
<td>2,691</td>
</tr>
</tbody>
</table>
Compliance...

- Plug-in voltage drop testers are available to establish VD @ panelboard.
- Pocket calculators, charts & on-line calculators are all readily available to calculate branch circuit VD, based on inputted wire size and length.
Relative Cost...

- Approximate material costs for a 50’- 100A aluminum feeder and subpanel, 6-20A, 6- 15A/120V and 1-50A/240V range ckt 25’ each for kitchen and vicinity = $145

- Approximate material costs for 6- 20A, 6- 15A/120V and 1 50A/240V range circuit all individual copper branch circuits 75’ long for kitchen and vicinity = $245

NET MATERIALS SAVINGS W/ SUBPANEL $100.
Enforcement

- At final inspection of an installation, plug a voltage-drop tester into the furthest outlet from the service.
- Set the test load to the rating of the branch circuit being tested (15 or 20A).
- A reading of 5% or less at the furthest outlet from a load center or panelboard is acceptable. All other outlets powered by that same panelboard will exhibit $VD \leq$ the furthest outlet.
The proposal has technically substantiated a problem that supports the need for this revision. CMP-2 based their action to this proposal using history and did not address the supporting evidence that this issue is a safety concern for property and persons. The NEC does not limit voltage drop at 120-volt outlets, and the product standard for standard circuit breakers does not require an instantaneous breaker response to a ground-fault or short-circuit current. Consequently, as recently collected short-circuit field test data indicates, if excessive voltage-drop limits the current available to a short-circuit or ground-fault occurring on a 15 or 20A/120V branch circuit to a level that is less than that required to trigger the branch circuit breaker’s magnetic (instantaneous) response, a thermal/magnetic circuit breaker protecting a 120V outlet will respond to a short-circuit or ground-fault with its intentionally delayed, thermal response. This response mechanism has been designed and is tested by the standard to respond effectively to low-level voltage-drop measurement of 5% or less on a 120V branch circuit allows the system to deliver at least 20 times the rated current of the circuit to a short-circuit or bolted fault, ensuring that the circuit breaker’s instantaneous mechanism will respond in compliance with other requirements of this Code.

The circuit conductors of a 15 or 20-ampere/120-volt branch circuit shall be sized such that voltage-drop measured at the rated ampacity of the circuit shall be 5 percent or less at any outlet.

A sample of >1000 field short-circuit tests has been assembled from residential users of a field test instrument that conducts a short-circuit test at a 120V receptacle outlet, measuring and recording the short-circuit current and the response time of the circuit breaker in each test. The test results indicate that in a majority of 120 receptacle outlets tested, a short-circuit test produced a delayed, thermal response from the thermal/magnetic circuit breaker protecting the outlet-under-test. Conductor heating has been calculated from these results by applying the calculation I²T to the data in each of the 1017 tests. The results of those calculations indicate that in 10 percent of the tests the circuit conductors were overheated when compared against short-circuit withstand ratings for insulated copper cables as established by the ICEA. The data further reveals that in all tests in which the breaker responded magnetically, conductor heating was safely limited to levels far below the I²T conductor heating allowed by the same standard.

The substantiation to proposal 2-193 explains how limiting voltage drop to 5 percent or less will ensure that sufficient current is available to produce a magnetic breaker response to a short-circuit or ground-fault at all 120V outlets, thereby addressing the questions raised by the data regarding the ability of thermal/magnetic circuit breakers to consistently protect conductors from overheating when exposed to a short-circuit or ground-fault.

The panel’s rejection statement ignores both the submitter’s technically substantiated argument that excessive voltage-drop is in fact a safety issue when it compromises overcurrent protection, and the supporting test data providing technical substantiation that the problem is real. Therefore, the submitter maintains that the panel’s rejection statement lacks sufficient basis to reject this proposal given the technical substantiation clearly demonstrates a safety concern for property. Proposals in the past about this issue did not provide the technical evidence that clearly supports the need for including the requirement in the NEC.

This proposal should be accepted with the exceptions deleted, and as revised above. The exceptions are not applicable to the intent of the requirement. One minor correction has been inserted in the FPN. If however, after
acknowledging the truth of the argument and the data that documents a real but latent problem, questions remain, the submitter suggests a compromise in the form of Acceptance in Principle and in Part. Such a resolution would mean that the panel understands the submitter’s intent, but believes more study is needed, and in Part means that the proposal should include the deletions and insertions as shown in the revision accompanying this comment.

**Panel Rejection statement:**

“The panel reaffirms their position taken on similar proposals in previous Code cycles that voltage drop is a design consideration that must be dealt with by the installer/designer for each installation and can be specific to the involved equipment.”

Note: Supporting material is available for review at NFPA Headquarters.

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1UL-489, Section 7, Standard Circuit Breakers  
2Residential Circuit Breaker- sorted by Short-Circuit Current  
3ibid  
4ibid, International Cable Engineers Association standard P32-382, Rev 2007: “Short-circuit Withstand Ratings for Insulated Copper Cables”.

**Panel Meeting Action:** Reject  
**Panel Statement:** The submitter has not provided data that shows that conductors are damaged in the circumstances claimed.  
**Number Eligible to Vote:** 12  
**Ballot Results:** Affirmative: 12
NFPA 70

2-193 Log #2957 NEC-P02
(210.19(A) (New))

Final Action: Reject

Page 21 of 34

Revised Page Number 33 of 813

Submitter: Paul A. Keleher, Paul Keleher Electrical Services

Recommendation: Revise text to read as follows:

210.19 Conductors - Minimum Ampacity and size
(A) Branch Circuits Not More Than 600 Volts.

(5) Permissible Voltage-Drop. The circuit conductors of a 15 or 20-ampere/120-volt branch circuit shall be sized such that voltage-drop measured at the rated ampacity of the circuit shall be 5% or less at any outlet.

Exception No. 1: Use of non-standardized circuit breakers in compliance with 240.4 shall be permitted on circuits supplying dedicated loads with high inrush or motor starting current where a circuit breaker meeting the requirements of this section can be shown to nuisance trip.

Exception No. 2: Where 240.3 or 240.4(G) applies.

FPN: Standard 120/240V circuit breakers rated from 15-50A that are listed to meet the overcurrent protection requirements of 240.4 contain a nonadjustable, instantaneous trip mechanism whose current setting will open the circuit within 1 cycle of being subjected to an overcurrent equal to or greater than 20 times their rated current. A full-load voltage drop measurement of 5% on a 120V branch circuit allows the system to deliver at least 20 times the rated current of the circuit to a short-circuit or bolted fault, ensuring that the circuit breaker’s instantaneous mechanism will respond in compliance with other requirements of this Code.

Substantiation: CMP-2 rejected a proposal in the last cycle to make 210.19(A), FPN 4 mandatory with the statement, “it is not clear from the substantiation that making the fine print note mandatory will reduce electrical fires”. The present proposal is substantiated by a sample of >1000 in-situ short-circuit tests conducted at 15-20A/120V receptacle outlets selected at random in dwelling units across the US. This data substantiates the claim of the previous submitter and this proposal that limiting voltage drop at outlets is necessary to provide effective protection against branch circuit fault current. Analysis of the test data shows that:

1. At more than ½ of the outlets in the sample, the breaker failed to trip instantaneously.
2. In nearly 20% of those tests where the instantaneous trip failed, the value of I^2T conductor heating recorded by the test exceeded the maximum safe limit according to accepted industry standards for conductor heating in insulated cables, potentially compromising the insulation when power to the circuit is restored.
3. In ALL tests where the breaker did respond instantaneously, conductor heating was limited to levels far below the safe threshold, safely preventing conductor overheating during fault conditions.

Furthermore, this failure in circuit breaker performance violates the requirements of section 250.4(A)(5) and other sections of the NEC. In 2005 CMP- 5 added several new sections and notes to the NEC, all reinforcing the intent of the CMP regarding the purpose of the equipment-grounding conductor in a circuit. 250.4(A)(5) is an extraordinary requirement in that explanatory language usually reserved to a non-mandatory Fine Print Note is here made MANDATORY TEXT. The intent of these requirements and the extraordinary emphasis it has placed on them is to make clear to installers of electrical circuits that an equipment-grounding conductor must be a "...permanent, low impedance circuit facilitating the operation of the overcurrent device...". The Panel has indicated its intent in 250.4(A)(5) is for an OCPD to operate "as quickly as possible," for which a thermal/magnetic circuit breaker means it must respond magnetically. The published time/current curves of the 5 dominant lines of 120/240V, 15-50A standard circuit breakers used to meet the requirements of 240.4 all show the magnetic response mechanism in a circuit breaker, when engaged, will clear the circuit in 1-cycle (.167 seconds). Therefore, the intent of NEC Section 250.4(A)(5) is to assure that a fault to the equipment-grounding conductor will trigger the magnetic response of a thermal/magnetic circuit breaker. The data indicates that the intent of 250.4(A)(5) is not met at more than half of 15 and 20A/120V outlets.

NEC Section 240.9 (Thermal Devices) prohibits the use of thermal devices as protection from short circuits or ground faults. Although intended to clarify the proper use of thermal overload relays in motor applications, 240.9 says in part, “thermal relays and other devices not designed to open short circuits or ground faults shall not be used for the protection of conductors against overcurrent due to short circuits or ground faults.” So, when the magnetic (instantaneous) trip mechanism in a thermal/magnetic circuit breaker fails to engage in response to a short circuit or ground fault at an outlet, leaving the thermal device as the sole response mechanism, this thermal device is being used as de facto protection of conductors against a short circuit or ground fault, in violation of 240.9.

Referring to the chart accompanying this proposal, the system supplying any outlet on a 120V branch circuit that exhibits a voltage-drop of 5% or less when measured at the full rated load of the circuit as stipulated in the proposal, will deliver sufficient current to a short circuit or ground fault to trigger a magnetic (instantaneous) circuit breaker response, provided that response is set to trigger at 20X its current-rating or less, as products installed to meet the requirements of
Section 240.4 presently do. A proposal presently under evaluation by UL/STP-489 will, if accepted, assure that the
circuit breaker performance described in the proposed Fine Print Note is assured in the future for all OCPD devices
installed to meet the overcurrent protection requirements of 240.4.

The result of this coordination is that all 15 and 20A/120V outlets are assured of an instantaneous breaker response to
fault current, putting to rest the questions raised by the test data and assuring compliance with 250.4(A)(5) and 240.9 for
15-20A/120V outlets.

The data supporting this proposal shows how the failure of circuit breakers to respond instantaneously to fault-level
overcurrent creates a safety issue based on accepted engineering standards that the NEC should address. Accordingly,
the submitter urges the NEC to accept this proposal and put the safety questions raised by the test data to rest.

Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: The panel reaffirms their position taken on similar proposals in previous Code cycles that voltage
drop is a design consideration that must be dealt with by the installer/designer for each installation and can be specific
to the involved equipment.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
1 CHAIR BELL: Thank you. Microphone 6.
2 MR. HICKMAN: Thank you. Palmer Hickman
3 with the IBEW Panel 1 speaking against the motion.
4 We did consider Mr. Manche's concerns at Panel 1 and
5 rejected them. Please support the 11-to-1 vote of
6 Panels 10 and 1. Thanks very much.
7 CHAIR BELL: Microphone 9.
8 MR. WEBER: Thank you, Mr. Chairman. Ray
9 Weber from the great state of Wisconsin representing
10 myself. I call for the question.
11 CHAIR BELL: The question is being called.
12 Is there a second? All those in favor of calling to
13 question, please raise your hand. All those opposed.
14 Thank you. We'll move directly to the vote.
15 The vote is on the motion to return a
16 portion of the report in the form of Proposal 1-183
17 and related Comments 1-114 through 1-125. All those
18 in favor of the motion, please raise your hand.
19 Thank you. All those opposed. Motion fails.
20 Move on to Motion Sequence 70-3. Is there a
21 motion on the floor related to Motion Sequence Number
22 70-3? Microphone 1.
23 MR. KELEHER: I'm Paul Keleher representing
24 Paul Keleher Electrical Services of Berlin,
25 Massachusetts.
CHAIR BELL: Thank you. And your motion?

MR. KELEHER: I move to accept an identifiable part of Proposal 2-193.

CHAIR BELL: The motion on the floor is to accept an identifiable part of Proposal 2-193. Is there a second? There's a second. Please proceed.

MR. KELEHER: The unidentifiable part will, if you accept it, create a new paragraph 5 under 210.19A that will read as follows.

"Permissible Voltage Drop. The circuit conductors of a 15- or 20-ampere/120-volt branch circuit shall be sized such that voltage-drop measured at the rated ampacity of the circuit shall be 5 percent or less at any outlet."

I support this motion because doing so will bring two necessary safety improvements and two major side benefits to the electrical industry. First and most important, it will reduce branch circuit fires. And, second, it will increase certainly safety. But it will also generate significant energy savings and reduce costs at the same time.

Let me explain first why a mandated 5 percent limit on voltage drop will reduce branch circuit fires. In a presentation to Code Panel 2 at the December 2009 ROC meeting, a major circuit
breaker manufacturer asked the following rhetorical question, quote, Can standard circuit breakers always protect against parallel arching faults in home runs, unquote. The presenter answered his own question in one word. The word was "no." The circuit breaker manufacturer was referring to 120-volt outlets where excessive voltage drop prohibits operating to fault instantaneously as it is designed to do.

When this happens, the breaker responds to a short circuit or a ground fault with its thermal protection mechanism that has been designed and is tested for low levels of overcurrent but not to protect circuits from short-circuits or ground faults.

Proposal 2-193 has been substantiated by more than one thousand field short-circuit tests that confirm the problem the circuit breaker manufacturer referred to. That a standard circuit breaker cannot provide a sure protection from parallel faults when excessive voltage drop inhibits a breaker's magnetic trip. The substantiating data indicates several related problems that prove the need for a mandatory limit on voltage drop in branch circuits.

First, roughly 60 percent of 120 volt outlets exhibit a voltage drop of more than
5 percent, and an unknown number exceed 10 percent. Second, in 75 percent of the tests where voltage drop does exceed 5 percent, the breaker responded thermally to a short-circuit test. This establishes a link between outlets with voltage drop exceeding 5 percent and thermal breaker responses. And, third, based on maximum safe tolerances that are identified in appropriate industry standards, in 10 percent of these tests, over a hundred, the branch circuit was overheated. And in one test the branch circuit was heated to the point where its receptacle screw terminals were loosened according to the standard. The manufacturers solution to these problems is the AFCI.

An AFCI responds to arching conditions. The problems of concern here are caused by an extensive heating, not ours. Therefore, an AFCI does not solve this problem. A short-circuit or ground fault can generate damaging heat at all outlets of a branch circuit from the branch breaker to the point of the fault in only a few seconds.

The hidden damage that can result when a thermal breaker responds to a short-circuit or a ground fault is not fast enough and typically goes undetected until some future time when a sizable load
is applied to that circuit and the damaged circuit is
stressed. A fire may result perhaps years after it's
causal event occurred.

   By limiting voltage drop to 5 percent or
less to any 120 volt outlet, we will ensure a
magnetic breaker response to short-circuits and
ground faults and limit exposure of a circuit and, in
the case of a ground fault, exposure of personnel to
one cycle or less.

   The test data indicates that a hundred
percent of the time when a breaker did respond
magnetically, circuit heating was limited to very
safe levels. I mentioned energy savings due to
reduced line losses. The data indicates that the
majority of 120-volt outlets exhibit more than
5 percent voltage drop.

   At an unknown number of outlets, voltage
drop exceeded 10 percent. Limiting voltage drop to
5 percent or less will reduce the amount of energy
that is wasted in branch circuits by a proportional
amount, which could be as much as 50 percent. This
will save energy big time. And in these times, as
expansion of electricity for transportation is coming
fast, we can't waste this kind of energy. Please
support this proposal.
CHAIR BELL: Thank you. Mr. Carpenter?

MR. CARPENTER: Yes, thank you. I'd like to defer to the Chair of the panel, Ray Weber.

MR. WEBER: Thank you, Mr. Chair. Ray Weber, proudly representing Panel 2 and the IAEI representative on the panel.

Mr. Keleher I know is very passionate on his view point. This has been debated for two and possible three cycles of the Panel 2 actions. And they have maintained that the Panel reaffirms their position taken on the similar proposals by different code cycles that a voltage drop is a designed consideration that must be dealt with by the installer designer for each installation and can be specific to the involved equipment.

Now, once again Mr. Keleher does mention the AFCI's. I feel that is something that, in fact, can help mitigate the situation that he's trying to address. And I realize that probably only addresses new type of construction versus, say, the old housing stock we have. But with new proposals, that may be in line as well. So the panel's firm position is to reject this.

CHAIR BELL: Thank you. Further discussion?

Microphone 5.
MR. MR. LINDSAY: Thank you. Travis Lindsay, Travis Lindsay Consulting Services, Inc. I'm speaking in favor of the motion. I believe that we all know that when a circuit has too much voltage drop, it can fail. The equipment connected to it can fail. My interest here is one of safety. That is, if a piece of equipment fails, it may have that secondary effect or even a tertiary effect on the life safety of the people in the building.

Now, we talked about this a number of times. And it may be a design consideration. But aren't all things design considerations? We're talking about equipment that may be emergency or standby equipment. That's not regulated by the Code as it stands now. It is imperative that we protect people.

We also understand that although voltage drop is a design consideration, in a second or tertiary event it can cause system failures and manufacturing processes and other things.

Now, we can just blindly allow those things to continue. But it's in our better interest to take a good hard look at this. Thank you very much.

CHAIR BELL: Thank you. Microphone 8.

MR. MCKLOWSKI: Vince McKlowski, National Electrical Manufacturers Association, speaking
against the motion. Mr. Chairman, NEMA opposes the motion. Thank you.

CHAIR BELL: Thank you. Microphone 5.

MR. LLOYD: Richard Lloyd speaking for myself. I'm for the motion. For years we always say the voltage drop is a fine-print note. It will be an informational note in the next code, and it is a design feature. However, I think installations are being improperly designed. My own new home was wired with a Number 14 wire in the bedrooms and so forth. My master bedroom is a good distance away from the panel. If we plug a vacuum cleaner in our master bedroom, we get a significant voltage drop. To me that's a code violation of 110.3(b) because the equipment calls for 120 volts. We're getting about 95 in that back bedroom when you put a load on it. I'm not tripping any breakers. I don't have enough current to trip a breaker. My AFCI's which I have in my new home are not trippy.

So even though it is a design consideration, I don't think anybody is taking it into design consideration. The fine-print note and the way it's being taught out there by all the teachers is not getting the job done. And I don't think that it would hurt to put it in as a mandatory requirement.
under branch circuits. It will solve a lot of problems. And, as the proponent said, it will save energy.

     CHAIR BELL: Thank you. Microphone 6.

     MR. JANIKOWSKI: Mr. Chairman, Ron Janikowski from the inspection arena. I speak in opposition only because I think it will be very difficult to enforce. Thank you.

     CHAIR BELL: Thank you. Microphone 9.

     MR. JOHNSTON: Thank you, Mr. Chair. Mike Johnston with NECA. I speak in favor of the motion. I'm also a member of NEC Code-making Panel 5. And I know there's a relationship between the effective ground fault current path and branch circuits and feeders that often involve voltage drop issues.

     I would also like to remind the body there are other requirements in the NEC such as those that deal with fire prompts that mandate maximum voltage drop limitations to address those concerns.

     So while I'm mindful that there has been a position expressed about those being design considerations, and I'm in agreement with that, I have recognized that there may be some value in what is being proposed and what was acted on the record by CMP-2 this cycle relative to a mandatory voltage drop
1 requirement in the NEC. Thank you, Mr. Chair.

2 CHAIR BELL: Thank you. Microphone 8.

3 MR. MANCHE: Alan Manche, Square D and Schneider Electric, speaking in opposition to the motion.

4 I'd simply like to say that if the group wants to put a voltage drop requirement in, that's fine. But the rationale and where it's going in here completely seems to be off base. A performance requirement for energy efficiency belongs over in the energy efficiency codes, not the National Electric Codes.

5 So it would appear to me that this discussion with regard to where it needs to go and where it needs to be placed in order to support the performance aspects of energy is completely down the wrong aisle here. And we're supporting this completely because it's the wrong rationale.

6 CHAIR BELL: Thank you. Microphone 7.

7 MR. KELEHER: Paul Keleher, Paul Keleher Electrical Services. I'm the maker of the motion. I'd like to speak to the enforcement issue that was raised.

8 This proposal can be enforced by an authority having jurisdiction with a plug-in voltage
drop test where the inspector needs to go to an
outlet that appears to be the furthest from the
distribution panel serving that outlet, plug in a
voltage drop tester and take a reading. That's all
that needs to be done for enforcement.

As regards to the previous speaker,
Mr. Manche, his argument that this is a proposal
about energy safety and belongs in some other codes,
he perhaps didn't understand my emphasis. The most
important value here that I have spoken about is the
safety issue. That when voltage drop exceeds
5 percent, circuit breakers are inhibited from
responding as they're designed to do. And that is a
safety issue.

And to this I speak to Mr. Weber as chair of
the panel to which I'm proposing. The panel
continues to refuse to look at the data that has been
submitted with this proposal that substantiates the
overheating that goes on when a magnetic trip
response is inhibited by high voltage drop. This
proposal is accompanied by a significant amount of
test data, and the panel has not yet considered that
data.

CHAIR BELL: Thank you. Microphone 4.

MR. WILKINSON: Robert Wilkinson, IEC. I
call the question.

CHAIR BELL: The question has been called.

I heard a second. We'll move directly to a vote.

All those in favor of calling to question, please raise your hand. Thank you. All those opposed. The motion passes.

We'll move directly to the vote on the motion on the floor, which is to accept an identifiable part of Proposal 2-193. All those in favor of the motion, please raise your hand. Thank you. All those opposed. We'll go to a standing count on this one.

Thank you. You can be seated. All those opposed to the motion, please stand. Motion fails 94 to 125.

Moving on to the next motion sequence, which is 70-4. Is there a motion on the floor related to Sequence Number 70-4? We're looking for a motion on Sequence Number 70-4. Microphone Number 9.

MS. TOMASINO: Good morning, ladies and gentlemen. My name is Alicia Tomasino. And I'm the designated representative for Carlo Compagnone, Compa Covers, Inc., out of Boston, Massachusetts. I move today to accept Comment 3-13.

CHAIR BELL: The motion on the floor is to
6/29/10

To: NFPA Standards Council

Subject: Appeal of Action to Reject Comment 3-69 - NFPA-70 (NITMAM 748, CAM 70-6)

This appeal involves proposal 3-140 that has been accepted and requires GFCI protection to be built into newer portable generators in Temporary Installations rather than requiring users to add GFCI protection when the generator is not so equipped. This appeal is to accept my comment which would reinstate the language in the 2008 NEC which would still require GFCI protection, just not built into the generator.

The appeal is based on the following:

1. The standards making process did not accommodate my lengthy and highly detailed comment very well. I can understand why the NFPA limits the amount published in the ROC for the NEC. They need to limit the size of the report and they do this by publishing only a portion of a lengthy comment and then telling people supporting material is available for review at NFPA Headquarters. They should not, however, do this for the comment material given to panel members as was done for my comment. The NFPA gave the panel members only what was published in the ROC and not the supporting information. My comment was lengthy because too many are rejected for lack of substantiation and this is a complex issue. This issue is made more difficult by the paradigm shift that is needed to understand the technical issues. Making the panel spend more time requesting the additional material seems unfair to them and to the process.

2. In this particular example, understanding grounding and portable generator operation were keys in making a decision on the proposal and the comment. GFCI protection works differently from the expected norm when the source is not grounded and it is clear from the panel’s response to my comment, that they did not understand grounding and GFCI operation on portable generators. They could have benefitted from knowledge from Panel 5 but a Panel 5 representative was not a member of the Task Group that made the proposal that lead to my comment. When issues get complex, panel members tend to rely more on the Task Group’s recommendations.

3. The Task Group, mentioned in 2 above, excluded GFCI protection on the generator’s 120/240 VAC 4-pole receptacle in their proposal. It appears that this was done to eliminate conflicts with other Code articles (i.e. egress lighting in Art. 525.23(C)), which resulted in the TCC rejection of this proposal during the 2008 Code cycle. The theory being, if the 120 VAC 3-pole receptacles are GFCI protected, but the 120/240 VAC 4-pole receptacle is not, the generator can be used per Code in all Temporary Installation situations. CMP 3 took it upon themselves to modify Proposal 3-140 to re-introduce the GFCI requirement on the 120/240 VAC 4-pole receptacle, and in so doing, re-introduce the very same conflict. Oddly enough, in contrast to their actions in the 2008 Code cycle, the TCC made no reference to this conflict nor provided any guidance as to how to deal with it in the 2011 Code cycle. I would think the 2011 Code cannot be published until this conflict is adjudicated.

4. I don’t know how Task Groups are formed, but the one that made the GFCI proposal to both Panels 3 and 13 seems rather limited in the scope of their expertise on GFCI issues. I know that Panel 13 went through a massive change and that new members who wanted to be part of the task group, and have the special knowledge to help, didn’t even know a task group was formed. I think the decision to disband and reform Panel 13 was correct but its timing affected the makeup of the Task Group and the quality of the proposal.

5. You are probably more aware of the law of unintended consequences then anybody, but more emphasis needs to be placed on demonstrating with facts and/or sound technical arguments that a change to the NEC is justified. The panel should not use panel history dating back to 1975 to
justify an action. It must be based on current information. In addition, the panel was focused more on code interpretation then on what is safe and what is not. I appreciate what the code says but if it is not safe as it applies to an obscure topic, a topic that the authors probably never considered when they first wrote the language, should it not be addressed?

6. Panel 13, responsible for Article 445 - Generators, had a similar proposal (13-19) that they accepted during the proposal stage and then reversed themselves in the comment stage when everybody had time to review the facts more thoroughly. Panel 13 did have a comment from NEMA that was not submitted to Panel 3. This comment stated the concerns of the GFCI manufacturers when using GFCIs in systems that are not grounded. That concern is that when people see the GFCI protection on the generator, they think they are protected from ground faults when they are not. NEMA didn’t notice proposal 3-140 until after Codes and Standards met on the comments which was too late to get a NEMA comment for 3-140. Would this have made the one vote difference that would have resulted in the proposal being rejected in panel 3?

7. Now that the NFPA requires GFCI protection to be built into the generator, will the NFPA tell generator manufactures how to design the internal wiring to optimize safety? I know of two ways of doing it, one which will offer more GFCI protection but is more expensive. Is it the intent of the NFPA to get into product design issues? Please note this design decision is moot if the generator is grounded, i.e. the GFCI is used in an environment for which it was designed. But the panel failed to understand this and there is no grounding requirement in the accepted change or anywhere in the NEC for this application.

I believe this issue is unique, and other circumstances are so unique that enough went wrong in the process to hold this proposal over for further consideration in the next code cycle. This decision to defer the change becomes easier when it is clear that the following applies:

1. The accepted language does not eliminate the existing methods right away but rather eliminates them for use with new generators. This means the panel did not have a reason to think the current methods are unsafe. To continue that for another code cycle will not hurt safety.

2. No one has substantiated a technical problem, either with statistics or with sound technical arguments, to justify that what is in the 2008 code is not safe.

3. The vote to accept the proposal was 14 to 0. The vote to reject my comment was 10 to 4 or one vote short of stopping the change from being made. It is also important to note that 1 out of the 3 CMP 3 voting member organizations on the Task Group that made the proposal no longer supported it in the comment stage.

The underlying issue here is safety and that depends on how well the process works. On the surface, the change looks like the right thing to do which makes it much easier for all to accept. Why spend time on the details? Underneath, and in this unusual case, the change poses a serious safety hazard. A hazard recognized by the GFCI and other electrical manufacturers, the Construction Safety Organization of Ontario and CMP 13. I think the process, which normally works well, not only failed to make the application safer but decreased the safety levels in this case.

Sincerely,

Michael O. Flegel
President
The NEC does not develop product standards for the equipment that is powered by a portable generator. The Code can and does address the following installation aspects of a portable generator:

1. It is impossible to have a ground fault back to the generator if it is not bonded and grounded, so GFCI protection on the generator doesn’t make sense since no requirement exists for bonding and grounding. In complex systems and in harsh environments, neutrals can be pulled to ground beyond the generator. GFCI protection on generators that are not bonded and grounded does not protect people against these ground faults but they may believe it does. This may encourage bad safety practices and/or discourage people from taking further steps to protect themselves against ground faults.

2. The bonding and grounding needed in Problem 1 will create ground fault hazards. Why intentionally create a hazard and then have to add a device to protect against it, especially when the added device is an electronic device on a piece of hot, vibrating equipment which adds to the likelihood of its failure? It makes more sense to float the system. A floating neutral portable generator without GFCI protection is safer than a bonded neutral portable generator with GFCI protection in stand alone applications even if the latter is properly grounded. There is no need to have GFCI protection in stand alone applications even if the latter is properly grounded. There is no need to have GFCI protection built into a floating neutral generator.

3. Stand alone portable generator applications currently used for Temporary Installations are not required to be grounded making GFCI protection more effective closer to the individual performing the work. The protection should not be on the generator.

4. In paragraph 590(A)(3) conflicts with the Exception in 590(A) in the Proposal. If the Temporary Installation is powered by a portable generator 15 kW or less, people cannot substitute an assured equipment grounding program in lieu of GFCI protection because no non-GFCI outlet is available on the generator.

5. 90.2 of the National Electrical Code states that the Code only covers the installation of electrical conductors, equipment, and raceways, etc. It does not cover the design of equipment such as having GFCI protection built into a portable generator. The Code can and does address the following installation aspects of a portable generator:
   a. Adding downstream GFCI protection—Article 590 (2008)
   b. Bonded or not bonded—There are several sections addressing Separately and Non-separated systems
   c. Receptacles connected to the frame— 250.34

In each case, the Code does not dictate that the generator has these design features but rather it instructs on how to install it when a generator has these features. The NEC does not develop product standards for the equipment that is installed. The NEC can specify how to install a bonded neutral generator with GFCI protection, or a floating neutral generator without GFCI protection but it shouldn’t require that the generator have the protection built in.

6. 590.6 requires receptacles, installed as part of the permanent wiring of the building or structure and that are used for temporary electric power, to have ground-fault circuit-interrupter protection for personnel. It allows the use of cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use to meet this requirement. It does not require people to replace permanently installed non-GFCI with GFCI receptacles in Temporary Installations. Why should permanently installed receptacles in portable generators be any different than those in a building or structure? If anything, the utility system has more reasons to replace non GFCI receptacles with GFCI protected receptacles because the system is always bonded and grounded.

7. 525.23 (C) clearly states that egress lighting circuits for carnivals, circuses, fairs, and similar events cannot be GFCI protected. The purpose of this is to assure that egress lighting is always available. Since egress lighting can be powered by portable generators at these sorts of events, the proposal will not allow compliance to this Article.

8. Off-generator GFCI protection adds an additional level of protection to all portable generator applications but yet the proposal infers it should not be used on generators manufactured after January 1, 2011.

9. The proposal has not substantiated a safety problem; it just incorrectly states there is one. GFCI protection on the generator would ensure that people would use it but is only effective if people properly bond and ground the generator and is not as effective as other alternatives as stated above in Problems 1 and 2 and 3. Generally people are more concerned about the live cords and devices they contact on a regular basis like the ones connected to the power tools they are using and the power tools themselves. This is where downstream, personal GFCI devices really are more effective in harsh environments. Power cords to distribution boxes are seldom handled, or seldom need to be handled,
when they are under power.

Do you know for a fact that the current safety record isn’t due to the fact that very few portable generators are grounded and has nothing to do with the fact that some have GFCI protection or that people use other forms of GFCI protection with them? Isolation is a powerful safety device and should not be ignored. Isolation and the extra protection of downstream GFCI protection is even better and it is essentially what is being done today since the generator is not required to be grounded. Has somebody provided data to show that what is being done now is not safe?

**Bonding and Grounding—Utility vs. Portable Generators**

OSHA requires bonded neutral generators in their regulations for construction sites. In reading these regulations, they appear to be identical to the NEC requirements except for this bonding requirement. The interpretation in Appendix A explains their position. To completely understand OSHA’s response, please read the request letter by Mr. Iwasa. It appears OSHA incorrectly interprets the NEC. It says a generator in stand alone use is a separately derived system (see Article 100) and as such needs to be bonded. Please note the interpretation does not have any safety arguments other than misinterpreting the NEC which leaves it with no technical merit. As such it has no relevance in this discussion.

Generators used in simple stand alone applications, operate in a much different environment than a premises wiring system being fed from the utility. There is no huge generator capable of outputting high fault current, no transformers and switchgear, and no large, elevated distribution system subject to lightning strikes all of which can create surges in the system. Such surges must be addressed through bonding and grounding rather than having them go through appliances and endanger safety. The reason for bonding and grounding is substantially reduced when utility power is removed. As a matter of fact, Article 250 agrees and does not require the grounding of a generator in stand-alone applications. This allows a floating system using either floating neutral generators or bonded-neutral generators that are not grounded.

Bonding and grounding have some pitfalls that are tolerated in order to get the desired protection described above from utility systems. A bonded and grounded system creates numerous pathways for current to flow back to the power source (substantiation for Problem 8). These include the ground, and any metal object connected to the ground such as plumbing fixtures and popes and heating ducts. If someone comes in contact with a hot wire from the power source and one of these objects, the circuit is completed with disastrous results to the individual. In fact, people did realize that these pitfalls created very dangerous situations for premises wiring systems. Products and systems were developed to mitigate the safety risks. Grounding wires were added to appliance plugs and grounding terminals were added to receptacles so that a hot wire faulting to the case of an appliance would cause a short, tripping the circuit breaker. This protected the user in case he touched the case and one of the extensive return paths to the power source created by bonding and grounding the system. The GFCI was invented to interrupt the current flow when the current out of a receptacle isn’t the same amount as the returning current. If it isn’t returning through the receptacle, then it probably is returning through a person that is touching one of those many objects that have a path back to the power source, again, as a result of bonding and grounding the system.

Why create a more dangerous situation by connecting multiple objects to a return path back to the source if there are no advantages in doing so in stand alone portable generator applications? Some people would argue that the devices used to protect people in bonded and grounded systems no longer would work in a floating situation. This is true but they fail to understand they are not necessary. The circuit breaker tripping in the fault-to-case example above and the GFCI protection are two of the safety devices in bonded and grounded systems mentioned earlier. In the first case, the fault to the case represents only a connection of the person to one wire from the source in a floating system. Because there is no path back to the source, the individual holding the tool is not injured. Similarly, a GFCI would never trip because there is never a ground path available back to the generator i.e. a ground fault can never occur back to the source. This truly is a paradigm shift in the way we think about electrical systems and it is important for people to understand they have to look at portable generator applications differently.

**Temporary Installations**

For the casual user such as a camper of home owner working in the back yard, the floating neutral generator is the safest and most cost effective application that does not require additional ground fault protection using GFCIs. But what about harsher environments where multipoint failures occur like in more complex systems such as Temporary Installations? The floating system still seems to be the safer of the two alternatives as shown in Appendix B (substantiation for Problems 1, 2, and 9). As you know, Temporary Installations can have lots of exposed cords that come in contact with exposed beams, piping, sharp objects and other metal objects that create a higher probability that neutral will be pulled to ground somewhere in the system. Article 590 wisely requires GFCI protection on receptacles. If the receptacles do not have GFCI protection, people must use GFCI protection that is built in to extension cords or other GFCI devices. No doubt this is an excellent idea for installations using grounded and bonded utility power but is it really necessary for the protection to be built into portable generators? The answer depends on whether the generator is
bonded and grounded. If it is, then the GFCI protection on the generator is needed but grounding the generator is unlikely since the NEC does not require it. If not grounded, the protection is unnecessary on the generator because you have a system that does not intentionally create any paths back to the source. If you are concerned that a neutral to ground fault would likely occur downstream from the generator receptacle because of the harsh environment, then adding GFCI protection with cord devices or other downstream GFCI devices is a good idea. See Figure supplied as supporting material.

The Figures also demonstrate that the closer the GFCI protection is to the person in a floating system, the more protection that person has (substantiation for Problems 3 and 8). A Temporary Installation should be either a bonded and grounded system with GFCI protection on the generator or a floating system without GFCI protection on the generator. For both and depending on the harshness of the environment, one may consider having additional ground fault protection close to the workers either in a distribution box in which the tools they are using are plugged or in belt mounted GFCIs. The extra protection would protect them in the grounded system incase the GFCI on the generator failed or if the generator was not properly grounded and a neutral was accidentally pulled to ground elsewhere in the system. It would protect them in the floating system incase a neutral was accidentally pulled to ground in the system (substantiation for Problems 8 and 9)

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See the panel statement in Comment 3-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3
Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
EASTER, L.: See NEMA’s Explanation of Negative on Comment 3-83.
OWEN, S.: See comment on 3-65.
Ground-fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) and (B). This section shall apply only to temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities. This section shall apply to power derived from an electric utility company or from an on-site-generated power source. For the purposes of this section, cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted.

(A) Receptacle Outlets. Temporary receptacle installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities shall comply with the requirements in 590.6(A)(1) through 590.6(A)(3), as applicable. Portable GFCI cord sets or devices shall be permitted to be used in accordance with 590.6(A)(4).

(1) Receptacle outlets not part of permanent wiring. All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are not a part of the permanent wiring of the building or structure and that are in use by personnel shall have ground-fault circuit-interrupter protection for personnel.

(2) Receptacle outlets existing or installed as permanent wiring. All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets if a receptacle(s) is installed or existing as part of the permanent wiring of the building or structure and is used for temporary electric power, ground-fault circuit-interrupter protection for personnel shall be provided.

(3) Receptacle outlets in industrial establishments. Exception: In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power were interrupted or having a design that is not compatible with GFCI protection.

(4) Portable GFCI cord sets or devices. For the purposes of this section, cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted but shall not be used as a substitute for any of the requirements in 590.6(A)(1) through 590.6(A)(3).

(B) Use of other outlets. For temporary wiring installations, receptacles, other than those covered by 590.6(A)(1) through 590.6(A)(4), 125-volt, single-phase, 15-, 20- and 30-ampere receptacles used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities, shall have protection in accordance with (B)(1) or the assured equipment grounding conductor program in accordance with (B)(2).

(remainder of section is unchanged.)

Substantiation: The section was rewritten to provide ease of use and user-friendliness, as has been the goal for many of the changes in the past three or four Code cycles. In addition, the intent of the change in the use of portable GFCI cord sets or devices is to continue to permit personal portable GFCI devices during construction, remodeling, maintenance, repair, or demolition of buildings but require GFCI protection at the source of the circuit, rather than at the end of the circuit. A cable is often installed from the source of supply for the temporary circuit to a spider box or other splitting device or cord where the supply cord can and often is damaged. Since GFCI protection is located at the spider box or splitting device or cord, there isn’t GFCI protection for the temporary cable where damage may have occurred. This suggested change will still permit spider box GFCI protection or personal GFCI protection but will additionally require the supply to be GFCI protected, however, the personal device cannot be used as a substitute for protecting temporary wiring, thus protecting the worker on the construction site to damaged supply cables.

This proposal was developed by a Task Group composed of Task Group Chairman Paul Casparro and Chair of Panel 3 (NJATC); Jim Wiseman at Square D Schneider-Electric and Panel 15 (NEMA); John R. Kovacik with Underwriters Laboratories, Panels 10, 13 and the NEC TCC (UL); Richard Owen with City of St Paul, Minnesota, Panel 3, and the NEC TCC (IAEI); and Mark C. Ode with Underwriters Laboratories, Panels 3, 13, and the NEC TCC (UL).

Panel Meeting Action: Accept in Principle
Revise text to read as follows:

*590.6 Ground-Fault Protection for Personnel.
Ground-fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A)
and (B). This section shall apply only to temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities. This section shall apply to power derived from an electric utility company or from an on-site-generated power source.

(A) Receptacle Outlets. Temporary receptacle installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities shall comply with the requirements in 590.6(A)(1) through 590.6(A)(3), as applicable.

Exception: In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power were interrupted or having a design that is not compatible with GFCI protection.

(1) Receptacle Outlets Not Part of Permanent Wiring. All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are not a part of the permanent wiring of the building or structure and that are in use by personnel shall have ground-fault circuit-interrupter protection for personnel.

(2) Receptacle Outlets Existing or Installed as Permanent Wiring. Ground-fault circuit-interrupter protection for personnel shall be provided for all 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets if a receptacle(s) is installed or existing as part of the permanent wiring of the building or structure and is used for temporary electric power. Listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted.

(3) Receptacles on 15 kW or less Portable Generators. All 125-volt and 125/250-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are a part of a 15 kW or smaller portable generator shall have listed ground-fault circuit interrupter protection for personnel. Listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted for use with 15kW or less portable generators manufactured or remanufactured prior to January 1, 2011.

(B) Use of Other Outlets. For temporary wiring installations, receptacles, other than those covered by 590.6(A)(1) through 590.6(A)(3); 125-volt, single-phase, 15-, 20-, and 30-ampere receptacles used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities, shall have protection in accordance with (B)(1) or the assured equipment grounding conductor program in accordance with (B)(2).

The remainder of subsection to remain as is.

Panel Statement: The revised wording retains the exception for industrial locations as found in the 2008 NEC. In addition, the provisions for permanent and non-permanent applications for GFCI protection were clarified with the provision for use of portable GFCI protection in permanent wiring locations. The revisions to the wording also clarified the requirements for GFCI protection on 15 kW or less portable generators, with information added, that will ensure that this requirement does not apply to manufactured or remanufactured generators prior to January 1, 2011.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative: CASPARR, P.: Continue to Accept in Principle. Ground-fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) and (B). This section shall apply to power derived from an electric utility company or from an on-site-generated power source.
directly to the vote to reject Comment 3-22.

All those in favor please, raise your hand.

Thank you. All those opposed. Motion carries.

At this time, ladies and gentlemen, I did want to mention that we're up to 13. You broke the record. So I want to congratulate you. And we can continue after a break. We're going to take a 15-minute break at this time.

Please recognize that we will not take a formal lunch break in order to most effectively use your time. Thank you.

(A brief recess was taken.)

CHAIR BELL: Ladies and gentlemen, get seated, and we'll get started again. I do want to remind you that you have your 13 consecutive streak, and we're still counting.

So we're up to motion sequence 70-6. Is there a motion for Sequence Number 70-6?

Microphone 1.

MR. FLEGEL: Mike Flegel, Reliance Controls Corporation. I move to accept Comment 3-69.

CHAIR BELL: The motion is to accept Motion 3-69. Is there a second? I hear a second. Please proceed.

MR. FLEGEL: This motion is to return the
language in Article 590.6 NEC. The issue is not whether GFCI protection is needed for portable generator power and temporary installations. It is needed, and it is already required in the 2008 NEC. But rather the issue is where to place that GFCI protection so that it provides the highest level of protection against injury by ground faults for the workers.

The panel action now requires the GFCI protection to be built into the generator receptacles for generators manufactured after January 31st, 2011. A study by the Construction Safety Association of Ontario, done in conjunction with the International Brotherhood of Electrical Workers, concluded that GFCI protection used in floating systems should be placed as close to the worker as possible. Since the NEC does not require portable generators in stand-alone use to be grounded, they are floating systems.

Requiring the GFCI protection to be built into the generator goes against the conclusions of this study and decreases workers safety. Ironically, or maybe not so ironically, the 2008 NEC language is actually fairly close to the conclusions of the study done by the Construction Safety Association of
Ontario and the IBEW.

It needs to be retained in the 2011 NEC.

There is absolutely no indication that the 2008 code language is not providing a safe environment. There is no hurry to make a change given the process. Another code cycle will review these issues. It will not hurt worker safety. That seems to be a better alternative than decreasing worker safety. Please vote in favor of my motion. Mr. Carpenter.

Mr. Carpenter: I would defer to the panel chair of Panel 3, Paul Casparo.

Mr. Casparo: Thank you, Mr. Chair. Paul Casparo representing the IBEW. I'm going to defer to Mark Odee, Panel 3.

Mr. Odee: Thank you, Paul. Mark Odee, Underwriters Laboratories, alternate member of Panel 3. And I'm speaking against the motion.

I'll take a very brief amount of time and kind of give you a historical brief on how this came about and when it first came about and what the requirements were in the National Electrical Code starting in 1975.

75 NEC Section 210.8(b) required all 120-volt single-phase receptacle outlets not part of the permanent wiring of the building or structure to
1 have ground fault circuit interrupters for personal protection.

2 An exception was inserted into 210.8(b) that permitted receptacle on a portable generator rated not more than 5 KW where the circuit conductors of the generator are insulated from earth and the generator frame is insulated from earth and all grounded surfaces.

3 This section and the exception was moved to Section 305.4A in 1984. And the text in the exception was changed to again deal with two wires, single-phase portable or vehicle-mounted generators rated not more than 5 KW, again, requiring GFCI protection for generators that were larger than 5 KW. But the exception four 5 KW in smaller generators still stayed in the code.

4 The exception, by the way, existed until the 2002 NEC, when it was removed by Panel 3. And the intent of removing the exception was to require GFCI protection for those receptacles even on generators that were smaller than 5 KW. So it's been in the Code a long time. We've been dealing with this for a long time.

5 Now, when I go back and I look at my requirements in Article 250 dealing with portable
generators and vehicle-mounted generators, 250.34 requires that -- it permits a generator that's a portable generator to not have a driven ground rod. In other words, I don't have to have a grounding electrode for a portable generator, which would be almost unreasonable. Every time you put a portable generator down, you'd have to drive a ground rod.

So, in effect, when I go back to 250.34A, it does not require a grounding electrode for a portable generator. But when I look at 250.34C, 250.34C says if I have a requirement for a grounded conductor, then that grounded conductor must be attached to the frame of the generator, which means that the equipment grounding conductor going out from that generator is going to be the path for the current flow to get back to the generator frame and from the generator frame back in through that bonding jumper to the actual core of the generator.

And that was the concept that we looked at. When I get into 15 KW and larger generators, the larger the 15 KW, I can end up with a capacitor effect on these kinds of generator where it can be critical in having the proper kind of protection on those generators.

If you look at UL 2201, UL 2201, which
handles 15 KW and smaller generators, now requires a 15, 20 and 30 ampere 120-volt receptacles on these generators be GFCI protected. Well, Panel 3 went one step further, similar to what we have since 1975. And it included GFCI requirements for 15 and 20 and 30 ampere receptacles to be GFCI protected even in the 120/240 volt range.

So, in effect, that's what we did. And we very clearly put a date on these generators so that we would know exactly when a new generator was installed or provided. So, again, we didn't require this for existing generators. Thank you, Mr. Chair.

CHAIR BELL: Thank you. Further discussion? Microphone 1.

MR. BLACK: Neal Black, Reliance Controls and also the representative for Code-making Panel 13 from the National Electrical Manufacturers Association. Mr. Chairman, when Underwriters Laboratories --

CHAIR BELL: Speaking? You broke the streak.

MR. BLACK: Sorry. Speaking for.

Mr. Chairman, when Underwriters Laboratories submitted this particular proposal to require GFCI outlets inside portable generators 15 KW and below to
1 Code-making Panel 3 and to Code-making Panel 13, I
2 believed then, as I do now, that they did so with the
3 best intentions of public safety. Unfortunately,
4 they chose a one-system-fits-all approach. And
5 equally as unfortunate, the truth is this is a
6 system-related issue. No one's questioning that
7 GFCI's are necessary. The question is, where are
8 they necessary? And that is a system issue.
9
10 It depends on whether the generator is a
11 bonded neutral generator or a floating neutral
12 generator. It depends on whether it's connected to
13 premises or wiring. It's a system issue. And,
14 therefore, I believe this is a flawed proposal.
15
16 But no one need take my word for it.
17 Underwriters Laboratories assembled a standards
18 technical panel, a group of technical experts from
19 across the country. Experts in generators. Experts
20 in generator safety. Experts in transfer switches.
21 Experts in generator applications, such as
22 electricians and local inspectors. That group was
23 formed to put together the UL 2201 standard. And
24 that group refused to support requiring GFCI's on
25 generators for safety reasons.
26 There's more. As has been reported by the
27 National Electrical Association and others, generator
manufacturers who could make money off of this proposal are not in favor of it. GFCI manufacturers who could make money off this proposal are not in favor of it. And transfer switch manufacturers and transfer equipment manufacturers who could make money off this proposals are not in favor of it.

But there's more. As you mentioned earlier, Code-making Panel 1 discussed it at length, and Code-making Panel 13 also refused to support this proposal. So I ask the members, if UL's own Standards Technical Member Panel thinks this is a bad idea and if the generator manufacturers think this is a bad idea and the GFCI manufacturers think this is a bad idea and the transfer equipment manufacturers think this is a bad idea and the Code-making Panel 13 thinks this is a bad idea, then perhaps it warrants some additional consideration. And I would recommend that the motion be adopted and that the proposal be rejected and that UL and the experts across the country be given the time and the opportunity to put together a true consensus proposal that meets all of the requirements of how generators are used and provides for maximum possible safety to protect the electrical workers, the homeowners, and pole linemen across the country. Please support this motion.
1 Thank you, Mr. Chairman.

2 CHAIR BELL: Thank you. Microphone 5.

3 MR. MCKLOWSKI: Vince McKlowski, speaking in support of the motion. Mr. Chairman, NEMA supports this motion. Thank you.

4 CHAIR BELL: Thank you. Microphone 6.

5 MR. SIMMONS: Thank you, Mr. Chairman. My name is Phil Simmons. I'm speaking for myself. And I'm speaking in opposition to the motion.

6 The Electrical Section considered this at some length on Monday and viewed a video and had quite a bit of opportunity to visit and talk about this issue. And it appears that after reviewing the video, the problem was that the folks were using a generator that does not comply with the safety rules in the NEC. Because there was no bonding jumper from the neutral to the enclosure.

7 As a result, GFCI protection would not work on the generator if installed. And there's no fault return path for a ground fault for any electrical equipment supplied by that generator. So it seems to me, as Mr. Odee described the history of this rule, that it's pretty carefully crafted and pretty carefully considered by the code panels for quite a number of years.
And I certainly urge this body to not support this motion, which certainly seems to be faulty on its face. It would do nothing to increase safety. In fact, I'm convinced it would decrease safety in the workplace. And I'm pretty sure we're not in favor of that.

CHAIR BELL: Thank you. Microphone 5.

MR. MANCHE: Alan Manche, speaking for myself. And I am in favor of the NITMAM of the motion. As an STP member of the 2201 Committee, I guess I would like to lend credibility to Mr. Swiecicki's comments with regard to the fact that the STP has continually opposed a requirement on all portable generators to have GFCI.

The challenge with this is multi-faulted. And it's not as simple as adding the language here that has been put into this particular language. And I think that's recognized by the fact that Panel 13 has made one decision and Panel 3 has made a different decision. We have to ask questions. And I think we have to ask the question, are we enhancing safety or are we not enhancing safety? There's two pieces. One is, is it worker safety using it as a portable means?

The other challenge becomes, we have
hundreds of thousands of transfer switches or transfer equipment installed in homes around the country up and down the coasts when the hurricanes come through, the ice storms come through. And if I end up going to the Lowes and Home Depots and pulling those portable generators with GFCI's in my home and I have those systems and now have GFCI protection, they will trip and not work. And I can guarantee that a homeowner will figure out a way to get their power on and put themselves at risk.

So there's a worker safety aspect of this, and there's a homeowner using these portable generators for other means at risk. And so in order to address this, this needs to be returned and thought out further. Thank you.

CHAIR BELL: Thank you. Microphone 4.

MR. DOWELL: Thank you, Mr. Chairman. My name is Jim Dowell, representing the International Brotherhood of Electrical Workers. And I rise in opposition to the motion on the floor.

I would like to first echo some comments that the previous speaker made. And he talked about how we're going to use this generator. What he mentioned with the transfer switches -- and the maker of this motion was the same maker of comments that
defeated on 13 -- is what is really the heart of this issue. It is not permitted in the National Electrical Code to have a premises wiring system and have it outdoors in a rain-related, weather-related disaster event and provide other outlets without GFCI protection. When you take a floating system neutral generator and you bond it to that 15 or 20 ampere, 125-volt transfer switch, that generator becomes part of the premises wiring. And it's covered by the National Electrical Code.

The second you do that, you have a grounded system. Now that homeowner will have one outlet inside the house hot. And he'll have five or six more on the generator, which they will use in a weather-related event with no GFCI protection.

It was mentioned earlier that generator manufacturers aren't in favor of bonded neutral-type generators with GFCI's. I urge all of you when you get home to go into Lowes and Home Depot, and you'll see more portable generators with built-in GFCI than you will of the variety that we're discussing right now.

I am the safety coordinator for IBEW Local 98. My full-time job is instruction safety. We support what CMP 3 did 100 percent for safety.
Please defeat the motion on the floor. Thank you.

CHAIR BELL: Thank you. Microphone 7.

MR. EKRODE: Mr. Chairman, my name is Curt Ekrode. I teach at Waukesha County Technical College. I rise in support of the motion. Let me reamplify what Mr. Manche had to say.

The panel action limits or mandates the placement GFCI's on the generator. This action ignores legacy residential transfer switch installations. Newly purchased replacement generators will be applied to these legacy systems. These systems will automatically trip.

This is caused by the bonding of neutral current and the generator, allowing roughly half of the neutral current to be carried by the ground. The generator GFCI will always trip. Resourceful homeowners -- and we know that they are -- may bypass the transfer switch and in their ignorance back-heed the utility service. This causes obvious danger to utility linemen. Do not limit the position of GFCI's in these small generator systems. Please vote for this motion.

CHAIR BELL: Thank you. Microphone 6.

MR. WEBER: Thank you, Mr. Chairman. Ray Weber representing myself. I rise in opposition to
the motion in support of the Panel 3 action. In field observations we're seeing a preponderance at not the major construction sites but the smaller ones where they will be using small 5 KW and 10 KW generators or something of that nature. I heard the commenter say, "Well, most of the workers have their own personal GFCI protection incorporated." And unfortunately I don't get to see that a great deal. I see a great many trades out there with cords plugged into these generators.

And, in my opinion, if we are going to have to ground the neutral of those smaller generators, so be it. It's a safety issue. Also, we deal with a lot of camping situations where today people go camping, and they don't put a tent up. We've even had pontoon boats where they'll put a generator in the pontoon boat so they can run the margarita machine or something else like that. So I think it's far better to have GFCI protection.

CHAIR BELL: Thank you. Microphone 1.

MR. FLEGEL: Mike Flegel, in support of the motion. The debate on the Electrical Section got bogged down in interpretation issues, much as it is here, partly due to the poor approach that I used in my presentation at the Electrical Section.
Before I had an opportunity to get things back on track, the opposition to the motion was passed. The Electrical Section did not get the information of the Construction Safety Association of Ontario's study. I think that information is critical. And as I said, it was supported by the IBEW as well.

They indicate that the position of the GFCI in the application is critical to whether the system is floating, that is, whether the generator is not grounded or whether it is grounded. Unfortunately, the demonstration that was given to the Electrical Section did have a floating neutral generator.

However, if it was a bonded neutral generator that was not grounded, it would have the same results. Those results are that if you have a bonded neutral generator with GFCI protection and you do not drive a ground rod, the protection on the generator is purely decoration. It will never function. It will function under some very isolated cases, but in the majority of the cases, it will not function.

It gives the impression that people are protected by the GFCI's when they are not. The fact that Mr. Simmons' comments -- the fact that all these
issues that we're discussing just indicates the
complexity of the problem. And I don't think the
panel looked at all the complexities. And I think
another Code-making cycle would help them in
determining that.

Please understand the current wording in the
2008 Code requires GFCI protection on all portable
generator output for temporary installations. We're
not advocating doing away with GFCI's. They just
have to be used properly. The GFCI manufacturers
understand that.

They are used on portable generators. And I
hope those generators are coming with instructions to
ground them. If they aren't grounding them, there
can be safety issues. Letting it go another code
cycle is not going to hurt worker safety. Making
this move now could hurt it based on that ASO study.
And people have to understand what that study is
about.

CHAIR BELL: Thank you. Microphone 4.
MR. WILKINSON: My name is Robert Wilkinson.
I seek to call the question.

CHAIR BELL: Motion is to call the question.
Do I hear a second. All those in favor of calling to
question, please raise your hand. Thank you. Motion
We'll move directly to the vote on the motion to accept Comment 3-69. All those in favor of the motion, please raise your hand. Thank you. All those opposed. Motion fails.

We'll move to the next sequence, which is Motion Sequence Number 70-7. Is there a motion on the floor related to Motion Sequence Number 70-7?

MS. HUNTER: Yes. My name is Christel Hunter with Alcan Cable. I move to accept Comment 6-43.

CHAIR BELL: The motion is to accept Comment 6-43. Is there a second? I hear a second. Please proceed.

MS. HUNTER: Thank you. The language in Section 310.15(B)(2)(c) is based on data collected during a study performed in Las Vegas. This study has run for several years now and produced a large amount of data. The paper that was published based on this data asserts that conductors on rooftops will fail and create a safety risk due to the high heat due to solar radiation. No confirmed real-live failures attributed to these conditions have been presented to the panel.

Three primary types of heating have been
ASSOCIATION AMENDMENT
BALLOT RESULTS

AMENDMENT

DATE: July 13, 2010

Document: NFPA 70®, National Electrical Code®

Motion: To Reject Comment 3-22

NEC TCC PRELIMINARY Ballot Results (Final due 7/16/10)

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment IS NOT achieving the necessary \( \frac{3}{4} \) majority vote needed to recommend approval of the Association Action by the Technical Correlating Committee.

The number of affirmative votes needed for the report to be published is \( 8 \).

\[ 12 \text{ (eligible to vote)} - 2 \text{ (not returned)} - 0 \text{ (abstentions)} = 10 \times 0.75 = 7.5 \]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[ 12 \text{ eligible} \div 2 = 6 + 1 = 7 \text{ (this is the simple majority)} \]

12 Eligible to Vote
2 Not Returned (Drake, Liggett)

<table>
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<tr>
<th>Agree</th>
<th>(Carpenter w/comment)</th>
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</thead>
<tbody>
<tr>
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<td>(Brunssen, Fiske, Hittinger, LaBrake)</td>
</tr>
<tr>
<td>Abstain</td>
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Final Action: FAILING

CMP-3 FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS NOT achieved the necessary \( \frac{2}{3} \) majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the amendment to be issued is \( 9 \).

\[ 14 \text{ (eligible to vote)} - 0 \text{ (not returned)} - 1 \text{ (abstention)} = 11 \times 0.66 = 8.58 \]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[ 14 \text{ eligible} \div 2 = 7 + 1 = 8 \text{ (this is the simple majority)} \]

14 Eligible to Vote
0 Not Returned

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<tr>
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<th>(Ayer, Casparro, Kahn, Keden, Mills, Owen, Pace, Sleights, Whistler)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do Not Agree</td>
<td></td>
</tr>
<tr>
<td>Abstention</td>
<td>(Egesdahl)</td>
</tr>
</tbody>
</table>

Final Action: FAIL
NFPA 70
TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
X Do Not Agree*
☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

I agree with the position of the TC members who voted in the Negative. All threads, whether factory-cut, field-cut, or on piece parts bought at the local building supply outlet should be protected. If they do not contain protection when purchased, corrosion protection compound should be applied in the field.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: __________________________________________

Name - Please Print: James E. Bruinssen

Date: July 3, 2010

June 2010
NFPA 70
TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reggs"). Under the Reggs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Reggs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Reggs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
X Do Not Agree*
☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

A significant majority of CMP-3 members stated that the panel action is correct. Absent some procedural failure — none in this case — the CMP’s findings should be given considerable deference.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

\[Signature\]

Name - Please Print: William T. Fiske
Date: 2010-07-07.

June 2010

Standards Council Supplemental Agenda
August 3-5, 2010
Page 72 of 1603

Revised Page Number 73 of 813
Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reg's"). Under the Reg's, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Reg's at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text.

While the Standards Council generally defers to the default recommendation prescribed by the Reg's, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

X Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I agree with the sections of CMP 3. There may be instances that are not considered "in the field" where corrosion protection is necessary. The wording accepted by panel 3 provides additional clarity to section 300.6.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-584-7070

Signature: [Signature]

Name - Please Print: [Name]

Date: [Date]

June 2010
NFPA 70
TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("RegS"). Under the RegS, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See RegS at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text.

While the Standards Council generally defers to the default recommendation prescribed by the RegS, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

The Technical Committee has not reached consensus for this amendment. A return to the original text will not have an adverse affect on correlation in the Code.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name: Neil F. LaBrake, Jr. – TCC Principal, PEI rep. (Please Print)

Date: 09 July 2010

June 2010
Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
☐ Do Not Agree*
☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Although the panel has voted not to agree with the amendment, the commentary and concern expressed at the annual meeting it is clear that this change could be subject to misinterpretation in its enforcement. It is therefore the best course to allow this language to remain as is for the 2010 National Electrical Code and to encourage the panel to re-examine the language and develop specific language that cannot be misinterpreted for the 2014 NEC.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: James W. Carpenter

Date: July 7, 2010

June 2010
NFPA 70
TC BALLOT for Code Making Panel 3
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text.

While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
☒ Do Not Agree *
☐ Abstain *

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Panel 3 changed the wording to provide additional clarity that 300.6(A) would cover any installation where corrosion protection is warranted. The present language may be misinterpreted that it does not apply to pre-fab shops and other areas that may be considered outside the “field”. We support the language as adopted by Panel 3.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: Lawrence S. Ayer

Name - Please Print: Lawrence S. Ayer
Date: June 21, 2010

June 2010
NFPA 70
TC BALLOT for Code Making Panel 3
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reggs"). Under the Reggs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Reggs at 4.7.1(a). Please note that the Amendment that is the subject of this ballot recommends a return of 308.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Reggs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
☒ Do Not Agree*
☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The submitters intent here is to address threads that may cut at a Home Depot or Lowes, or an Electrical supply house where a protective coating wouldn’t necessarily be reapplied before the conduit was installed on the jobsite. The definition of field cut threads needs to be more clearly defined during the next code cycle.

________________________________________________________________________

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 817-984-7070

Signature: ___________________________

Name - Please Print: Paul Casparro

Date: June 15, 2010

June 2010
NFPA 70
TC BALLOT for Code Making Panel 3
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

THE PANEL TOOK THE CORRECT ACTION FOR THE REASONS STATED. WORDING AS ACCEPTED BY THE PANEL SHOULD BE RETAINED

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-794-7070

Signature:  

Name - Please Print: 06-22-10 STANLEY D KAHN

Date: ____________________

June 2010
NFPA 70
TC BALLOT for Code Making Panel 3
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

X Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I do not agree with the Amendment to Reject Comment 3-22. There was no doubt in the previous Panel 3 discussions that all conduit threads have to be protected where corrosion protection is necessary.

The question was how to define "field threading". Whereas someone could argue that "field" is anything outside the conduit manufacturer's premises (e.g., distributor, wholesaler, big box vendor, job site), Panel 3 decided on the more narrow definition, commonly understood in the trade, that "field" is just the contractor's sphere - the shop, maybe with a pre-fab facility, and the job site.

This would have left modifications done at distributors, etc. uncovered. The Panel 3 comment resolution places the responsibility for a code-compliant installation on the contractor.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: Ray R. Keden

Date: June 15, 2010
June 2010
Warren, Mary

From: T David Mills [tdmills@yahoo.com]
Sent: Tuesday, June 22, 2010 10:49 AM
To: Warren, Mary
Cc: Mel Sanders
Subject: CMP-03 Response to NITMAM 766 (Seq 70-5) Vote

Mary,

Below is my response to the NITMAM 766 voting.

Thanks,

Dave Mills

Help me help the kids with brain tumors.
Please visit: www.firstgiving.com/tdaviddills10

IEEE CMP-03 David Mills does not agree with the NITMAM 766 (Seq 70-5) vote at the June 2010 Association Technical Meeting.

ROP 3-51 for the 2005 NEC revision cycle was submitted by Steel Tube Institute of North America

CMP 3 modified “conduits” to “raceway” in the last sentence but this was not picked up in the text of Proposal 3051, page 2071 of NEC Committee Report on Proposals.

ROP 3-52 and ROP 3-55 were accepted in part to change the word “approved” in the last sentence to “listed.” ROP 3-54 was rejected which sought to allow a zinc coating compound because of concern with its ability to be electrically conductive.

ROC 3-24 and ROC 3-26, both submitted by the American Chemistry Council, were accepted which changed “listed” to “approved” in the last sentence. ROC 3-28 submitted by the Steel Tube Institute of North America was accepted which changed the last sentence to “Where corrosion protection is necessary and the conduct is threaded in the field...” This accepted text also changed the term “raceway” back to “conduit.”

Although not found in the official documentation from 2005 NEC revision cycle, the phrase “corrosion protection is necessary” satisfied the concerns expressed from the ROP stage that all threaded joints would have
to be field protected, and instead allowed past experiences to be considered when judging where corrosion protection would be necessary. This is borne out by the CMP 3 unanimous vote.

ROP 3-58 for the 2008 NEC revision cycle was submitted by a manufacturer of a listed compound to change the last sentence by replacing “approved” with “listed.” The CMP 3 vote to reject was not unanimous.

No substantiation had been provided of any problems using non-listed compounds and their efficacy as to being corrosion resistant and electrically conductive. ROP 3-59 was unanimously accepted to change “non-ferrous” to “aluminum. Since ROP 3-60 was accepted in principle, the acceptance of ROP 3-59 precluded the need to add an exception for Red Brass.

ROC 3-40 committee comment failed to achieve a consensus although a majority of CMP 3 agreed with accepting ROP 3-58 to change “approved” to “listed” with ROC 3-41, ROC 3-42, ROC 3-43, ROC 3-44 and ROC 3-45 all reported as rejected due to failure of ROC 3-40. A negative comment on ROC 3-40 provided both a history of the efforts on this issue as well as examples of materials that should not be employed to meet a corrosion problem.

ROP 3-63 for the 2011 NEC revision cycle sought to change “suitable” to “identified” which was rejected on procedural grounds. ROP 3-64 sought to include threads that did not have corrosion protection. The substantiation cited factory nipples and bends (sometimes referred to as “elbows” or “sweep ells”) do not have factory applied corrosion protection. ROC 3-64 was rejected with the statement that any field cut threads after the final factory coating was applied were subject to protection needs.

ROC 3-22 clarified that not all factory made elbows or nipples have corrosion protection applied. CMP 3 then changed the text to require any threads that do not have corrosion protection to have protection applied in the field. The 2005 NEC text was retained to state this protection was to be applied “Where corrosion protection is necessary…” to allow for site specific evaluation. This vote was unanimous by CMP 3.

The floor discussion on NITMAM 766 (Seq 70-5) confirmed the following.

1. Factory cut threads have corrosion protection applied.

2. Field cut threads do not.

3. Factory applied corrosion protection is not always “broken through” when RMC or IMC is tightened.

4. Field applied protection must be both corrosive resistant and electrically conductive.
5. Factory applied corrosion protection by itself does not take into account any electrically conductive nature of the process because each length is provided with a factory supplied coupling and is tested as an assembly at the factory for conductivity through the threads per UL listing.

These facts were made known to CMP 3 members during the ROP and ROC period of the 2005, 2008 and 2011 NEC revision cycle.

Also included in the floor discussion on NITMAM 766 (Seq 70-5) was the misstatement that inspectors would be constantly bombarded with requests to rule on when and where corrosion protection would be necessary. There have been no proposals or comments from any inspection agencies to CMP 3 where this has been an issue. In addition, the published text through 2005 and 2008 NEC editions state, and proposed text to 2011 NEC edition continues to include the following phrase “Where corrosion protection is necessary…”

This phrase has been, and is, understood and accepted by all represented organizations on CMP 3 that application of corrosion protection is site specific and experience oriented.

The accepted text of ROC 3-22 acknowledges the submitter’s substantiation that vendor supplied factory elbows and vendor supplied nipples do not always have corrosion protection applied to those threads. Because there is no definition as to what constitutes “field” versus “factory” CMP 3 then accepted the changed text “…where threads do not have corrosion protection…” to apply to factory elbows and factory nipples that do not have the corrosion protection applied, such as the protection found on straight lengths of RMC or IMC as confirmed by both NEMA representatives on CMP 3.

In summary, there is no disagreement with the NEMA statements that apply to straight lengths of RMC and IMC as they leave the factory.

What was also agreed by the NEMA representatives on CMP 3 is that “factory” elbows and “factory” nipples do not always have corrosion protection applied.

The NITMAM discussion pertained to straight lengths of RMC and IMC with no discussion of the reason for the actual text change.

The NITMAM discussion included the unsubstantiated statement that AHJ would be bombarded with innumerable requests for rulings on this issue when the lack such proposals and comments during the 2005 and 2008 and 2011 NEC revision cycle do not bear this out.
NFPA 70
TC BALLOT for Code Making Panel 3
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reg's"). Under the Reg's, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Reg's at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Reg's, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

X Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

The intent of this change is to address threads that are cut at locations other than the field, such as in a wholesale house. The argument from the original submitter is to address these threads, only and not some plan to require manufacturers to submit additional information to AHJ's. As pointed out in the original Panel Statement for the Proposal, UL, listing already requires such corrosion protection from the factory. This change is only to address the loophole of shop (not field) cut threads.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: __________________________________________

Name - Please Print: Richard P. Owen

Date: June 13, 2010

June 2010
Standards Council Supplemental Agenda
August 3-5, 2010

NFPA 70
TC BALLOT for Code Making Panel 3
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

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☐ Agree
☒ Do Not Agree*
☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

The submitter of both Proposal 3-64 and Comment 3-22 provided valid substantiation. Panel 3 revised the wording and voted unanimously to Accept in Principle the Comment. Corrosion will prevent a steel conduit from being an effective ground return path and will impact the structural integrity of conduit. Section 300.6(A) should apply to threads whether they are created in the field or if they are created as a part of a manufacturing process. The change provided by Comment 3-22 helps ensure a safe installation.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: ___________________________  David Pace  6/21/10

June 2010
NFPA 70  
TC BALLOT for Code Making Panel 3  
June 2010 ASSOCIATION AMENDMENT  
(To Reject Comment 3-22)

Amendment:  Reject Comment 3-22

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☐ Agree
☒ Do Not Agree*
☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

I was unable to access information regarding the issue with the Committee's actions that prompted this amendment prior to the deadline for submission of this ballot. Therefore I DO NOT AGREE with the amendment and feel that the committee actions are appropriate as stated.

________________________________________________________________________
________________________________________________________________________

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-984-7070

Signature: John E. Sleights

Name - Please Print: ________________________________

Date: 06/21/10

June 2010
Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reg's"). Under the Reg's, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Reg's at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Reg's, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain": It is my professional experience that conduit nipple whether they are RMC or IMC type will still rust and corrode when installed in a corrosive atmosphere. This is why it is necessary to use a conductive anti-corrosion compound on all conduit terminations. I have professional experience as it relates to installations in corrosive environments such as adjacent to saltwater atmospheres, and to personnel working in paper mills where the only way to protect the threads is to use the conductive anti-corrosion compound. It can be shown that the corrosion inhibitor that was testified to is grossly inadequate when subjected to the above environments.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

[Signature]

Name - Please Print: Wendell R. Whitster

Date: 06/13/2010

June 2010
NFPA 70
TC BALLOT for Code Making Panel 3
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

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☐ Agree
☐ Do Not Agree*
X Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

June 22nd: The meeting transcript is not available for review by the Automatic Fire Alarm Association (AFAA) Codes and Standards Committee. As a result, it is not possible to make an informed decision.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: S. E. Egesdal

Name - Please Print: S. E. Egesdal

Date: June 22, 2010

June 2010
**COMMENT 3-22 (A2010) Reject Comment**

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<tr>
<th>3-22 Log #1984 NEC-P03</th>
<th>Final Action: Accept in Principle</th>
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Submitter: Donald A. Ganiere, Ottawa, IL

**Comment on Proposal No:** 3-64

**Recommendation:** This proposal should be accepted.

**Substantiation:** I don’t think I made my original proposal completely clear. When the electrician purchases a “factory made” elbow or a “factory cut” nipple, the threads of these items do not always have corrosion protection on the threads like the full lengths of made conduit do. Because these unprotected threads are not field cut the current code rule does not require the installer to apply a corrosion protection compound. These threads have the same corrosion issues as a field cut thread and need field applied protection. My proposal will require than any unprotected threads installed in areas where corrosion protection is required to have field applied corrosion protection.

**Panel Meeting Action:** Accept in Principle

Revise text to read as follows:

(A) Ferrous Metal Equipment. Ferrous metal raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, metal elbows, couplings, nipples, fittings, supports, and support hardware shall be suitably protected against corrosion inside and outside (except threads at joints) by a coating of approved corrosion-resistant material. Where corrosion protection is necessary and the conduit is threaded in the field, the threads shall be coated with an approved electrically conductive, corrosion-resistant compound.

**Panel Statement:** The text was modified to more accurately meet the intent of the submitter.

- **Number Eligible to Vote:** 14
- **Ballot Results:** Affirmative: 14

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**PROPOSAL 3-64 (A2010) Backup**

<table>
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<th>3-64 Log #3646 NEC-P03</th>
<th>Final Action: Reject</th>
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Submitter: Donald A. Ganiere, Ottawa, IL

**Recommendation:** Revise text to read as follows:

(A) Ferrous Metal Equipment. Ferrous metal raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, metal elbows, couplings, nipples, fittings, supports, and support hardware shall be suitably protected against corrosion inside and outside (except threads at joints) by a coating of approved corrosion-resistant material. Where corrosion protection is necessary and the conduit is threaded in the field, the threads shall be coated with an approved electrically conductive, corrosion-resistant compound.

**Substantiation:** The current wording only applies to field cut threads. Where factory nipples and bends are used, these threads do not have corrosion protection and need field applied protection just like field cut threads do.

**Panel Meeting Action:** Reject

**Panel Statement:** RMC and IMC are listed and the corrosion protection is part of the listing. Section 5.4.2 in UL 6 provides the requirements for protection of threads. IMC and RMC are threaded before the final coating is provided for the overall length, but if it is field cut (after the final coating) then protection must be applied before the conduit is installed as required in 300.6(A). There is no technical substantiation to justify this proposed requirement.

- **Number Eligible to Vote:** 14
- **Ballot Results:** Affirmative: 14
it needs to be covered. The NEC must address this issue.

CHAIR BELL: Thank you. Microphone 4.

MR. WILKINSON: Robert Wilkinson, IEC, call the question.

CHAIR BELL: There's been a motion to call the question. Is there a second? There's a second. All those in favor to call the question, please raise your hand. Thank you. All those opposed. Motion passes.

We'll move directly to the vote to accept Comment 3-13. All those in favor of accepting Comment 3-13, please raise your hand. Thank you. All those opposed. Motion fails.

We'll move on to the next sequence, Motion Sequence 70-5. Is there a motion on the floor?

MR. BRENT: Yes. Martin Brent, employed by Wheatland 2 Company, a fittings manufacturer, speaking for myself. I'm the maker of the motion and speaking in support of the motion. I move for the acceptance.

CHAIR BELL: Let's get the motion on the floor. Your motion is to reject Comment 3-22; is that correct?
MR. BRENT: Yes, sir.

CHAIR BELL: Is there a second? Please proceed.

MR. BRENT: I move for the acceptance of my NITMAM 70-5, which seeks rejection of Comment 3-22. If successful, this proposed motion will return 300.6A back to the previous edition text since the original Proposal 3-64 was rejected.

The substantiation states, As an electrician purchases factory-made elbows or factory-cut nipple, the threads of these items do not always have corrosion protection on the thread like the full lengths of made conduit do."

It also states, "These threads have the same corrosion issue as field cut threads and need field-applied protection. While I agree they are similar, there are some differences.

And the fact that the manufacturer under a manufacturing listing is required to have corrosion protection on the threads, it's a very big difference than the field cut threads which are outside the control of UL.

And the language in the 2008 Code is appropriate for that. Factory threaded elbows and nipples are required by the listings to have a
1 corrosion resistance code. Please support my NITMAM
2 and vote to approve -- reject 3-22.
3 CHAIR BELL: Mr. Carter.
4 MR. CARTER: I'd like to defer to the Chair
5 of Panel 3, Paul Casparo.
6 MR. CASPARO: Paul Casparo representing
7 IBEW. Panel 3 accepted in principle that comment.
8 Some of the discussions were factory 90's,
9 manufacturer 90's, and the protection that they
10 already had. The field cut threads was another
11 issue. And it was termed that field cut threads did
12 need additional protection, which it does have now.
13 So, again, Panel 3 accepted in principle 3-22.
14 CHAIR BELL: Further discussion?
15 Microphone 3.
16 MR. KAVOJIC: Thank you Mr. Chairman. John
17 Kavojic, Underwriters Laboratories, speaking as the
18 representative of the Electrical Section of the
19 National Fire Protection Association and speaking in
20 favor of the motion.
21 The Electrical Section of NFPA met earlier
22 this week. And at that meeting, the members voted to
23 support the motion on the floor. Thank you.
24 CHAIR BELL: Thank you. Microphone 1.
25 MR. ODEE: Mark Odee, Underwriters
Laboratories and alternate member of Panel 3. And I'm supporting the motion. UL 6, covering rigid metal conduit, and UL 1242, covering IMC and rigid metal conduit, requires standard lengths of rigid metal conduit. The IMC couplings, elbows, nipples that have a galvanized coating applied at the factory has corrosion protection. So the proposed extra field-installed protection is unnecessary. This proposed change would introduce circumstances where substantial lengths of listed raceways and fittings already installed to be removed for the extra corrosion protection to be installed with no technical reason. These things are already coming as part of the listed assembly. In other words, I take a piece of rigid metal conduit, put a coupling together, I put fittings together, they're already corrosion protected by the factory. And we test for that corrosion protection. So this is an unnecessary inclusion in the National Electrical Code.

CHAIR BELL: Thank you. Microphone 9.

MS. THOMPSON: Thank you, Mr. Chairman.

Elaine Thompson, Allied Tube and Conduit, speaking for the motion.

When this was put forward, the change in
this language, the 300.6 in the proposal stage, Panel 3 voted unanimously to reject it. And the reason for the rejection was, as former speakers have already testified, there is already erosion protection on factory supplied product. And, number two, there's already something in the code that takes care of field cut threads. And, number 3, there was not sufficient substantiation or problem.

So I don't know what happened during the comment stage to change the panel's mind. And perhaps they didn't realize the full impact of the language. But the language now states that where corrosion protection is necessary and where threads do not have corrosion protection, the threads shall be coated, et cetera.

What's going to happen, you know, we manufacturers coat the thread. So that's not a problem. I think it's going to be really tough on inspectors, installers, and contractors because every time they install threaded conduit now, I think they're going to have to be calling the factory. "Do you have corrosion protection on your threads?" And the answer is quite simply, "Yes, we do." We have to. We're required to do so by the UL standards. 

So I think it's going to cause a lot more
problems than it's trying to solve. And we hope you support this motion.

CHAIR BELL: Thank you. Microphone 5.

MR. MCKLOWSKI: Vince Mcklowski, National Electrical Manufacturers Association speaking in support of the motion. Mr. Chairman, NEMA does support the motion. Thank you.

CHAIR BELL: Thank you. Microphone 9 again.

MR. JOHNSTON: Thank you, Mr. Chair. Mike Johnston, NECA. I'm talking in support of the motion.

I believe this may introduce unnecessary steps in what the contractors and installers are required to accomplish or perform when it's already a provision of the fittings and so forth for conduit. So NECA supports the motion on the floor.

CHAIR BELL: Thank you. Microphone 2.

MR. HIRSCHLER: Marcelo Hirschler, GBH International, call the question.

CHAIR BELL: Motion to call the question.

Is there a second?

UNIDENTIFIED SPEAKER: Second.

CHAIR BELL: There is a second. All those in favor of calling to question, raise your hand.

All those opposed. Motion carries. We'll move
directly to the **vote to reject Comment 3-22.**

All those in favor please, raise your hand.

Thank you. All those opposed. **Motion carries.**

At this time, ladies and gentlemen, I did want to mention that we're up to 13. You broke the record. So I want to congratulate you. And we can continue after a break. We're going to take a 15-minute break at this time.

Please recognize that we will not take a formal lunch break in order to most effectively use your time. Thank you.

(A brief recess was taken.)

CHAIR BELL: Ladies and gentlemen, get seated, and we'll get started again. I do want to remind you that you have your 13 consecutive streak, and we're still counting.

So we're up to motion sequence 70-6. Is there a motion for Sequence Number 70-6?

Microphone 1.

MR. FLEGEL: Mike Flegel, Reliance Controls Corporation. I move to accept Comment 3-69.

CHAIR BELL: The motion is to accept Motion 3-69. Is there a second? I hear a second. Please proceed.

MR. FLEGEL: This motion is to return the
ASSOCIATION AMENDMENT
BALLOT RESULTS
DATE: July 19, 2010

AMENDMENT

Document: NFPA 70®, National Electrical Code®

Motion: To Reject Comment 3-22

NEC TCC FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS NOT achieved the necessary \( \frac{3}{4} \) majority vote needed to recommend approval of the Association Action by the Technical Correlating Committee.

The number of affirmative votes needed for the report to be published is 9.

\[ 12 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 11 \times 0.75 = 8.25 \]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[ 12 \text{ eligible} \div 2 = 6 + 1 = 7 \text{ (this is the simple majority)} \]

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<td>5 Do Not Agree</td>
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<tr>
<td>0 Abstain</td>
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Final Action: FAIL

CMP-3 FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS NOT achieved the necessary \( \frac{2}{3} \) majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the amendment to be issued is 9.

\[ 14 \text{ (eligible to vote)} - 0 \text{ (not returned)} - 1 \text{ (abstention)} = 11 \times 0.66 = 8.58 \]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[ 14 \text{ eligible} \div 2 = 7 + 1 = 8 \text{ (this is the simple majority)} \]

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<td>1 Abstention</td>
<td>(Egesdahl)</td>
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Final Action: FAIL
ASSOCIATION AMENDMENT
BALLOT RESULTS

DATE: July 19, 2010

AMENDMENT

Document: NFPA 70®, National Electrical Code®

Motion: To Reject Comment 3-22

NEC TCC FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment **HAS NOT** achieved the necessary 3/4 majority vote needed to recommend approval of the Association Action by the Technical Correlating Committee.

The number of affirmative votes needed for the report to be published is **9**.

\[
[12 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 11 \times 0.75 = 8.25]
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
[12 \text{ eligible } ÷ 2 = 6 + 1 = 7 \text{ (this is the simple majority)}]
\]

12 Eligible to Vote
1 Not Returned (Drake)

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<td>(Brunssen, Fiske, Hittinger, LaBrake, Liggett)</td>
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Final Action: FAIL

CMP-3 FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment **HAS NOT** achieved the necessary 2/3 majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the amendment to be issued is **9**.

\[
[14 \text{ (eligible to vote)} - 0 \text{ (not returned)} - 1 \text{ (abstention)} = 11 \times 0.66 = 8.58]
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
[14 \text{ eligible } ÷ 2 = 7 + 1 = 8 \text{ (this is the simple majority)}]
\]

14 Eligible to Vote
0 Not Returned

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<td>(Egesdahl)</td>
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Final Action: FAIL

Revised Page Number 98 of 813
Amendment:  Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regns"). Under the Regns, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regns at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text.

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☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I agree with the position of the TC members who voted in the Negative. All threads, whether factory-cut, field-cut, or on piece parts bought at the local building supply outlet should be protected. If they do not contain protection when purchased, corrosion protection compound should be applied in the field.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: ____________________________

Name - Please Print: James F. Bruinsma

Date: July 3, 2010

June 2010
NFPA 70
TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text.

While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
☒ Do Not Agree*
☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

A significant majority of CMP-3 members stated that the panel action is correct. Absent some procedural failure – none in this case – the CMP’s findings should be given considerable deference.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

[Signature]

Name - Please Print: William T. Fiske
Date: 2010-07-07

June 2010
Supplemental Attachment 10-8-1-d

June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22.

NOTES: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reg's"). Under the Reg's, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Reg's 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to F300.4(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Reg's, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain".

I agree with the action of NFPA 3. There may be instances that are not considered "in the field" where confusion and definition may be necessary. The wording accepted by panel 5 provides additional clarity to sections 200.4.

Please return as soon as possible, before later than Friday, July 9, 2010.

Mary V. Werner
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-378-2679

Signature: [Signature]

Name: Please Print  David Hunter

Date: July 8, 2010

June 2010
Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reg"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

The Technical Committee has not reached consensus for this amendment. A return to the original text will not have an adverse affect on correlation in the Code.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name: Neil F. LaBrake, Jr. – TCC Principal, EEF rep. (Please Print)

Date: 09 July 2010

June 2010
Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reggs"). Under the Reggs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Reggs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Reggs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☑ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I agree with the action of Panel 3. All threads whether factory or field made should be protected where corrosion protection is required.

________________________________________________________________________

________________________________________________________________________

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: ____________________________________________

Name - Please Print: ______________________________________

Date: 7-16-2010

June 2010
Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

X Agree

☐ Do Not Agree*

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Although the panel has voted not to agree with the amendment, by the commentary and concern expressed at the annual meeting it is clear that this change could be subject to misinterpretation in its enforcement. It is therefore the best course to allow this language to remain as is for the 2010 National Electrical Code and to encourage the panel to re-examine the language and develop specific language that cannot be misinterpreted for the 2014 NEC.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: James W Carpenter

Date: July 7, 2010

June 2010
Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
☒ Do Not Agree*
☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

Panel 3 changed the wording to provide additional clarity that 300.6(A) would cover any installation where corrosion protection is warranted. The present language may be misinterpreted that it does not apply to pre-fab shops and other areas that may be considered outside the "field". We support the language as adopted by Panel 3.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: __________

Name - Please Print: Lawrence S. Ayer
Date: June 21, 2010

June 2010
NFPA 70
TC BALLOT for Code Making Panel 3
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(e). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
☒ Do Not Agree*
☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:
The submitters intent here is to address threads that may cut at a Home Depot or Lowes, or an Electrical supply house where a protective coating wouldn’t necessarily be reapplied before the conduit was installed on the jobsite. The definition of field cut threads needs to be more clearly defined during the next code cycle.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: Paul Casparro

Date: June 15, 2010

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June 2010
Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reggs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text.

While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
☒ Do Not Agree*
☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

THE PANEL TOOK THE CORRECT ACTION FOR THE REASONS STATED. WORDING AS ACCEPTED BY THE PANEL SHOULD BE RETAINED

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: 06-22-10 STANLEY D KAHN

Date: ______________________

June 2010
NFPA 70
TC BALLOT for Code Making Panel 3
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text.

While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

X Do Not Agree*

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

I do not agree with the Amendment to Reject Comment 3-22. There was no doubt in the previous Panel 3 discussions that all conduit threads have to be protected where corrosion protection is necessary.

The question was how to define “field threading”. Whereas someone could argue that “field” is anything outside the conduit manufacturer’s premises (e.g., distributor, wholesaler, big box vendor, job site), Panel 3 decided on the more narrow definition, commonly understood in the trade, that “field” is just the contractor’s sphere - the shop, maybe with a pre-fab facility, and the job site.

This would have left modifications done at distributors, etc. uncovered. The Panel 3 comment resolution places the responsibility for a code-compliant installation on the contractor.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: Ray R. Keden

Date: June 15, 2010
June 2010
Mary,

Below is my response to the NITMAM 766 voting.

Thanks,

Dave Mills

Help me help the kids with brain tumors.
Please visit: www.firstgiving.com/davidmills10

IEEE CMP-03 doesn't agree with the NITMAM 766 (Seq 70-5) vote at the June 2010 Association Technical Meeting.

ROP 3-51 for the 2005 NEC revision cycle was submitted by Steel Tube Institute of North America.

CMP 3 modified "conduits" to "raceway" in the last sentence but this was not picked up in the text of Proposal 3051, page 2071 of NEC Committee Report on Proposals.

ROP 3-52 and ROP 3-55 were accepted in part to change the word "approved" in the last sentence to "listed." ROP 3-54 was rejected which sought to allow a zinc coating compound because of concern with its ability to be electrically conductive.

ROC 3-24 and ROC 3-26, both submitted by the American Chemistry Council, were accepted which changed "listed" to "approved" in the last sentence. ROC 3-28 submitted by the Steel Tube Institute of North America was accepted which changed the last sentence to "Where corrosion protection is necessary and the conduct is threaded in the field..." This accepted text also changed the term "raceway" back to "conduit."

Although not found in the official documentation from 2005 NEC revision cycle, the phase "corrosion protection is necessary" satisfied the concerns expressed from the ROP stage that all threaded joints would have...
to be field protected, and instead allowed past experiences to be considered when judging where corrosion protection would be necessary. This is borne out by the CMP 3 unanimous vote.

ROP 3-58 for the 2008 NEC revision cycle was submitted by a manufacturer of a listed compound to change the last sentence by replacing “approved” with “listed.” The CMP 3 vote to reject was not unanimous.

No substantiation had been provided of any problems using non-listed compounds and their efficacy as to being corrosion resistant and electrically conductive. ROP 3-59 was unanimously accepted to change “non-ferrous” to “aluminum. Since ROP 3-60 was accepted in principle, the acceptance of ROP 3-59 precluded the need to add an exception for Red Brass.

ROC 3-40 committee comment failed to achieve a consensus although a majority of CMP 3 agreed with accepting ROP 3-58 to change “approved” to “listed” with ROC 3-41, ROC 3-42, ROC 3-43, ROC 3-44 and ROC 3-45 all reported as rejected due to failure of ROC 3-40. A negative comment on ROC 3-40 provided both a history of the efforts on this issue as well as examples of materials that should not be employed to meet a corrosion problem.

ROP 3-63 for the 2011 NEC revision cycle sought to change “suitable” to “identified” which was rejected on procedural grounds. ROP 3-64 sought to include threads that did not have corrosion protection. The substantiation cited factory nipples and bends (sometimes referred to as “elbows” or “sweep ells”) do not have factory applied corrosion protection. ROC 3-64 was rejected with the statement that any field cut threads after the final factory coating was applied were subject to protection needs.

ROC 3-22 clarified that not all factory made elbows or nipples have corrosion protection applied. CMP 3 then changed the text to require any threads that do not have corrosion protection to have protection applied in the field. The 2005 NEC text was retained to state this protection was to be applied “Where corrosion protection is necessary….” to allow for site specific evaluation. This vote was unanimous by CMP 3.

The floor discussion on NITMAM 766 (Seq 70-5) confirmed the following.

1. Factory cut threads have corrosion protection applied.
2. Field cut threads do not.
3. Factory applied corrosion protection is not always “broken through” when RMC or IMC is tightened.
4. Field applied protection must be both corrosive resistant and electrically conductive.
5. Factory applied corrosion protection by itself does not take into account any electrically conductive nature of the process because each length is provided with a factory supplied coupling and is tested as an assembly at the factory for conductivity through the threads per UL listing.

These facts were made known to CMP 3 members during the ROP and ROC period of the 2005, 2008 and 2011 NEC revision cycle.

Also included in the floor discussion on NITMAM 766 (Seq 70-5) was the misstatement that inspectors would be constantly bombarded with requests to rule on when and where corrosion protection would be necessary. There have been no proposals or comments from any inspection agencies to CMP 3 where this has been an issue. In addition, the published text through 2005 and 2008 NEC editions state, and proposed text to 2011 NEC edition continues to include the following phrase “Where corrosion protection is necessary…”

This phrase has been, and is, understood and accepted by all represented organizations on CMP 3 that application of corrosion protection is site specific and experience oriented.

The accepted text of ROC 3-22 acknowledges the submitter’s substantiation that vendor supplied factory elbows and vendor supplied nipples do not always have corrosion protection applied to those threads. Because there is no definition as to what constitutes “field” versus “factory” CMP 3 then accepted the changed text “…where threads do not have corrosion protection…” to apply to factory elbows and factory nipples that do not have the corrosion protection applied, such as the protection found on straight lengths of RMC or IMC as confirmed by both NEMA representatives on CMP 3.

In summary, there is no disagreement with the NEMA statements that apply to straight lengths of RMC and IMC as they leave the factory.

What was also agreed by the NEMA representatives on CMP 3 is that “factory” elbows and “factory” nipples do not always have corrosion protection applied.

The NITMAM discussion pertained to straight lengths of RMC and IMC with no discussion of the reason for the actual text change.

The NITMAM discussion included the unsubstantiated statement that AHJ would be bombarded with innumerable requests for rulings on this issue when the lack such proposals and comments during the 2005 and 2008 and 2011 NEC revision cycle do not bear this out.
NFPA 70
TC BALLOT for Code Making Panel 3
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 3-22)

Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reggs"). Under the Reggs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Reggs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Reggs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

The intent of this change is to address threads that are cut at locations other than the field, such as in a wholesale house. The argument from the original submitter is to address these threads only and not some plan to require manufacturers to submit additional information to AHJ’s. As pointed out in the original Panel Statement for the Proposal, UL listing already requires such corrosion protection from the factory. This change is only to address the loophole of shop (not field)-cut threads.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: ____________________________

Name - Please Print: Richard P. Owen

Date: June 13, 2010

June 2010
Amendment: Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
☐ Do Not Agree*
☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

The submitter of both Proposal 3-64 and Comment 3-22 provided valid substantiation. Panel 3 revised the wording and voted unanimously to Accept in Principle the Comment. Corrosion will prevent a steel conduit from being an effective ground return path and will impact the structural integrity of conduit. Section 300.6(A) should apply to threads whether they are created in the field or if they are created as a part of a manufacturing process. The change provided by Comment 3-22 helps ensure a safe installation.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: ____________________________  
David Pace  6/21/10

June 2010
**Amendment:** Reject Comment 3-22

**NOTE:** This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reg's"). Under the Reg's, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Reg's at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Reg's, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I was unable to access information regarding the issue with the Committee's actions that prompted this amendment prior to the deadline for submission of this ballot. Therefore I DO NOT AGREE with the amendment and feel that the committee actions are appropriate as stated.

__________________________________________

Please return as soon as possible, but no later than **Tuesday, June 22, 2010** to:

Mary V. Warren  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-984-7070

Signature: John E. Sleights  
Name - Please Print: __________________________________________

Date: **06/21/10**

June 2010
Amendment:  Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reg's"). Under the Reg's, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Reg's at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Reg's, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
☑ Do Not Agree*
☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

It is my professional experience that conduit nipple whether they are RMC or IMC type will still rust and corrode when installed in a corrosive atmosphere. This is why it is necessary to use a conductive anti-corrosion compound on all conduit terminations. I have professional experience as it relates to installations in corrosive environments such as adjacent to saltwater atmospheres, and in bleach plants within paper mills where the only way to protect the threads is to use the conductive anti-corrosion compound.

It can be shown that the corrosion inhibitor that was testified to is grossly inadequate when subjected to the above environments.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name: Please Print: Wendell R. Whitster

Date: 06/13/2010

June 2010
Amendment:  Reject Comment 3-22

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return of 300.6(A) to previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
☐ Do Not Agree*
X Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

June 22nd: The meeting transcript is not available for review by the Automatic Fire Alarm Association (AFAA) Codes and Standards Committee. As a result, it is not possible to make an informed decision.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-984-7070

Signature:  S. E. Egesdal

Name - Please Print:  S. E. Egesdal

Date:  June 22, 2010

June 2010
COMMENT 3-22 (A2010) Reject Comment

3-22 Log #1984 NEC-P03 Final Action: Accept in Principle
(300.6(A))

Submitter: Donald A. Ganiere, Ottawa, IL
Comment on Proposal No: 3-64
Recommendation: This proposal should be accepted.
Substantiation: I don’t think I made my original proposal completely clear. When the electrician purchases a “factory made” elbow or a “factory cut” nipple, the threads of these items do not always have corrosion protection on the threads like the full lengths of made conduit do. Because these unprotected threads are not field cut the current code rule does not require the installer to apply a corrosion protection compound. These threads have the same corrosion issues as a field cut thread and need field applied protection. My proposal will require than any unprotected threads installed in areas where corrosion protection is required to have field applied corrosion protection.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
(A) Ferrous Metal Equipment. Ferrous metal raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, metal elbows, couplings, nipples, fittings, supports, and support hardware shall be suitably protected against corrosion inside and outside (except threads at joints) by a coating of approved corrosion-resistant material. Where corrosion protection is necessary and the conduit is threaded in the field, the threads shall be coated with an approved electrically conductive, corrosion-resistant compound.
Panel Statement: The text was modified to more accurately meet the intent of the submitter.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

PROPOSAL 3-64 (A2010) Backup

3-64 Log #3646 NEC-P03 Final Action: Reject
(300.6(A))

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
(A) Ferrous Metal Equipment. Ferrous metal raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, metal elbows, couplings, nipples, fittings, supports, and support hardware shall be suitably protected against corrosion inside and outside (except threads at joints) by a coating of approved corrosion-resistant material. Where corrosion protection is necessary and the conduit is threaded in the field, threads do not have corrosion protection, the threads shall be coated with an approved electrically conductive, corrosion-resistant compound.
Substantiation: The current wording only applies to field cut threads. Where factory nipples and bends are used, these threads do not have corrosion protection and need field applied protection just like field cut threads do.
Panel Meeting Action: Reject
Panel Statement: RMC and IMC are listed and the corrosion protection is part of the listing. Section 5.4.2 in UL 6 provides the requirements for protection of threads. IMC and RMC are threaded before the final coating is provided for the overall length, but if it is field cut (after the final coating) then protection must be applied before the conduit is installed as required in 300.6(A). There is no technical substantiation to justify this proposed requirement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Subject: Extension to the implementation of Code change to Article 590.6

From: Chris Turner [mailto:Chris.Turner@generac.com]
Sent: Monday, June 28, 2010 12:37 PM
To: Earley, Mark
Subject: Extension to the implementation of Code change to Article 590.6

Mr. Earley,

My company, Generac Power Systems along with other member companies of the PGMA, Portable Generator Manufacturers Association has been made aware of the recent acceptance of Proposal 3-140 made by Mr. Mark Ode to article 590.6 at the NFPA Convention in Las Vegas earlier this month. This change requires the addition of GFCI protected receptacles for 125 / 250V, single phase 15, 20 and 30A on all portable 15Kw and less.

Whilst to many on the outside this may seem like a simple change there are many factors that need to be taken into account not the least of which is the fact that GFCI versions of 20 and 30A 125 / 250V Receptacles simply do not exist on the market today. As manufacturers we will need time to redesign our control panels to fit additional components, possibly retool injection molded or stamped steel enclosures, obtain prototype samples, endurance test, await overseas supply lead times, re certify products to applicable standards.

We do not believe this can be accomplished by the proposed implementation date of Jan 1st 2011. We would like to propose an extension or delay of 12 months. Although the code change will be made we request that the proposal date for implementation be changed to Jan 1st 2012.

Please advise if this proposal can be considered at all be the code making panel. Obviously you can understand we have not been able to make this proposal until now as the original proposal was not fully approved until earlier this month as it was being contested in a NITMAM.

I would appreciate your prompt reply to this issue so we can share the information with the other members of the PGMA.

Kind Regards

Chris Turner
Principal Engineer
Generac Power Systems
Tel: 262 544 4811 Ext 3293
Fax: 262 594 5039
cturner@generac.com
FORM FOR FILING NOTICE OF INTENT TO MAKE A MOTION (NITMAM) AT AN ASSOCIATION TECHNICAL MEETING

PLEASE CHECK SCHEDULE FOR FINAL DATE FOR RECEIPT OF NITMAM

If you have questions about filling out or filing the NITMAM, please contact the Codes and Standards Administration at 617-884-7249

For further information on the Codes- and Standards-Making Process, see the NFPA website (www.nfpa.org)

Date 5/5/10 Name Michael O. Flegel Tel. No. 262-634-6155
Company or Affiliation Reliance Controls Corporation Email Address: mkle@reliancecontrols.com
Street Address 2001 Young Court City Racine State WI Zip 53404

1. (a) NFPA Document (Include Number and Title) NFPA 70, National Electrical Code
   (b) Proposal or Comment Number, Comment 3-69
   (c) Section/Paragraph Article 590.6

2. Motion to be made. Please check one; (See also 4.6 of the Regulations Governing Committee Projects)
   (a) Proposal
      (1) Accept
      (2) Accept an Identifiable Part.*
      (3) Accept as modified by the TC.
      (4) Accept an Identifiable Part as modified by TC.*
   (b) Comment
      (X) (1) Accept
      (2) Accept an Identifiable Part.*
      (3) Accept as modified by the TC.
      (4) Accept an Identifiable Part as modified by TC.*
      (5) Reject
      (6) Reject an Identifiable Part.*
   (c) Return Technical Committee Report for Further Study
      (1) Return entire Report.
      (2) Return a portion of a Report in the form of a proposal and related comment(s).
      (3) Return a portion of a Report in the form of identifiable part(s) of a proposal and related comments (s). (Identify the specific portion of the proposal and the related comments below)*

* Clearly identify the Identifiable Part(s) indicated above (use separate sheet if required).

3. I am entitled to make this motion in accordance with 4.6.8 of the Regulations Governing Committee Projects, as follows: (check (a), (b), or (c)).

   (a) X This motion may be made by the original submitter or their designated representative, and I am the (if you check (a) indicate one of the following):
      X I am the Original submitter of the proposal or comment, or
      ___ I am the submitter's designated representative (attach written authorization signed by the original submitter), or
   (b) ___ This motion may be made by a Technical Committee Member and I am a Member of the responsible Technical Committee.
   (c) ___ This motion may be made by anyone.

(Form continued on next page)

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4. Comments or Clarification (optional): This NITMAM will be reviewed by a Motions Committee. In addition to determining whether your Amending Motion is proper, the Committee may take other actions as described in 2.3 of the Technical Meeting Convention Rules as follows:

Restating and Grouping of Motions. Upon request or on its own initiative, and in consultation with the mover(s), the Motions Committee may: (a) restate an Amending Motion to facilitate the making of a proper motion or to clarify the intent of the mover; and (b) group Amending Motions which are dependent on one another into a single Amending Motion. Dependent motions are motions that the mover(s) wish to be considered by the assembly and voted on as single up or down package. In addition to the foregoing, the Motions Committee may take such other actions or make such other recommendations as will facilitate the fair and efficient consideration of motions within the available time.

The NFPA Staff may contact you to clarify your motion or to consult on the permitted actions in 2.3. If you have any comments, suggestions, or requests of the Motions Committee as it reviews your NITMAM and considers actions permitted in 2.3, please provide them below. (Use additional sheet if necessary):

Name (please print): Michael O. Flegel
Signature (Required) [Signature]

(Note: This NITMAM will be reviewed, and if proper, your Amending Motion will be certified in accordance with the Technical Meeting Convention Rules and posted on the NFPA website. Documents that have Certified Amending Motions will be considered at the June Annual Meeting Technical Committee Report Session. In order to have your Certified Amending Motion considered at that meeting, you must appear, sign in, and make the motion as prescribed in the Convention Rules).

PLEASE USE A SEPARATE NITMAM FORM FOR EACH AMENDING MOTION YOU WISH TO MAKE.

Mail to: Secretary, Standards Council, National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471
NFPA Fax: (617) 770-3500

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very few portable generators are grounded and has nothing to do with the fact that some have GFCI protection of some sort. How people use their protection with them? Isolation is a powerful safety device and should not be ignored. Isolation and the extra protection of downstream GFCI protection is even better and it is essentially what is being done today since the generator is not required to be grounded. Has somebody provided data to show that what is being done now is not safe?

**Bonding and Grounding—Utility vs. Portable Generators**

OSHA requires bonded neutral generators in their regulations for construction sites. In reading these regulations, they appear to be identical to the NEC. The requirement for bonding requirements are presented in Appendix A explains their position. To completely understand OSHA's response, please read the request letter by Mr. Iwasa. It appears OSHA incorrectly interprets the NEC. It says a generator in a stand alone use is a separately derived system (see Article 200) and not as much to be bonded. Please note the interpretation does not have any safety arguments other than misinterpreting the NEC which leaves it with no technical merit. As such it has no relevance in this discussion.

Generators used in simple stand alone applications, operate in a much different environment than a properly operating system being fed from the utility. There is no huge generator capable of outputting high fault current, no transformers and switchgear, and no large, elevated distribution system subject to lightning strikes all of which can create surges in the system. Such surges can be addressed through bonding and grounding rather than having them go through appliances and endanger safety. The reason for bonding and grounding is substantially reduced when utility power is removed. As a matter of fact, Article 250 agrees and does not require the grounding of a generator in stand alone applications. This allows a floating system using existing bonding neutral generators or bonded-neutral generators that are not grounded.

Bonding and grounding have some pitfalls that are tolerated in order to get the desired protection described above from utility systems. A bonded and grounded system creates numerous pathways for current to flow back to the power source (substitution for Problem 6). These include the ground, and any metal object connected to the ground such as plumbing fixtures and pipes and beating ducts. If someone comes in contact with a hot wire from the power source and one of these objects, the circuit is completed through the individual. In fact, people can be shot if these pitfalls created very dangerous situations for premises wiring systems. Products and systems were developed to mitigate the safety risks. Grounding wires were added to appliances plugs and grounding terminals were added to receptacles so that if some faulting to the case of the appliance would cause a short, it would go through the circuit breaker. This protected the user in case he touched the case and one of the extensive return paths to the power source created by bonding and grounding the system. The GFCI was invented to interrupt the current flow when the current out of a receptacle isn't the same amount as the returning current. If it isn't returning thru the receptacle, then it probably is returning through a person that is touching one of those many objects that have a path back to the power source, again, as a result of bonding and grounding the system.

Why create a more dangerous situation by connecting multiple objects to a return path back to the source if there are no advantages in doing so like in stand alone portable generator applications? Some people would argue that the devices used to protect people in bonded and grounded systems no longer work in a floating situation. This is true but the devices are not only designed to be used on a system that is grounded they are not necessary. The circuit breaker tripping in the fault-to-case example above and the GFCI protection are two of the safety devices in bonded and grounded systems mentioned earlier. In the first case, the fault to case means only a connection between the person to the faulted conductor and they are not necessary. Similarly, a GFCI would never trip because there is never a ground path available back to the generator i.e. a ground fault can never occur back to the source. This truly is a paradoxical shift in the way we think about electrical systems and it is important for people to understand they have to look at portable generator applications differently.

**Temporary Installations**

For the casual user such as a camper of home owner working in the back yard, the floating neutral generator is the safest and most cost effective application that does not require additional ground fault protection using, what about harsher environments where more than 50% chance occur like in more complex systems such as Temporary Installations? The floating system still seems to be the safer of the two alternatives as shown in Appendix B (supplementation for Problems 1, 2, and 3). As you know, Temporary Installations can have lots of exposed cords that come in contact with adjacent objects and other objects and this is a higher probability that neutral will be pulled to ground somewhere in the system. Article 590 wisely requires GFCI protection on receptacles. If the receptacles do not have GFCI protection, people must use GFCI protection that is wired to extension cords or the GFCI devices. No doubt this is an excellent idea for installations using grounded and bonded utility power but is it really necessary for the protection to be built into portable generators? The answer depends on whether the generator is bonded and grounded. If it is, then the GFCI protection on the generator and grounded the generator is unnecessary since the NEC does not require it. If not grounded, the protection is unnecessary on the generator because you have a system that does not
intentionally creates any paths back to the source. If you are concerned that a neutral to ground fault would likely occur downstream from the generator receptacle because of the harsh environment, then adding GFCI protection with cord devices or other downstream GFCI devices is a good idea. See Figure supplied as supporting material.

The figures also demonstrate that the closer the GFCI protection is to the person in a floating system, the more protection that person has (substantiation for Problems 3 and 8). A Temporary Installation should be either a bonded and grounded system with GFCI protection on the generator or a floating system with no GFCI protection on the generator. For both and depending on the harshness of the environment, one may consider having additional ground fault protection close to the workers either in a distribution box in which the tools they are using are plugged or in bent mounted GFICIs. The extra protection would protect them in the grounded system in case the GFCI on the generator failed or if the generator was not properly grounded and a neutral was accidentally pulled to ground elsewhere in the system. It would protect them in the floating system in case a neutral was accidentally pulled to ground in the system (substantiation for Problems 8 and 9).

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: See the panel statement in Comment 3-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3

Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
EASTER, L.: See NEMA’s Explanation of Negative on Comment 3-83.
OWEN, S.: See comment on 3-65.

Comment 3-67 (A2010) Related comment to
Comment 3-69 Panel Statement

3-67 Log #1414 NEC-P03 (590.6)
Final Action: Reject

Submitter: James Hendricks, Hendricks Hardware Co.
Comment on Proposal No. 3-140
Recommendation: Delete 590.6(A) as follows:
590.6(A) Receptacles at 15 kW or less Portable Generators: All 120 and 208/240 volt, single-phase, 15 kW and 208/240 volt, single-phase receptacle outlets that are a part of a 15 kW or less portable generator shall have listed ground fault
interupter protection for personnel.
Substitution: Most of the commercially available small inverter generators like the Honda EU2000i (Honeywell, et al) and Onan are just a few of the others feature a floating neutral. Tens of thousands of these are sold every year. Adding a GFCI to the receptacles will serve no purpose, as it will be completely ineffective on a floating neutral generator because the ground and neutral are not tied together. How can the NEC mandate a “safety” measure that won’t work?
Panel Meeting Action: Reject
Panel Statement: A GFCI receptacle monitors the amount of current that goes out on the ungrounded conductor and then comes back on the neutral conductor and if there is a loss of 6 milliamperes or greater it does not come back through the GFCI comparison device, then the GFCI device will trip. GFCIs will trip without the benefit of an equipment grounding conductor path back to the source but obviously having a lower impedance path back to the source is much more desirable since the equipment grounding conductor path back to the frame of the generator and then back to the source for the system bonding jumper to the neutral provides a much lower impedance path. Section 250.20(B)(1) requires any AC system of 50 volts to 1000 volts to be grounded where the system can be grounded so that the maximum voltage to ground on the ungrounded conductor does not exceed 150 volts. Section 250.20(D) requires any separately derived system, as covered by 250.20(B) to be grounded in accordance with 250.30(A) of which a portable generator would be covered under this section.
In addition, 250.54 does not require the frame of a portable generator to be connected to a grounding electrode if the portable generator supplies only equipment mounted on the generator, cord-and-plug-connected equipment through receptacles mounted on the generator, or both. In addition, the normally non-current-carrying parts of equipment and bonding conductors terminals of the receptacles are required to be connected to the generator frame. This section does not state that floating the neutral in the generator is acceptable since the generator is a separately derived system and must have a system bonding jumper installed from the equipment grounding system in the generator to the grounded or neutral conductor within the generator.

The 1975 NEC Section 210-8(b) required “all 120-volt single phase 15 and 20 ampere receptacle outlets which are part of the permanent wiring of the building or structure, shall have ground fault circuit interrupters for personnel protection.” An exception was inserted into 210-8(b) that permitted “receptacles on a portable generator rated not more than 3 kW, where the circuit conductors of the generator are insulated from earth and the generator frame is insulated from earth and all grounded surfaces.
This section and exception was moved to 305-4(a) in 1984 and the text in the exception was changed to “receptacles on a 2-wire, single-phase portable or vehicle-mounted generator rated not more than 5 kW, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces” need not be GFCI protected. This exception existed with similar wording until the 2002 NEC when it was removed by Panel 3 from 527-6(A) with the intent to require GFCI protection of all generator receptacles based on temporary installations on construction sites.
Section 406.3(B), Exception No. 1 permits receptacles mounted on portable and vehicle mounted generators to comply with 250.34 but does not permit the equipment grounding conductor to just connect to the frame of the generator since there must be a complete path for fault current back to the generator coils based on 250.20(B) and (D) as stated above. Section 250.21 and 250.22 do not permit an ungrounded neutral for a 120 and 120/240 volt system.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 10 Negative: 4

Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
CASEARCO, F.: This comment should have been accepted. What is at stake here is the safety of the construction worker on the job site, OSHA enforces the lack of GFCI protection on construction sites. We know lives have been saved by the use of GFCI’s, we just don’t know how many.
EASTER, L.: See NEMA’s Explanation of Negative on Comment 3-83.
OWEN, S.: See comment on 3-65.

Comment 3-81 (A2010) Related comment

3-81 Log #1229 NEC-P03 (590.6(A))
Final Action: Accept in Principle

Submitter: Vince Bacilwzki, National Electrical Manufacturers Association (NEMA)
Comment on Proposal No. 3-161
Recommendation: This Proposal should be accepted to add new text to the requirement in Section 590.6(A).
Substitution: Receptacles provided with equipment such as portable generators in temporary installations require the same degree of protection as for fixed installations according to 460.8. UL 2201, Portable Engine-Generator Assemblies, First Edition dated March 4, 2009, is up to date on the requirements of 406.8, requiring that all “15- and 20-A, 125 and 250 V non-locking receptacles shall be of the weather resistant type” UL 2201 also requires, in clause 15.7.6, that “Receptacles shall be protected from exposure to weather. The requirements in 406.8(A) provide the appropriate requirements to support the standard.
The Panel statement that this requirement would be “unenforceable” seems to imply the that the protection needs to be added to the generator at the point of use. In fact, with the force of the Code, generator manufacturers and produces of other separately derived equipment would be compelled to provide the required protection, and thus the degree of safety required by 406.8. NEMA would like to point out that thousands of portable engine-generators are purchased by the general public each year. The requirement described in the new UL 2201 standard for portable generators is an example of how this standard has anticipated the necessity of this Code direction.
Panel Meeting Action: Accept in Principle
Add the following revised text as a second sentence to the accept in principle text 590.6(A)(3) in Proposal 3-140 to read as follows: All 15- and 20-ampere, 125- and 250-volt receptacles, including those that are part of a portable generator, used in a damp or wet location shall comply with Section 406.8(A) and (B).
Panel Statement: The word “all” provides an adjective to start the sentence, rather than a number, and the word “Section” has been deleted in compliance with the NEC Style Manual. Specific subsections (A) and (B) were added since receptacles of portable generators would not be separately derived and the equipment grounding conductor terminals of the receptacles are required to be connected to the generator frame. This panel does not state that floating the neutral in the generator is acceptable since the generator is a separately derived system and must have a system bonding jumper installed from the equipment grounding system in the generator to the grounded or neutral conductor within the generator.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
PROPOSAL 3-140 (A2010) Backup

3-140 Log #4419 NEC-P03  Final Action: Accept in Principle
(590.6)

Submitter: Mark C. Ode, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
Ground fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) and (B). This section shall apply only to temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities. This section shall also apply to power derived from an electric utility company or from an on-site-generated power source.

(A) Receptacle Outlets. Temporary receptacle outlets shall be used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities. This section shall apply to power derived from an electric utility company or from an on-site-generated power source.

(1) Receptacle Outlets Not Part of Permanent Wiring. All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are not a part of the permanent wiring of the building or structure and that are used by personnel shall have ground fault circuit interrupter protection for personnel.

(2) Receptacle Outlets Existing or Installed as Permanent Wiring. Ground fault circuit interrupter protection for personnel shall be provided for all 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are a part of the permanent wiring of the building or structure and are used for temporary electric power. Listed cord sets or devices incorporating listed ground fault circuit interrupter protection for personnel identified for portable use shall be permitted.

(B) Use of Other Outlets. For temporary wiring installations, R receptacles, other than those covered by 590.6(A)(1) through 590.6(A)(3), shall have protection in accordance with (B)(1) or the assured equipment grounding conductor program in accordance with (B)(2).

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also be given the same degree of protection as is called for in 406.8. These generators typically come with cautions for use only in areas protected from weather. However, since they are usually gas powered the user is directed to only use the equipment outdoors with sufficient ventilation.

Panel Meeting Action: Reject
Panel Statement: Requiring a portable generator to comply with 406.8, where used in a damp or wet location during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities, would be almost impossible to enforce.

Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
EASTER, L.: This proposal should have been accepted by Panel 3. The entire Article 590 requires inspection. The panel statement that this requirement would be “unenforceable” seems to imply that the protection needs to be added to the generator by the installer. In fact, with the force of the Code, generator manufacturers would be compelled to provide the required protection, and thus the degree of safety required by 406.8. AFCI receptacles in portable generators on job sites should have WUU protection.
3-65 Log #1313 NEC-P03
(590,6)

Submitter: Andrew S. McConnell, Boyle Fredrickson SC
Comment on Proposal No: 3-140
Recommendation: Proposal 3-139 should be rejected.
Substantiation: 90.2 specifically defines the National Electrical Code as an installation code, and Article 90.1(c) specifically indicates the National Electrical Code is not intended as a design specification. However, the proposed change to 590.6 concerns the design of portable generators, not their installation. This is a substantial departure from the historical intent and purpose of the National Electrical Code.

Under conventional and accepted use of the Code for safe installation practices, the NFPA would not have product liability exposures in the event a manufacturer produce a product that possesses some hidden safety flaw. However, under the proposed product design specification of 590.6, it is possible that the NFPA could be subjected to exposure in product liability litigation. For example, a manufacturer may comply with Code requirements and produce a generator with an on-board GFCI. In the event the configuration has a safety flaw and does not prevent all possible ground faults, resulting in injury or death, the NFPA could be named as a defendant in a product liability lawsuit because the generator was designed to the required design specifications of 590.6.

The NFPA should give careful thought to the significant departure in the intent and purpose of the National Electrical Code reflected by the proposed change to 590.6, and should avoid acting in a manner that could expose it to potential liability resulting from the specification of product design features.

Panel Meeting Action: Reject
Panel Statement: The requirements for GFCI protection on certain receptacles concerning portable generators does not deal with product design or product specification, any more than requiring a GFCI receptacle for a bathroom receptacle deals with product design. This deals with GFCI protection for personnel for any temporary power used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities no matter if the power originates from the power company or from a generator.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3

Explanation of Negative:

AYER, L.: While it may seem like a good idea at first, there are numerous issues that must be studied prior to requiring GFCI protection for all 125V 15A, 20A, and 30A receptacles on portable generators. This requirement should be rejected until these issues have been resolved.

First, OSHA requires GFCI protection for receptacles on generators that are larger than 5 kW. This is required since larger units can have capacitive coupling between the generator frame and the winding causing a shock hazard and a complete path for the current to flow back to the generator. Units smaller than 5 kW are less of a concern since there is less risk for capacitive coupling. Allowing the text to go through as written will create conflict with the OSHA standards.

There are numerous instances in which having GFCI protection may create more harm than good. Individuals use portable generators for a wide variety of reasons beyond providing power for electrical construction tools. Connecting a generator to power a furnace during an ice storm, or using a portable generator with 300 foot long extension cords to power temporary lighting may be an issue if GFCI protection is mandated. Inrush currents on motors and leakage currents in long extension cords may cause inadvertent nuisance tripping. Contractors and maintenance personnel should be afforded the opportunity to place GFCI protection at the best possible location given the situation for which the generator is being used.

Portable generators are used in harsh environments. It is quite realistic that a lifespan of a GFCI device would be shortened due to the harsh conditions in which it would operate. Should this requirement pass workers may rely more heavily on the perception that they are protected by the generator rather than providing cord sets and external GFCI receptacle devices. Cord sets and external GFCI receptacles are much more likely to be either be tested prior to use or be replaced on a more frequent basis.

A study completed by the Construction Safety Association of Ontario (CSAO) in 1997 reviewed two different grounding schemes for portable generators: floating-neutral and bonding-neutral. The floating neutral is used mainly for generators 5 kw or less. The study concludes that floating neutral generators should have GFCI protection closest to the tool being used while bonding-neutral generators can have GFCI protection at the generators. These differences do not bode well to required GFCI protection at all portable generators regardless if the neutral-ground bond exists.

EASTER, L.: See NEMA’s Explanation of Negative on Comment 3-83.

OWEN, S.: I agree with Mr. Pauley’s comment 3-83. It is not within the purview of CMP-3 to require GFCI protection

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as an integral part of a generator. Further, I do not believe that there is substantiation provided to warrant the changes proposed requiring GFCI protection to be an integral part of a generator. I wish to apply this reasoning for comments 3-65 through 3-80, and 3-82 through 3-89.
Standards Council Supplemental Agenda
August 3-5, 2010

Report on Comments – June 2010

3-67 Log #1414 NEC-P03
(590.6)

Submitter: James Hendricks, Hendricks Hardware Co.
Comment on Proposal No: 3-140
Recommendation: Delete 590.6(3) as follows:

590.6(3) Receptacles an 15 kW or less Portable Generators. All 120 and 120/240 volt, single phase, 15, 20, and 30 ampere receptacle outlets that are a part of a 15 kW or smaller portable generator shall have listed ground fault circuit interrupter protection for personnel:

Substantiation: Most of the commercially available small inverter generators like the Honda EU2000 (Honeywell, ETQ, and Can are just a few of the others) feature a floating neutral. Tens of thousands of these are sold every year. Adding a GFCl to the receptacles will serve no purpose, as it will be completely ineffective on a floating neutral generator because the ground and neutral are not tied together. How can the NEC mandate a “safety” measure that won’t work?

Panel Meeting Action: Reject
Panel Statement: A GFCl receptacle monitors the amount of current that goes out on the ungrounded conductor and then comes back on the neutral conductor and if there is leakage of 6 milliamps or greater that does not come back through the GFCl comparison device, then the GFCl device will trip. GFCls will trip without the benefit of an equipment grounding conductor path back to the source but obviously having a lower impedance path back to the source is much more desirable since the equipment grounding conductor path back to the frame of the generator and then back to the source on the system bonding jumper to the neutral provides a much lower impedance path.

Section 250.20(B)(1) requires any AC system of 50 volts to 1000 volts to be grounded where the system can be grounded so that the maximum voltage to ground on the ungrounded conductor does not exceed 150 volts. Section 250.20(D) requires any separately derived system, as covered by 250.20(B) to be grounded in accordance with 250.30(A) of which a portable generator would be covered under this section.

In addition, 250.34 does not require the frame of a portable generator to be connected to a grounding electrode if the portable generator supplies only equipment mounted on the generator, cord-and-plug-connected equipment through receptacles mounted on the generator, or both. In addition, the normally non-current-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are required to be connected to the generator frame. This section does not state that floating the neutral in the generator is acceptable since the generator is a separately derived system and must have a system bonding jumper installed from the equipment grounding system in the generator to the grounded or neutral conductor within the generator.

The 1975 NEC Section 210-8(b) required “all 120-volt single phase 15 and 20 ampere receptacle outlets which are not part of the permanent wiring of the building or structure, shall have ground fault circuit interrupters for personnel protection.” An exception was inserted into 210-8(b) that permitted “receptacles on a portable generator rated not more than 5 kW, where the circuit conductors of the generator are insulated from earth and the generator frame is insulated from earth and all grounded surfaces.”

This section and exception was moved to 305-4(a) in 1984 and the text in the exception was changed to “receptacles on a 2-wire, single-phase portable or vehicle-mounted generator rated not more than 5 kW, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces” need not be GFCl protected. This exception existed with similar wording until the 2002 NEC when it was removed by Panel 3 from 527-6(A) with the intent to require GFCl protection of all generator receptacles based on temporary installations on construction sites.

Section 406.3(B), Exception No. 1 permits receptacles mounted on portable and vehicle mounted generators to comply with 250.34 but does not permit the equipment grounding conductor to just connect to the frame of the generator since there must be a complete path for fault current back to the generator coils based on 250.20(B) and (D) as well as 250.30(A) as stated above. Section 250.21 and 250.22 do not permit an ungrounded neutral for a 120 and 120/240 volt system.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 10 Negative: 4
Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
CASPARRO, P.: This comment should have been accepted. What is at stake here is the safety of the construction worker on the job site. OSHA enforces the lack of GFCl protection on construction sites. We know lives have been saved by the use of GFCl’s, we just don’t know how many
EASTER, L.: See NEMA’s Explanation of Negative on Comment 3-83.
OWEN, S.: See comment on 3-65.
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3-69 Log #1646 NEC-P03
(590.6)

Final Action: Reject

Submitter: Michael Flagel, Reliance Controls Corporation

Comment on Proposal No: 3-140

Recommendation: Reject the proposal.

Substantiation: Statement of Problems Proposal 3-140

Substantiation for Problems 1, 2, 3, 6, 8 and 9 is listed below:

1. It is impossible to have a ground fault back to the generator if it is not bonded and grounded, so GFCI protection on the generator doesn’t make sense since no requirement exists for bonding and grounding. In complex systems and in harsh environments, neutrals can be pulled to ground beyond the generator. GFCI protection on generators that are not bonded and grounded does not protect people against these ground faults but they may believe it does. This may encourage bad safety practices and/or discourage people from taking further steps to protect themselves against ground faults.

2. The bonding and grounding needed in Problem 1 will create ground fault hazards. Why intentionally create a hazard and then have to add a device to protect against it, especially when the added device is an electronic device on a piece of hot, vibrating equipment which adds to the likelihood of its failure? It makes more sense to float the system. A floating neutral portable generator without GFCI protection is safer than a bonded neutral portable generator with GFCI protection in stand alone applications even if the latter is properly grounded. There is no need to have GFCI protection in stand alone applications even if the latter is properly grounded. There is no need to have GFCI protection built into a floating neutral generator.

3. Stand alone portable generator applications currently used for Temporary Installations are not required to be grounded making GFCI protection more effective closer to the individual performing the work. The protection should not be on the generator.

4. In paragraph 590(A)(3) conflicts with the Exception in 590(A) in the Proposal. If the Temporary Installation is powered by a portable generator 15 kW or less, people cannot substitute an assured equipment grounding program in lieu of GFCI protection because no non-GFCI outlet is available on the generator.

5. 90.2 of the National Electrical Code states that the Code only covers the installation of electrical conductors, equipment, and raceways, etc. It does not cover the design of equipment such as having GFCI protection built into a portable generator. The Code can and does address the following installation aspects of a portable generator:

a. Adding downstream GFCI protection—Article 590 (2008)

b. Bonded or not bonded—There are several sections addressing Separately and Non-separately derived systems

c. Receptacles connected to the frame—250.34

In each case, the Code does not dictate that the generator has these design features but rather it instructs on how to install it when a generator has these features. The NEC does not develop product standards for the equipment that is installed. The NEC can specify how to install a bonded neutral generator with GFCI protection, or a floating neutral generator without GFCI protection but it shouldn’t require that the generator have the protection built in.

6. 590.6 requires receptacles, installed as part of the permanent wiring of the building or structure and that are used for temporary electric power, to have ground-fault circuit-interrupter protection for personnel. It allows the use of cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use to meet this requirement. It does not require people to replace permanently installed non-GFCI with GFCI receptacles in Temporary Installations. Why should permanently installed receptacles in portable generators be any different than those in a building or structure? If anything, the utility system has more reasons to replace non GFCI receptacles with GFCI protected receptacles because the system is always bonded and grounded.

7. 525.23 (C) clearly states that egress lighting circuits for carnivals, circuses, fairs, and similar events cannot be GFCI protected. The purpose of this is to assure that egress lighting is always available. Since egress lighting can be powered by portable generators at these sorts of events, the proposal will not allow compliance to this Article.

8. Off-generator GFCI protection adds an additional level of protection to all portable generator applications but yet the proposal infers it should not be used on generators manufactured after January 1, 2011.

9. The proposal has not substantiated a safety problem; it just incorrectly states there is one. GFCI protection on the generator would ensure that people would use it but is only effective if people properly bond and ground the generator and is not as effective as other alternatives as stated above in Problems 1 and 2 and 3. Generally people are more concerned about the live cords and devices they contact on a regular basis like the ones connected to the power tools they are using and the power tools themselves. This is where downstream, personal GFCI devices really are more effective in harsh environments. Power cords to distribution boxes are seldom handled, or seldom need to be handled.
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when they are under power.

Do you know for a fact that the current safety record isn’t due to the fact that very few portable generators are grounded and has nothing to do with the fact that some have GFCI protection or that people use other forms of GFCI protection with them? Isolation is a powerful safety device and should not be ignored. Isolation and the extra protection of downstream GFCI protection is even better and it is essentially what is being done today since the generator is not required to be grounded. Has somebody provided data to show that what is being done now is not safe?

Bonding and Grounding—Utility vs. Portable Generators

OSHA requires bonded neutral generators in their regulations for construction sites. In reading these regulations, they appear to be identical to the NEC requirements except for this bonding requirement. The interpretation in Appendix A explains their position. To completely understand OSHA’s response, please read the request letter by Mr. Iwasa. It appears OSHA incorrectly interprets the NEC. It says a generator in stand alone use is a separately derived system (see Article 100) and as such needs to be bonded. Please note the interpretation does not have any safety arguments other than misinterpreting the NEC which leaves it with no technical merit. As such it has no relevance in this discussion.

Generators used in simple stand alone applications, operate in a much different environment than a premises wiring system being fed from the utility. There is no huge generator capable of outputting high fault current, no transformers and switchgear, and no large, elevated distribution system subject to lightning strikes all of which can create surges in the system. Such surges must be addressed through bonding and grounding rather than having them go through appliances and endanger safety. The reason for bonding and grounding is substantially reduced when utility power is removed. As a matter of fact, Article 250 agrees and does not require the grounding of a generator in stand-alone applications. This allows a floating system using either floating neutral generators or bonded-neutral generators that are not grounded.

Bonding and grounding have some pitfalls that are tolerated in order to get the desired protection described above from utility systems. A bonded and grounded system creates numerous pathways for current to flow back to the power source (substantiation for Problem 6). These include the ground, and any metal object connected to the ground such as plumbing fixtures and popes and heating ducts. If someone comes in contact with a hot wire from the power source and one of these objects, the circuit is completed with disastrous results to the individual. In fact, people did realize that these pitfalls created very dangerous situations for premises wiring systems. Products and systems were developed to mitigate the safety risks. Grounding wires were added to appliance plugs and grounding terminals were added to receptacles so that a hot wire faulting to the case of an appliance would cause a short, tripping the circuit breaker. This protected the user in case he touched the case and one of the extensive return paths to the power source created by bonding and grounding the system. The GFCI was invented to interrupt the current flow when the current out of a receptacle isn’t the same amount as the returning current. If it isn’t returning through the receptacle, then it probably is returning through a person that is touching one of those many objects that have a path back to the power source, again, as a result of bonding and grounding the system.

Why create a more dangerous situation by connecting multiple objects to a return path back to the source if there are no advantages in doing so like in stand alone portable generator applications? Some people would argue that the devices used to protect people in bonded and grounded systems no longer would work in a floating situation. This is true but they fail to understand they are not necessary. The circuit breaker tripping in the fault-to-case example above and the GFCI protection are two of the safety devices in bonded and grounded systems mentioned earlier. In the first case, the fault to the case represents only a connection of the person to one wire from the source in a floating system. Because there is no path back to the source, the individual holding the tool is not injured. Similarly, a GFCI would never trip because there is never a ground path available back to the generator i.e. a ground fault can never occur back to the source. This truly is a paradigm shift in the way we think about electrical systems and it is important for people to understand they have to look at portable generator applications differently.

Temporary Installations

For the casual user such as a camper of home owner working in the back yard, the floating neutral generator is the safest and most cost effective application that does not require additional ground fault protection using GFCIs. But what about harsher environments where multipoint failures occur like in more complex systems such as Temporary Installations? The floating system still seems to be the safer of the two alternatives as shown in Appendix B (substantiation for Problems 1, 2, and 9). As you know, Temporary Installations can have lots of exposed cords that come in contact with exposed beams, piping, sharp objects and other metal objects that create a higher probability that neutral will be pulled to ground somewhere in the system. Article 590 wisely requires GFCI protection on receptacles. If the receptacles do not have GFCI protection, people must use GFCI protection that is built in to extension cords or other GFCI devices. No doubt this is an excellent idea for installations using grounded and bonded utility power but is it really necessary for the protection to be built into portable generators? The answer depends on whether the generator is
bonded and grounded. If it is, then the GFCI protection on the generator is needed but grounding the generator is unlikely since the NEC does not require it. If not grounded, the protection is unnecessary on the generator because you have a system that does not intentionally create any paths back to the source. If you are concerned that a neutral to ground fault would likely occur downstream from the generator receptacle because of the harsh environment, then adding GFCI protection with cord devices or other downstream GFCI devices is a good idea. See Figure supplied as supporting material.

The Figures also demonstrate that the closer the GFCI protection is to the person in a floating system, the more protection that person has (substantiation for Problems 3 and 8). A Temporary Installation should be either a bonded and grounded system with GFCI protection on the generator or a floating system without GFCI protection on the generator. For both and depending on the harshness of the environment, one may consider having additional ground fault protection close to the workers either in a distribution box in which the tools they are using are plugged or in belt mounted GFCIs. The extra protection would protect them in the grounded system incase the GFCI on the generator failed or if the generator was not properly grounded and a neutral was accidentally pulled to ground elsewhere in the system. It would protect them in the floating system incase a neutral was accidentally pulled to ground in the system (substantiation for Problems 8 and 9)

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: See the panel statement in Comment 3-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3
Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
EASTER, L.: See NEMA's Explanation of Negative on Comment 3-83.
OWEN, S.: See comment on 3-65.
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3-70 Log #1655 NEC-P03
(590.6)

Final Action: Reject

Submitter: Nick Weinkauf, Industrial Sales Tech Inc.
Comment on Proposal No: 3-140
Recommendation: This proposal should be rejected.
Substantiation: GFCI protection integral to a generator may not necessarily ensure adequate personnel protection. In particular, a poorly grounded bonded-neutral generator may not provide a ground path adequate to allow the GFCI to trip. In such cases, a user would mistakenly be led to believe that he was adequately protected when, in fact, he was not. GFCI protection, when required by Code, is beset provided independently of the generator.
Panel Meeting Action: Reject
Panel Statement: See the panel statement in Comment 3-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3
Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
EASTER, L.: See NEMA's Explanation of Negative on Comment 3-63.
OWEN, S.: See comment on 3-65.
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3-71 Log #2003 NEC-P03 Final Action: Reject
(590.6)

Submitter: Jerry Qian, All Power America

Comment on Proposal No: 3-140

Recommendation: Proposal 3-140 should be rejected entirely.
Proposal 3-140 will add this Article to the NEC:
590.6(3). Receptacles on 15 kW or less Portable Generators used in Temporary Installations.
We have been made aware that this pending code proposal will require GFCI protection to be integral to all portable
generators smaller than 15 kW, regardless of whether or not GFCI protection will perform as intended.
Proposal 3-140 should be rejected entirely.
Proposal 3-140 will the following to the NEC:
590.6(3). Receptacles on 15 kW or less Portable Generators used in Temporary Installations.
We have been made aware that this pending code proposal will require GFCI protection to be integral to all portable
generators smaller than 15 kW, regardless of whether or not GFCI protection will perform as intended.

Substantiation:
Proposal 3-140 should be rejected entirely for the following reasons, including but not limited to:

1. GFCIs on generators will not function reliably unless the neutral and ground conductors are connected to a
functional grounding system, which they generally are not.

The NEC does not require the grounding of portable generators when used in stand-alone applications. This becomes
extremely important for workers at temporary installations, where GFCI protection is required by the NEC. In such
cases, ineffective protection given by the GFCI protection on the portable generator can mistakenly lead personnel to
believe that they are protected by the generator GFCI, and continue the use of personal or other supplemental GFCI
protection that has kept them safe for years. This could be a serious mistake.

2. This Proposal would create at least two Code conflicts.

525.23(C) clearly states that egress lighting circuits for carnivals, circuses, fairs, and similar events cannot be GFCI
protected. The purpose of this is to assure that egress lighting is always available. Since egress lighting is often
powered by portable generators at these sorts of events, the proposed additional Articles cannot mandate GFCI outlets
on portable generators.

In addition, proposed 590.6(A)(3) and the Exception under 590.6(A) are mutually exclusive. The Exception allows
590.6(B)(2) under circumstances that are "not compatible with GFCI protection" but the proposal does not provide for a
portable generator where non-GFCI protection is allowed.

3. If floating neutral generators are used, there is no need for the GFCI.
In a system as complex as premises wiring, full isolation is not possible, and the reasons for grounding such unique
electrical systems are spelled out in 250.4(A)(1). In such a case, the GFCI is necessary to protect the user from being
injured or killed by the utility power since exposed metal parts are intentionally electrified through the bonding and
grounding process. However, with a stand-alone portable generator, bonding and grounding is not required by the NEC,
and full isolation is easily achievable. Therefore, public safety for portable generators is best served by protecting the
user through the use of simple, dependable basic insulation and isolation, instead of through a process that deliberately:
(a) creates a ground path,
(b) allows the electrocution to begin and then,
(c) attempts to stop it before lethality is complete using a complicated and fragile electronic sensing and interrupting
device.
Quite simply, if there is no ground fault path, then there can be no ground fault.

4. This proposal is clearly outside of the scope of the National Electrical Code.
UL addresses applications of small portable generators such as lighting on camp sites, powering table saws and
hand-held tools, and so on. However, 90.2 of the National Electrical Code states that the Code only covers the
installation of electrical conductors, equipment, and raceways, etc. It does not cover electrical equipment that is not
installed. Neither the portable generator used in a stand-alone application nor the appliances it powers are installed. As
a result, the NEC clearly has no jurisdiction over portable generators used in stand-alone applications.

5. The NEC cannot mandate design or construction requirements for equipment.
As an installation code, the NEC can mandate that a particular feature exists (disconnect at a certain location, for
example), but not how it is to be achieved (circuit breaker, switch, properly rated plug-and-connector, etc.). Therefore,
while the NEC can mandate ground fault protection for particular circuits, it is not within its authority to mandate that said
ground fault protection must be provided by a GFCI outlet integral to the generator.
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We believe that this proposal is ill-conceived (even though well-intended) and will lead to confusion at the user level, will not improve portable generator safety as intended, or are better addressed by existing code requirements.

Panel Meeting Action: Reject

Panel Statement: See the panel statement in Comment 3-67.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 11 Negative: 3

Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
EASTER, L.: See NEMA's Explanation of Negative on Comment 3-83.
OWEN, S.: See comment on 3-65.
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3-72  Log #2126  NEC-P03
(590.6)

Final Action: Reject

Submitter: Lora Christensen, Reliance Controls Corp.
Comment on Proposal No:  3-140
Recommendation: Revise text to read as follows:

(3) Receptacles on 15 kW or less Portable Generators. All 125-volt and 125/250-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are a part of a 15 kW or smaller bonded-neutral portable generator shall have listed ground-fault circuit interrupter protection for personnel. Listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted required for use with 15kW or less all portable generators manufactured or remanufactured prior to January 1, 2011 except bonded-neutral generators with built-in GFCI protection that are grounded in accordance with Article 250.

Substantiation: If there is no neutral connection to the ground, ground faults back to the source are impossible. Bonded-neutral generators have the frame of the generator tied to the neutral of the generator but if the frame is not properly grounded, no path exists for ground faults. Floating-neutral generators only have the grounding conductors tied to the frame isolating the neutral from any contact with the ground, even if the generator is grounded. No need to have GFCI protection built into a floating neutral generator. There is a need for a bonded-neutral generator but only if it is properly grounded. Since neutrals can be pulled to ground away from the generator in harsh applications, the use of off-generator GFCI protection should be encouraged for all generators not grounded, whether or not the generator has GFCI protection built in.

Panel Meeting Action: Reject
Panel Statement: See the panel statement in Comment 3-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 12  Negative: 2
Explanation of Negative:
EASTER, L.: See NEMA’s Explanation of Negative on Comment 3-83.
OWEN, S.: See comment on 3-65.
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Submitter: Jeffrey Flegel, Reliance Controls Corp.

Comment on Proposal No: 3-140

Recommendation: This proposal should be rejected.

Substantiation: This proposal will cause mass confusion in the marketplace. The installed base of double-pole, 120/240V manual transfer switches will not operate with generators with GFCI outlet protection and with the neutral bonded to the generator frame. Hundreds of thousands of double-pole manual transfer switches would be rendered inoperable and require replacement with more expensive three-pole transfer switches. These applications go far beyond home standby use and agricultural applications. For example, from New York to Florida, traffic signals along storm and flood evacuation routes are equipped with manual transfer switches that will not work with GFCI protected portable generators. Many of these routes are critical for Homeland Security and may be subject to the requirements of Article 708. Therefore, the NEC should consider the severe economic and safety impact on the public sector and reject this proposal.

Panel Meeting Action: Reject

Panel Statement: The requirement in 590.6 only applies to generators used for temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities and would not apply to home standby power and agricultural applications. See the panel statement in Comment 3-67.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 11 Negative: 3

Explanation of Negative:

- AYER, L.: See negative statement on comment 3-65.
- EASTER, L.: See NEMA's Explanation of Negative on Comment 3-63.
- OWEN, S.: See comment on 3-65.
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3-74 Log #2517 NEC-P03
(590.6)

Final Action: Reject

Submitter: Bill Johnson, Champion Power Equipment

Comment on Proposal No: 3-140

Recommendation: Reject Proposal 3-140.

Substantiation: Requiring the addition of GFCI receptacles to portable generator panels rather than relying on GFCI cord sets may introduce safety hazards. GFCI receptacles are not reliable when exposed to the vibration and environment of portable generators powered by single cylinder reciprocating engines. Loss of electrical power to lighting (visibility) or power to tools caused by false tripping of generator mounted GFCI receptacles can create safety hazards. Also, panel mounted GFCI receptacles require bonding one hot leg of a 2-wire single phase 120 volt generator output to the generator frame in order to sense a ground fault. Many portable generators are designed for other markets, including emergency back up power and recreational activity. The use of floating neutrals in these applications is common in order to eliminate a return path, preventing an otherwise lethal condition in the event of an equipment short circuit. There is no guarantee that these floating neutral generators will not end up at job sites with GFCI receptacles installed, resulting in a false sense of security and a safety hazard.

Panel Meeting Action: Reject

Panel Statement: The requirement in 590.6 only applies to generators used for temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities and would not apply to other applications. See the panel statement in Comment 3-67.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 11 Negative: 3

Explanation of Negative:

AYER, L.: See negative statement on comment 3-65.

EASTER, L.: See NEMA's Explanation of Negative on Comment 3-83.

OWEN, S.: See comment on 3-65.
3-75 Log #2520 NEC-P03
(590.6)

Final Action: Reject

Submitter: James Jongkind, American Honda Motor Co., Inc.

Recommendation: Please do not accept the proposal as it could be misinterpreted as requiring that all portable generators be installed with GFCIs as original equipment. Mandatory wide-spread application of GFCIs to portable generators could have serious unintended consequences.

Substantiation: This section already wrongly requires floating neutral generators to utilize GFCIs when used for temporary power during certain professional use activities. See also comment to Proposal 3-19. The proposal requires that GFCIs be located at the source, but it does not clarify that this is an installation requirement in as much that an approved corded GFCI can satisfy the requirement.

Panel Meeting Action: Reject

Panel Statement: See the panel statement in Comment 3-67.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 11 Negative: 3

Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
EASTER, L.: See NEMA's Explanation of Negative on Comment 3-83.
OWEN, S.: See comment on 3-65.
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3-76 Log #2448 NEC-P03 (590.6(3))

Final Action: Reject

Submitter: Jack Mandula, GenTran Corp.

Comment on Proposal No: 3-140

Recommendation: Delete entire proposal.

Substantiation: 1. Portable generators 15kW or smaller with GFCI protection will not operate with the installed base of non-automatic transfer switches used for standby power applications. Over 3/4 of portable generators sold are used at one time or another for standby power applications, connected to a manual transfer switch, to provide standby power to buildings. Adopting the proposal will create field user issues not solvable without modification to existing, installed equipment.

2. GFCIs on portable generators will not operate properly unless the generator ground and neutral are connected to grounding system, which is not required by the NEC in temporary applications, leading to false sense of security and defeating the possible GFCI protection benefits.

3. This proposal is not within the scope of the NEC. The NEC covers the installation, not the design of equipment. This proposal attempts to mandate certain designs for portable generators, the NEC does not apply.

Panel Meeting Action: Reject

Panel Statement: The requirement in 590.6 only applies to generators used for temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities and would not apply to other applications. See the panel statement in Comment 3-67.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 11 Negative: 3

Explanation of Negative:

AYER, L.: See negative statement on comment 3-65.

EASTER, L.: See NEMA’s Explanation of Negative on Comment 3-83.

OWEN, S.: See comment on 3-85.
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3-78 Log #2523 NEC-P03 Final Action: Reject
(590.6(3))

Submitter: Stewart Cleveland, Exhibit Logistics LLC
Comment on Proposal No: 3-140
Recommendation: Delete text as follows:

590.6 (3) Receptacles on 15 kW or less Portable Generators. All 120 and 120/240 volt, single phase, 15, 20, and
50-ampere receptacle outlets that are a part of a 15 kW or smaller portable generator shall have listed ground fault
circuit interrupter protection for personnel. Listed cord sets or devices incorporating listed ground fault circuit interrupter
protection for personnel identified for portable use shall be permitted for use with 15 kW or less portable generators
manufactured or remanufactured prior to January 1, 2011.
Substantiation: In the field, we have to be able to decide where GFCI protection is necessary or required and where it
is required that we don’t use it. 526.23 specifically prohibits use of GFCIs for egress lighting, and we commonly use
portable generators for this purpose. Where GFCI protection is necessary, there are many commercially available GFCI
solutions that can be installed close to the generator without being mounted on it. While well intentioned, the authors of
this proposal have not thought through all of the far-reaching implications of this change or even considered conflicts
with other parts of the NEC. Please strike this paragraph to avoid many problems.
Panel Meeting Action: Reject
Panel Statement: The requirement in 590.6 only applies to generators used for temporary wiring installations used to
supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or
demolition of buildings, structures, equipment, or similar activities and would not apply to other applications, such as
carnivals and fairs. See the panel statement in Comment 3-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3
Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
EASTER, L.: See NEMA’s Explanation of Negative on Comment 3-83.
OWEN, S.: See comment on 3-65.
Submitter: Howard Heaner, Howard Electric
Comment on Proposal No: 3-140
Recommendation: Delete as follows:

590.6(3) Receptacles an 15 kW or less Portable Generators. All 120 and 120/240 volt, single phase, 15-20, and 30-ampere receptacle outlets that are a part of a 15 kW or smaller portable generator shall have listed ground fault circuit interrupter protection for personnel. Listed cord sets or devices incorporating listed ground fault circuit interrupter protection for personnel identified for portable use shall be permitted for use with 15 kW or less portable generators manufactured or remanufactured prior to January 1, 2011.

Substantiation: This would create a real mess. In the field, we use personal GFCI protection with portable generators because the safest place for it is as close to the user as possible. This is common knowledge and common practice. The proposal moves the GFCI as far away from the user as possible and suggests that personal protection is no longer necessary. How are we supposed to know when a generator was manufactured? There is no date on them. And what about floating neutral generators? The GFCIs won't work. This irresponsible proposal jeopardizes my safety by moving the GFCI away from me and leaving unanswered questions about implementation and enforcement.

Panel Meeting Action: Reject
Panel Statement: The requirement in 590.6 only applies to generators used for temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities and would not apply to other applications. There is no restriction in the NEC that would keep someone from also using portable personnel protection in addition to the GFCI requirement on the generator. Manufacturers of motors and countless other electrical appliances mark manufacturing dates on nameplates to indicate the date of manufacture of the equipment. See the panel statement in Comment 3-67.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3
Explanation of Negative:
AYER, L. See negative statement on comment 3-65.
EASTER, L.: See NEMA's Explanation of Negative on Comment 3-63.
OWEN, S.: See comment on 3-65.
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3-83 Log #1593 NEC-P03
(590.6(A)(3))

Final Action: Reject

Submitter: Jim Pauley, Schneider Electric
Comment on Proposal No: 3-140
Recommendation: Delete the section (3) added in the panel action text.
Substantiation: CMP 3 has stepped out of their scope with this requirement. The issue of whether or not a generator should have GFCI provided as part of the generator set is rightly under the purview of CMP 13 with Article 445 that covers generators. As it stands, CMP 3 has written a requirement that is in conflict with the provisions under review by CMP 13.

The issue for CMP 3 is ensuring that GFCI protection is provided for the worker under temporary wiring installations. Whether that is provided with a GFCI as part of the generator set or a GFCI that is part of the cord set, or a GFCI that is part of a spider box arrangement should not matter to the panel. As long as the GFCI is anywhere between the person being protected and the source of power, the GFCI can do its job.

Adding a requirement for GFCI protection as part of the generator creates a number of other issues that should not be ignored. Because of Y2K, ice storms, hurricanes and other natural disasters the industry has worked hard to get users to install proper transfer equipment so that generators can be connected. The vast majority of these installations are installed with a solidly grounded (not switched) neutral. When the portable generator with GFCI is properly connected to the transfer equipment, the GFCI will trip due because it will see a grounded neutral downstream. So the result then becomes using extension cords from the generator into the house, removing the equipment grounding connection and isolating the generator from ground to avoid in order to keep the GFCI from tripping.

CMP 3 should stick with their basic requirement that the receptacle being used for the temporary wiring must have GFCI protection and not attempt to be specific as to where that protection must be provided.

Panel Meeting Action: Reject
Panel Statement: In the 1984 NEC process, Section 210-8(b) and the exception covering the exclusion of GFCI protection on 5 kW and smaller portable generators was moved to 305-6(a) and came under the jurisdiction of Panel 3. The exception stated as follows: “Receptacles on a 2-wire, single-phase portable or vehicle-mounted generator rated not more than 5 kW, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces.” The text clearly addresses receptacles on the 5 kW and smaller generator not being required to have GFCI protection. This exception was removed by Panel 3 during the 2002 NEC with the intention of requiring all sizes of generators and all sources of power on construction sites to have GFCI protection for personnel and this was further reinforced in the last sentence in 590.8 as follows: This section shall apply to power derived from an electric utility company or from an on-site generated power source.” To say that Panel 3 does not have jurisdiction over this issue for temporary construction sites and that it is outside the scope of Panel 3 would mean that none of the actions or involvement of Panel 3 since it was moved into Article 305, 527, or 590 was correct. The text in the 1983 TCR stated that the NEC TCC was transferring GFCI requirements and the exception for 5 kW and smaller generators for construction sites to Article 305 and Panel 3.

See the panel statement in Comment 3-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3
Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
EASTER, L.: Neither the code nor the proposal contains any grounding requirements for a generator in stand alone use. Without grounding, a ground fault back to the generator is impossible so that the GFCI protection on the generator is useless and so it should not be required. Grounding away from the generator in Temporary Installations can occur by a neutral contacting the ground downstream from the generator. GFCI protection on the generator will protect no one in this instance and will be useless. People seeing GFCI on the generator will make no further effort to protect themselves.
There is a correlation issue that should be addressed by the TCC. The requirements for a generator itself belong to CMP 13 and not CMP 3. CMP 3 should only specify that GFCI protection is required and the protection can be provided in various ways.
No substantiation was provided suggesting that a safety problem exists with the way portable generators are now used in Temporary Installations nor was substantiation provided to show that proposal 3-140 will improve safety.
The panel members considered only grounded systems and did not consider a floating system.

OWEN, S.: See comment on 3-65.
Report on Comments – June 2010

3-84  Log #1659 NEC-P03 (590.6(A)(3))

Final Action: Reject

Submitter: Bryan Landerman, Milwaukee, WI

Comment on Proposal No: 3-140

Recommendation: This proposal should be rejected.

Substantiation: Proposed 590.6(A)(3) and the Exception under 590.6(A) are contradictory. The Exception allows "an assured equipment grounding program as specified in 590.6(B)(2)" under circumstances that "would create a greater hazard if power were interrupted or having a design that is not compatible with GFCI protection." The proposal does not provide for a portable generator where GFCI protection is not present.

Panel Meeting Action: Reject

Panel Statement: Section 590.6(A)(3) and the exception in 590.6(A) are not contradictory since there are many generators on job sites that are larger than 15 kW and would not be required to comply with 590.6(A)(3) and could use the assured grounding program. See the panel statement in Comment 3-67.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 11 Negative: 3

Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
EASTER, L.: See NEMA Explanation of Negative on comment 3-83.
OWEN, S.: See comment on 3-65.
Standards Council Supplemental Agenda

August 3-5, 2010

Report on Comments – June 2010

3-85 Log #1660 NEC-P03 (590.6(A)(3))

Final Action: Reject

Submitter: Erv Meier, Brookfield, WI
Comment on Proposal No: 3-140

Recommendation: This proposal should be rejected.

Substantiation: There is a large installed base of transfer switches for switching only the hot leg of a 120 volt utility and portable generator source. These appear in numerous municipal and state traffic signal installations that have been designed for portable generator backup during a power outage, many of which are located on hurricane evacuation routes. GFCI receptacles on bonded neutral generators will trip if an attempt is made to use them on these systems, thereby creating the possibility of a safety threat far more serious than that which the GFCI is intended to prevent. GFCI protection, when required by the Code, can be easily added independent of the generator.

Panel Meeting Action: Reject

Panel Statement: The requirement in 590.6 only applies to generators used for temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities and would not apply to other applications. See the panel statement in Comment 3-67.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 11 Negative: 3

Explanation of Negative:

AYER, L.: See negative statement on comment 3-65.

EASTER, L.: See NEMA Explanation of Negative on comment 3-83.

OWEN, S.: See comment on 3-65.
Standards Council Supplemental Agenda
August 3-5, 2010

Report on Comments – June 2010

3-86  Log #1874  NEC-P03
(590.6(A)(3))

Final Action: Reject

Submitter: Robert Hamilton, Osprey, FL
Comment on Proposal No: 3-140
Recommendation: Delete text.

590.6(A)(3) Receptacles on 15kW or less Portable Generators: All 125 volt and 125/250 volt, single phase, 15, 20, and 30 ampere receptacle outlets that are a part of a 15 kW or smaller portable generator shall have listed ground-fault circuit-interrupter protection for personnel. Listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted for use with 15 kW or less portable generators manufactured or remanufactured prior to January 1, 2011.

Substantiation: This proposal should be rejected. Here in Florida, there are many single pole transfer switches installed by municipalities and the state for backup 120-volt generator control of traffic signals. The GFCIs on bonded-neutral generators will trip if used under these circumstances, thereby, causing a loss of generator power and resulting in consequences that could be far more serious than those which the GFCI was intended to prevent, especially during an emergency evacuation.

Panel Meeting Action: Reject

Panel Statement: The requirement in 590.6 only applies to generators used for temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities and would not apply to other applications. See the panel statement in Comment 3-67.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 11  Negative: 3

Explanation of Negative:
Ayer, L.: See negative statement on comment 3-66.
East, L.: See NEMA Explanation of Negative on comment 3-63.
Owen, S.: See comment on 3-85.
Standards Council Supplemental Agenda
August 3-5, 2010

3-88  Log #1878  NEC-P03
(590.6(A)(3))

Submitter: David Fiegel, Reliance Controls Corp.
Comment on Proposal No: 3-140
Recommendation: Delete text.

590.6(A)(3) Receptacles on 15kW or less Portable Generators: All 125 volt and 125/250 volt; single phase; 15; 20; and 30 ampere receptacle outlets that are a part of a 15 kW or smaller portable generator shall have listed ground-fault circuit interrupter protection for personnel. Listed cord sets or devices incorporating listed ground-fault circuit interrupter protection for personnel identified for portable use shall be permitted for use with 15 kV or less portable generators manufactured or remanufactured prior to January 1, 2011:

Substantiation: This proposal should be rejected for the following reasons:

1) 590.6(A)(3) and the exception under 590.6(A) are mutually exclusive. The exception allows 590.6(B)(2) under circumstances that are "not compatible with GFCI protection," but the proposal fails to allow for a small portable generator where GFCI protection is not present.
2) There is no means for a user or AHJ to determine a generator manufacture date, and no proposal to require such a date to be shown. As such, any reference to a generator manufacture date is meaningless.
3) This proposal conflicts with 525.23(C) which requires that egress lighting circuits for carnivals, circuses, fairs, and similar events cannot be GFCI protected. Small portable generators are frequently used in this type of application.
4) It is doubtful that GFCI protection would be at all effective if a generator is not properly grounded, and there is no provision in the code to require grounding [see 250.34(A)]. This is hardly comforting for the user and certainly not an improvement over existing code requirements for GFCI protection.
5) 90.1(C) clearly states that the Code is not intended as a design specification. Accordingly, the Code is clearly not intended to direct a manufacturer to design their product in a particular manner, including making GFCI outlets integral to a generator. This proposal should be rejected at least until all the negative consequences of undertaking the responsibilities of product design are thoroughly evaluated.
6) There is a very large installed base of municipal traffic signal transfer switches that are single-pole 120-volt. A bonded neutral generator with GFCIs integral to the generator will not work in these applications. This is because generator bonding will cause a small amount of current to return to the generator through the grounding conductor, creating an imbalance that will always trip the GFCI. Thus, GFCIs under power will not be able to establish a non-tripped condition. Failure to establish temporary backup power for traffic signals (particularly those located on emergency evacuation routes) would disrupt "public health and safety", a condition that is not permitted under the scope of 708.1.
7) This proposal should be rejected at least until all the conflicting issues, a number of which have been described above, can be examined. The use of portable generators for a variety of power purposes (stand-alone, temporary, stand-by, etc.) and at a variety of locations, creates a variety of situations that are at the same time simple, complex, common, and unique. All are addressed in at least two sections, and maybe more, of the Code. Declaring that all small portable generators be integrally GFCI-equipped (especially without substantiating that any electrical ground-fault safety problem with non-GFCI-equipped generators exists) is premature, and time should be taken to examine closely all the conflicting issues.

Panel Meeting Action: Reject
Panel Statement: Section 590.6(A)(3) and the exception in 590.6(A) are not mutually exclusive since there are many generators on job sites that are larger than 15 kW and would not be required to comply with 590.6(A)(3) and could use the assured grounding program. Manufacturers of motors and countless other electrical appliances mark manufacturing dates on nameplates to indicate the date of manufacture of the equipment. See the panel statement in Comment 3-67.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3
Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
EASTER, L.: See NEMA Explanation of Negative on comment 3-63.
OWEN, S.: See comment on 3-65.
Standards Council Supplemental Agenda
August 3-5, 2010

3-89 Log #1879 NEC-P03
(590.6(A)(3))

Submitter: David Fiegel, Reliance Controls Corp.
Comment on Proposal No: 3-140
Recommendation: Revise to read as follows:
590.6(A)(3) Receptacles on 15kW or less Portable Generators. All 125 volt and 125/250 volt; single phase, -15, -20, and 30-ampere receptacle outlets that are a part of a 15 kW or smaller portable generator shall have listed ground-fault circuit-interrupter protection for personnel. Listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted for use with 15 kW or less portable generators manufactured or remanufactured prior to January 1, 2011.
Substantiation: 1) As written, this proposal conflicts with Proposal 13-19, which intentionally does not require GFCI protection on 20- and 30-ampere 125/250 volt receptacles. This is specifically for the purpose of permitting a portable generator to be used for supplying power to a residential or small commercial system during a utility power outage according to text that appears in the substantiation:
"By limiting GFCI protection only to 15, 20-, and 30-ampere, single phase, 120 volt circuits, these small portable generators can still be used for supplying standby power for non-GFCI protected 20- and 30-ampere, and larger 120/240 single phase, 3-wire with ground ... for houses and small commercial buildings. " While Proposal 13-19 and its substantiation may not appear to have an impact on Proposal 3-140, the fact remains that this will lead to considerable confusion in the marketplace. It will be quite possible to have two identical-appearing portable generators, one with GFCI protection on the 125/250 volt twistlock, and the other without.
2) All other means of supplemental GFCI protection for personnel should then continue to be allowed in view of the fact that the 125/250-volt receptacle is not GFCI protected.
3) There is a huge installed base of 2-pole residential transfer switches used for establishing a non separately derived system with a floating neutral portable generator. Generator manufacturer research has shown that the most common application for portable generators is for home standby systems (in excess of 70% of small portable generators sold.) A bonded neutral generator with GFCIs integral to the generator will not work at all on these systems. This is because generator bonding will cause a small amount of current to return to the generator through the grounding wire, causing an imbalance that will always trip the GFCI. Thus, GFCIs under power will not be able to establish a non-tripped condition. At a minimum, some provision should be made to allow for a non-GFCI protected 125/250 volt twist lock outlet which would then allow a generator to be used in this type of application.
Panel Meeting Action: Reject
Panel Statement: The requirements in the accept in principle in Proposal 3-140 are not in conflict with Proposal 13-19 since Proposal 3-140 applies only to construction installations and not to optional standby power for commercial and residential applications. A generator manufacturer may elect to manufacture a construction site generator and an optional standby power generator. The optional standby generator would not require GFCI protection on 30 ampere 125/250 volt four-wire power wiring to a residential or small commercial application.
The requirement in 590.6 only applies to generators used for temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities and would not apply to other applications. See the panel statement in Comment 3-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3
Explanation of Negative:
AYER, L.: See negative statement on comment 3-65.
EASTER, L.: See NEMA Explanation of Negative on comment 3-83.
OWEN, S.: See comment on 3-65.
directly to the vote to reject Comment 3-22.
All those in favor please, raise your hand.
Thank you. All those opposed. Motion carries.
At this time, ladies and gentlemen, I did
want to mention that we're up to 13. You broke the
record. So I want to congratulate you. And we can
continue after a break. We're going to take a
15-minute break at this time.
Please recognize that we will not take a
formal lunch break in order to most effectively use
your time. Thank you.

(A brief recess was taken.)

CHAIR BELL: Ladies and gentlemen, get
seated, and we'll get started again. I do want to
remind you that you have your 13 consecutive streak,
and we're still counting.

So we're up to motion sequence 70-6. Is
there a motion for Sequence Number 70-6?

Microphone 1.

MR. FLEGEL: Mike Flegel, Reliance Controls
Corporation. I move to accept Comment 3-69.
CHAIR BELL: The motion is to accept Motion
3-69. Is there a second? I hear a second. Please
proceed.

MR. FLEGEL: This motion is to return the
language in Article 590.6 NEC. The issue is not
whether GFCI protection is needed for portable
generator power and temporary installations. It is
needed, and it is already required in the 2008 NEC.
But rather the issue is where to place that GFCI
protection so that it provides the highest level of
protection against injury by ground faults for the
workers.

The panel action now requires the GFCI
protection to be built into the generator receptacles
for generators manufactured after January 31st, 2011.
A study by the Construction Safety Association of
Ontario, done in conjunction with the International
Brotherhood of Electrical Workers, concluded that
GFCI protection used in floating systems should be
placed as close to the worker as possible. Since the
NEC does not require portable generators in
stand-alone use to be grounded, they are floating
systems.

Requiring the GFCI protection to be built
into the generator goes against the conclusions of
this study and decreases workers safety. Ironically,
or maybe not so ironically, the 2008 NEC language is
actually fairly close to the conclusions of the study
done by the Construction Safety Association of
1 Ontario and the IBEW.
2 It needs to be retained in the 2011 NEC.
3 There is absolutely no indication that the 2008 code
4 language is not providing a safe environment. There
5 is no hurry to make a change given the process.
6 Another code cycle will review these issues. It will
7 not hurt worker safety. That seems to be a better
8 alternative than decreasing worker safety. Please
9 vote in favor of my motion. Mr. Carpenter.
10 MR. CARPENTER: I would defer to the panel
11 chair of Panel 3, Paul Casparo.
12 MR. CASPARO: Thank you, Mr. Chair. Paul
13 Casparo representing the IBEW. I'm going to defer to
14 Mark Odee, Panel 3.
15 MR. ODEE: Thank you, Paul. Mark Odee,
16 Underwriters Laboratories, alternate member of
17 Panel 3. And I'm speaking against the motion.
18 I'll take a very brief amount of time and
19 kind of give you a historical brief on how this came
20 about and when it first came about and what the
21 requirements were in the National Electrical Code
22 starting in 1975.
23 75 NEC Section 210.8(b) required all
24 120-volt single-phase receptacle outlets not part of
25 the permanent wiring of the building or structure to
have ground fault circuit interrupters for personal
protection.

An exception was inserted into 210.8(b) that
permitted receptacle on a portable generator rated
not more than 5 KW where the circuit conductors of
the generator are insulated from earth and the
generator frame is insulated from earth and all
grounded surfaces.

This section and the exception was moved to
Section 305.4A in 1984. And the text in the
exception was changed to again deal with two wires,
single-phase portable or vehicle-mounted generators
rated not more than 5 KW, again, requiring GFCI
protection for generators that were larger than 5 KW.
But the exception four 5 KW in smaller generators
still stayed in the code.

The exception, by the way, existed until the
2002 NEC, when it was removed by Panel 3. And the
intent of removing the exception was to require GFCI
protection for those receptacles even on generators
that were smaller than 5 KW. So it's been in the
Code a long time. We've been dealing with this for a
long time.

Now, when I go back and I look at my
requirements in Article 250 dealing with portable
generators and vehicle-mounted generators, 250.34 requires that -- it permits a generator that's a portable generator to not have a driven ground rod. In other words, I don't have to have a grounding electrode for a portable generator, which would be almost unreasonable. Every time you put a portable generator down, you'd have to drive a ground rod.

So, in effect, when I go back to 250.34A, it does not require a grounding electrode for a portable generator. But when I look at 250.34C, 250.34C says if I have a requirement for a grounded conductor, then that grounded conductor must be attached to the frame of the generator, which means that the equipment grounding conductor going out from that generator is going to be the path for the current flow to get back to the generator frame and from the generator frame back in through that bonding jumper to the actual core of the generator.

And that was the concept that we looked at.

When I get into 15 KW and larger generators, the larger the 15 KW, I can end up with a capacitor effect on these kinds of generator where it can be critical in having the proper kind of protection on those generators.

If you look at UL 2201, UL 2201, which
handles 15 KW and smaller generators, now requires a 15, 20 and 30 ampere 120-volt receptacles on these generators be GFCI protected. Well, Panel 3 went one step further, similar to what we have since 1975. And it included GFCI requirements for 15 and 20 and 30 ampere receptacles to be GFCI protected even in the 120/240 volt range.

So, in effect, that's what we did. And we very clearly put a date on these generators so that we would know exactly when a new generator was installed or provided. So, again, we didn't require this for existing generators. Thank you, Mr. Chair.

CHAIR BELL: Thank you. Further discussion?

Microphone 1.

MR. BLACK: Neal Black, Reliance Controls and also the representative for Code-making Panel 13 from the National Electrical Manufacturers Association. Mr. Chairman, when Underwriters Laboratories --

CHAIR BELL: Speaking? You broke the streak.

MR. BLACK: Sorry. Speaking for.

Mr. Chairman, when Underwriters Laboratories submitted this particular proposal to require GFCI outlets inside portable generators 15 KW and below to
Code-making Panel 3 and to Code-making Panel 13, I believed then, as I do now, that they did so with the best intentions of public safety. Unfortunately, they chose a one-system-fits-all approach. And equally as unfortunate, the truth is this is a system-related issue. No one's questioning that GFCI's are necessary. The question is, where are they necessary? And that is a system issue.

It depends on whether the generator is a bonded neutral generator or a floating neutral generator. It depends on whether it's connected to premises or wiring. It's a system issue. And, therefore, I believe this is a flawed proposal. But no one need take my word for it. Underwriters Laboratories assembled a standards technical panel, a group of technical experts from across the country. Experts in generators. Experts in generator safety. Experts in transfer switches. Experts in generator applications, such as electricians and local inspectors. That group was formed to put together the UL 2201 standard. And that group refused to support requiring GFCI's on generators for safety reasons.

There's more. As has been reported by the National Electrical Association and others, generator
manufacturers who could make money off of this proposal are not in favor of it. GFCI manufacturers who could make money off this proposal are not in favor of it. And transfer switch manufacturers and transfer equipment manufacturers who could make money off this proposals are not in favor of it.

But there's more. As you mentioned earlier, Code-making Panel 1 discussed it at length, and Code-making Panel 13 also refused to support this proposal. So I ask the members, if UL's own Standards Technical Member Panel thinks this is a bad idea and if the generator manufacturers think this is a bad idea and the GFCI manufacturers think this is a bad idea and the transfer equipment manufacturers think this is a bad idea and the Code-making Panel 13 thinks this is a bad idea, then perhaps it warrants some additional consideration. And I would recommend that the motion be adopted and that the proposal be rejected and that UL and the experts across the country be given the time and the opportunity to put together a true consensus proposal that meets all of the requirements of how generators are used and provides for maximum possible safety to protect the electrical workers, the homeowners, and pole linemen across the country. Please support this motion.
1 Thank you, Mr. Chairman.

2 CHAIR BELL: Thank you. Microphone 5.

3 MR. MCKLOWSKI: Vince McKlowski, speaking in
4 support of the motion. Mr. Chairman, NEMA supports
5 this motion. Thank you.

6 CHAIR BELL: Thank you. Microphone 6.

7 MR. SIMMONS: Thank you, Mr. Chairman. My
8 name is Phil Simmons. I'm speaking for myself. And
9 I'm speaking in opposition to the motion.

10 The Electrical Section considered this at
11 some length on Monday and viewed a video and had
12 quite a bit of opportunity to visit and talk about
13 this issue. And it appears that after reviewing the
14 video, the problem was that the folks were using a
15 generator that does not comply with the safety rules
16 in the NEC. Because there was no bonding jumper from
17 the neutral to the enclosure.

18 As a result, GFCI protection would not work
19 on the generator if installed. And there's no fault
20 return path for a ground fault for any electrical
21 equipment supplied by that generator. So it seems to
22 me, as Mr. Odee described the history of this rule,
23 that it's pretty carefully crafted and pretty
24 carefully considered by the code panels for quite a
25 number of years.
And I certainly urge this body to not support this motion, which certainly seems to be faulty on its face. It would do nothing to increase safety. In fact, I'm convinced it would decrease safety in the workplace. And I'm pretty sure we're not in favor of that.

CHAIR BELL: Thank you. Microphone 5.

MR. MANCHE: Alan Manche, speaking for myself. And I am in favor of the NITMAM of the motion. As an STP member of the 2201 Committee, I guess I would like to lend credibility to Mr. Swiecicki's comments with regard to the fact that the STP has continually opposed a requirement on all portable generators to have GFCI.

The challenge with this is multi-faulted. And it's not as simple as adding the language here that has been put into this particular language. And I think that's recognized by the fact that Panel 13 has made one decision and Panel 3 has made a different decision. We have to ask questions. And I think we have to ask the question, are we enhancing safety or are we not enhancing safety? There's two pieces. One is, is it worker safety using it as a portable means?

The other challenge becomes, we have
hundreds of thousands of transfer switches or transfer equipment installed in homes around the country up and down the coasts when the hurricanes come through, the ice storms come through. And if I end up going to the Lowes and Home Depots and pulling those portable generators with GFCI's in my home and I have those systems and now have GFCI protection, they will trip and not work. And I can guarantee that a homeowner will figure out a way to get their power on and put themselves at risk.

So there's a worker safety aspect of this, and there's a homeowner using these portable generators for other means at risk. And so in order to address this, this needs to be returned and thought out further. Thank you.

CHAIR BELL: Thank you. Microphone 4.

MR. DOWELL: Thank you, Mr. Chairman. My name is Jim Dowell, representing the International Brotherhood of Electrical Workers. And I rise in opposition to the motion on the floor.

I would like to first echo some comments that the previous speaker made. And he talked about how we're going to use this generator. What he mentioned with the transfer switches -- and the maker of this motion was the same maker of comments that
defeated on 13 -- is what is really the heart of this issue. It is not permitted in the National Electrical Code to have a premises wiring system and have it outdoors in a rain-related, weather-related disaster event and provide other outlets without GFCI protection. When you take a floating system neutral generator and you bond it to that 15 or 20 ampere, 125-volt transfer switch, that generator becomes part of the premises wiring. And it's covered by the National Electrical Code.

The second you do that, you have a grounded system. Now that homeowner will have one outlet inside the house hot. And he'll have five or six more on the generator, which they will use in a weather-related event with no GFCI protection.

It was mentioned earlier that generator manufacturers aren't in favor of bonded neutral-type generators with GFCI's. I urge all of you when you get home to go into Lowes and Home Depot, and you'll see more portable generators with built-in GFCI than you will of the variety that we're discussing right now.

I am the safety coordinator for IBEW Local 98. My full-time job is instruction safety. We support what CMP 3 did 100 percent for safety.
1 Please defeat the motion on the floor. Thank you.

2 CHAIR BELL: Thank you. Microphone 7.

3 MR. EKRODE: Mr. Chairman, my name is Curt Ekrode. I teach at Waukesha County Technical College. I rise in support of the motion. Let me reamplify what Mr. Manche had to say.

4 The panel action limits or mandates the placement GFCI's on the generator. This action ignores legacy residential transfer switch installations. Newly purchased replacement generators will be applied to these legacy systems. These systems will automatically trip.

5 This is caused by the bonding of neutral current and the generator, allowing roughly half of the neutral current to be carried by the ground. The generator GFCI will always trip. Resourceful homeowners -- and we know that they are -- may bypass the transfer switch and in their ignorance back-heed the utility service. This causes obvious danger to utility linemen. Do not limit the position of GFCI's in these small generator systems. Please vote for this motion.

6 CHAIR BELL: Thank you. Microphone 6.

7 MR. WEBER: Thank you, Mr. Chairman. Ray Weber representing myself. I rise in opposition to
the motion in support of the Panel 3 action. In field observations we're seeing a preponderance at not the major construction sites but the smaller ones where they will be using small 5 KW and 10 KW generators or something of that nature. I heard the commenter say, "Well, most of the workers have their own personal GFCI protection incorporated." And unfortunately I don't get to see that a great deal. I see a great many trades out there with cords plugged into these generators.

And, in my opinion, if we are going to have to ground the neutral of those smaller generators, so be it. It's a safety issue. Also, we deal with a lot of camping situations where today people go camping, and they don't put a tent up. We've even had pontoon boats where they'll put a generator in the pontoon boat so they can run the margarita machine or something else like that. So I think it's far better to have GFCI protection.

CHAIR BELL: Thank you. Microphone 1.

MR. FLEGEL: Mike Flegel, in support of the motion. The debate on the Electrical Section got bogged down in interpretation issues, much as it is here, partly due to the poor approach that I used in my presentation at the Electrical Section.
Before I had an opportunity to get things back on track, the opposition to the motion was passed. The Electrical Section did not get the information of the Construction Safety Association of Ontario's study. I think that information is critical. And as I said, it was supported by the IBEW as well.

They indicate that the position of the GFCI in the application is critical to whether the system is floating, that is, whether the generator is not grounded or whether it is grounded. Unfortunately, the demonstration that was given to the Electrical Section did have a floating neutral generator.

However, if it was a bonded neutral generator that was not grounded, it would have the same results. Those results are that if you have a bonded neutral generator with GFCI protection and you do not drive a ground rod, the protection on the generator is purely decoration. It will never function. It will function under some very isolated cases, but in the majority of the cases, it will not function.

It gives the impression that people are protected by the GFCI's when they are not. The fact that Mr. Simmons' comments -- the fact that all these
issues that we're discussing just indicates the complexity of the problem. And I don't think the panel looked at all the complexities. And I think another Code-making cycle would help them in determining that.

Please understand the current wording in the 2008 Code requires GFCI protection on all portable generator output for temporary installations. We're not advocating doing away with GFCI's. They just have to be used properly. The GFCI manufacturers understand that.

They are used on portable generators. And I hope those generators are coming with instructions to ground them. If they aren't grounding them, there can be safety issues. Letting it go another code cycle is not going to hurt worker safety. Making this move now could hurt it based on that ASO study. And people have to understand what that study is about.

CHAIR BELL: Thank you. Microphone 4.

MR. WILKINSON: My name is Robert Wilkinson. I seek to call the question.

CHAIR BELL: Motion is to call the question. Do I hear a second. All those in favor of calling to question, please raise your hand. Thank you. Motion
1 carries.

2 We'll move directly to the vote on the

3 motion to accept Comment 3-69. All those in favor of

4 the motion, please raise your hand. Thank you. All

5 those opposed. Motion fails.

6 We'll move to the next sequence, which is

7 70-7. Is there a motion on the floor related to

8 Motion Sequence Number 70-7?

9 MS. HUNTER: Yes. My name is Christel

10 Hunter with Alcan Cable. I move to accept Comment

11 6-43.

12 CHAIR BELL: The motion is to accept Comment

13 6-43. Is there a second? I hear a second. Please

14 proceed.

15 MS. HUNTER: Thank you. The language in

16 Section 310.15(B)(2)(c) is based on data collected

17 during a study performed in Las Vegas. This study

18 has run for several years now and produced a large

19 amount of data. The paper that was published based

20 on this data asserts that conductors on rooftops will

21 fail and create a safety risk due to the high heat

22 due to solar radiation. No confirmed real-live

23 failures attributed to these conditions have been

24 presented to the panel.

25 Three primary types of heating have been
July 8, 2010

National Fire Protection Association  
Attn: Ms. Mary Maynard  
1 Battymarch Park  
Quincy, MA  02169-7471

RE: Appeal to NFPA re: CAM 70-12

Dear Ms. Maynard;

Please find attached the following supporting documentation in regard to the above-referenced appeal:

(1) Four (4) photographs, and

Further, pursuant to your request, the following is the content of the appeal:

Recommendation: Add new text as follows:

The open front of both metal and nonmetallic electrical device boxes shall be temporarily covered to protect insulated electrical conductors from physical damage or deterioration due to power routers, plaster, paint spray guns, spray foam insulation and other potential damage during construction. The covers shall be clearly marked, “Not for permanent installation.”

Substantiation: Many home fires arise from faulty premises wiring group equipment resulting from damage to wiring within the electrical outlet box. For instance, according to statistics provided by the National Fire Protection Association (“NFPA”), in 2006, “an estimated 16,380 reported U.S. non-confined home structure fires involving premises wiring group equipment resulted in 145 civilian deaths [and] 458 civilian injuries...” (Please see “Home Electrical Fires,” John R. Hall, Jr., March 2009, National Fire Protection Association.) According to the NFPA, “The two leading specific factors contributing to ignition were unclassified electrical failure or malfunction (33%) and

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1 As defined by the National Fire Protection Association, “premises wiring” refers to all installed wiring equipment between power source and outlet. “Premises wiring” includes all electrical distribution equipment except cords, plugs and light fixtures. (Please see “Home Electrical Fires,” John R. Hall, Jr., March 2009, National Fire Protection Association.)
Page Two.
Ms. Mary Maynard.
July 8, 2010

unspecified short circuit arc (28%). These two leading factors lack details on the nature of the failure. The leading factors contributing to ignition with details were short circuit arc from defective or worn insulation (12%), arc from faulty contact or broken conductor (6%), short circuit arc from mechanical damage (4%), and equipment overloaded (3%).” (emphasis added) (See Id.)

The main purpose of the National Electrical Code (“NEC”) is the safeguarding of persons and property, which in turn is a primary reason why the NFPA sponsors the code making process and publishes the NEC. According to the NFPA’s March 2009 analysis on home electrical fires, “Two-fifths (38%) of the 2003-2006 reported non-confined home structure fires involving premises wiring group equipment involved unclassified or unknown-type wiring. Because such a large share of these fires and associated losses are unclassified or unknown-type, the numbers and percentages for every specific type of equipment are probably severely understated. Comparisons within a group are not a problem. For example, note that the number of fires declines for wiring as one moves from inside the house along the wiring network toward the connections to the utility poles outside the house.” (emphasis added) (Id.) According to this analysis, the majority of fires begin within the outlet box, which is the one area of premises wiring in which the NEC provides no specific guidelines. Clearly, it is necessary for the NEC to provide a specific mandate to electricians, that when implemented, would serve as a safeguard against death, injury and the loss of property due to home electrical fires caused within the house along the wiring network. This is an issue that has been raised in at least the past two (2) Code cycles, and numerous proposals have been submitted in this cycle in an attempt to address the matter.

Acceptance of Proposal 9-52 would be a definitive step towards this mandate.

It is unclear why the NEC contains provisions for protecting the wiring at almost all points of vulnerability throughout the construction process, but excludes the wiring located within the electrical outlet box. In fact, the NEC’s newest provision, Section 406.11, involves a requirement for tamper-resistant receptacles with a built-in shutter system at the outlet plug post-construction. While the NEC has added this provision, it blatantly fails to ensure the integrity of the wiring once it reaches the outlet box. What good is Section 406.11, if the wiring behind the receptacle is damaged? This is certainly a problem that must be addressed by the NEC with specificity which includes a mandatory provision for protecting wiring within the electrical outlet box.

While there are broad provisions contained in the NEC for safeguarding all electrical equipment and connections from damage and contamination, these provisions are not specific enough. For instance, Section 110.12, which provides that the equipment must be installed in a “neat and workmanlike manner,” and states that “there shall be no damaged parts that may adversely affect safe operation or mechanical strength of the
equipment...” While it is a nice concept that electrical equipment be neat and workmanlike, this phrase is unenforceable, and ultimately meaningless. In addition, despite its use of the word “equipment,” Section 110.12 is not broad enough to address the concerns raised in Proposal 9-52. Nowhere in Section 110.12 is there a reference to wiring or the protection of wiring within electrical outlet boxes during the construction phase. The section only refers to equipment, including, “busbars, wiring terminals, insulators, and other surfaces...” It is not enough to assume Section 110.12 requires the protection of wiring in electrical boxes, particularly given the alarming statistics provided by the NFPA.

The concept of providing specific solutions for the protection of wiring is not foreign to the NEC, which mandates prescriptive requirements upon all areas of the wiring, except for wiring within the electrical outlet box. For example, Article 300 provides for very detailed methods of safeguarding cables which are subject to damage during the construction phase. Article 300.4 requires the installation of a nail plate where cable wiring is subject to nail or screw penetration. Article 300.4(B)(1) requires installation of bushings or grommets on all metal edges of punched out or factory-installed holes. If an electrician does not meet these Code requirements, wires are damaged and the inspection is deemed a failure.

Clearly, wiring is damaged during the construction process because wires sit exposed for months, while various tradesmen work, subjecting the wiring in the outlet boxes to damage from plaster, power routers, insulation and paint contamination. Drywall installers no longer cut box openings by marking the location and cutting away from the box. Conductors are damaged by pin routers, since the operator cannot see where the box is located and wires located near the edge of the box can be severely damaged. When spray foam is utilized and sprayed into a box, wiring inside the box may be corroded over time as a result of chemicals contained in the spray foam. When paint is sprayed, the paint covers the colored wiring, including the ground wiring, making it unclear which wire is which and requiring the electrician to make a cut into the paint-covered wire, potentially damaging it. Further, when the ground wiring is covered in paint, the grounding bond is lost, since the paint disrupts the copper wire. Faulty ground wires cause short circuits, sparks and arcs, all of which cause fire.

Since there is no mandate for protecting wiring within the electrical box, electricians may or may not choose to cover the boxes once they have completed their wiring. Given the NFPA’s grim statistics, it does not appear that enough electricians are choosing to provide protection for the electrical outlet boxes during construction.

Wiring damaged during the construction process also poses a financial hardship upon electricians since they oftentimes have to remove numerous sheets of drywall to rewire the box if enough additional cable is not available outside the box. Much of the time, the
electrician must scrape the spray foam out of the box, or try to remove the paint from covered wires. Wire left exposed, having been contaminated by paint, plaster, power routers or other materials, must be cleaned out or cut, and the requirements of Section 110.12 are not met, since the work is no longer “neat.”

What is more, while the Code requires, in Section 300.14, that six (6) inches of “free-flowing” conductor be left in an electrical box, the Code provides no specific provisions requiring protection of this length of wiring. Unfortunately, when wiring is compromised during the construction process, it is nearly impossible for an electrician to comply with this provision of the Code, as they oftentimes must cut portions of the damaged six (6) inches out of the box.

Requiring a cover, which is reusable, is a simple and cost-effective manner of ensuring that wiring is protected once it reaches the electrical outlet box. In fact, it should cost less than $100 to cover electrical boxes in most new construction homes, and these covers will be re-useable, lessening the cost substantially. This is a small expense in comparison to an electrician returning to the construction site and fixing the damage which occurred while other tradesmen did their jobs. In addition, there would be no need for re-inspection, since covers would be placed on boxes upon completion of rough wiring. Thus, boxes would be covered at the time of rough inspection, similar to nail plates having to be on at the time of rough inspection, pursuant to provision 300.4. Given that the electrical boxes would be covered at the completion of rough wiring, the wiring inside the box would not get damaged during construction.

Moreover, and most importantly, Proposal 9-52 offers a specific solution to a significant issue at a minimal expense in comparison to death, injury and property damage. Simply stated, requiring covers on electrical boxes at the time of rough inspection insures the integrity of the wiring, insures uniformity in protection of the wiring within electrical boxes, and insures safety within the premises and conformity and compliance with the provisions and purpose of the National Electrical Code.

Please do not hesitate to contact me with any questions. Thank you so much for your assistance and consideration.

Very truly yours,

Carlo Compagnone, Jr.

enclosures
As a Master electrician and having been involved in the electrical field for almost twenty (20) years, I am concerned about home-safety issues and the harm, liabilities and expenses inherent therein. In particular, many home fires arise from faulty premises wiring group equipment resulting from damage to wiring within the electrical outlet box. For instance, according to statistics provided by the National Fire Protection Association ("NFPA"), in 2006, "an estimated 16,380 reported U.S. non-confined home structure fires involving premises wiring group equipment resulted in 145 civilian deaths [and] 458 civilian injuries...". (Please see "Home Electrical Fires," John R. Hall, Jr., March 2009, National Fire Protection Association.)

According to the NFPA, "The two leading specific factors contributing to ignition were unclassified electrical failure or malfunction (33%) and unspecified short circuit arc (28%). These two leading factors lack details on the nature of the failure. The leading factors contributing to ignition with details were short circuit arc from defective or worn insulation (12%), arc from faulty contact or broken conductor (6%), short circuit arc from mechanical damage (4%), and equipment overloaded (3%)." (emphasis added) (See Id.)

The main purpose of the National Electrical Code ("NEC") is the safeguarding of persons and property, which in turn is a primary reason why the NFPA sponsors the code making process and publishes the NEC. According to the NFPA's March 2009 analysis on home electrical fires, "Two-fifths (38%) of the 2003-2006 reported non-confined home structure fires involving premises wiring group equipment involved unclassified or unknown-type wiring. Because such a large share of these fires and associated losses are unclassified or unknown-type, the numbers and percentages for every specific type of equipment are probably severely understated. Comparisons within a group are not a problem. For example, note that the number of fires declines for wiring as one moves from inside the house along the wiring network toward the connections to the utility poles outside the house." (emphasis added) (Id.) According to this analysis, the majority of fires begin within the outlet box, which is the one area of premises wiring in which the NEC provides no specific guidelines. This is an issue that has been raised in at least the past two (2) Code cycles, and numerous proposals have been submitted in this cycle in an attempt to address the matter. Clearly, it is necessary for the NEC to provide a specific mandate to electricians, that when implemented, would serve as a safeguard against death, injury and the loss of property due to home electrical fires caused within the house along the wiring network.

Acceptance of Proposal 9-52 would be a definitive step towards this mandate. It is unclear why the NEC contains provisions for protecting the wiring at almost all points of vulnerability throughout the construction process, but excludes the wiring located within the electrical outlet box. In fact, the NEC's newest provision, Section 406.11, involves a requirement for tamper-resistant receptacles with a built-in shutter system at the outlet plug penetration. Article 300.4 requires the installation of a nail plate where cable wiring is subject to nail or screw penetration. Article 300.4(B)(1) requires installation of bushings or grommets on metal edges of punched out or factory-installed holes. If an electrician does not meet these Code requirements, wires are damaged and the inspection...
is deemed a failure.

Clearly, wiring is damaged during the construction process because wires sit exposed for months, while various tradesmen work, subjecting the wiring in the outlet boxes to damage from plaster, power routers, insulation and paint contamination. Drywall installers no longer cut box openings by marking the location and cutting away from the box. Conduits are damaged by pin routers, since the operator cannot see where the box is located and wires located near the edge of the box can be severely damaged. When spray foam is utilized and sprayed into a box, wiring inside the box may be corroded over time as a result of chemicals contained in the spray foam. When paint is sprayed, the paint covers the colored wiring, including the ground wiring, making it unclear which wire is which and requiring the electrician to make a cut into the paint-covered wire, potentially damaging it. Further, when the ground wiring is covered in paint, the grounding bond is lost, since the paint disrupts the copper wire. Faulty ground wires cause short circuits, sparks and arcs, all of which cause fire.

Since there is no mandate for protecting wiring within the electrical box, electricians may or may not choose to cover the boxes once they have completed their wiring. Given the NFPA’s grim statistics, it does not appear that enough electricians are choosing to provide protection for the electrical outlet boxes during construction.

Wiring damaged during the construction process also poses a financial hardship upon electricians since they oftentimes have to remove numerous sheets of drywall to rewire to box if enough additional cable is not available outside the box. Much of the time, the electrician must scrape the spray foam out of the box, or try to remove the paint from covered wires. Wire left exposed, having been contaminated by paint, plaster, power routers or other materials, must be cleaned out or cut, and the requirements of Section 110.12 are not met, since the work is no longer "neat."

What is more, while the Code requires, in Section 300.14, that six (6) inches of "free-flowing" conductor be left in an electrical box, the Code provides no specific provisions requiring protection of this length of wiring. Unfortunately, when wiring is compromised during the construction process, it is nearly impossible for an electrician to comply with this provision of the Code, as they oftentimes must cut portions of the damaged six (6) inches out of the box.

Requiring a cover, which is reusable, is a simple and cost-effective manner of ensuring that wiring is protected once it reaches the electrical outlet box. In fact, it should cost less than $100 to cover electrical boxes in most new construction homes, and these covers will be re-useable, lessening the cost substantially. This is a small expense in comparison to an electrician returning to the construction site and fixing the damage which occurred while other tradesmen did their jobs. In addition, there would be no need for re-inspection, since covers would be placed in boxes upon completion of rough wiring. Thus, boxes would be covered at the time of rough inspection, similar to nail plates having to be on at the time of rough inspection, pursuant to provision 300.4. Given that the electrical boxes would be covered at the completion of rough wiring, the wiring inside the box would not get damaged during construction.

Moreover, and most importantly, Proposal 9-52 offers a specific solution to a significant issue at a minimal expense in comparison to death, injury and property damage. Simply stated, requiring covers in electrical boxes at the time of rough inspection ensures the integrity of the wiring, ensures uniformity in protection of the wiring within electrical boxes, and ensures safety within the premises and conformity and compliance with the provisions and purpose of the National Electrical Code.

I have also submitted this proposal to Code-Making Panel 9 for 314.17(E) or 314.26.

¹As defined by the National Fire Protection Association, "premises wiring" refers to all installed wiring equipment between power source and outlet. "Premises wiring" includes all electrical distribution equipment except cords, plugs and light fixtures. (Please see "Home Electrical Fires," John R. Hall, Jr., March 2009, National Fire Protection Association.)

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: Refer to the panel action and statement on Comment 9-25.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
9-52     Log #1535  NEC-P09  
(314.17(E) or 314.26)  Final Action: Reject

Submitter: Carlo Compagnone, Jr., Compa Covers, Inc.

Recommendation: Add new text as follows:
The open front of both metal and nonmetallic electrical device boxes shall be temporarily covered to protect insulated electrical conductors from physical damage or deterioration due to power routers, plaster, paint spray guns, spray foam insulation, and other potential damage during construction. The covers shall be clearly marked "Not For Permanent Installation".

Substantiation: Leaving the front end of an electrical box open during the preliminary stages of construction results in exposed wires. This allows electrical wiring to be vulnerable to be cut or damaged during construction with power routers along with plaster filled boxes and overspray from paint guns and spray foam insulation guns, which in the end will leave a poor and unsafe working environment. Having a temporary cover on an electrical box is most of all a safety factor. Such covers will prevent build up of debris and puts a stop to unauthorized personnel tampering with wiring during the time of construction.

I have also submitted this proposal to Code-Making Panel 3 for 300.4(G).

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject


Number Eligible to Vote: 12

Ballot Results: Affirmative: 12
Cables that are damaged or nicked because of these types of situations that exist pose some very serious safety issues. I would highly recommend that you vote against this motion.

CHAIR BELL: Thank you. Microphone 7.

MR. WILKINSON: My name is Robert Wilkinson with IEC. Call the question.

CHAIR BELL: Motion on the floor to call the question. Is there a second?

UNIDENTIFIED SPEAKER: Second.

CHAIR BELL: For information purposes, I will note that there was at least one individual at the microphone. All those in favor of calling the question, please raise your hand. Thank you. All those opposed. The motion carries.

We'll move to the motion on the floor, which is to accept Comment 7-34. All those in favor of the motion, please raise your hand. All those opposed. Motion fails.

We'll move on to the next motion sequence.

Is there a motion on the floor related to Motion Sequence 70-12?

MS. TOMASINO: Alicia Tomasino speaking on behalf of Carlo Compagnone, Compa Covers, Inc., out of Boston, Massachusetts. I move that you accept
Comment 9-26.

CHAIR BELL: Motion on the floor is to accept Comment 9-26. Is there a second? I hear a second. Please proceed.

MS. TOMASINO: Thank you. The provisions contained in the Code in relation to the proposal are far from adequate to safeguard persons and property.

In 2007 there would not have been 16,380 reported noncompliance home structure fires involving premises wiring group. If the Code provided adequate protection, would 458 civilians have been injured, 145 civilians have died, and almost $500 million in property damage have occurred in 2006 alone as a result of these fires? Premises wiring group is defined by the NEC as the wiring between the power source and the outlet and does not include cords, plugs, and light fixtures. This data is provided by the NFPA and is contained in the 2009 article, "Home Electrical Fires" by John R. Hall.

Mr. Hall notes in his article that the number of fires decline for wiring as one moves from inside the house along the wiring towards the connections to the utility poles outside the house. According to this analysis, the majority of fires begins within the outlet box, which is the one area
of premises wiring that the NEC provides no specific guidelines for.

It is obvious in reviewing these statistics that Code-making Code Panel 9 in their panel statement in rejecting this proposal should not be saying, quote, "If it becomes necessary to cover the boxes, there are many acceptable methods."

The panel must recognize that it is necessary to include a provision requiring that electrical boxes be covered after their installation because the current provisions of the Code are not adequate to prevent foreign materials from entering electrical boxes, damaging the wiring inside and causing fires.

This proposal has not been accepted because it is argued that the provisions contained in the code are adequate to address this problem. Section 110.12 dealt with the situation adequately with 61 percent of home structure fires being caused by premises wiring group. Section 110.12 states that there shall be no damaged parts that may adversely affect safe operation or mechanical strength of the equipment. However, wires in the electrical box are highly vulnerable to damage, particularly during the construction phase. With so much demand on the
construction industry, subcontractors do what is best and fastest for them. Whether it's the plumber, the board hanger, the plasterer, the painter, or spray foam insulator, their only concern is getting their job done. Other contractors have no concern for the damage they cause, especially where it's unseen, such as in the device box.

The NEC must take action and mandate the use of cover plates over device boxes in order to take control over these safety issues. It's unclear why the NEC contains provisions specifically for protection of the wiring against physical damage at almost all points of vulnerability throughout the construction process but does not contain a single provision that adequately addresses the wiring that's exposed for weeks and months on a job site.

It's interesting that by failing to require that a cover be placed over the device box, other articles in the NEC are violated. 110.12 provides that equipment must be installed in a neat and workmanlike manner. However, wires left exposed once contaminated by paint, plaster, power riders, or other materials must be cleaned out or cut by the electrician. And the requirements of 110-12 are not met since the work is no longer neat and workmanlike.
Article 250.5(A)(5) establishes provisions for effective ground fog current path. When the ground fog gets covered by foreign substances, it's not as strong as it should be, and it's ultimately a safety issue. Section 314 requires 6 inches of free flowing conductor be left in the box. But when the wire is compromised, this free flowing conductor must be cut in order to --

CHAIR BELL: 1 minute left.

MS. TOMASINO: I'm going to leave you with this final thought. If you are building or renovating your home, would you want your loved ones living there knowing they could be one of the far too many injured or killed each year as a result of damaged wiring lurking behind those outlets.

Mr. Compagnone and I thank you for the privilege of appearing before you today. I respectfully request that you reconsider this proposal and accept it into the National Electrical Code.

CHAIR BELL: Mr. Carpenter.

MR. CARPENTER: Yes. I'd like to recognize that Keith Laughlin, a member of Code-making Panel 9 will speak for the Panel.

MR. LAUGHLIN: Yes. Keith Laughlin here on
behalf of our chairman, who had some health issues and could not attend. And at this point I'm not sure which of us is the healthiest, but I do represent Panel 9.

We did consider this motion very thoroughly. Again, I commend the submitter of the proposal for the product that is being discussed here. I felt like we could not limit it to just this product. And also, as has been stated, this is adequately covered in 110.12(B). The proposal was rejected 12 to 0 along with the comment that is being issued here or discussed.

CHAIR BELL: Thank you. Microphone 7.

MR. CARPENTER: My name is Robert Wilkinson from the IEC. I call the question.

CHAIR BELL: There's a motion on the floor to call the question. Is there a second? I hear a second. I do want to point out I see no one at the microphone.

All those in favor of calling the question, please raise your hand. Thank you. All those opposed. Motion carries. We'll move directly to the motion on the floor, which is to accept Comment 9-26.

All those in favor of the motion, please raise your hand. All those opposed. Motion fails. We'll move
HOME ELECTRICAL FIRES

John R. Hall, Jr.
March 2009

National Fire Protection Association
Fire Analysis and Research Division
HOME ELECTRICAL FIRES

Part I. Home Structure Fires Involving Electrical Failure or Malfunction

Part II. Home Structure Fires Involving Electrical Distribution or Lighting Equipment

John R. Hall, Jr.

March 2009
Abstract

Home electrical fires
In 2006, an estimated 52,500 home structure fires reported to U.S. fire departments involved some type of electrical failure or malfunction as a factor contributing to ignition. These fires resulted in 340 civilian deaths, 1,400 civilian injuries, and $1,447 million in direct property damage.

Home electrical distribution or lighting equipment fires
In 2006, an estimated 25,100 reported U.S. non-confined home structure fires involving electrical distribution or lighting equipment resulted in 370 civilian deaths, 840 civilian injuries, and $776 million in direct property damage.

These estimates are based on data from the U.S. Fire Administration’s (USFA’s) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association’s (NFPA’s) annual fire department experience survey.

Keywords: Electrical fire, wiring, lamp, light, cord, plug, fuse, circuit breaker, transformer, outlet, receptacle, switch, generator, battery, fire statistics, home fires, residential fires.

Acknowledgements

The National Fire Protection Association thanks all the fire departments and state fire authorities who participate in the National Fire Incident Reporting System (NFIRS) and the annual NFPA fire experience survey. These firefighters are the original sources of the detailed data that make this analysis possible. Their contributions allow us to estimate the size of the fire problem.

We are also grateful to the U.S. Fire Administration for its work in developing, coordinating, and maintaining NFIRS.

For more information about the National Fire Protection Association, visit www.nfpa.org or call 617-770-3000. To learn more about the One-Stop Data Shop go to www.nfpa.org/osds or call 617-984-7443.

Copies of this analysis are available from:

National Fire Protection Association
One-Stop Data Shop
1 Batterymarch Park
Quincy, MA  02169-7471
www.nfpa.org
e-mail:  osds@nfpa.org
phone:  617-984-7450

NFPA No. USS37

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Executive Summary

Home electrical fires

The most inclusive and direct interpretation of “electrical fire” is a fire involving some type of electrical failure or malfunction. In 2006, an estimated 52,500 home structure fires reported to U.S. fire departments involved some type of electrical failure or malfunction as a factor contributing to ignition. These fires resulted in 340 civilian deaths, 1,400 civilian injuries, and $1,447 million in direct property damage. These 2006 home electrical fires represented 13% of total 2006 home structure fires, 13% of associated civilian deaths, 11% of associated civilian injuries, and 21% of associated direct property damage.

These statistics include fires reported as “confined fires,” for which detailed reporting is not required. Estimates of detailed characteristics for confined fires require statistical allocation of a large share of unknowns and so involve less confidence. In this analysis, fires reported as confined fires added an average of 15% to the non-confined fire estimates in 2003-2006. They added less than 1% to civilian deaths and injuries and to direct property damage. Most of the confined fires (61%) were fires confined to a cooking vessel, and most of the rest (27% of the total) were fires confined to fuel burner, boiler, chimney or flue. The rest were fires confined to trash (6%), fires confined to a commercial compactor (3%), and fires confined to an incinerator (3%).

Roughly half (46%) of 2003-2006 reported non-confined U.S. home structure fires involving electrical failure or malfunction had some type of electrical distribution or lighting equipment as equipment involved in ignition. The leading other types of equipment involved in ignition were fan (6%), clothes dryer (5%), air conditioning equipment (4%), space heater (3%), water heater (3%), and range (3%).

Home electrical distribution or lighting equipment fires

In 2006, an estimated 25,100 reported U.S. non-confined home structure fires involving electrical distribution or lighting equipment resulted in 370 civilian deaths, 840 civilian injuries, and $776 million in direct property damage. Fires reported as confined fires would add only 1.8% to the estimated non-confined fires and less than 0.2% to associated losses. Therefore, they are not included in the rest of the analysis.

As with other types of equipment cited as equipment involved in ignition, all that we know from this designation is that the equipment provided the heat leading to ignition. That does not mean that there was electrical or any other type of failure or malfunction. For example, a hot light bulb might have been too close to combustibles.

Electrical distribution or lighting equipment accounted for 5% of 2003-2006 home structure fires, ranking third among major causes behind cooking equipment and heating equipment. Electrical distribution or lighting equipment also accounted for 12% of associated civilian deaths (ranking behind smoking materials, heating equipment, and cooking equipment), 6% of
associated civilian injuries (ranking sixth), and 12% of associated direct property damage (ranking third).

The report is organized around three major sub-groups of electrical distribution or lighting equipment:

- **Premises wiring group**, which includes all equipment defined as “premises wiring” in electrical codes except light fixtures. Generators, batteries, rectifiers, chargers, and inverters are also included in this group for analysis purposes. “Premises wiring” includes these types of equipment:
  - Wiring
  - Outlets, receptacles, and switches
  - Transformers and overcurrent protection equipment
  - Meters and meter boxes
- **Lamps, light fixtures, light bulbs, and signs**
- **Cords and plugs**

There are also two minor equipment groups:

- **Electric fences**
- **Lightning rods and lightning arresters**

The national estimates in this report are derived from data reported to the U.S. Fire Administration’s National Fire Incident Reporting System (NFIRS). Fires declined by about one-third from 1980 to 1998. Version 5.0 of NFIRS, introduced in 1999, contained numerous changes in data categories, definitions, and rules. After the transition period of 1999-2001, when NFIRS Version 5.0 was being phased in, the estimates settled into a level about one-half lower than the levels of the late 1990s, a much larger decline than would have been expected if the 1980-1998 trend had continued unchanged. Associated losses also showed large declines coinciding with the shift to NFIRS Version 5.0.

The premises wiring group* accounted for the largest share (61%) of 2003-2006 home structure fires involving electrical distribution or lighting equipment, followed by lamps, light fixtures, and light bulbs (26%) and cords and plugs (12%).

Three-fourths (74%) of 2003-2006 non-confined home structure fires involving electrical distribution or lighting equipment cited some type of electrical failure or malfunction as a factor contributing to ignition.

The majority of 2003-2006 non-confined home structure fires involving electrical distribution or lighting equipment began with ignition of products and materials often found in structural areas, including wire or cable insulation (31%), structural member or framing (13%), insulation within structural area (5%), exterior wall covering (5%), or interior wall covering (5%).

Two-fifths (40%) of deaths in 2003-2006 non-confined home structure fires involving electrical distribution or lighting equipment resulted from fires that began in a living room, family room, or den.

* “Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters, and chargers.
Three-fourths (72%) of deaths in 2003-2006 home structure fires involving electrical distribution or lighting equipment involved victims who were outside the area of origin when fire began. By comparison 58% of fatal victims for all home structure fires were outside the area of origin.

Home structure fires involving electrical distribution or lighting equipment, in 2003-2006, show a winter peak similar to that for heating equipment but less pronounced.

In 2007, 43 people died of injuries from unvented carbon monoxide from generators. Fueled equipment to generate electricity is the only type of electrical distribution or lighting equipment that can produce carbon monoxide.

The death toll from carbon monoxide produced by generators has increased sharply in recent years until 2007, from less than 10 per year on average in 1999 and prior years to 19 per year in 2000-2001, 47 per year in 2002-2004, 89 per year in 2005-2006, and back to 43 in 2007.

Safety Tips

- Home electrical safety begins with NFPA 70, *National Electrical Code®*, and related documents with special relevance to homes, notably NFPA 73, *Electrical Inspection Code for Existing Dwellings*. However, work on home electrical distribution or lighting equipment should only be conducted by someone qualified as an electrician. When you are buying, selling or remodeling a home, have it inspected by a professional electrician.

- Call a qualified electrician or landlord if you have
  - recurring problems with blowing fuses or tripping circuit breakers,
  - a tingling feeling when you touch an electrical appliance,
  - discolored or warm wall outlets,
  - a burning smell or rubbery odor coming from an appliance,
  - flickering lights,
  - sparks from an outlet.

- Arc fault circuit interrupters (AFCIs) are a type of circuit breaker that shuts off electricity when a dangerous condition occurs. Consider having them installed in your home. Use a qualified electrician.
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Home Fires Involving Electrical Failure or Malfunction

U.S. fire departments responded to an estimated average of 52,500 reported U.S. home structure fires involving electrical failure or malfunction in 2006. These fires resulted in 340 civilian deaths, 1,400 civilian injuries and $1,447 million in direct property damage.

46% of home electrical failure fires involved electrical distribution or lighting equipment in 2003-2006.

Leading Known Types of Electrical Distribution or Lighting Equipment Involved in Home Electrical Failure Fires, 2003-2006

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outlet or receptacle</td>
<td>5%</td>
</tr>
<tr>
<td>Extension cord</td>
<td>3%</td>
</tr>
<tr>
<td>Branch circuit wiring</td>
<td>3%</td>
</tr>
<tr>
<td>Fuse or circuit breaker panel</td>
<td>3%</td>
</tr>
</tbody>
</table>

47% of electrical failure home fires involved other known types of equipment in 2003-2006.

Leading Other Known Types of Equipment Involved in Home Electrical Failure Fires, 2003-2006

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan</td>
<td>6%</td>
</tr>
<tr>
<td>Clothes dryer</td>
<td>5%</td>
</tr>
<tr>
<td>Air conditioning equipment</td>
<td>4%</td>
</tr>
</tbody>
</table>

Home Fires Involving Electrical Distribution or Lighting Equipment

U.S. fire departments responded to an estimated average of 25,100 reported U.S. non-confined home structure fires involving electrical distribution or lighting equipment in 2006. These fires resulted in 370 civilian fire deaths, 840 civilian fire injuries, and $776 million in direct property damage.

In 2003-2006:
Some type of electrical failure or malfunction was cited as factor contributing to ignition for 74% of electrical distribution or lighting equipment home structure fires.

Two-fifths (40%) of civilian deaths in home structure fires involving electrical distribution or lighting equipment began in the living room, family room or den.

Wire or cable insulation is what ignited first in 31% of electrical distribution or lighting equipment home structure fires.

1Homes are dwellings, duplexes, manufactured homes, apartments, townhouses, and rowhouses.
Introduction

This report is organized into two parts, Part I is on home electrical fires. Part II is on home fires with electrical distribution or lighting equipment as the equipment involved in ignition.

Electrical Failure or Malfunction

Part I is new to this report and defines “electrical fire” as a fire involving any type of electrical failure or malfunction as a factor contributing to ignition. An electrical fire can involve any type of electrically powered equipment. Fewer than half of home electrical fires involve electrical distribution or lighting equipment.

Electrical Distribution or Lighting Equipment

Part II is the latest in this long-running entry in NFPA’s reports on home fires by cause. Three out of four home electrical distribution or lighting equipment fires are electrical fires. Of the rest, the largest share of fires involved a heat source, primarily a light fixture or lamp, being too close to combustibles.
HOME ELECTRICAL FIRES

Part I. Home Structure Fires Involving Electrical Failure or Malfunction

John R. Hall, Jr.
March 2009

National Fire Protection Association
Fire Analysis and Research Division
Electrical Fires

In 2006, an estimated 52,500 home electrical fires were reported to U.S. fire departments. “Electrical fire” is defined as structure fire that involved some type of electrical failure or malfunction as a factor contributing to ignition.

These fires resulted in 340 civilian deaths, 1,400 civilian injuries, and $1,447 million in direct property damage. These 2006 home electrical fires represented 13% of total 2006 home structure fires, 13% of associated civilian deaths, 11% of associated civilian injuries, and 21% of associated direct property damage.

Figure 1. Home Structure Fires Involving Electrical Failure or Malfunction as Factor Contributing to Ignition, by Year
Structure Fires Reported to U.S. Fire Departments

Source: Data from NFIRS (Version 5.0 after 1998) and NFPA survey. Note: See Note in Table 1.

Figure 1 and Table 1 show that there has been a fairly steady and substantial downward trend, with the 2006 total being roughly half the size of the 1980 estimated total of 100,700 fires. However, the trend was fairly level from the late 1980s to 1998 and has been fairly level since the introduction of NFIRS Version 5.0 in 1999. Civilian deaths and direct property damage (adjusted for inflation) have not shown a consistent decline from 1980 to the present. The decline associated with the introduction of NFIRS Version 5.0 (after 1998) may be due more to changes in data categories, definitions, and rules, than to real changes in the actual fire problem.

These statistics include fires reported as “confined fires,” for which detailed reporting is not required. Estimates of detailed characteristics for confined fires require statistical allocation of a large share of unknowns and so involve less confidence. In this analysis, fires reported as confined fires added an average of 15% to the non-confined fire estimates in 2003-2006. They added less than 1% to civilian deaths and injuries and to direct property damage. Most of the confined fires (61%) were fires confined to a cooking vessel, and most of the rest (27% of the total) were fires confined to fuel burner, boiler, chimney or flue. The rest were fires confined to trash (6%), fires confined to a commercial compactor (3%), and fires confined to an incinerator (3%).
Table A. Home Fires Involving Electrical Failure or Malfunction as Factor Contributing to Ignition, by Factor Contributing to Ignition
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Type of Electrical Failure or Malfunction</th>
<th>Fires (in thousands)</th>
<th>Civilian Deaths (in thousands)</th>
<th>Civilian Injuries (in thousands)</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>21,100 (45%)</td>
<td>230 (45%)</td>
<td>650 (46%)</td>
<td>$709 (49%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>12,900 (28%)</td>
<td>140 (28%)</td>
<td>400 (28%)</td>
<td>$443 (31%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>6,800 (15%)</td>
<td>70 (14%)</td>
<td>210 (15%)</td>
<td>$168 (12%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>2,100 (5%)</td>
<td>10 (3%)</td>
<td>60 (4%)</td>
<td>$54 (4%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>1,900 (4%)</td>
<td>30 (5%)</td>
<td>60 (4%)</td>
<td>$46 (3%)</td>
</tr>
<tr>
<td>Arc or spark from operating equipment</td>
<td>1,900 (4%)</td>
<td>40 (7%)</td>
<td>70 (5%)</td>
<td>$64 (4%)</td>
</tr>
<tr>
<td>Water caused short circuit arc</td>
<td>800 (2%)</td>
<td>0 (0%)</td>
<td>10 (1%)</td>
<td>$9 (1%)</td>
</tr>
<tr>
<td>Fluorescent light bulb</td>
<td>200 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$12 (1%)</td>
</tr>
<tr>
<td><strong>Total fires</strong></td>
<td><strong>46,400 (100%)</strong></td>
<td><strong>510 (100%)</strong></td>
<td><strong>1,420 (100%)</strong></td>
<td><strong>$1,443 (100%)</strong></td>
</tr>
<tr>
<td><strong>Total factors</strong></td>
<td><strong>47,600 (102%)</strong></td>
<td><strong>520 (101%)</strong></td>
<td><strong>1,460 (103%)</strong></td>
<td><strong>$1,504 (104%)</strong></td>
</tr>
</tbody>
</table>

Note: Figures exclude confined fires, which are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections exclude fires reported only to Federal or state agencies or industrial fire brigades. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten, and property damage is rounded to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with factor contributing to ignition listed as unknown, unreported, none, or blank. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Roughly half (46%) of 2003-2006 reported non-confined U.S. home structure fires involving electrical failure or malfunction had some type of electrical distribution or lighting equipment as equipment involved in ignition.**

The leading other types of equipment involved in ignition were fan (6%), clothes dryer (5%), air conditioning (4%), space heater (3%), water heater (3%), and range (3%). See Table 2.

Lamps, light bulbs, and light fixtures rank lower in Table 2 than they do on any list of all home fires by equipment involved in ignition. This is because the percentage of lamp, light fixture, or light bulb fires involving electrical failure or malfunction (37%) is much lower than the corresponding percentages for cords and plugs (80%) and for the premises wiring group* (88%).

**Most (73%) reported non-confined home structure fires involving electrical failure or malfunction were reported with no details on failure mode.**

Table A shows the estimates for different types of electrical failure or malfunction.

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* “Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters, and chargers.
The more specifically defined electrical failure modes also show a different equipment involved in ignition profile than the combined group of all electrical failure fires. Table 2 shows the leading equipment types (excluding no equipment) for all electrical failure modes combined (in 2003-2006 non-confined home structure fires) were:

- Unclassified or unknown-type wiring – 12%
- Fan – 6%
- Outlet or receptacle – 5%
- Clothes dryer – 5%
- Air conditioning equipment – 4%

The detailed failure mode with the largest share of fires was short circuit arc from defective or worn insulation (6,800 fires per year in Table A). When that was a factor contributing to ignition, the leading types of equipment involved (excluding no equipment) were:

- Unclassified or unknown-type wiring – 19%
- Extension cord – 6%
- Branch circuit wiring – 5%
- Outlet or receptacle – 5%
- Clothes dryer – 4%
- Fan – 4%
- Air conditioning equipment – 4%

When the failure mode is short circuit arc from defective or worn insulation, there are larger shares for extension cord (6% vs. 3% all failure modes) and branch circuit wiring (5% vs. 3% for all failure modes). Of all electrical equipment, extension cords are probably most likely to be used in high traffic areas, where damage to insulation through abrasion can easily occur.

The detailed failure mode with the second largest share of fires was arc from faulty contact or broken conductor (2,100 fires per year in Table A). When that was a factor contributing to ignition, the leading types of equipment involved in ignition (excluding no equipment) were:

- Unclassified or unknown-type wiring – 14%
- Outlet or receptacle – 13%
- Branch circuit wiring – 5%
- Fuse, circuit breaker, or other overcurrent protection device – 5%
- Clothes dryer – 4%
- Extension cord – 4%
- Water heater – 4%

When arc from faulty contact or broken conductor is a factor contributing to ignition, there is a much larger share for outlet or receptacle (13% vs. 5% for all failure modes). This is probably the type of electrical equipment most vulnerable to this kind of failure, particularly as a result of plugs being repeatedly inserted and removed.

When short circuit arc from mechanical damage is a factor contributing to ignition (1,900 fires per year in Table A), the leading types of equipment involved in ignition (excluding no equipment) were:

- Unclassified or unknown-type wiring – 8%
- Fan – 7%
• Clothes dryer – 6%
• Extension cord – 6%
• Air conditioning equipment – 5%
• Range – 5%
• Branch circuit wiring – 4%
• Service supply wiring – 4%

As with defective or worn insulation, there is a larger share for extension cord, compared to its share with other failure modes.

The two failure modes with the smallest shares of fires also have the most distinctive profiles for equipment involved in ignition. When short circuit arc caused by water is a factor contributing to ignition (800 fires per year in Table A), the leading types of equipment involved in ignition (excluding no equipment) were:

• Water heater – 27%
• Outlet or receptacle – 9%
• Fuse, circuit breaker or other overcurrent protection device – 9%
• Unclassified or unknown-type wiring – 6%

One-quarter of these fires involved water heaters. These could involve release of water from the water heater, exposure to storm flooding, or flooding from a break in the home’s water supply.

When fluorescent light ballast was a factor contributing to ignition (200 fires per year in Table A), the leading type of equipment involved in ignition was fluorescent light fixture (70%).

Arcing appears to account for most home electrical fires, as compared with overheating due to overcurrent.

If electrical failure or malfunction is defined by Factor Contributing to Ignition, then the relative roles of arcing and overheating can be examined using Heat Source. Arcing should be the mode of ignition if Heat Source refers to arcing or sparks. Overheating should be the mode of ignition if Heat Source refers to radiated or conducted heat or to molten or hot material. Here are the leading Heat Source entries and their respective shares of fires with known Heat Source, from all home fires involving electrical failure or malfunction:

• Arcing – 58%, definitely arcing;
• Unclassified heat from powered equipment – 16%, could be either;
• Unclassified heat source – 7%, could be either;
• Radiated or conducted heat from operating equipment – 6%; should be overheating;
• Spark, ember or flame from operating equipment – 6%, could be either;
• Unclassified hot or smoldering object – 5%, probably overheating;
• Heat or spark from friction – 1%, could be either;
• Molten or hot material – 1%, very probably overheating.

These statistics suggest a 5-to-1 ratio of arcing fires to overheating fires if unclassified hot or smoldering object is counted with overheating and a 10-to-1 ratio if it is not.

Fires due to overheating caused by overcurrent can be prevented by overcurrent protection devices, principally circuit breakers and fuses, while fires due to arcing can be prevented by arc
fault circuit interrupters (AFCIs). The former has been present in all, or nearly all, homes with electrical service since electrical service has been available. The latter is a technology developed more recently and is still in very limited use.

A 1983 special study by the National Institute of Standards and Technology (then still called the National Bureau of Standards) examined 80 cases of one- and two-family dwelling electrical distribution or lighting equipment fires for which the type and performance of overcurrent protection was known and reported. None of the 43 cases with circuit breakers and 11% of the cases with fuses were deemed to involve circumstances where the overcurrent protection device should have operated to prevent ignition.

The U.S. Consumer Product Safety Commission which had arranged and sponsored the collection of the data analyzed by NIST, arranged and sponsored a second phase of data collection in the late 1980s and performed the analysis themselves. One finding was a strong relationship between age of dwelling and the rate of electrical distribution and lighting equipment fires per million dwellings, as shown in Table B.

<table>
<thead>
<tr>
<th>Age of Dwelling</th>
<th>1990 CPSC Study</th>
<th>1983 NIST Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10 years</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>11-20 years</td>
<td>0.5</td>
<td>0.3</td>
</tr>
<tr>
<td>21-40 years</td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td>More than 40 years</td>
<td>1.6</td>
<td>1.9</td>
</tr>
<tr>
<td>All ages</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Note: The risk ratio is defined as the ratio of the fire rate for dwellings of that age to the fire rate for all dwellings.


The two analyses identified three primary factors in relationship between age of dwelling and risk.

- In the 1990 CPSC analysis, no dwelling built later than 1965 used fuses rather than circuit breakers, whereas about half the dwellings built before 1965 used fuses. As of 2007, roughly 42% of the action’s occupied detached single-family dwellings had been built before 1965, which suggests dwellings with fuses now account for at most one-fifth of total dwellings.
- In the 1983 NIST analysis, no dwelling built later than 1950 used knob and tube wiring whereas about one-third of dwellings built before 1950 used knob and tube wiring. As of

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2007, 23% of the nation’s occupied detached single-family dwellings were built before 1950, which suggests dwellings with knob and tube wiring now account for less than one-tenth of total dwellings.\footnote{American Housing Survey 2007, U.S. Department of Commerce and U.S. Department of Housing and Urban Development, September 2008, Tables 1A-1 and 2.25.}

- In the 1983 NIST analysis, 63% of fire cases involving dwellings built before 1960 found electrical systems in need of repair, compared to only 27% of fire cases involving dwellings built after 1960 (at most 20 years old).

Of these three factors, the first two – use of fuses and use of knob and tube wiring – are clearly much less common today than they were at the time of the NIST and CPSC studies. However, age may still be a factor in the risk of home electrical fires. In the CPSC study, one-sixth (17%) of the fires were in dwellings that showed equipment deterioration due to aging.

The Fire Protection Research Foundation sponsored a project in 2002-2008 to take an updated look at the issue of aging electrical distribution and lighting equipment in dwellings.\footnote{David A. Dini, \textit{Residential Electrical System Aging Research Project}, Fire Protection Research Foundation, Quincy, MA, July 1, 2008.} The methodology consisted of a detailed examination of 30 homes that were 30 to 110 years old. They identified a number of system problems, which may correlate with system age for different reasons. Here are some examples:

1. \textbf{Physical deterioration due to age alone.} Pre-1950 wiring often used conductors with thermoset rubber insulation, and rubber is known to become brittle with age. This general potential was confirmed to have occurred in some of the sample homes. Ground fault circuit interrupters (GFCIs) were cited as an example of an electrical product that in several cases were left in place past their design product life. Like non-operational smoke alarms, these products include test features and/or external indicators of non-operationality but may still be left in place without needed maintenance or replacements.

2. \textbf{Deterioration as a possible or likely cumulative result of repeated impacts in normal use.} Receptacle outlets receive repeated impacts from the insertion and removal of plugs. Some of these insertions or removals are rough enough to constitute abuse, but even normal use creates the potential for product deterioration over time.

3. \textbf{Products that, even though they may not deteriorate with age, no longer provide as much fire protection as alternative products now widely used.} Age is indirectly related because it correlates with the degree of usage of these alternative products. Circuit breakers and fuses are always cited as an example, but the FPRF study, like the NIST and CPSC studies, did not find a clear difference in performance between fuses and circuit breakers. All those studies tend to indicate that old fuses and old circuit breakers work well if not abused or misused. Fuses are easier to defeat through tampering, and this appears to be the key to any statistical difference in performance.
(4) Misuse of products where affordability may be an issue, no longer provide as much fire protection as alternative products now widely used. Age is indirectly related because poor and other high-risk households are more likely to live in older homes.\(^4\)

The principal example was the use of extension cords as permanent wiring instead of adding more outlets. There was also a general reference to the failure to replace worn-out electrical devices. At the same time, some problems – such as improper installation, poor product choices, and inadequate electrical capacity – can arise in new homes as easily as in older homes. For example, in 2007, the American Housing Survey asked whether fuses or circuit breakers had “blown” in the previous three months.\(^5\) The overall average was 9% of households said yes. The response was the same for new construction (housing units no more than four years old) as for older housing.

Other reports provide statistics on non-fire incidents and harm due to electricity.

See the following reports:

- Jennifer D. Flynn, *Non-Fire Electrical Wiring and Equipment Problem Incidents Reported to U.S. Fire Departments*, NFPA Fire Analysis and Research Division, Quincy, MA, August 2007 – Analyzes 316,000 reported 2003 incidents, such as power line down, that did not involve fire or rescue.
- Jennifer D. Flynn, *Non-Fire Electrical Rescue Incidents Reported to Fire Departments in 2003*, NFPA Fire Analysis and Research Division, Quincy, MA, August 2007 – Analyzes 2,800 reported incidents, including electrocutions and people trapped by power lines.
- John R. Hall, Jr., *Deaths and Injuries Due to Non-Fire Burns*, NFPA Fire Analysis and Research Division, Quincy, MA, March 2009 – Estimates 1991-2007 electrical burn injuries reported to U.S. hospital emergency rooms and 1980-2005 unintentional-injury deaths by electrical current, including deaths specifically attributable to electric transmission lines or to lightning.

Also of interest is the following:


Safety Tips

- Home electrical safety begins with NFPA 70, *National Electrical Code®* and related documents with special relevance to homes, notable NFPA 73, *Electrical Inspection Code for Existing Dwellings*. However, work on home electrical distribution or lighting equipment should only be conducted by someone qualified as an electrician. When you are buying, selling or remodeling a home, have it inspected by a professional electrician.

- Call a qualified electrician or landlord if you have
  - Recurring problems with blowing fuses or tripping circuit breakers,

\[^4\] For example, in 2007, 50% of poor households lived in a housing unit built before 1970 compared to 44% of all households, and 37% of poor households lived in a housing unit built before 1960 compared to 32% of all households. (*American Housing Survey 2007*, U.S. Department of Commerce and U.S. Department of Housing and Urban Development, September 2008, Table 2-25.)

- A tingling feeling when you touch an electrical appliance,
- Discolored or warm wall outlets,
- A burning smell or rubbery odor coming from an appliance,
- Flickering lights,
- Sparks from an outlet.

- Arc fault circuit interrupters (AFCIs) are a type of circuit breaker that shuts off electricity when a dangerous condition occurs. Consider having them installed in your home. Use a qualified electrician.
<table>
<thead>
<tr>
<th>Year</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>As Reported</td>
</tr>
<tr>
<td>1980</td>
<td>100,700</td>
<td>580</td>
<td>2,230</td>
<td>$635</td>
</tr>
<tr>
<td>1981</td>
<td>93,600</td>
<td>580</td>
<td>2,150</td>
<td>$549</td>
</tr>
<tr>
<td>1982</td>
<td>88,000</td>
<td>540</td>
<td>2,230</td>
<td>$603</td>
</tr>
<tr>
<td>1983</td>
<td>83,300</td>
<td>550</td>
<td>2,260</td>
<td>$691</td>
</tr>
<tr>
<td>1984</td>
<td>81,600</td>
<td>440</td>
<td>1,920</td>
<td>$684</td>
</tr>
<tr>
<td>1985</td>
<td>82,400</td>
<td>530</td>
<td>2,070</td>
<td>$855</td>
</tr>
<tr>
<td>1986</td>
<td>78,700</td>
<td>690</td>
<td>1,960</td>
<td>$721</td>
</tr>
<tr>
<td>1987</td>
<td>76,800</td>
<td>630</td>
<td>2,210</td>
<td>$665</td>
</tr>
<tr>
<td>1988</td>
<td>79,600</td>
<td>610</td>
<td>2,520</td>
<td>$882</td>
</tr>
<tr>
<td>1989</td>
<td>74,200</td>
<td>540</td>
<td>2,370</td>
<td>$835</td>
</tr>
<tr>
<td>1990</td>
<td>72,800</td>
<td>500</td>
<td>2,350</td>
<td>$883</td>
</tr>
<tr>
<td>1991</td>
<td>76,800</td>
<td>470</td>
<td>2,720</td>
<td>$1,137*</td>
</tr>
<tr>
<td>1992</td>
<td>74,500</td>
<td>490</td>
<td>2,720</td>
<td>$852</td>
</tr>
<tr>
<td>1993</td>
<td>76,600</td>
<td>540</td>
<td>2,860</td>
<td>$1,046</td>
</tr>
<tr>
<td>1994</td>
<td>76,300</td>
<td>550</td>
<td>2,480</td>
<td>$959</td>
</tr>
<tr>
<td>1995</td>
<td>73,700</td>
<td>680</td>
<td>2,400</td>
<td>$978</td>
</tr>
<tr>
<td>1996</td>
<td>76,500</td>
<td>640</td>
<td>2,580</td>
<td>$1,176</td>
</tr>
<tr>
<td>1997</td>
<td>71,900</td>
<td>410</td>
<td>2,180</td>
<td>$1,096</td>
</tr>
<tr>
<td>1998</td>
<td>70,800</td>
<td>500</td>
<td>2,410</td>
<td>$1,084</td>
</tr>
<tr>
<td>1999</td>
<td>48,300</td>
<td>(45,900)</td>
<td>390 (390)</td>
<td>1,690 (1,690)</td>
</tr>
<tr>
<td>2000</td>
<td>51,000</td>
<td>(47,600)</td>
<td>390 (390)</td>
<td>1,670 (1,670)</td>
</tr>
<tr>
<td>2001</td>
<td>55,200</td>
<td>(50,300)</td>
<td>550 (550)</td>
<td>1,710 (1,660)</td>
</tr>
<tr>
<td>2002</td>
<td>55,800</td>
<td>(50,400)</td>
<td>280 (280)</td>
<td>1,310 (1,310)</td>
</tr>
<tr>
<td>2003</td>
<td>53,800</td>
<td>(46,200)</td>
<td>640 (640)</td>
<td>1,380 (1,380)</td>
</tr>
<tr>
<td>2004</td>
<td>55,000</td>
<td>(47,500)</td>
<td>630 (630)</td>
<td>1,540 (1,530)</td>
</tr>
<tr>
<td>2005</td>
<td>52,200</td>
<td>(45,600)</td>
<td>450 (450)</td>
<td>1,410 (1,390)</td>
</tr>
<tr>
<td>2006</td>
<td>52,500</td>
<td>(46,300)</td>
<td>340 (340)</td>
<td>1,400 (1,390)</td>
</tr>
</tbody>
</table>

* All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Figures in parentheses exclude confined fires which are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest ten, and direct property damage to the nearest million dollars. Figures reflect a proportional share of home fires with factor contributing to ignition listed as unknown, unreported, none, or blank. Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for these years are highly uncertain and must be used with caution. Inflation adjustment to 2006 dollars is done using the consumer price index.

Source: Data from NFIRS (Version 5.0 after 1998) and NFPA survey.
### Table 2. Home Structure Fires Involving Electrical Failure or Malfunction, by Equipment Involved in Ignition
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments (Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Equipment Involved in Ignition</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrical distribution or lighting equipment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unclassified or unknown-type wiring</td>
<td>5,800</td>
<td>30 (6%)</td>
<td>130 (9%)</td>
<td>$221 (15%)</td>
</tr>
<tr>
<td>Outlet or receptacle</td>
<td>2,400</td>
<td>20 (4%)</td>
<td>110 (8%)</td>
<td>$90 (6%)</td>
</tr>
<tr>
<td>Extension cord</td>
<td>1,600</td>
<td>80 (17%)</td>
<td>100 (7%)</td>
<td>$66 (5%)</td>
</tr>
<tr>
<td>Branch circuit wiring</td>
<td>1,600</td>
<td>10 (1%)</td>
<td>30 (2%)</td>
<td>$66 (5%)</td>
</tr>
<tr>
<td>Fuse or circuit breaker panel</td>
<td>1,400</td>
<td>0 (1%)</td>
<td>20 (1%)</td>
<td>$34 (2%)</td>
</tr>
<tr>
<td>Unclassified or unknown-type electrical distribution or lighting equipment</td>
<td>1,000</td>
<td>20 (3%)</td>
<td>30 (2%)</td>
<td>$57 (4%)</td>
</tr>
<tr>
<td>Unclassified lamp, light fixture or sign</td>
<td>800</td>
<td>10 (2%)</td>
<td>10 (1%)</td>
<td>$27 (2%)</td>
</tr>
<tr>
<td>Incandescent lighting fixture</td>
<td>700</td>
<td>0 (1%)</td>
<td>10 (1%)</td>
<td>$16 (1%)</td>
</tr>
<tr>
<td>Service supply wire from utility</td>
<td>600</td>
<td>0 (0%)</td>
<td>10 (1%)</td>
<td>$20 (1%)</td>
</tr>
<tr>
<td>Meter or meter box</td>
<td>600</td>
<td>10 (1%)</td>
<td>10 (1%)</td>
<td>$18 (1%)</td>
</tr>
<tr>
<td>Wiring from meter box to circuit breaker</td>
<td>500</td>
<td>0 (0%)</td>
<td>10 (1%)</td>
<td>$11 (1%)</td>
</tr>
<tr>
<td>Permanently attached power cord</td>
<td>500</td>
<td>20 (4%)</td>
<td>40 (3%)</td>
<td>$11 (1%)</td>
</tr>
<tr>
<td>Table lamp</td>
<td>500</td>
<td>10 (3%)</td>
<td>10 (1%)</td>
<td>$14 (1%)</td>
</tr>
<tr>
<td>Surge protector</td>
<td>500</td>
<td>20 (4%)</td>
<td>20 (2%)</td>
<td>$15 (1%)</td>
</tr>
<tr>
<td>Unclassified cord or plug</td>
<td>500</td>
<td>10 (1%)</td>
<td>40 (3%)</td>
<td>$31 (2%)</td>
</tr>
<tr>
<td>Electrical power (utility) line</td>
<td>400</td>
<td>0 (1%)</td>
<td>0 (0%)</td>
<td>$8 (1%)</td>
</tr>
<tr>
<td>Heat tape</td>
<td>300</td>
<td>0 (0%)</td>
<td>10 (1%)</td>
<td>$5 (0%)</td>
</tr>
<tr>
<td>Detachable power cord</td>
<td>300</td>
<td>0 (1%)</td>
<td>20 (2%)</td>
<td>$16 (1%)</td>
</tr>
<tr>
<td>Wall switch</td>
<td>300</td>
<td>0 (0%)</td>
<td>10 (1%)</td>
<td>$6 (0%)</td>
</tr>
<tr>
<td>Fluorescent lighting fixture or ballast</td>
<td>200</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$7 (0%)</td>
</tr>
<tr>
<td>Other known electrical distribution or lighting equipment</td>
<td>900</td>
<td>10 (2%)</td>
<td>30 (2%)</td>
<td>$41 (3%)</td>
</tr>
<tr>
<td><strong>Equipment other than electrical distribution or light</strong></td>
<td>22,000</td>
<td>240 (47%)</td>
<td>700 (49%)</td>
<td>$567 (39%)</td>
</tr>
<tr>
<td>Fan</td>
<td>2,600</td>
<td>20 (4%)</td>
<td>80 (6%)</td>
<td>$81 (6%)</td>
</tr>
<tr>
<td>Clothes dryer</td>
<td>2,400</td>
<td>0 (0%)</td>
<td>50 (4%)</td>
<td>$40 (3%)</td>
</tr>
<tr>
<td>Air conditioning equipment</td>
<td>1,800</td>
<td>10 (3%)</td>
<td>60 (4%)</td>
<td>$45 (3%)</td>
</tr>
<tr>
<td>Space heater, portable or stationary</td>
<td>1,600</td>
<td>70 (14%)</td>
<td>40 (3%)</td>
<td>$47 (3%)</td>
</tr>
<tr>
<td>Water heater</td>
<td>1,600</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$13 (1%)</td>
</tr>
<tr>
<td>Range</td>
<td>1,500</td>
<td>10 (3%)</td>
<td>20 (2%)</td>
<td>$18 (1%)</td>
</tr>
<tr>
<td>Unclassified or unknown-type heating or air conditioning equipment</td>
<td>1,200</td>
<td>0 (0%)</td>
<td>20 (1%)</td>
<td>$22 (2%)</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>700</td>
<td>10 (1%)</td>
<td>30 (2%)</td>
<td>$23 (2%)</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>600</td>
<td>0 (0%)</td>
<td>10 (0%)</td>
<td>$12 (1%)</td>
</tr>
</tbody>
</table>
Table 2. Home Structure Fires Involving Electrical Failure or Malfunction, by Equipment Involved in Ignition (Continued)
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Equipment Involved in Ignition</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnace or other central heating unit</td>
<td>600 (1%)</td>
<td>20 (3%)</td>
<td>20 (1%)</td>
<td>$7 (0%)</td>
</tr>
<tr>
<td>Microwave oven</td>
<td>500 (1%)</td>
<td>0 (0%)</td>
<td>30 (2%)</td>
<td>$10 (1%)</td>
</tr>
<tr>
<td>Television</td>
<td>500 (1%)</td>
<td>10 (1%)</td>
<td>40 (3%)</td>
<td>$15 (1%)</td>
</tr>
<tr>
<td>Unclassified personal or household equipment</td>
<td>400 (1%)</td>
<td>10 (2%)</td>
<td>40 (3%)</td>
<td>$20 (1%)</td>
</tr>
<tr>
<td>Unclassified or unknown-type electronic equipment</td>
<td>400 (1%)</td>
<td>0 (0%)</td>
<td>30 (2%)</td>
<td>$20 (1%)</td>
</tr>
<tr>
<td>Unclassified or unknown-type cooking or other kitchen equipment</td>
<td>400 (1%)</td>
<td>20 (4%)</td>
<td>10 (1%)</td>
<td>$9 (1%)</td>
</tr>
<tr>
<td>Oven</td>
<td>400 (1%)</td>
<td>0 (0%)</td>
<td>10 (0%)</td>
<td>$4 (0%)</td>
</tr>
<tr>
<td>Washing machine</td>
<td>300 (1%)</td>
<td>0 (0%)</td>
<td>10 (1%)</td>
<td>$2 (0%)</td>
</tr>
<tr>
<td>Electric blanket</td>
<td>300 (1%)</td>
<td>20 (4%)</td>
<td>30 (2%)</td>
<td>$12 (1%)</td>
</tr>
<tr>
<td>Grease hood or duct exhaust fan</td>
<td>300 (1%)</td>
<td>0 (0%)</td>
<td>10 (1%)</td>
<td>$4 (0%)</td>
</tr>
<tr>
<td>Other known equipment other than electrical distribution or lighting equipment</td>
<td>3,900 (8%)</td>
<td>40 (8%)</td>
<td>150 (11%)</td>
<td>$165 (11%)</td>
</tr>
<tr>
<td><strong>No equipment involved</strong></td>
<td><strong>2,500 (5%)</strong></td>
<td><strong>10 (1%)</strong></td>
<td><strong>20 (1%)</strong></td>
<td><strong>$80 (6%)</strong></td>
</tr>
<tr>
<td><strong>Unclassified equipment involved in ignition</strong></td>
<td><strong>500 (1%)</strong></td>
<td><strong>0 (1%)</strong></td>
<td><strong>10 (1%)</strong></td>
<td><strong>$16 (1%)</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>46,400 (100%)</strong></td>
<td><strong>510 (100%)</strong></td>
<td><strong>1,420 (100%)</strong></td>
<td><strong>$1,443 (100%)</strong></td>
</tr>
</tbody>
</table>

Note: Figures exclude confined fires which are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest ten, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with factor contributing to ignition listed as unknown, unreported, none, or blank. Figures reflect a proportional share of home fires with factor contributing to ignition codes as electrical failure or malfunction and equipment involved with ignition shown as unknown or blank or as "no equipment" without a confirming heat source (codes 40-99 under heat source). Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.
HOME ELECTRICAL FIRES

Part II. Home Structure Fires Involving Electrical Distribution or Lighting Equipment

John R. Hall, Jr.
March 2009
Electrical Distribution or Lighting Equipment

In 2006, an estimated 25,100 reported U.S. non-confined home structure fires involving electrical distribution or lighting equipment resulted in 370 civilian deaths, 840 civilian injuries, and $776 million in direct property damage.

As with other types of equipment cited as equipment involved in ignition, all that we know from this designation is that the equipment provided the heat leading to ignition. That does not mean that there was electrical or any other type of failure or malfunction. For example, a hot light bulb might have been too close to combustibles.

Electrical distribution or lighting equipment accounted for 5% of 2003-2006 home structure fires, ranking third among major causes behind cooking equipment and heating equipment. Electrical distribution or lighting equipment also accounted for 12% of associated civilian deaths (ranking behind smoking materials, heating equipment, and cooking equipment), 6% of associated civilian injuries (ranking sixth), and 12% of associated direct property damage (ranking third).

The report is organized around three major sub-groups of electrical distribution or lighting equipment:

- Premises wiring group, which includes all equipment defined as “premises wiring” in electrical codes except light fixtures. Generators, batteries, rectifiers, chargers, and inverters are also included in this group for analysis purposes. “Premises wiring” includes these types of equipment:
  - Wiring
  - Outlets, receptacles, and switches
  - Transformers and overcurrent protection equipment
  - Meters and meter boxes
- Lamps, light fixtures, light bulbs, and signs
- Cords and plugs

Source: Data from NFIRS (Version 5.0 after 1998) and NFPA survey. Note: See Note in Table 3.
There are also two minor equipment groups:

- Electric fences
- Lightning rods and lightning arresters

The national estimates in this report are derived from data reported to the U.S. Fire Administration’s National Fire Incident Reporting System (NFIRS). Fires declined by about one-third from 1980 to 1998. (See Figure 2 and Table 3.) Version 5.0 of NFIRS, introduced in 1999, contained numerous changes in data categories, definitions, and rules. After the transition period of 1999-2001, when Version 5.0 of the U.S. Fire Administration’s National Fire Incident Reporting System (NFIRS) was being phased in, the estimates settled into a level about one-half lower than the levels of the late 1990s, a larger decline than would have been expected if the 1980-1998 trend had continued unchanged. Associated losses also showed large declines coinciding with the shift to NFIRS Version 5.0.

NFIRS Version 5.0 introduced six types of “confined fires” – fires confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor – for which detailed reporting is not required. Estimates of detailed characteristics for confined fires involve a large share of unknowns and so involve less confidence. In 2003-2006, an average of 400 home structure confined fires per year involved electrical distribution or lightning equipment. They add only 1.8% to non-confined fires and less than 0.2% to any measure of associated loss. Therefore, no other analyses in this section include confined fires.

### Table C. Home Fires Involving Electrical Distribution or Lighting Equipment, by Major Equipment Group

<table>
<thead>
<tr>
<th>Major Equipment Group</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premises wiring group*</td>
<td>13,010 (61%)</td>
<td>159 (43%)</td>
<td>397 (48%)</td>
<td>$450 (61%)</td>
</tr>
<tr>
<td>Lamps, light fixtures, and light bulbs</td>
<td>5,500 (26%)</td>
<td>72 (19%)</td>
<td>227 (27%)</td>
<td>$169 (23%)</td>
</tr>
<tr>
<td>Cords and plugs</td>
<td>2,620 (12%)</td>
<td>139 (38%)</td>
<td>209 (25%)</td>
<td>$117 (16%)</td>
</tr>
<tr>
<td>Lightning rods and arresters</td>
<td>10 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Electric fences</td>
<td>10 (0%)</td>
<td>0 (0%)</td>
<td>2 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Total</td>
<td>21,150 (100%)</td>
<td>370 (100%)</td>
<td>835 (100%)</td>
<td>$737 (100%)</td>
</tr>
</tbody>
</table>

Note: Figures exclude fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Totals may not equal sums because of rounding error.

Source: Data from NFIRS and NFPA survey.

* “Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
The premises wiring group* accounted for most 2003-2006 home structure fires involving electrical distribution or lighting equipment.

Three-fourths (74%) of 2003-2006 non-confined home structure fires involving electrical distribution or lighting equipment cited factors contributing to ignition that are electrical failures or malfunctions.

Leading factors with specific detail include short circuit arc from defective or worn insulation (11% of fires), heat source too close to combustibles (11%), arc from faulty contact or broken conductor (4%), equipment overloaded (4%), and short circuit arc from mechanical damage (3%). (See Table 4.) Table 5 shows human factors contributing to ignition.

The majority of 2003-2006 non-confined home structure fires involving electrical distribution or lighting equipment began with ignition of products and materials often found in structural areas, including wire or cable insulation (31%), structural member or framing (13%), insulation within structural area (5%), exterior wall covering (5%), and interior wall covering (5%).

Leading items first ignited for fire deaths involving these types of equipment include wire or cable insulation (30%), upholstered furniture (13%), interior wall covering (7%), mattress or bedding (6%), floor covering (6%), and flammable or combustible gas or liquid (6%). (See Table 6.)

Two-fifths (40%) of deaths in 2003-2006 non-confined home structure fires involving electrical distribution or lighting equipment resulted from fires that began in a living room, family room, or den.

Leading areas of origin for fire incidents include both those identified with specific living areas – e.g., bedroom (19%), living room, family room, or den (9%), kitchen (6%), and unclassified function area (5%) – and those identified as structural or exterior areas – e.g., attic or ceiling/roof assembly or concealed space (9%), wall assembly or concealed space (7%), exterior wall surface (5%), ceiling/floor assembly or concealed space (4%), and crawl space and substructure space (4%). (See Table 7.)

Three-fourths (72%) of deaths in 2003-2006 home structure fires involving electrical distribution or lighting equipment involved victims who were outside the area of origin when the fire began.

This compares to 58% of the fatal victims being outside the area of origin for all home structure fire deaths. Table 8 provides additional details on victim location.

Table 9 provides an overview of victim activity when injured. Relative to all 2003-2006 home structure fire deaths, the fatal victims of 2003-2006 home structure fires involving electrical distribution or lighting equipment were more likely to be attempting to fight the fire (13% vs. 3%) and less likely to have been sleeping (32% vs. 39%) or acting irrationally (1% vs. 5%).

* "Premises wiring" refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the "premises wiring group" is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
This is despite the fact that 2003-2006 home structure fire deaths involving electrical distribution or lighting equipment show the same kind of night time peak as do 2003-2006 home structure fire deaths of all causes. (See Figure 3 and Table 10.)

**Figure 3. Non-Confined Home Fires and Deaths Involving Electrical Distribution or Lighting Equipment, by Time of Day, 2003-2006**

[Graph showing percentage of fires and deaths by time of day]

Source: Data from NFIRS Version 5.0 and NFPA survey.

Note: See Note on Table 10.

**Figure 4. Non-Confined Home Fires and Deaths Involving Electrical Distribution or Lighting Equipment, by Month, 2003-2006**

[Graph showing percentage of fires and deaths by month]

Source: Data from NFIRS Version 5.0 and NFPA survey.

Note: See Note on Table 11.
Home structure fires involving electrical distribution or lighting equipment, in 2003-2006, show a winter peak similar to that for heating equipment but less pronounced.

Figure 4 and Table 11 show this pattern. Note that in winter, not only are the days and nights colder, but also more of the day is dark. A longer period of time requiring lighting each day, combined with increased demands from heating equipment, some of which are electric-powered, all help to explain this peak.

Because statistics from other countries often differ with regard to the properties included and the equipment included, it is only possible to make very rough comparisons. With these limits, it is not clear whether Canada’s fire problem is different in size from its U.S. counterpart. U.K. electrical distribution fires and losses, adjusted for their population which is one-fourth the U.S. population and recognizing that lighting fires may not be included, still seem significantly lower. (See Table 12.)

Electrical distribution and lighting equipment dwelling fires have been shown to increase in frequency with increasing dwelling age.6

When studies show higher fire risk generally for older homes, it is usually because the studies have not controlled for the risk levels associated with occupants. Statistically, older homes have a higher proportion of occupants who are poor or have other risk factors. NFPA’s annual study of variations in state fire death rates is one of the few studies of risk factors where the statistical link between older homes and higher-risk occupants is broken.7 This is because several states (like Vermont and Connecticut) have large shares of older, expensive homes with affluent occupants. In that study, age of housing has a small or no statistical correlation with fire death risk. See a more extended and detailed discussion about the age of home and its electrical system vs. fire risks in the electrical failure or malfunction section of this report.

In 2007, 43 people died of non-fire injuries from unvented carbon monoxide from generators.8

Fueled equipment to generate electricity is the only type of electrical distribution or lighting equipment that can produce carbon monoxide. (Fueled lighting devices are not included in the scope of this report.)

The death toll from carbon monoxide produced by generators has increased sharply in recent years until 2007, from less than 10 per year on average in 1999 and prior years to 19 per year in 2000-2001, 47 per year in 2002-2004, 89 per year in 2005-2006, and back to 43 in 2007.

The large jump in deaths involving generators in 2000 may reflect the fact that roughly half the total generators in use in 2000 had been purchased in 1999 because of concerns over Y2K (year 2000) problems with the nation’s power grid.9 This meant a large number of generator users had no experience in safe generator use. Disasters like Hurricane Katrina and a series of Florida

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6 Linda E. Smith and Dennis McCoskrie, “What causes wiring fires in residences?” Fire Journal, January/February 1990, Volume 84, Number 1. The title cites wiring, but the study includes the other major types of electrical distribution and lighting equipment.


hurricanes have added to the demand for generators and probably added to the number of inexperienced users.


For nearly two-fifths (38%) of the 349 deaths where it was known why generators were in use, the reason for use was power outage due to either weather or problem with power distribution. Further investigation showed that all of these deaths with a known reason for the outage specifically involved weather. The types of weather were snow or ice storms (46% of carbon monoxide deaths involving generators used because of a weather related power outage), hurricanes or tropical storms (39%), wind storms (7%) and thunderstorms (5%).

For 62% of the deaths where it was known why generators were in use, the known reason was something other than power outage due to either weather or problem with power distribution. The other leading reasons for generator use were power shutoff by electric company due to bill dispute or non-payment (18% of deaths where a reason was reported); providing power to a storage shed, trailer, boat, camper, cabin, or campsite (19%); new home or homeowner with power not yet turned on or turned off for construction or renovation (10%); and providing power to a home that normally does not have electricity (7%).

Table D. Electrocution Deaths Involving Electrical Distribution or Lighting Equipment, by Year and Type of Equipment

<table>
<thead>
<tr>
<th>Year</th>
<th>Installed household wiring</th>
<th>Lamp or light fixture</th>
<th>Extension cord</th>
<th>Work or trouble light</th>
<th>All four equipment groups combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>53</td>
<td>14</td>
<td>9</td>
<td>6</td>
<td>82</td>
</tr>
<tr>
<td>1996</td>
<td>41</td>
<td>10</td>
<td>4</td>
<td>1</td>
<td>56</td>
</tr>
<tr>
<td>1997</td>
<td>22</td>
<td>15</td>
<td>9</td>
<td>6</td>
<td>52</td>
</tr>
<tr>
<td>1998</td>
<td>25</td>
<td>12</td>
<td>12</td>
<td>6</td>
<td>55</td>
</tr>
<tr>
<td>2000</td>
<td>10</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>2001</td>
<td>19</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>33</td>
</tr>
<tr>
<td>Average</td>
<td>28</td>
<td>12</td>
<td>7</td>
<td>4</td>
<td>51</td>
</tr>
</tbody>
</table>

Source: CPSC analysis of death certificate data base.

In 1995-2001 (excluding 1999), four types of electrical distribution or lighting equipment accounted for an average of 51 electrocution deaths per year.
Some other types of electrical distribution or lighting equipment occasionally are involved in electrocution deaths but are not listed separately in CPSC’s analysis of electrocution deaths by product. No analysis was done for 1999, and analyses for years after 2001 did not provide separate statistics for all the types of equipment discussed here.10

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In 2006, an estimated 71,350 injuries involving electrical distribution or lighting equipment were reported to hospital emergency rooms.\footnote{\textsuperscript{11} Statistics from National Electronic Injury Surveillance System (NEISS) data obtained from the U.S. Consumer Product Safety Commission (CPSC) website, \url{www.cpsc.gov}.}

Nearly half of these injuries involved lamps, light fixtures, or light bulbs. Interestingly, work and trouble lights were not involved in any reported hospital emergency room injuries in 2006 – and accounted for a small fraction of reported home structure fires and associated deaths and injuries involving lamps, light fixtures, or light bulbs – but as noted are involved in electrocution deaths every year. The reason for these very different statistics may be that there is much less usage of work or trouble lights than of any other type of equipment in the lamp, light fixture, and light bulb group, but the nature of usage of work or trouble lights may often place them in unusually hazardous environments, such as flooded areas where normal power has failed.

Of the equipment groups identified in fire incident data, meters and meter boxes, transformers, and electric fences do not appear to be identified separately in the coding of products involved in hospital emergency room injuries.

Table E. Injuries Involving Electrical Distribution or Lighting Equipment, Reported to Hospital Emergency Rooms, 2006

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Type of Injury</th>
<th>Total</th>
<th>Laceration</th>
<th>Contusion or Abrasion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamps, light fixtures, and light bulbs</td>
<td>Total</td>
<td>35,330</td>
<td>15,560</td>
<td>4,890</td>
</tr>
<tr>
<td></td>
<td>Laceration</td>
<td>15,560</td>
<td>(75%)</td>
<td>(50%)</td>
</tr>
<tr>
<td></td>
<td>Contusion or Abrasion</td>
<td>4,890</td>
<td>(50%)</td>
<td></td>
</tr>
<tr>
<td>Premises wiring excluding light fixtures and</td>
<td>Total</td>
<td>23,920</td>
<td>3,830</td>
<td>2,620</td>
</tr>
<tr>
<td>including power sources</td>
<td>Laceration</td>
<td>3,830</td>
<td>(18%)</td>
<td>(27%)</td>
</tr>
<tr>
<td></td>
<td>Contusion or Abrasion</td>
<td>2,620</td>
<td>(27%)</td>
<td></td>
</tr>
<tr>
<td>Cords and plugs</td>
<td>Total</td>
<td>12,070</td>
<td>1,340</td>
<td>2,230</td>
</tr>
<tr>
<td></td>
<td>Laceration</td>
<td>1,340</td>
<td>(6%)</td>
<td>(23%)</td>
</tr>
<tr>
<td></td>
<td>Contusion or Abrasion</td>
<td>2,230</td>
<td>(23%)</td>
<td></td>
</tr>
<tr>
<td>Lightning rods and arresters</td>
<td>Total</td>
<td>30</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Laceration</td>
<td>0</td>
<td>(0%)</td>
<td>(0%)</td>
</tr>
<tr>
<td></td>
<td>Contusion or Abrasion</td>
<td>0</td>
<td>(0%)</td>
<td></td>
</tr>
<tr>
<td>Total electrical distribution and lighting</td>
<td>Total</td>
<td>71,350</td>
<td>20,720</td>
<td>9,740</td>
</tr>
<tr>
<td>equipment</td>
<td>Laceration</td>
<td>20,720</td>
<td>(100%)</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Contusion or Abrasion</td>
<td>9,740</td>
<td>(100%)</td>
<td></td>
</tr>
</tbody>
</table>

Source: CPSC’s National Electronic Injury Surveillance System.

Safety Tips

- Home electrical safety begins with NFPA 70, \textit{National Electrical Code}\textsuperscript{\textregistered} and related documents with special relevance to homes, notable NFPA 73, \textit{Electrical Inspection Code for Existing Dwellings}. However, work on home electrical distribution or lighting equipment should only be conducted by someone qualified as an electrician. When you are buying, selling or remodeling a home, have it inspected by a professional electrician.

- Call a qualified electrician or landlord if you have
  - Recurring problems with blowing fuses or tripping circuit breakers,
  - A tingling feeling when you touch an electrical appliance,
  - Discolored or warm wall outlets,
  - A burning smell or rubbery odor coming from an appliance,
  - Flickering lights,
  - Sparks from an outlet.
- Keep lamps, light fixtures, and light bulbs away from anything that can burn, including lamp shades, furniture, bedding, curtains, clothing, and flammable or combustible gases and liquids.
- Never place clothing over a lamp or a cloth over a light bulb.
- Place lamps away from where people and pets walk or where things might fall against them.
- Use light bulbs that match the recommended wattage on the lamp or fixture.
- If a fuse blows or a circuit breaker trips often, find out why and correct the problem.
- Replace fuses with the correct amp rating for the circuit they protect.
- Never replace a fuse with a higher rated fuse.
- If the problem continues, call an electrician.

- Only plug one heat-producing appliance (such as a coffee maker, toaster, space heater, etc.) into a receptacle outlet at a time.
- Never plug a major appliance into an extension cord.
- Buy only appliances that have the label of a recognized testing laboratory.
- Replace cracked electrical cords. If you have older cords with cloth covering, check for fraying as well, and replace any frayed cords.
- Pinching cords against walls or furniture or running them under carpets or across doorways can cause a fire.
- Use extension cords for temporary wiring only.
- Consider having additional circuits or receptacles added by a qualified electrician.
- Receptacle outlets and switches should have wall plates to prevent shocks.
- Homes with young children should have tamper-resistant electrical receptacles.

- If an appliance is malfunctioning, unplug it if it is safe to do so. If necessary, cut off power by unscrewing a fuse or turning off the circuit breaker.
- Arc fault circuit interrupters (AFCIs) are a type of circuit breaker that shuts off electricity when a dangerous condition occurs. Consider having them installed in your home. Use a qualified electrician.
- Ground fault circuit interrupters (GFCIs) reduce the risk of shock.
- Test AFCIs and GFCIs once a month to make sure they are working properly.

- Keep ladders away from overhead power lines including the electrical service into your home.
- Never touch a power line. Stay at a safe distance – you could be electrocuted.
- Report downed power lines to authorities.
- Some power lines are underground. Call your local utility before digging.
<table>
<thead>
<tr>
<th>Year</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>As Reported</td>
</tr>
<tr>
<td>1980</td>
<td>68,400</td>
<td>520</td>
<td>1,650</td>
<td>$493</td>
</tr>
<tr>
<td>1981</td>
<td>62,300</td>
<td>550</td>
<td>1,500</td>
<td>$459</td>
</tr>
<tr>
<td>1982</td>
<td>60,900</td>
<td>410</td>
<td>1,820</td>
<td>$519</td>
</tr>
<tr>
<td>1983</td>
<td>56,700</td>
<td>500</td>
<td>1,570</td>
<td>$548</td>
</tr>
<tr>
<td>1984</td>
<td>54,800</td>
<td>440</td>
<td>1,520</td>
<td>$549</td>
</tr>
<tr>
<td>1985</td>
<td>56,500</td>
<td>470</td>
<td>1,400</td>
<td>$720</td>
</tr>
<tr>
<td>1986</td>
<td>54,300</td>
<td>720</td>
<td>1,420</td>
<td>$597</td>
</tr>
<tr>
<td>1987</td>
<td>51,600</td>
<td>520</td>
<td>1,580</td>
<td>$512</td>
</tr>
<tr>
<td>1988</td>
<td>53,400</td>
<td>440</td>
<td>1,720</td>
<td>$715</td>
</tr>
<tr>
<td>1989</td>
<td>47,900</td>
<td>610</td>
<td>1,500</td>
<td>$642</td>
</tr>
<tr>
<td>1990</td>
<td>47,400</td>
<td>440</td>
<td>1,540</td>
<td>$683</td>
</tr>
<tr>
<td>1991</td>
<td>49,000</td>
<td>350</td>
<td>1,890</td>
<td>$958*</td>
</tr>
<tr>
<td>1992</td>
<td>46,400</td>
<td>400</td>
<td>1,770</td>
<td>$617</td>
</tr>
<tr>
<td>1993</td>
<td>48,900</td>
<td>420</td>
<td>1,900</td>
<td>$818</td>
</tr>
<tr>
<td>1994</td>
<td>48,300</td>
<td>460</td>
<td>1,640</td>
<td>$714</td>
</tr>
<tr>
<td>1995</td>
<td>47,200</td>
<td>490</td>
<td>1,650</td>
<td>$775</td>
</tr>
<tr>
<td>1996</td>
<td>47,000</td>
<td>470</td>
<td>1,560</td>
<td>$839</td>
</tr>
<tr>
<td>1997</td>
<td>46,600</td>
<td>350</td>
<td>1,580</td>
<td>$865</td>
</tr>
<tr>
<td>1998</td>
<td>44,500</td>
<td>360</td>
<td>1,370</td>
<td>$843</td>
</tr>
<tr>
<td>1999</td>
<td>34,800</td>
<td>180</td>
<td>530</td>
<td>$806</td>
</tr>
<tr>
<td>2000</td>
<td>26,600</td>
<td>120</td>
<td>1,130</td>
<td>$631</td>
</tr>
<tr>
<td>2001</td>
<td>26,200</td>
<td>440</td>
<td>1,030</td>
<td>$717</td>
</tr>
<tr>
<td>2002</td>
<td>22,700</td>
<td>170</td>
<td>700</td>
<td>$593</td>
</tr>
<tr>
<td>2003</td>
<td>19,200</td>
<td>320</td>
<td>600</td>
<td>$698</td>
</tr>
<tr>
<td>2004</td>
<td>19,400</td>
<td>290</td>
<td>840</td>
<td>$623</td>
</tr>
<tr>
<td>2005</td>
<td>20,800</td>
<td>500</td>
<td>1,060</td>
<td>$858</td>
</tr>
<tr>
<td>2006</td>
<td>25,100</td>
<td>370</td>
<td>840</td>
<td>$776</td>
</tr>
</tbody>
</table>

* All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections exclude fires reported only to Federal or state agencies or industrial fire brigades. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten, and property damage is rounded to the nearest million dollars. Fires, deaths, and injuries are rounded more on this table than on any other in the report, because otherwise, most of the entries shown would have four significant places, and that would suggest an unreasonably high degree of precision. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution. Inflation adjustment to 2006 dollars is done using the consumer price index.

Source: Data from NFIRS (Version 5.0 after 1998) and NFPA survey.
Table 4. Home Fires Involving Electrical Distribution or Lighting Equipment, by Factor Contributing to Ignition
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>6,700 (29%)</td>
<td>43 (12%)</td>
<td>163 (20%)</td>
<td>$246 (33%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>4,860 (23%)</td>
<td>63 (17%)</td>
<td>185 (22%)</td>
<td>$188 (26%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>2,360 (11%)</td>
<td>49 (13%)</td>
<td>123 (15%)</td>
<td>$65 (9%)</td>
</tr>
<tr>
<td>Heat source too close to combustibles</td>
<td>2,250 (11%)</td>
<td>31 (8%)</td>
<td>115 (15%)</td>
<td>$74 (10%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>890 (4%)</td>
<td>0 (0%)</td>
<td>28 (3%)</td>
<td>$31 (4%)</td>
</tr>
<tr>
<td>Equipment overloaded</td>
<td>760 (4%)</td>
<td>25 (7%)</td>
<td>52 (6%)</td>
<td>$28 (4%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>640 (3%)</td>
<td>29 (8%)</td>
<td>24 (3%)</td>
<td>$20 (3%)</td>
</tr>
<tr>
<td>Unclassified mechanical failure or malfunction</td>
<td>630 (3%)</td>
<td>17 (5%)</td>
<td>25 (3%)</td>
<td>$22 (3%)</td>
</tr>
<tr>
<td>Arc or spark from operating equipment</td>
<td>500 (2%)</td>
<td>4 (1%)</td>
<td>25 (3%)</td>
<td>$15 (2%)</td>
</tr>
<tr>
<td>Unclassified misuse of material</td>
<td>460 (2%)</td>
<td>15 (4%)</td>
<td>55 (7%)</td>
<td>$12 (2%)</td>
</tr>
<tr>
<td>Installation deficiency</td>
<td>450 (2%)</td>
<td>9 (2%)</td>
<td>21 (3%)</td>
<td>$17 (2%)</td>
</tr>
<tr>
<td>Worn out</td>
<td>320 (1%)</td>
<td>4 (1%)</td>
<td>7 (1%)</td>
<td>$10 (1%)</td>
</tr>
<tr>
<td>Unclassified factor</td>
<td>310 (1%)</td>
<td>17 (5%)</td>
<td>6 (1%)</td>
<td>$11 (2%)</td>
</tr>
<tr>
<td>Water caused short circuit arc</td>
<td>270 (1%)</td>
<td>0 (0%)</td>
<td>8 (1%)</td>
<td>$5 (1%)</td>
</tr>
<tr>
<td>Equipment unattended</td>
<td>250 (1%)</td>
<td>3 (1%)</td>
<td>9 (1%)</td>
<td>$14 (2%)</td>
</tr>
<tr>
<td>Collision, knockdown, or turnover</td>
<td>240 (1%)</td>
<td>8 (2%)</td>
<td>17 (2%)</td>
<td>$7 (1%)</td>
</tr>
<tr>
<td>Storm</td>
<td>230 (1%)</td>
<td>0 (0%)</td>
<td>2 (0%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Animal</td>
<td>170 (1%)</td>
<td>0 (0%)</td>
<td>4 (1%)</td>
<td>$3 (0%)</td>
</tr>
<tr>
<td>Equipment not being operated properly</td>
<td>170 (1%)</td>
<td>18 (5%)</td>
<td>4 (0%)</td>
<td>$8 (1%)</td>
</tr>
<tr>
<td>Unclassified operational deficiency</td>
<td>150 (1%)</td>
<td>5 (1%)</td>
<td>16 (2%)</td>
<td>$8 (1%)</td>
</tr>
<tr>
<td>Unintentionally turned on or not turned off</td>
<td>140 (1%)</td>
<td>0 (0%)</td>
<td>4 (0%)</td>
<td>$3 (0%)</td>
</tr>
<tr>
<td>Equipment used for not intended purpose</td>
<td>140 (1%)</td>
<td>5 (1%)</td>
<td>10 (1%)</td>
<td>$9 (1%)</td>
</tr>
<tr>
<td>Leak or break</td>
<td>110 (1%)</td>
<td>0 (0%)</td>
<td>9 (1%)</td>
<td>$4 (1%)</td>
</tr>
<tr>
<td>High wind</td>
<td>110 (1%)</td>
<td>0 (0%)</td>
<td>2 (0%)</td>
<td>$3 (0%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>860 (4%)</td>
<td>51 (14%)*</td>
<td>39 (5%)</td>
<td>$29 (4%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>21,150 (100%)</td>
<td>370 (100%)</td>
<td>835 (100%)</td>
<td>$737 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>23,300 (110%)</td>
<td>396 (107%)</td>
<td>956 (114%)</td>
<td>$841 (114%)</td>
</tr>
<tr>
<td>All electrical failures or malfunction</td>
<td>15,670 (74%)</td>
<td>188 (51%)</td>
<td>557 (67%)</td>
<td>$573 (78%)</td>
</tr>
</tbody>
</table>

* The leading factor contributing to ignition for fire deaths not shown above is construction deficiency (8% of deaths).

Note: Multiple entries are allowed, resulting in more factor entries than fires. Figures exclude combined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home structure fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5. and NFPA survey.
Table 5. Home Fires Involving Electrical Distribution or Lighting Equipment, 
by Human Factor Contributing to Ignition 
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments 
(Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Human Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asleep</td>
<td>570</td>
<td>(3%)</td>
<td>82 (22%)</td>
<td>$38 (5%)</td>
</tr>
<tr>
<td>Unattended or unsupervised person</td>
<td>540</td>
<td>(3%)</td>
<td>15 (4%)</td>
<td>$19 (3%)</td>
</tr>
<tr>
<td>Age was a factor</td>
<td>210</td>
<td>(1%)</td>
<td>25 (7%)</td>
<td>$7 (1%)</td>
</tr>
<tr>
<td>Multiple persons involved</td>
<td>110</td>
<td>(0%)</td>
<td>10 (3%)</td>
<td>$5 (1%)</td>
</tr>
<tr>
<td>Possibly impaired by alcohol or other drug</td>
<td>50</td>
<td>(0%)</td>
<td>22 (6%)</td>
<td>$2 (0%)</td>
</tr>
<tr>
<td>Possibly mentally disabled</td>
<td>40</td>
<td>(0%)</td>
<td>5 (1%)</td>
<td>$2 (0%)</td>
</tr>
<tr>
<td>Physically disabled</td>
<td>30</td>
<td>(0%)</td>
<td>9 (2%)</td>
<td>$1 (0%)</td>
</tr>
<tr>
<td>None</td>
<td>19,760</td>
<td>(93%)</td>
<td>236 (64%)</td>
<td>$672 (91%)</td>
</tr>
</tbody>
</table>

Total fires                          | 21,150| (100%)        | 370 (100%)       | $737 (100%)                         |
Total factor entries                  | 21,300| (101%)        | 403 (109%)       | $746 (101%)                         |

Note: Multiple entries are allowed, resulting in more factor entries than fires. Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home structure fires with human factor contributing to ignition listed as unknown, blank or not reported have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.
Table 6. Home Fires Involving Electrical Distribution or Lighting Equipment, by Item First Ignited  
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments  
(Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>6,460</td>
<td>(31%)</td>
<td>(30%)</td>
<td>(24%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>2,810</td>
<td>(13%)</td>
<td>(5%)</td>
<td>(7%)</td>
</tr>
<tr>
<td>Insulation within structural area</td>
<td>1,130</td>
<td>(5%)</td>
<td>(3%)</td>
<td>(2%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>970</td>
<td>(5%)</td>
<td>(1%)</td>
<td>(3%)</td>
</tr>
<tr>
<td>Interior wall covering</td>
<td>970</td>
<td>(5%)</td>
<td>(7%)</td>
<td>(7%)</td>
</tr>
<tr>
<td>Mattress or bedding</td>
<td>940</td>
<td>(4%)</td>
<td>(6%)</td>
<td>(11%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>840</td>
<td>(4%)</td>
<td>(0%)</td>
<td>(2%)</td>
</tr>
<tr>
<td>Unclassified structural component or finish</td>
<td>760</td>
<td>(4%)</td>
<td>(5%)</td>
<td>(2%)</td>
</tr>
<tr>
<td>Clothing</td>
<td>740</td>
<td>(4%)</td>
<td>(1%)</td>
<td>(5%)</td>
</tr>
<tr>
<td>Floor covering</td>
<td>660</td>
<td>(3%)</td>
<td>(6%)</td>
<td>(4%)</td>
</tr>
<tr>
<td>Upholstered furniture</td>
<td>480</td>
<td>(2%)</td>
<td>(13%)</td>
<td>(7%)</td>
</tr>
<tr>
<td>Appliance housing or casing</td>
<td>420</td>
<td>(2%)</td>
<td>(0%)</td>
<td>(3%)</td>
</tr>
<tr>
<td>Interior ceiling covering</td>
<td>400</td>
<td>(2%)</td>
<td>(1%)</td>
<td>(0%)</td>
</tr>
<tr>
<td>Unclassified furniture or utensil</td>
<td>380</td>
<td>(2%)</td>
<td>(2%)</td>
<td>(2%)</td>
</tr>
<tr>
<td>Curtain or drape</td>
<td>280</td>
<td>(1%)</td>
<td>(1%)</td>
<td>(2%)</td>
</tr>
<tr>
<td>Cabinetry</td>
<td>280</td>
<td>(1%)</td>
<td>(1%)</td>
<td>(2%)</td>
</tr>
<tr>
<td>Unclassified soft goods or clothing</td>
<td>260</td>
<td>(1%)</td>
<td>(3%)</td>
<td>(1%)</td>
</tr>
<tr>
<td>Multiple items first ignited</td>
<td>250</td>
<td>(1%)</td>
<td>(0%)</td>
<td>(1%)</td>
</tr>
<tr>
<td>Flammable or combustible gas or liquid</td>
<td>200</td>
<td>(1%)</td>
<td>(6%)</td>
<td>(5%)</td>
</tr>
<tr>
<td>Linen other than bedding</td>
<td>190</td>
<td>(1%)</td>
<td>(2%)</td>
<td>(1%)</td>
</tr>
<tr>
<td>Box or bag</td>
<td>180</td>
<td>(1%)</td>
<td>(1%)</td>
<td>(1%)</td>
</tr>
<tr>
<td>Light vegetation including grass</td>
<td>170</td>
<td>(1%)</td>
<td>(0%)</td>
<td>(0%)</td>
</tr>
<tr>
<td>Papers</td>
<td>160</td>
<td>(1%)</td>
<td>(0%)</td>
<td>(1%)</td>
</tr>
<tr>
<td>Unclassified organic materials</td>
<td>120</td>
<td>(1%)</td>
<td>(0%)</td>
<td>(0%)</td>
</tr>
<tr>
<td>Other known item</td>
<td>1,110</td>
<td>(5%)</td>
<td>(5%)*</td>
<td>(5%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>21,150</td>
<td>(100%)</td>
<td>370 (100%)</td>
<td>835 (100%)</td>
</tr>
</tbody>
</table>

* The leading item first ignited for fire deaths not shown above is Christmas tree (5% of deaths).

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home structure fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.
Table 7. Home Fires Involving Electrical Distribution or Lighting Equipment, by Area of Origin
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires (in Millions)</th>
<th>Civilian Deaths (in Millions)</th>
<th>Civilian Injuries (in Millions)</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>4,050 (19%)</td>
<td>56 (15%)</td>
<td>282 (34%)</td>
<td>$146 (20%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>1,970 (9%)</td>
<td>149 (40%)</td>
<td>144 (17%)</td>
<td>$81 (11%)</td>
</tr>
<tr>
<td>Attic or ceiling/roof assembly or concealed space</td>
<td>1,940 (9%)</td>
<td>44 (12%)</td>
<td>19 (2%)</td>
<td>$62 (8%)</td>
</tr>
<tr>
<td>Wall assembly or concealed space</td>
<td>1,550 (7%)</td>
<td>11 (3%)</td>
<td>26 (3%)</td>
<td>$47 (6%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>1,240 (6%)</td>
<td>21 (6%)</td>
<td>32 (4%)</td>
<td>$35 (5%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>1,120 (5%)</td>
<td>0 (0%)</td>
<td>16 (2%)</td>
<td>$21 (3%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>980 (5%)</td>
<td>20 (5%)</td>
<td>49 (6%)</td>
<td>$39 (5%)</td>
</tr>
<tr>
<td>Ceiling/floor assembly or concealed space</td>
<td>820 (4%)</td>
<td>8 (2%)</td>
<td>16 (2%)</td>
<td>$42 (6%)</td>
</tr>
<tr>
<td>Crawlspace or substructure space</td>
<td>790 (4%)</td>
<td>10 (3%)</td>
<td>32 (4%)</td>
<td>$32 (4%)</td>
</tr>
<tr>
<td>Garage*</td>
<td>780 (4%)</td>
<td>0 (0%)</td>
<td>26 (3%)</td>
<td>$49 (7%)</td>
</tr>
<tr>
<td>Laundry room</td>
<td>690 (3%)</td>
<td>6 (2%)</td>
<td>20 (2%)</td>
<td>$15 (2%)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>690 (3%)</td>
<td>3 (1%)</td>
<td>24 (3%)</td>
<td>$18 (2%)</td>
</tr>
<tr>
<td>Closet</td>
<td>490 (2%)</td>
<td>0 (0%)</td>
<td>23 (3%)</td>
<td>$16 (2%)</td>
</tr>
<tr>
<td>Unclassified equipment or service area</td>
<td>350 (2%)</td>
<td>7 (2%)</td>
<td>7 (1%)</td>
<td>$13 (2%)</td>
</tr>
<tr>
<td>Unclassified structural area</td>
<td>340 (2%)</td>
<td>6 (2%)</td>
<td>7 (1%)</td>
<td>$15 (2%)</td>
</tr>
<tr>
<td>Exterior balcony or unenclosed porch</td>
<td>330 (2%)</td>
<td>0 (0%)</td>
<td>14 (2%)</td>
<td>$18 (2%)</td>
</tr>
<tr>
<td>Unclassified storage area</td>
<td>290 (1%)</td>
<td>0 (0%)</td>
<td>14 (2%)</td>
<td>$8 (1%)</td>
</tr>
<tr>
<td>Unclassified area of origin</td>
<td>270 (1%)</td>
<td>3 (1%)</td>
<td>4 (0%)</td>
<td>$6 (1%)</td>
</tr>
<tr>
<td>Conduit, pipe, utility, or ventilation shaft</td>
<td>240 (1%)</td>
<td>0 (0%)</td>
<td>6 (1%)</td>
<td>$4 (1%)</td>
</tr>
<tr>
<td>Heating equipment room</td>
<td>220 (1%)</td>
<td>0 (0%)</td>
<td>5 (1%)</td>
<td>$5 (1%)</td>
</tr>
<tr>
<td>Unclassified outside area</td>
<td>200 (1%)</td>
<td>0 (0%)</td>
<td>6 (1%)</td>
<td>$2 (0%)</td>
</tr>
<tr>
<td>Storage room, area, tank, or bin</td>
<td>190 (1%)</td>
<td>0 (0%)</td>
<td>3 (0%)</td>
<td>$6 (1%)</td>
</tr>
<tr>
<td>Office</td>
<td>170 (1%)</td>
<td>11 (3%)</td>
<td>9 (1%)</td>
<td>$14 (2%)</td>
</tr>
<tr>
<td>Lobby or entrance way</td>
<td>160 (1%)</td>
<td>4 (1%)</td>
<td>8 (1%)</td>
<td>$5 (1%)</td>
</tr>
<tr>
<td>Switchgear area or transformer vault</td>
<td>160 (1%)</td>
<td>0 (0%)</td>
<td>7 (1%)</td>
<td>$3 (0%)</td>
</tr>
<tr>
<td>Hallway or corridor</td>
<td>120 (1%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (0%)</td>
</tr>
<tr>
<td>Courtyard, terrace or patio</td>
<td>110 (1%)</td>
<td>5 (1%)</td>
<td>0 (0%)</td>
<td>$6 (1%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>890 (4%)</td>
<td>7 (2%)</td>
<td>37 (4%)</td>
<td>$30 (4%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>21,150 (100%)</td>
<td>370 (100%)</td>
<td>835 (100%)</td>
<td>$737 (100%)</td>
</tr>
</tbody>
</table>

* Excludes residential garage reported as separate property.

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home structure fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.
Table 8. Civilian Deaths and Injuries in Home Fires Involving Electrical Distribution or Lighting Equipment, by Victim Location at Ignition
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Coded as Confined Fires)

<table>
<thead>
<tr>
<th>Victim Location at Ignition</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>In area of origin and not involved</td>
<td>7 (2%)</td>
<td>6 (1%)</td>
</tr>
<tr>
<td>Not in area of origin and not involved</td>
<td>67 (18%)</td>
<td>308 (37%)</td>
</tr>
<tr>
<td>Not in area of origin but involved</td>
<td>200 (54%)</td>
<td>345 (41%)</td>
</tr>
<tr>
<td>In area of origin and involved</td>
<td>96 (26%)</td>
<td>176 (21%)</td>
</tr>
<tr>
<td>In area of origin</td>
<td>103 (28%)</td>
<td>182 (22%)</td>
</tr>
<tr>
<td>Not involved in origin</td>
<td>268 (72%)</td>
<td>654 (78%)</td>
</tr>
<tr>
<td>Involved in ignition</td>
<td>296 (80%)</td>
<td>521 (62%)</td>
</tr>
<tr>
<td>Not involved in ignition</td>
<td>74 (20%)</td>
<td>315 (38%)</td>
</tr>
<tr>
<td>Total</td>
<td>370 (100%)</td>
<td>835 (100%)</td>
</tr>
</tbody>
</table>

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Home fire casualties involving indicated equipment with victim location unknown have been proportionally allocated. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Casualties with this equipment involved in ignition but victim location unknown have been proportionally allocated. Totals may not equal sums because off rounding error. Civilian deaths and injuries are estimated to the nearest one.

Source: Data from NFIRS Version 5.0 and NFPA survey.
### Table 9. Civilian Deaths and Injuries in Home Fires Involving Electrical Distribution or Lighting Equipment, by Victim Activity When Injured

**Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments**

*(Excluding Fires Reported as Confined Fires)*

<table>
<thead>
<tr>
<th>Activity</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attempting to escape</td>
<td>128 (35%)</td>
<td>226 (27%)</td>
</tr>
<tr>
<td>Sleeping</td>
<td>117 (32%)</td>
<td>125 (15%)</td>
</tr>
<tr>
<td>Attempting to fight fire</td>
<td>47 (13%)</td>
<td>278 (33%)</td>
</tr>
<tr>
<td>Unable to act</td>
<td>41 (11%)</td>
<td>24 (3%)</td>
</tr>
<tr>
<td>Attempting rescue</td>
<td>26 (7%)</td>
<td>75 (9%)</td>
</tr>
<tr>
<td>Returning to vicinity of fire</td>
<td>6 (2%)</td>
<td>103 (12%)</td>
</tr>
<tr>
<td>Irrational act</td>
<td>5 (1%)</td>
<td>5 (1%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>370 (100%)</strong></td>
<td><strong>835 (100%)</strong></td>
</tr>
</tbody>
</table>

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Fires with this equipment involved but activity unknown have been proportionally allocated. Totals may not equal sums because of rounding error. Civilian deaths and injuries are estimated to the nearest one.

Source: Data from NFIRS Version 5.0 and NFPA survey.
Table 10. Home Fires Involving Electrical Distribution or Lighting Equipment, by Time of Day
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments

<table>
<thead>
<tr>
<th>Time</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midnight – 1:59 am</td>
<td>1,380 (7%)</td>
<td>48 (13%)</td>
<td>65 (8%)</td>
<td>$55 (7%)</td>
</tr>
<tr>
<td>2:00 – 3:59 am</td>
<td>1,150 (5%)</td>
<td>43 (11%)</td>
<td>66 (8%)</td>
<td>$61 (8%)</td>
</tr>
<tr>
<td>4:00 – 5:59 am</td>
<td>1,040 (5%)</td>
<td>90 (24%)</td>
<td>62 (7%)</td>
<td>$45 (6%)</td>
</tr>
<tr>
<td>6:00 – 7:59 am</td>
<td>1,260 (6%)</td>
<td>44 (12%)</td>
<td>78 (9%)</td>
<td>$51 (7%)</td>
</tr>
<tr>
<td>8:00 – 9:59 am</td>
<td>1,610 (8%)</td>
<td>16 (4%)</td>
<td>78 (9%)</td>
<td>$48 (7%)</td>
</tr>
<tr>
<td>10:00 – 11:59 am</td>
<td>1,860 (9%)</td>
<td>15 (4%)</td>
<td>79 (9%)</td>
<td>$79 (11%)</td>
</tr>
<tr>
<td>Noon – 1:59 pm</td>
<td>2,020 (10%)</td>
<td>4 (1%)</td>
<td>55 (7%)</td>
<td>$68 (9%)</td>
</tr>
<tr>
<td>2:00 – 3:59 pm</td>
<td>2,100 (10%)</td>
<td>15 (4%)</td>
<td>50 (6%)</td>
<td>$71 (10%)</td>
</tr>
<tr>
<td>4:00 – 5:59 pm</td>
<td>2,160 (10%)</td>
<td>8 (2%)</td>
<td>82 (10%)</td>
<td>$63 (9%)</td>
</tr>
<tr>
<td>6:00 – 7:59 pm</td>
<td>2,390 (11%)</td>
<td>28 (8%)</td>
<td>56 (7%)</td>
<td>$70 (10%)</td>
</tr>
<tr>
<td>8:00 – 9:59 pm</td>
<td>2,350 (11%)</td>
<td>25 (7%)</td>
<td>93 (11%)</td>
<td>$66 (9%)</td>
</tr>
<tr>
<td>10:00 – 11:59 pm</td>
<td>1,830 (9%)</td>
<td>36 (10%)</td>
<td>72 (9%)</td>
<td>$59 (8%)</td>
</tr>
<tr>
<td>Total</td>
<td>21,150 (100%)</td>
<td>370 (100%)</td>
<td>835 (100%)</td>
<td>$737 (100%)</td>
</tr>
</tbody>
</table>

Note: Figures exclude combined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires are rounded to the nearest hundred and civilian deaths to the nearest one. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.
Table 11. Home Fires Involving Electrical Distribution or Lighting Equipment, by Month
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th></th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>2,030 (10%)</td>
<td>51 (14%)</td>
<td>72 (9%)</td>
<td>$83 (11%)</td>
</tr>
<tr>
<td>February</td>
<td>1,660 (8%)</td>
<td>44 (12%)</td>
<td>67 (8%)</td>
<td>$59 (8%)</td>
</tr>
<tr>
<td>March</td>
<td>1,720 (8%)</td>
<td>81 (22%)</td>
<td>95 (11%)</td>
<td>$62 (8%)</td>
</tr>
<tr>
<td>April</td>
<td>1,530 (7%)</td>
<td>29 (8%)</td>
<td>56 (7%)</td>
<td>$57 (8%)</td>
</tr>
<tr>
<td>May</td>
<td>1,630 (8%)</td>
<td>32 (9%)</td>
<td>74 (9%)</td>
<td>$57 (8%)</td>
</tr>
<tr>
<td>June</td>
<td>1,610 (8%)</td>
<td>12 (3%)</td>
<td>84 (10%)</td>
<td>$44 (6%)</td>
</tr>
<tr>
<td>July</td>
<td>1,860 (9%)</td>
<td>11 (3%)</td>
<td>48 (6%)</td>
<td>$57 (8%)</td>
</tr>
<tr>
<td>August</td>
<td>1,740 (8%)</td>
<td>14 (4%)</td>
<td>64 (8%)</td>
<td>$56 (8%)</td>
</tr>
<tr>
<td>September</td>
<td>1,520 (7%)</td>
<td>20 (5%)</td>
<td>53 (6%)</td>
<td>$48 (7%)</td>
</tr>
<tr>
<td>October</td>
<td>1,620 (8%)</td>
<td>31 (8%)</td>
<td>68 (8%)</td>
<td>$60 (8%)</td>
</tr>
<tr>
<td>November</td>
<td>1,780 (8%)</td>
<td>13 (4%)</td>
<td>57 (7%)</td>
<td>$67 (9%)</td>
</tr>
<tr>
<td>December</td>
<td>2,450 (12%)</td>
<td>32 (9%)</td>
<td>99 (12%)</td>
<td>$90 (12%)</td>
</tr>
<tr>
<td>Total</td>
<td>21,150 (100%)</td>
<td>370 (100%)</td>
<td>835 (100%)</td>
<td>$737 (100%)</td>
</tr>
</tbody>
</table>

Note: Figures exclude combined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.
### Table 12. Fires in Other Countries Related to Home Electrical Distribution or Lighting Equipment

A. Canada, 1990-2002, not limited to homes, electrical distribution excluding lighting

<table>
<thead>
<tr>
<th>Year</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current Canada Dollars</td>
</tr>
<tr>
<td>1990</td>
<td>8,600</td>
<td>36</td>
<td>180</td>
<td>$218</td>
</tr>
<tr>
<td>1991</td>
<td>8,600</td>
<td>33</td>
<td>120</td>
<td>$230</td>
</tr>
<tr>
<td>1992</td>
<td>7,800</td>
<td>30</td>
<td>160</td>
<td>$248</td>
</tr>
<tr>
<td>1993</td>
<td>6,100</td>
<td>10</td>
<td>120</td>
<td>$175</td>
</tr>
<tr>
<td>1994</td>
<td>7,100</td>
<td>12</td>
<td>170</td>
<td>$210</td>
</tr>
<tr>
<td>1995</td>
<td>7,800</td>
<td>19</td>
<td>150</td>
<td>$215</td>
</tr>
<tr>
<td>1996</td>
<td>7,100</td>
<td>18</td>
<td>120</td>
<td>$222</td>
</tr>
<tr>
<td>1997</td>
<td>5,800</td>
<td>16</td>
<td>130</td>
<td>$184</td>
</tr>
<tr>
<td>1998</td>
<td>6,200</td>
<td>14</td>
<td>110</td>
<td>$156</td>
</tr>
<tr>
<td>1999</td>
<td>6,400</td>
<td>15</td>
<td>120</td>
<td>$191</td>
</tr>
<tr>
<td>2000</td>
<td>6,200</td>
<td>11</td>
<td>130</td>
<td>$207</td>
</tr>
<tr>
<td>2001</td>
<td>6,700</td>
<td>22</td>
<td>160</td>
<td>$235</td>
</tr>
<tr>
<td>2002</td>
<td>6,600</td>
<td>16</td>
<td>140</td>
<td>$241</td>
</tr>
</tbody>
</table>

B. U.K., 1990-2006, dwellings (corresponds to U.S. homes), electrical distribution but unclear whether lighting included

<table>
<thead>
<tr>
<th>Year</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>3,200</td>
<td>22</td>
<td>410</td>
</tr>
<tr>
<td>1991</td>
<td>3,100</td>
<td>18</td>
<td>360</td>
</tr>
<tr>
<td>1992</td>
<td>3,100</td>
<td>9</td>
<td>380</td>
</tr>
<tr>
<td>1993</td>
<td>3,100</td>
<td>12</td>
<td>300</td>
</tr>
<tr>
<td>1994</td>
<td>2,000</td>
<td>13</td>
<td>290</td>
</tr>
<tr>
<td>1995</td>
<td>2,500</td>
<td>18</td>
<td>300</td>
</tr>
<tr>
<td>1996</td>
<td>2,500</td>
<td>21</td>
<td>300</td>
</tr>
<tr>
<td>1997</td>
<td>2,500</td>
<td>9</td>
<td>330</td>
</tr>
<tr>
<td>1998</td>
<td>2,700</td>
<td>9</td>
<td>340</td>
</tr>
<tr>
<td>1999</td>
<td>2,700</td>
<td>14</td>
<td>310</td>
</tr>
<tr>
<td>2000</td>
<td>2,800</td>
<td>15</td>
<td>330</td>
</tr>
<tr>
<td>2001</td>
<td>2,600</td>
<td>15</td>
<td>280</td>
</tr>
<tr>
<td>2002</td>
<td>2,700</td>
<td>9</td>
<td>300</td>
</tr>
<tr>
<td>2003</td>
<td>2,800</td>
<td>7</td>
<td>310</td>
</tr>
<tr>
<td>2004</td>
<td>2,900</td>
<td>11</td>
<td>320</td>
</tr>
<tr>
<td>2005</td>
<td>3,100</td>
<td>9</td>
<td>370</td>
</tr>
<tr>
<td>2006</td>
<td>3,100</td>
<td>8</td>
<td>290</td>
</tr>
</tbody>
</table>

Note: Statistics include a proportional share of fires with undetermined cause. U.K. damage statistics are not available. U.K. statistics in and after 1997 include some incidents (e.g., heat or smoke damage only) that were not included previously and are not included in U.S. statistics. Sums may not equal totals because of rounding.

Table 12. Fires in Other Countries Related to Home Electrical Distribution or Lighting Equipment (Continued)

C. Japan, 1990-2004, all structures, wiring equipment, lighting, and telephone wiring

<table>
<thead>
<tr>
<th>Year</th>
<th>Fires</th>
<th>Deaths</th>
<th>Property Damage</th>
<th>Total in Billions of Yen</th>
<th>Total in Millions of U.S. Dollars As Reported In 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>1,300</td>
<td>14</td>
<td></td>
<td>5.8</td>
<td>$40 $62</td>
</tr>
<tr>
<td>1991</td>
<td>1,400</td>
<td>13</td>
<td></td>
<td>6.2</td>
<td>$46 $68</td>
</tr>
<tr>
<td>1992</td>
<td>1,400</td>
<td>21</td>
<td></td>
<td>6.7</td>
<td>$53 $76</td>
</tr>
<tr>
<td>1993</td>
<td>1,300</td>
<td>10</td>
<td></td>
<td>8.9</td>
<td>$80 $111</td>
</tr>
<tr>
<td>1994</td>
<td>1,600</td>
<td>28</td>
<td></td>
<td>9.7</td>
<td>$95 $129</td>
</tr>
<tr>
<td>1995</td>
<td>1,700</td>
<td>21</td>
<td></td>
<td>8.3</td>
<td>$88 $116</td>
</tr>
<tr>
<td>1996</td>
<td>1,700</td>
<td>35</td>
<td></td>
<td>9.2</td>
<td>$85 $109</td>
</tr>
<tr>
<td>1997</td>
<td>1,700</td>
<td>32</td>
<td></td>
<td>10.0</td>
<td>$83 $104</td>
</tr>
<tr>
<td>1998</td>
<td>1,900</td>
<td>19</td>
<td></td>
<td>9.2</td>
<td>$71 $87</td>
</tr>
<tr>
<td>1999</td>
<td>1,800</td>
<td>34</td>
<td></td>
<td>11.9</td>
<td>$104 $126</td>
</tr>
<tr>
<td>2000</td>
<td>2,100</td>
<td>39</td>
<td></td>
<td>10.3</td>
<td>$96 $112</td>
</tr>
<tr>
<td>2001</td>
<td>2,100</td>
<td>35</td>
<td></td>
<td>13.1</td>
<td>$108 $123</td>
</tr>
<tr>
<td>2002</td>
<td>2,100</td>
<td>51</td>
<td></td>
<td>10.8</td>
<td>$86 $97</td>
</tr>
<tr>
<td>2003</td>
<td>1,900</td>
<td>40</td>
<td></td>
<td>7.6</td>
<td>$66 $72</td>
</tr>
<tr>
<td>2004</td>
<td>2,200</td>
<td>NA</td>
<td></td>
<td>9.5</td>
<td>$88 $94</td>
</tr>
</tbody>
</table>

NA – Not available because analysis of 2004 fire deaths was still under review.

Note: Statistics include a proportional share of fires with undetermined cause. Sums may not equal totals because of rounding. Japanese injury statistics are not available by cause. A bath furnace is a small local water heater that only heats water for a bath.

Source: Analyses of Japanese fire experience data by Dr. Ai Sekizawa, NRIFD, foreign exchange rates form Organization for Economic Co-operation and Development. Consumer price index used to adjust for inflation.
In 2006, an estimated 16,380 reported U.S. non-confined home structure fires involving premises wiring group* equipment resulted in 145 civilian deaths, 458 civilian injuries, and $497 million in direct property damage.

NFPA 70, *National Electrical Code*, 2005 edition, defines “premises wiring (system)” as “that interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed, that extends from the service point or source of power, such as a battery, a solar photovoltaic system, or a generator, transformer, or converter windings, to the outlet(s).”

Premises wiring and the premises wiring group both include the following groups and types of electrical distribution equipment:

- **Wiring**
  - Branch circuit wiring
  - Power (utility) wiring
  - Electrical service supply wiring
  - Wiring from meter box to service
- **Outlets, receptacles, and switches**
  - Outlet or receptacle
  - Wall switch
- **Transformers and overcurrent protection equipment**
  - Panelboard or switchboard for circuit breakers or fuses
  - Overcurrent or disconnect equipment associated with transformers
  - Ground fault circuit interrupter (GFCI)
  - Surge protector
  - Low voltage transformer
  - Distribution type transformer
- **Generators**
  - Battery charger or rectifier
  - Uninterrupted power supply

Also for purposes of analysis, these power-source-related type of equipment are included in the premises wiring group:

- Generator
- Battery
- Inverter

The premises wiring group excludes light fixtures and signs, which are part of premises wiring but are here grouped with lamps and light bulbs for purposes of analysis.

To put it another way, the premises wiring group includes all electrical distribution equipment except cords and plugs. Lighting equipment – specifically light fixtures, lamps, and light bulbs – also is not part of the premises wiring group.

The newest type of protection device – arc fault circuit interrupter (AFCI) – is not separately identified among the choices for equipment involved in ignition. GFCIs and AFCIs are triggered by different

---

* “Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.

* “Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
conditions from those that activate conventional circuit breakers. Conventional fuses and circuit breakers activate when too much current is flowing through the circuit. AFCIs activate when they detect a low but irregular electrical current, indicating current is leaking out of the circuit, possibly into adjacent combustible material. AFCIs have more of an effect in preventing fire ignitions, while GFCIs have more of an effect in preventing electric shock.

It is possible that some fires involving a battery are coded in terms of the appliance or equipment powered by the battery.

Fires involving premises wiring group equipment declined by more than one-third from 1980 to 1998. After the transition period of 1999-2001, when NFIRS Version 5.0 was being phased in, the estimates for 2003-2005 have been more than one-half lower than the levels of the late 1990s, a much larger decline than would have been expected if the 1980-1998 trend had continued unchanged. Some of the sharp decline after 1998 may be due to the changes in data categories, definitions, and rules introduced in NFIRS Version 5.0 rather than a decline in the real size of this fire problem.

Premises wiring group equipment accounted for 61% of 2003-2006 non-confined structure fires involving electrical distribution or lighting equipment, as well as 43% of associated civilian deaths, 48% of associated civilian injuries, and 61% of associated direct property damage.

Two-fifths (38%) of the 2003-2006 reported non-confined home structure fires involving premises wiring group equipment* involved unclassified or unknown-type wiring. Because such a large share of these fires and associated losses are unclassified or unknown-type, the numbers and percentages for every specific type of equipment are probably severely understated. Comparisons within a group are not a problem. For example, note that the number of fires declines for wiring as one moves from inside the house along the wiring network toward the connections to the utility poles outside the house.

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* "Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
### Home Fires Involving Premises Wiring Group*, by Specific Type of Equipment

Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments  
(Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Type and Group of Equipment</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wiring</td>
<td>2,860</td>
<td>62 (39%)</td>
<td>67 (17%)</td>
<td>$95 (21%)</td>
</tr>
<tr>
<td>Branch circuit wiring</td>
<td>1,440</td>
<td>59 (37%)</td>
<td>35 (9%)</td>
<td>$58 (13%)</td>
</tr>
<tr>
<td>Electrical service supply</td>
<td>610</td>
<td>0 (0%)</td>
<td>14 (4%)</td>
<td>$19 (4%)</td>
</tr>
<tr>
<td>wiring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiring from meter box to</td>
<td>430</td>
<td>0 (0%)</td>
<td>12 (3%)</td>
<td>$11 (2%)</td>
</tr>
<tr>
<td>service</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power (utility) line</td>
<td>380</td>
<td>3 (2%)</td>
<td>5 (1%)</td>
<td>$7 (2%)</td>
</tr>
<tr>
<td>Outlets, switches, or</td>
<td>2,310</td>
<td>14 (9%)</td>
<td>99 (25%)</td>
<td>$75 (17%)</td>
</tr>
<tr>
<td>receptacles</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outlet or receptacle</td>
<td>2,070</td>
<td>14 (9%)</td>
<td>90 (23%)</td>
<td>$70 (15%)</td>
</tr>
<tr>
<td>Wall switch</td>
<td>230</td>
<td>0 (0%)</td>
<td>9 (2%)</td>
<td>$5 (1%)</td>
</tr>
<tr>
<td>Overcurrent protection device</td>
<td>1,680</td>
<td>20 (12%)</td>
<td>54 (14%)</td>
<td>$43 (10%)</td>
</tr>
<tr>
<td>Panelboard or switchboard</td>
<td>1,220</td>
<td>9 (6%)</td>
<td>30 (7%)</td>
<td>$28 (6%)</td>
</tr>
<tr>
<td>for fuses or circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>breakers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surge protector</td>
<td>440</td>
<td>11 (7%)</td>
<td>22 (6%)</td>
<td>$15 (3%)</td>
</tr>
<tr>
<td>Ground fault circuit</td>
<td>20</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>interrupter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meter or meter box</td>
<td>510</td>
<td>3 (2%)</td>
<td>12 (3%)</td>
<td>$15 (3%)</td>
</tr>
<tr>
<td>Power source</td>
<td>480</td>
<td>3 (2%)</td>
<td>32 (8%)</td>
<td>$31 (7%)</td>
</tr>
<tr>
<td>Generator</td>
<td>230</td>
<td>3 (2%)</td>
<td>23 (6%)</td>
<td>$16 (4%)</td>
</tr>
<tr>
<td>Battery charger or rectifier</td>
<td>160</td>
<td>0 (0%)</td>
<td>8 (2%)</td>
<td>$10 (2%)</td>
</tr>
<tr>
<td>Battery</td>
<td>60</td>
<td>0 (0%)</td>
<td>2 (0%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Uninterrupted power supply</td>
<td>10</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (0%)</td>
</tr>
<tr>
<td>Inverter</td>
<td>10</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Transformer</td>
<td>270</td>
<td>4 (2%)</td>
<td>14 (4%)</td>
<td>$8 (2%)</td>
</tr>
<tr>
<td>Low voltage transformer</td>
<td>130</td>
<td>0 (0%)</td>
<td>10 (2%)</td>
<td>$4 (1%)</td>
</tr>
<tr>
<td>Overcurrent or disconnect</td>
<td>90</td>
<td>4 (2%)</td>
<td>5 (1%)</td>
<td>$4 (1%)</td>
</tr>
<tr>
<td>equipment associated with</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>transformers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution type transformer</td>
<td>60</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (0%)</td>
</tr>
<tr>
<td>Unclassified or unknown</td>
<td>4,890</td>
<td>53 (33%)</td>
<td>119 (30%)</td>
<td>$184 (41%)</td>
</tr>
<tr>
<td>type wiring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13,010</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
</tr>
</tbody>
</table>

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

* “Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
Seven of eight (88%) of 2003-2006 non-confined home structure fires involving premises wiring group equipment involved electrical failures or malfunctions as a factor contributing to ignition. The two leading specific factors contributing to ignition were unclassified electrical failure or malfunction (33%) and unspecified short circuit arc (28%). These two leading factors lack details on the nature of the failure. The leading factors contributing to ignition with details were short circuit arc from defective or worn insulation (12%), arc from faulty contact or broken conductor (6%), short circuit arc from mechanical damage (4%), and equipment overloaded (3%). Factors contributing to ignition are shown in the tables for all premises wiring group equipment and for leading specific types of equipment.

One-third (37%) of 2003-2006 non-confined home structure fires involving premises wiring (excluding light fixtures and including power sources) began with ignition of wire or cable insulation. Other leading items first ignited were structural member or framing (18%), insulation within structural area (6%), interior wall covering (6%), and exterior wall coverings (5%). Items first ignited are shown in the tables for all premises wiring group equipment and for leading specific types of equipment.

The areas of origin for 2003-2006 non-confined home structure fires involving premises wiring (excluding light fixtures and including power sources) are fairly evenly divided between concealed or exterior spaces and normally occupied spaces. The leading areas of origin that are concealed or exterior spaces were attic or ceiling/roof assembly or concealed space (11%), wall assembly or concealed space (11%), exterior wall surface (6%), crawl space or substructure space (5%), and ceiling/floor assembly or concealed space (4%). The leading areas of origin that are normally occupied spaces were bedroom (13%), living room, family room, or den (7%), kitchen (6%), unclassified function area (4%), garage (4%), and laundry room or area (4%).

### Injuries Involving Premises Wiring Excluding Light Fixtures and Including Power Sources, Reported to Hospital Emergency Rooms, 2006

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Total</th>
<th>Laceration</th>
<th>Contusion or Abrasion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>11,620</td>
<td>790</td>
<td>1,320</td>
</tr>
<tr>
<td>Outlet, receptacle, or switch</td>
<td>4,200</td>
<td>840</td>
<td>320</td>
</tr>
<tr>
<td>Wiring</td>
<td>3,820</td>
<td>1,530</td>
<td>560</td>
</tr>
<tr>
<td>Generator</td>
<td>2,700</td>
<td>180</td>
<td>190</td>
</tr>
<tr>
<td>Panelboard or switchboard for circuit breakers or fuses</td>
<td>1,220</td>
<td>480</td>
<td>90</td>
</tr>
<tr>
<td>Battery charger</td>
<td>360</td>
<td>20</td>
<td>140</td>
</tr>
<tr>
<td>Total premises wiring excluding light fixtures and including power sources</td>
<td>23,920</td>
<td>3,830</td>
<td>2,620</td>
</tr>
</tbody>
</table>

Source: CPSC’s National Electronic Injury Surveillance System.

*“Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.*
In 2006, an estimated 23,920 injuries involving premises wiring group equipment were reported to hospital emergency rooms.¹²

This group of equipment also accounted for 1,920 electric shock injuries and 1,570 electric burn injuries. Batteries also accounted for 3,740 ingested object injuries and 1,820 chemical burn injuries.

In 1995-2001 (excluding 1999), installed household wiring accounted for an average of 28 electrocution deaths per year.¹³

No analysis was done by CPSC for 1999, and analysis for years after 2001 did not provide separate statistics for this type of equipment.

<table>
<thead>
<tr>
<th>Year</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>53</td>
</tr>
<tr>
<td>1996</td>
<td>41</td>
</tr>
<tr>
<td>1997</td>
<td>22</td>
</tr>
<tr>
<td>1998</td>
<td>25</td>
</tr>
<tr>
<td>2000</td>
<td>10</td>
</tr>
<tr>
<td>2001</td>
<td>19</td>
</tr>
<tr>
<td>Average</td>
<td>28</td>
</tr>
</tbody>
</table>

Source: CPSC analysis of death certificate database.

In 2007, 43 people died of non-fire injuries from unvented carbon monoxide from generators.¹⁴

Fueled equipment to generate electricity is the only type of electrical distribution or lighting equipment that can produce carbon monoxide. (Fueled lighting devices are not included in the scope of this report.)

The death toll from carbon monoxide produced by generators has increased sharply in recent years until 2007, from less than 10 per year on average in 1999 and prior years to 19 per year in 2000-2001, 47 per year in 2002-2004, 89 per year in 2005-2006, and back to 43 in 2007.

The large jump in deaths involving generators in 2000 may reflect the fact that roughly half the total generators in use in 2000 had been purchased in 1999 because of concerns over Y2K (year 2000) problems with the nation’s power grid.¹⁵ This meant a large number of generator users had no experience in safe generator use. Disasters like Hurricane Katrina and a series of Florida hurricanes have added to the demand for generators and probably added to the number of inexperienced users.

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For nearly two-fifths (38%) of the 349 deaths where it was known why generators were in use, the reason for use was power outage due to either weather or problem with power distribution. Further investigation showed that all of these deaths with a known reason for the outage specifically involved weather. The types of weather were snow or ice storms (46% of carbon monoxide deaths involving generators used because of a weather related power outage), hurricanes or tropical storms (39%), wind storms (7%) and thunderstorms (5%).

For 62% of the deaths where it was known why generators were in use, the known reason was something other than power outage due to either weather or problem with power distribution. The other leading reasons for generator use were power shutoff by electric company due to bill dispute or non-payment (18% of deaths where a reason was reported); providing power to a storage shed, trailer, boat, camper, cabin, or campsite (19%); new home or homeowner with power not yet turned on or turned off for construction or renovation (10%); and providing power to a home that normally does not have electricity (7%).

Safety Tips

**General**

- Home electrical safety begins with NFPA 70, *National Electrical Code®*, and related documents with special relevance to homes, notably NFPA 73, *Electrical Inspection Code for Existing Dwellings*. However, work on home electrical distribution or lighting equipment should only be conducted by someone qualified as an electrician. When you are buying, selling, or remodeling a home, have it inspected by a professional electrician.
- Call a qualified electrician or your landlord if you have
  - recurring problems with blowing fuses or tripping circuit breakers,
  - a tingling feeling when you touch an electrical appliance,
  - discolored or warm wall outlets,
  - a burning smell or rubbery odor coming from an appliance,
  - flickering lights,
  - sparks from an outlet,
  - discolored or warm wall outlets.

**Outlets, Receptacles, and Switches**

- Consider having additional circuits or receptacles added by a qualified electrician.
- Receptacle outlets and switches should have wall plates to prevent shocks.
- Homes with young children should have tamper-resistant electrical receptacles.

*Circuit Breakers, Fuses, Overcurrent Protection, GFCIs, AFCIs*

- Replace fuses with the correct amp rating for the circuit they protect.
• Never replace a fuse with a higher rated fuse.
• Only plug one heat-producing appliance (such as a coffee maker, toaster, space heater, etc.) into a receptacle outlet at a time.
• If an appliance is malfunctioning, unplug it if it is safe to do so. If necessary, cut off power by unscrewing a fuse or turning off the circuit breaker.
• Arc fault circuit interrupters (AFCIs) are a type of circuit breaker that shuts off electricity when a dangerous condition occurs. Consider having them installed in your home. Use a qualified electrician.
• Ground fault circuit interrupters (GFCIs) reduce the risk of shock.
• Test AFCIs and GFCIs once a month to make sure they are working properly.

Power Lines

• Keep ladders away from overhead power lines including the electrical service into your home.
• Never touch a power line. Stay at a safe distance – you could be electrocuted.
• Report downed power lines to authorities.
• Some power lines are underground. Call your local utility before digging.

Generators

• Use generators only in well-ventilated areas outdoors, away from all doors, windows, and vent openings. This is to avoid serious danger of carbon monoxide poisoning from exhaust fumes.
• Generators should be operated and refueled in accordance with manufacturer’s instructions.
• Do not use a generator that is in poor condition.
• Make sure the equipment is not overloaded.
• Carefully follow manufacturer’s instructions when using any of these devices.
• Install carbon monoxide alarms, powered by batteries or with battery back-up to a line voltage connection by hard-wiring or plug-in, in accordance with manufacturer’s instructions.
## Home Fires Involving Premises Wiring Group* Equipment by Year

### Structure Fires Reported to U.S. Fire Departments

<table>
<thead>
<tr>
<th>Year</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As Reported</td>
<td>In 2006 Dollars</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>39,340</td>
<td>281</td>
<td>682</td>
<td>$310  $760</td>
</tr>
<tr>
<td>1981</td>
<td>35,740</td>
<td>317</td>
<td>674</td>
<td>$265  $586</td>
</tr>
<tr>
<td>1982</td>
<td>35,980</td>
<td>161</td>
<td>736</td>
<td>$321  $670</td>
</tr>
<tr>
<td>1983</td>
<td>33,560</td>
<td>268</td>
<td>700</td>
<td>$333  $674</td>
</tr>
<tr>
<td>1984</td>
<td>32,790</td>
<td>173</td>
<td>667</td>
<td>$348  $673</td>
</tr>
<tr>
<td>1985</td>
<td>33,890</td>
<td>272</td>
<td>618</td>
<td>$392  $733</td>
</tr>
<tr>
<td>1986</td>
<td>32,170</td>
<td>325</td>
<td>554</td>
<td>$373  $686</td>
</tr>
<tr>
<td>1987</td>
<td>30,160</td>
<td>300</td>
<td>763</td>
<td>$300  $533</td>
</tr>
<tr>
<td>1988</td>
<td>31,240</td>
<td>257</td>
<td>733</td>
<td>$446  $761</td>
</tr>
<tr>
<td>1989</td>
<td>27,570</td>
<td>343</td>
<td>589</td>
<td>$407  $662</td>
</tr>
<tr>
<td>1990</td>
<td>27,400</td>
<td>149</td>
<td>603</td>
<td>$395  $610</td>
</tr>
<tr>
<td>1991</td>
<td>29,450</td>
<td>134</td>
<td>714</td>
<td>$580  $858**</td>
</tr>
<tr>
<td>1992</td>
<td>27,100</td>
<td>205</td>
<td>780</td>
<td>$367  $528</td>
</tr>
<tr>
<td>1993</td>
<td>28,470</td>
<td>138</td>
<td>747</td>
<td>$412  $575</td>
</tr>
<tr>
<td>1994</td>
<td>28,080</td>
<td>255</td>
<td>692</td>
<td>$418  $568</td>
</tr>
<tr>
<td>1995</td>
<td>27,210</td>
<td>301</td>
<td>696</td>
<td>$456  $603</td>
</tr>
<tr>
<td>1996</td>
<td>26,650</td>
<td>226</td>
<td>645</td>
<td>$504  $649</td>
</tr>
<tr>
<td>1997</td>
<td>25,830</td>
<td>177</td>
<td>722</td>
<td>$494  $621</td>
</tr>
<tr>
<td>1998</td>
<td>25,470</td>
<td>190</td>
<td>581</td>
<td>$495  $613</td>
</tr>
<tr>
<td>1999</td>
<td>20,270</td>
<td>61</td>
<td>210</td>
<td>$459  $555</td>
</tr>
<tr>
<td>2000</td>
<td>15,370</td>
<td>41</td>
<td>243</td>
<td>$326  $382</td>
</tr>
<tr>
<td>2001</td>
<td>15,730</td>
<td>305</td>
<td>554</td>
<td>$450  $513</td>
</tr>
<tr>
<td>2002</td>
<td>13,360</td>
<td>60</td>
<td>298</td>
<td>$345  $386</td>
</tr>
<tr>
<td>2003</td>
<td>11,130</td>
<td>124</td>
<td>201</td>
<td>$406  $445</td>
</tr>
<tr>
<td>2004</td>
<td>11,380</td>
<td>146</td>
<td>421</td>
<td>$372  $397</td>
</tr>
<tr>
<td>2005</td>
<td>13,110</td>
<td>220</td>
<td>513</td>
<td>$527  $544</td>
</tr>
<tr>
<td>2006</td>
<td>16,380</td>
<td>145</td>
<td>458</td>
<td>$497  $497</td>
</tr>
</tbody>
</table>

** All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and property damage is rounded to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution. Inflation adjustment to 2006 dollars is done using the consumer price index.

Source: Data from NFIRS (Version 5.0 after 1998) and NFPA survey.

* "Premises wiring" refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the "premises wiring group" is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
## Home Fires Involving the Premises Wiring Group*, by Factor Contributing to Ignition

Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments

(Excluding Fires Reported as Confined Fires)

A. All Premises Wiring Group Equipment

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>4,300</td>
<td>35 (22%)</td>
<td>99 (25%)</td>
<td>$167 (37%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>3,690</td>
<td>18 (11%)</td>
<td>117 (29%)</td>
<td>$143 (32%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>1,620</td>
<td>21 (13%)</td>
<td>62 (16%)</td>
<td>$47 (11%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>750</td>
<td>0 (0%)</td>
<td>16 (4%)</td>
<td>$22 (5%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>460</td>
<td>4 (2%)</td>
<td>13 (3%)</td>
<td>$14 (3%)</td>
</tr>
<tr>
<td>Unclassified mechanical failure or malfunction</td>
<td>450</td>
<td>20 (12%)</td>
<td>19 (5%)</td>
<td>$13 (3%)</td>
</tr>
<tr>
<td>Equipment overloaded</td>
<td>420</td>
<td>16 (10%)</td>
<td>16 (4%)</td>
<td>$18 (4%)</td>
</tr>
<tr>
<td>Arc or spark from operating equipment</td>
<td>340</td>
<td>0 (0%)</td>
<td>14 (4%)</td>
<td>$9 (2%)</td>
</tr>
<tr>
<td>Installation deficiency</td>
<td>270</td>
<td>10 (6%)</td>
<td>10 (3%)</td>
<td>$8 (2%)</td>
</tr>
<tr>
<td>Worn out</td>
<td>240</td>
<td>0 (0%)</td>
<td>5 (1%)</td>
<td>$9 (2%)</td>
</tr>
<tr>
<td>Water caused short circuit arc</td>
<td>230</td>
<td>0 (0%)</td>
<td>8 (2%)</td>
<td>$5 (1%)</td>
</tr>
<tr>
<td>Heat source too close to combustibles</td>
<td>220</td>
<td>0 (0%)</td>
<td>8 (2%)</td>
<td>$14 (3%)</td>
</tr>
<tr>
<td>Storm</td>
<td>210</td>
<td>0 (0%)</td>
<td>2 (0%)</td>
<td>$6 (1%)</td>
</tr>
<tr>
<td>Unclassified misuse of material</td>
<td>170</td>
<td>5 (3%)</td>
<td>11 (3%)</td>
<td>$3 (1%)</td>
</tr>
<tr>
<td>Unclassified factor contributed to ignition</td>
<td>110</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$3 (1%)</td>
</tr>
<tr>
<td>High wind</td>
<td>80</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$3 (1%)</td>
</tr>
<tr>
<td>Leak or break</td>
<td>80</td>
<td>0 (0%)</td>
<td>7 (2%)</td>
<td>$3 (1%)</td>
</tr>
<tr>
<td>Exposure fire</td>
<td>80</td>
<td>0 (0%)</td>
<td>2 (0%)</td>
<td>$4 (1%)</td>
</tr>
<tr>
<td>Unclassified operational deficiency</td>
<td>70</td>
<td>0 (0%)</td>
<td>4 (1%)</td>
<td>$5 (1%)</td>
</tr>
<tr>
<td>Equipment not being operated properly</td>
<td>60</td>
<td>5 (3%)</td>
<td>2 (1%)</td>
<td>$2 (0%)</td>
</tr>
<tr>
<td>Equipment unattended</td>
<td>50</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$7 (2%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>450</td>
<td>34 (22%)*</td>
<td>26 (7%)</td>
<td>$15 (3%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>13,010</td>
<td>159 (100%)</td>
<td>397 (100%)</td>
<td>$450 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>14,340</td>
<td>168 (106%)</td>
<td>445 (112%)</td>
<td>$520 (115%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>11,390</td>
<td>78 (49%)</td>
<td>330 (83%)</td>
<td>$407 (90%)</td>
</tr>
</tbody>
</table>

** The leading factor contributing to ignition for fire deaths not shown above is construction deficiency (22% of deaths).

* "Premises wiring" refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the "premises wiring group" is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
### B. Branch Circuit Wiring

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unspecified short circuit arc</td>
<td>480 (33%)</td>
<td>0 (0%)</td>
<td>13 (37%)</td>
<td>$22 (38%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>350 (24%)</td>
<td>7 (12%)</td>
<td>6 (17%)</td>
<td>$20 (35%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>240 (17%)</td>
<td>0 (0%)</td>
<td>7 (20%)</td>
<td>$6 (10%)</td>
</tr>
<tr>
<td>Installation deficiency</td>
<td>100 (7%)</td>
<td>14 (23%)</td>
<td>9 (26%)</td>
<td>$3 (6%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>90 (6%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$3 (5%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>70 (5%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Equipment overloaded</td>
<td>70 (5%)</td>
<td>18 (30%)</td>
<td>0 (0%)</td>
<td>$2 (3%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>200 (14%)</td>
<td>21 (35%)**</td>
<td>9 (25%)</td>
<td>$9 (16%)</td>
</tr>
<tr>
<td><strong>Total fires</strong></td>
<td>1,440 (100%)</td>
<td>59 (100%)</td>
<td>35 (100%)</td>
<td>$58 (100%)</td>
</tr>
<tr>
<td><strong>Total factor entries</strong></td>
<td>1,590 (110%)</td>
<td>59 (100%)</td>
<td>44 (125%)</td>
<td>$66 (115%)</td>
</tr>
<tr>
<td><strong>All electrical failures or malfunctions</strong></td>
<td>1,260 (87%)</td>
<td>7 (12%)</td>
<td>30 (86%)</td>
<td>$54 (93%)</td>
</tr>
</tbody>
</table>

**The leading factor contributing to ignition for fire deaths not shown above is unclassified mechanical failure or malfunction (35% of deaths).**

### C. Electrical Service Supply Wiring

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>170 (27%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$5 (24%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>140 (23%)</td>
<td>0 (NA)</td>
<td>3 (21%)</td>
<td>$6 (29%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>70 (11%)</td>
<td>0 (NA)</td>
<td>8 (60%)</td>
<td>$3 (16%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>60 (9%)</td>
<td>0 (NA)</td>
<td>6 (40%)</td>
<td>$2 (13%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>60 (9%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$2 (11%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>210 (34%)</td>
<td>0 (NA)</td>
<td>8 (60%)</td>
<td>$7 (35%)</td>
</tr>
<tr>
<td><strong>Total fires</strong></td>
<td>610 (100%)</td>
<td>0 (NA)</td>
<td>14 (100%)</td>
<td>$19 (100%)</td>
</tr>
<tr>
<td><strong>Total factor entries</strong></td>
<td>700 (114%)</td>
<td>0 (NA)</td>
<td>26 (181%)</td>
<td>$24 (128%)</td>
</tr>
<tr>
<td><strong>All electrical failures or malfunctions</strong></td>
<td>500 (81%)</td>
<td>0 (NA)</td>
<td>23 (160%)</td>
<td>$19 (102%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because total is zero.

---

* "Premises wiring" refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.*
## D. Wiring From Meter Boxes

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unspecified short circuit arc</td>
<td>140 (33%)</td>
<td>0 (NA)</td>
<td>12 (100%)</td>
<td>$2 (22%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>110 (26%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$5 (45%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>60 (14%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (4%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>30 (7%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (1%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>30 (6%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (2%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>120 (29%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$5 (43%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>430 (100%)</td>
<td>0 (NA)</td>
<td>12 (100%)</td>
<td>$11 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>490 (114%)</td>
<td>0 (NA)</td>
<td>12 (100%)</td>
<td>$12 (117%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>390 (91%)</td>
<td>0 (NA)</td>
<td>12 (100%)</td>
<td>$8 (79%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because total is zero.

## E. Power (Utility) Line Wiring

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>110 (29%)</td>
<td>0 (0%)</td>
<td>2 (33%)</td>
<td>$3 (40%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>70 (19%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (7%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>50 (13%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (10%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>30 (9%)</td>
<td>3 (100%)</td>
<td>2 (33%)</td>
<td>$1 (15%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>160 (42%)</td>
<td>0 (0%)</td>
<td>2 (33%)</td>
<td>$3 (42%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>380 (100%)</td>
<td>3 (100%)</td>
<td>5 (100%)</td>
<td>$7 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>430 (112%)</td>
<td>3 (100%)</td>
<td>5 (100%)</td>
<td>$8 (115%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>300 (79%)</td>
<td>3 (100%)</td>
<td>3 (67%)</td>
<td>$6 (85%)</td>
</tr>
</tbody>
</table>

* “Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
### F. Outlets or Receptacles

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unspecified short circuit arc</td>
<td>700 (34%)</td>
<td>4 (26%)</td>
<td>33 (37%)</td>
<td>$27 (39%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>610 (30%)</td>
<td>7 (48%)</td>
<td>18 (21%)</td>
<td>$23 (33%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>210 (10%)</td>
<td>0 (0%)</td>
<td>16 (18%)</td>
<td>$8 (11%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>190 (9%)</td>
<td>0 (0%)</td>
<td>8 (9%)</td>
<td>$8 (11%)</td>
</tr>
<tr>
<td>Equipment overloaded</td>
<td>100 (5%)</td>
<td>0 (0%)</td>
<td>4 (4%)</td>
<td>$5 (7%)</td>
</tr>
<tr>
<td>Arc or spark from operating equipment</td>
<td>60 (3%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Water caused short circuit arc</td>
<td>50 (3%)</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>280 (14%)</td>
<td>4 (26%)**</td>
<td>15 (16%)</td>
<td>$9 (12%)</td>
</tr>
</tbody>
</table>

Total fires 2,070 (100%) | 14 (100%) | 90 (100%) | $70 (100%)

** The leading factor contributing to fire deaths not shown above is unclassified misuse of material (26% of deaths).

### G. Wall Switches

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unspecified short circuit arc</td>
<td>70 (29%)</td>
<td>0 (NA)</td>
<td>2 (18%)</td>
<td>$1 (28%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>60 (27%)</td>
<td>0 (NA)</td>
<td>4 (40%)</td>
<td>$2 (44%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>40 (17%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>90 (38%)</td>
<td>0 (NA)</td>
<td>6 (65%)</td>
<td>$2 (41%)</td>
</tr>
</tbody>
</table>

Total fires 230 (100%) | 0 (NA) | 9 (100%) | $5 (100%)

NA – Not applicable because total is zero.

---

* "Premises wiring" refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
### H. Panelboards or Switchboards for Fuses or Circuit Breakers

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unspecified short circuit arc</td>
<td>440</td>
<td>4 (42%)</td>
<td>2 (8%)</td>
<td>$10 (37%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>400</td>
<td>0 (0%)</td>
<td>3 (11%)</td>
<td>$11 (40%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>70</td>
<td>0 (0%)</td>
<td>5 (18%)</td>
<td>$2 (7%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>70</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (3%)</td>
</tr>
<tr>
<td>Water caused short circuit arc</td>
<td>60</td>
<td>0 (0%)</td>
<td>5 (17%)</td>
<td>$1 (5%)</td>
</tr>
<tr>
<td>Unclassified mechanical failure or malfunction</td>
<td>50</td>
<td>5 (58%)</td>
<td>11 (39%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>240</td>
<td>4 (42%)**</td>
<td>2 (8%)</td>
<td>$6 (22%)</td>
</tr>
</tbody>
</table>

**Total fires** 1,220 (100%)  9 (100%)  30 (100%)  $28 (100%)

**Total factor entries** 1,340 (110%)  13 (142%)  30 (100%)  $33 (117%)

All electrical failures or malfunctions 1,120 (91%)  4 (42%)  16 (54%)  $27 (97%)

**The leading factor contributing to ignition for fire deaths not shown above is equipment overloaded (42% of deaths).**

### I. Surge Protectors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>200</td>
<td>11 (100%)</td>
<td>14 (64%)</td>
<td>$9 (63%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>120</td>
<td>0 (0%)</td>
<td>4 (16%)</td>
<td>$2 (12%)</td>
</tr>
<tr>
<td>Equipment overloaded</td>
<td>60</td>
<td>0 (0%)</td>
<td>6 (27%)</td>
<td>$3 (18%)</td>
</tr>
<tr>
<td>Misuse of material</td>
<td>20</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (5%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>100</td>
<td>4 (35%)**</td>
<td>4 (19%)</td>
<td>$2 (13%)</td>
</tr>
</tbody>
</table>

**Total fires** 440 (100%)  11 (100%)  22 (100%)  $15 (100%)

**Total factor entries** 500 (113%)  14 (135%)  28 (126%)  $17 (112%)

All electrical failures or malfunctions 370 (85%)  11 (100%)  22 (99%)  $11 (77%)

**The leading factor contributing to ignition for fire deaths not shown above is equipment not being operated properly (35% of deaths).**
## J. Meters or Meter Boxes

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>190</td>
<td>3 (100%)</td>
<td>0 (0%)</td>
<td>$5 (32%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>150</td>
<td>0 (0%)</td>
<td>7 (60%)</td>
<td>$6 (44%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>40</td>
<td>0 (0%)</td>
<td>3 (22%)</td>
<td>$2 (12%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>40</td>
<td>0 (0%)</td>
<td>2 (19%)</td>
<td>$0 (1%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>150</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$4 (25%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>510</td>
<td>3 (100%)</td>
<td>12 (100%)</td>
<td>$15 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>560</td>
<td>3 (100%)</td>
<td>12 (100%)</td>
<td>$17 (115%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>470</td>
<td>3 (100%)</td>
<td>12 (100%)</td>
<td>$14 (95%)</td>
</tr>
</tbody>
</table>

## K. Generators

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat source too close to combustibles</td>
<td>60</td>
<td>NA (NA)</td>
<td>2 (9%)</td>
<td>$5 (32%)</td>
</tr>
<tr>
<td>Flammable liquid or gas spilled</td>
<td>30</td>
<td>NA (NA)</td>
<td>13 (55%)</td>
<td>$1 (9%)</td>
</tr>
<tr>
<td>Unclassified mechanical failure or malfunction</td>
<td>20</td>
<td>NA (NA)</td>
<td>0 (0%)</td>
<td>$1 (3%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>140</td>
<td>NA (NA)</td>
<td>10 (45%)</td>
<td>$11 (68%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>230</td>
<td>3 (100%)</td>
<td>23 (100%)</td>
<td>$16 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>260</td>
<td>NA (NA)</td>
<td>25 (109%)</td>
<td>$18 (112%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>40</td>
<td>NA (NA)</td>
<td>2 (9%)</td>
<td>$5 (28%)</td>
</tr>
</tbody>
</table>

NA – Not available because all fatal fires had factor contributing to ignition unknown.

*“Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.*
### L. Transformers

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>130 (48%)</td>
<td>0 (0%)</td>
<td>11 (73%)</td>
<td>$4 (53%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>60 (20%)</td>
<td>4 (100%)</td>
<td>0 (0%)</td>
<td>$3 (36%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>20 (8%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>90 (32%)</td>
<td>0 (0%)</td>
<td>4 (27%)</td>
<td>$2 (26%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>270 (100%)</td>
<td>4 (100%)</td>
<td>14 (100%)</td>
<td>$8 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>300 (109%)</td>
<td>4 (100%)</td>
<td>14 (100%)</td>
<td>$9 (116%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>220 (80%)</td>
<td>4 (100%)</td>
<td>11 (73%)</td>
<td>$7 (90%)</td>
</tr>
</tbody>
</table>

* "Premises wiring" refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the "premises wiring group" is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
## M. Unclassified or Unknown-Type Wiring

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>1,860</td>
<td>0 (0%)</td>
<td>37 (31%)</td>
<td>$74 (40%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>1,290</td>
<td>3 (6%)</td>
<td>39 (33%)</td>
<td>$58 (32%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>820</td>
<td>19 (36%)</td>
<td>23 (19%)</td>
<td>$27 (15%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>210</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Unclassified mechanical failure or malfunction</td>
<td>170</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>130</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Equipment overloaded</td>
<td>110</td>
<td>0 (0%)</td>
<td>3 (2%)</td>
<td>$4 (2%)</td>
</tr>
<tr>
<td>Worn out</td>
<td>100</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Arc or spark from operating equipment</td>
<td>90</td>
<td>0 (0%)</td>
<td>6 (5%)</td>
<td>$3 (1%)</td>
</tr>
<tr>
<td>Installation deficiency</td>
<td>80</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$4 (2%)</td>
</tr>
<tr>
<td>Heat source too close to combustibles</td>
<td>70</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>430</td>
<td>31 (58%)**</td>
<td>15 (13%)</td>
<td>$18 (10%)</td>
</tr>
</tbody>
</table>

** The leading factor contributing to ignition for fire deaths not shown above is construction deficiency (58% of deaths).

Note: Multiple entries are allowed, resulting in more factor entries than fires. Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home structure fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

* "Premises wiring" refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the "premises wiring group" is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
Home Fires Involving Premises Wiring Group*, by Item First Ignited
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Premises Wiring Group Equipment

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>4,860</td>
<td>80 (50%)</td>
<td>94 (24%)</td>
<td>$122 (27%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>2,320</td>
<td>19 (12%)</td>
<td>55 (14%)</td>
<td>$126 (28%)</td>
</tr>
<tr>
<td>Insulation within structural area</td>
<td>810</td>
<td>10 (6%)</td>
<td>16 (4%)</td>
<td>$20 (4%)</td>
</tr>
<tr>
<td>Interior wall covering</td>
<td>770</td>
<td>11 (7%)</td>
<td>48 (12%)</td>
<td>$30 (7%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>700</td>
<td>6 (4%)</td>
<td>17 (4%)</td>
<td>$21 (5%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>530</td>
<td>0 (0%)</td>
<td>6 (2%)</td>
<td>$8 (2%)</td>
</tr>
<tr>
<td>Unclassified structural component or finish</td>
<td>490</td>
<td>15 (9%)</td>
<td>13 (3%)</td>
<td>$19 (4%)</td>
</tr>
<tr>
<td>Mattress or bedding</td>
<td>240</td>
<td>0 (0%)</td>
<td>19 (5%)</td>
<td>$10 (2%)</td>
</tr>
<tr>
<td>Interior ceiling covering</td>
<td>230</td>
<td>0 (0%)</td>
<td>4 (1%)</td>
<td>$12 (3%)</td>
</tr>
<tr>
<td>Floor covering</td>
<td>200</td>
<td>5 (3%)</td>
<td>10 (3%)</td>
<td>$8 (2%)</td>
</tr>
<tr>
<td>Appliance housing or casing</td>
<td>180</td>
<td>0 (0%)</td>
<td>8 (2%)</td>
<td>$7 (1%)</td>
</tr>
<tr>
<td>Clothing</td>
<td>170</td>
<td>0 (0%)</td>
<td>13 (3%)</td>
<td>$8 (2%)</td>
</tr>
<tr>
<td>Upholstered furniture</td>
<td>160</td>
<td>5 (3%)</td>
<td>13 (3%)</td>
<td>$7 (2%)</td>
</tr>
<tr>
<td>Cabinetry</td>
<td>150</td>
<td>0 (0%)</td>
<td>14 (4%)</td>
<td>$5 (1%)</td>
</tr>
<tr>
<td>Unclassified furniture or utensil</td>
<td>140</td>
<td>0 (0%)</td>
<td>6 (2%)</td>
<td>$7 (2%)</td>
</tr>
<tr>
<td>Flammable or combustible gas or liquid</td>
<td>140</td>
<td>8 (5%)</td>
<td>24 (6%)</td>
<td>$8 (2%)</td>
</tr>
<tr>
<td>Multiple items first ignited</td>
<td>130</td>
<td>0 (0%)</td>
<td>5 (1%)</td>
<td>$8 (2%)</td>
</tr>
<tr>
<td>Unclassified soft goods or clothing</td>
<td>70</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (0%)</td>
</tr>
<tr>
<td>Other known item</td>
<td>740</td>
<td>0 (0%)</td>
<td>32 (8%)</td>
<td>$23 (5%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>13,010</td>
<td>159 (100%)</td>
<td>397 (100%)</td>
<td>$450 (100%)</td>
</tr>
</tbody>
</table>

B. Branch Circuit Wiring

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural member or framing</td>
<td>500</td>
<td>5 (8%)</td>
<td>14 (41%)</td>
<td>$27 (47%)</td>
</tr>
<tr>
<td>Wire or cable insulation</td>
<td>420</td>
<td>11 (69%)</td>
<td>8 (22%)</td>
<td>$11 (19%)</td>
</tr>
<tr>
<td>Insulation within structural area</td>
<td>210</td>
<td>9 (15%)</td>
<td>2 (7%)</td>
<td>$6 (11%)</td>
</tr>
<tr>
<td>Interior wall covering</td>
<td>40</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (3%)</td>
</tr>
<tr>
<td>Unclassified structural component or finish</td>
<td>40</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (4%)</td>
</tr>
<tr>
<td>Interior ceiling covering</td>
<td>40</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>30</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>30</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>120</td>
<td>5 (8%)**</td>
<td>11 (31%)</td>
<td>$5 (8%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>1,440</td>
<td>59 (100%)</td>
<td>35 (100%)</td>
<td>$58 (100%)</td>
</tr>
</tbody>
</table>

** The leading item first ignited for fire deaths not shown above is floor covering (8% of deaths).

* "Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
### Home Fires Involving Premises Wiring Group*, by Item First Ignited (Continued)
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

#### C. Electrical Service Supply Wiring

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>210</td>
<td>0 (NA)</td>
<td>2 (12%)</td>
<td>$5 (29%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>110</td>
<td>0 (NA)</td>
<td>7 (51%)</td>
<td>$4 (23%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>100</td>
<td>0 (NA)</td>
<td>2 (13%)</td>
<td>$5 (27%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>20</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (1%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>160</td>
<td>0 (NA)</td>
<td>3 (24%)</td>
<td>$4 (21%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>610</td>
<td>0 (NA)</td>
<td>14 (100%)</td>
<td>$19 (100%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because total is zero.

#### D. Wiring From Meter Boxes

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>210</td>
<td>0 (NA)</td>
<td>7 (54%)</td>
<td>$5 (43%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>90</td>
<td>0 (NA)</td>
<td>2 (19%)</td>
<td>$3 (31%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>40</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (5%)</td>
</tr>
<tr>
<td>Insulation within structural area</td>
<td>20</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (3%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>80</td>
<td>0 (NA)</td>
<td>3 (27%)</td>
<td>$2 (17%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>430</td>
<td>0 (NA)</td>
<td>12 (100%)</td>
<td>$11 (100%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because total is zero.

#### E. Power (Utility) Line Wiring

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>100</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (19%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>80</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (23%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>40</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (17%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>30</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (2%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>130</td>
<td>3 (100%)**</td>
<td>5 (100%)</td>
<td>$3 (38%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>380</td>
<td>3 (100%)</td>
<td>5 (100%)</td>
<td>$7 (100%)</td>
</tr>
</tbody>
</table>

** The leading item first ignited for fire deaths not shown above is flammable or combustible gas or liquid (100% of deaths).

* “Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
### Home Fires Involving Premises Wiring Group*, by Item First Ignited (Continued)

Annual Average of 2003-2006 Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

#### F. Outlets or Receptacles

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>790</td>
<td>7 (48%)</td>
<td>16 (18%)</td>
<td>$15 (22%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>260</td>
<td>0 (0%)</td>
<td>8 (9%)</td>
<td>$20 (29%)</td>
</tr>
<tr>
<td>Interior wall covering</td>
<td>250</td>
<td>4 (26%)</td>
<td>18 (20%)</td>
<td>$10 (15%)</td>
</tr>
<tr>
<td>Mattress or bedding</td>
<td>120</td>
<td>0 (0%)</td>
<td>14 (16%)</td>
<td>$4 (5%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>80</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$2 (2%)</td>
</tr>
<tr>
<td>Insulation within structural area</td>
<td>80</td>
<td>0 (0%)</td>
<td>10 (11%)</td>
<td>$2 (3%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>70</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Unclassified structural component or finish</td>
<td>60</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (3%)</td>
</tr>
</tbody>
</table>

Other known item first ignited 350 (17%) 4 (26%)** 19 (22%) $14 (20%)

Total fires 2,070 (100%) 14 (100%) 90 (100%) $70 (100%)

** The leading item first ignited for fire deaths not shown above is upholstered furniture (26% of deaths).

#### G. Wall Switches

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>120</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (23%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>50</td>
<td>0 (NA)</td>
<td>5 (59%)</td>
<td>$2 (46%)</td>
</tr>
<tr>
<td>Interior wall covering</td>
<td>20</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
</tbody>
</table>

Other known item first ignited 40 (18%) 0 (NA) 4 (41%) $1 (25%)

Total fires 230 (100%) 0 (NA) 9 (100%) $5 (100%)

NA – Not applicable because total is zero.

#### H. Panelboards or Switchboards for Fuses or Circuit Breakers

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>770</td>
<td>4 (42%)</td>
<td>8 (26%)</td>
<td>$10 (35%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>130</td>
<td>0 (0%)</td>
<td>8 (25%)</td>
<td>$9 (33%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>60</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Interior wall covering</td>
<td>60</td>
<td>5 (58%)</td>
<td>4 (15%)</td>
<td>$3 (11%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>40</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Unclassified structural component or finish</td>
<td>40</td>
<td>0 (0%)</td>
<td>8 (26%)</td>
<td>$1 (4%)</td>
</tr>
</tbody>
</table>

Other known item first ignited 110 (9%) 0 (0%) 2 (7%) $3 (12%)

Total fires 1,220 (100%) 9 (100%) 30 (100%) $28 (100%)

*“Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
**Home Fires Involving Premises Wiring Group*, by Item First Ignited (Continued)**

*Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments (Excluding Fires Reported as Confined Fires)*

## I. Surge Protectors

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>190</td>
<td>4 (35%)</td>
<td>6 (25%)</td>
<td>$3 (23%)</td>
</tr>
<tr>
<td>Floor covering</td>
<td>50</td>
<td>0 (0%)</td>
<td>6 (27%)</td>
<td>$1 (10%)</td>
</tr>
<tr>
<td>Appliance housing or casing</td>
<td>30</td>
<td>0 (0%)</td>
<td>4 (16%)</td>
<td>$3 (23%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>30</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>130</td>
<td>7 (65%)**</td>
<td>7 (32%)</td>
<td>$6 (40%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>440</td>
<td>11 (100%)</td>
<td>22 (100%)</td>
<td>$15 (100%)</td>
</tr>
</tbody>
</table>

** The leading item first ignited for fire deaths not shown above is unclassified structural component or finish (65% of deaths).

## J. Meters or Meter Boxes

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>270</td>
<td>0 (0%)</td>
<td>5 (40%)</td>
<td>$2 (11%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>80</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$3 (21%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>50</td>
<td>3 (100%)</td>
<td>2 (17%)</td>
<td>$7 (51%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>20</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (3%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>90</td>
<td>0 (0%)</td>
<td>5 (43%)</td>
<td>$2 (14%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>510</td>
<td>3 (100%)</td>
<td>12 (100%)</td>
<td>$15 (100%)</td>
</tr>
</tbody>
</table>

## K. Generators

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable or combustible gas or liquid</td>
<td>60</td>
<td>3 (100%)</td>
<td>20 (89%)</td>
<td>$2 (11%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>40</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (6%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>30</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$4 (25%)</td>
</tr>
<tr>
<td>Wire or cable insulation</td>
<td>20</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$3 (15%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>80</td>
<td>0 (0%)</td>
<td>3 (11%)</td>
<td>$7 (42%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>230</td>
<td>3 (100%)</td>
<td>23 (100%)</td>
<td>$16 (100%)</td>
</tr>
</tbody>
</table>

* "Premises wiring" refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the "premises wiring group" is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.

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**Home Electrical Fires, 3/09**

**Standards Council Supplemental Agenda**

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**NFPA Fire Analysis & Research, Quincy, MA**

**August 3-5, 2010**

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Home Fires Involving Premises Wiring Group*, by Item First Ignited (Continued)
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

**L. Transformers**

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>90 (33%)</td>
<td>0 (0%)</td>
<td>3 (22%)</td>
<td>$0 (2%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>30 (12%)</td>
<td>4 (100%)</td>
<td>0 (0%)</td>
<td>$2 (28%)</td>
</tr>
<tr>
<td>Transformer or transformer fluids</td>
<td>30 (11%)</td>
<td>0 (0%)</td>
<td>2 (17%)</td>
<td>$0 (6%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>30 (11%)</td>
<td>0 (0%)</td>
<td>5 (38%)</td>
<td>$1 (8%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>90 (33%)</td>
<td>0 (0%)</td>
<td>3 (24%)</td>
<td>$4 (56%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>270 (100%)</td>
<td>4 (100%)</td>
<td>14 (100%)</td>
<td>$8 (100%)</td>
</tr>
</tbody>
</table>

**M. Unclassified or Unknown-Type Wiring**

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>1,590 (32%)</td>
<td>27 (51%)</td>
<td>38 (32%)</td>
<td>$60 (32%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>1,030 (21%)</td>
<td>7 (12%)</td>
<td>15 (12%)</td>
<td>$42 (23%)</td>
</tr>
<tr>
<td>Insulation within structural area</td>
<td>420 (9%)</td>
<td>0 (0%)</td>
<td>4 (3%)</td>
<td>$10 (5%)</td>
</tr>
<tr>
<td>Interior wall covering</td>
<td>300 (6%)</td>
<td>0 (0%)</td>
<td>15 (12%)</td>
<td>$9 (5%)</td>
</tr>
<tr>
<td>Unclassified structural component</td>
<td>290 (6%)</td>
<td>9 (17%)</td>
<td>2 (2%)</td>
<td>$11 (6%)</td>
</tr>
<tr>
<td>or finish</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>160 (3%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>150 (3%)</td>
<td>11 (20%)</td>
<td>7 (6%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Interior ceiling covering</td>
<td>140 (3%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$7 (4%)</td>
</tr>
<tr>
<td>Upholstered furniture</td>
<td>80 (2%)</td>
<td>0 (0%)</td>
<td>5 (4%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Floor covering</td>
<td>80 (2%)</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Mattress or bedding</td>
<td>80 (2%)</td>
<td>0 (0%)</td>
<td>4 (3%)</td>
<td>$4 (2%)</td>
</tr>
<tr>
<td>Clothing</td>
<td>80 (2%)</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Appliance housing or casing</td>
<td>70 (1%)</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Unclassified furniture or utensil</td>
<td>70 (1%)</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Cabinetry</td>
<td>50 (1%)</td>
<td>0 (0%)</td>
<td>4 (3%)</td>
<td>$3 (1%)</td>
</tr>
<tr>
<td>Other known item</td>
<td>310 (6%)</td>
<td>0 (0%)</td>
<td>17 (15%)</td>
<td>$18 (10%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>4,890 (100%)</td>
<td>53 (100%)</td>
<td>119 (100%)</td>
<td>$184 (100%)</td>
</tr>
</tbody>
</table>

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home structure fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal same because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

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* "Premises wiring" refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
### Home Fires Involving Premises Wiring Group*, by Area of Origin

Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments  
(Excluding Fires Reported as Confined Fires)

#### A. All Premises Wiring Group Equipment

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>1,710</td>
<td>7 (5%)</td>
<td>110 (28%)</td>
<td>$70 (16%)</td>
</tr>
<tr>
<td>Attic or ceiling/roof assembly or concealed space</td>
<td>1,490</td>
<td>43 (27%)</td>
<td>10 (3%)</td>
<td>$47 (10%)</td>
</tr>
<tr>
<td>Wall assembly or concealed space</td>
<td>1,410</td>
<td>7 (4%)</td>
<td>19 (5%)</td>
<td>$43 (10%)</td>
</tr>
<tr>
<td>Living room, family room, lounge or den</td>
<td>900</td>
<td>55 (35%)</td>
<td>44 (11%)</td>
<td>$34 (8%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>830</td>
<td>12 (8%)</td>
<td>23 (6%)</td>
<td>$23 (5%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>740</td>
<td>0 (0%)</td>
<td>9 (2%)</td>
<td>$14 (3%)</td>
</tr>
<tr>
<td>Crawl space or substructure space</td>
<td>600</td>
<td>6 (4%)</td>
<td>21 (5%)</td>
<td>$23 (5%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>540</td>
<td>6 (4%)</td>
<td>27 (7%)</td>
<td>$14 (3%)</td>
</tr>
<tr>
<td>Ceiling/floor assembly or concealed space</td>
<td>540</td>
<td>8 (5%)</td>
<td>13 (3%)</td>
<td>$28 (6%)</td>
</tr>
<tr>
<td>Garage**</td>
<td>510</td>
<td>0 (0%)</td>
<td>14 (3%)</td>
<td>$38 (8%)</td>
</tr>
<tr>
<td>Laundry room or area</td>
<td>500</td>
<td>3 (2%)</td>
<td>16 (4%)</td>
<td>$9 (2%)</td>
</tr>
<tr>
<td>Unclassified equipment or service area</td>
<td>320</td>
<td>0 (0%)</td>
<td>7 (2%)</td>
<td>$13 (3%)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>310</td>
<td>0 (0%)</td>
<td>9 (2%)</td>
<td>$12 (3%)</td>
</tr>
<tr>
<td>Conduit, pipe, utility, or ventilation shaft</td>
<td>230</td>
<td>0 (0%)</td>
<td>6 (1%)</td>
<td>$4 (1%)</td>
</tr>
<tr>
<td>Unclassified structural area</td>
<td>230</td>
<td>0 (0%)</td>
<td>7 (2%)</td>
<td>$10 (2%)</td>
</tr>
<tr>
<td>Closet</td>
<td>220</td>
<td>0 (0%)</td>
<td>16 (4%)</td>
<td>$10 (2%)</td>
</tr>
<tr>
<td>Unclassified storage area</td>
<td>190</td>
<td>0 (0%)</td>
<td>4 (1%)</td>
<td>$4 (1%)</td>
</tr>
<tr>
<td>Heating equipment room</td>
<td>180</td>
<td>0 (0%)</td>
<td>2 (0%)</td>
<td>$4 (1%)</td>
</tr>
<tr>
<td>Unclassified area of origin</td>
<td>180</td>
<td>0 (0%)</td>
<td>2 (0%)</td>
<td>$5 (1%)</td>
</tr>
<tr>
<td>Switchgear area or transformer vault</td>
<td>150</td>
<td>0 (0%)</td>
<td>7 (2%)</td>
<td>$2 (0%)</td>
</tr>
<tr>
<td>Storage room or area</td>
<td>140</td>
<td>0 (0%)</td>
<td>3 (1%)</td>
<td>$5 (1%)</td>
</tr>
<tr>
<td>Exterior balcony or unenclosed porch</td>
<td>140</td>
<td>0 (0%)</td>
<td>4 (1%)</td>
<td>$6 (1%)</td>
</tr>
<tr>
<td>Unclassified outside area</td>
<td>120</td>
<td>0 (0%)</td>
<td>4 (1%)</td>
<td>$1 (0%)</td>
</tr>
<tr>
<td>Office</td>
<td>100</td>
<td>0 (0%)</td>
<td>2 (0%)</td>
<td>$9 (2%)</td>
</tr>
<tr>
<td>Lobby or entrance way</td>
<td>80</td>
<td>4 (2%)</td>
<td>4 (1%)</td>
<td>$2 (0%)</td>
</tr>
<tr>
<td>Exterior roof surface</td>
<td>70</td>
<td>0 (0%)</td>
<td>2 (0%)</td>
<td>$1 (0%)</td>
</tr>
<tr>
<td>Tool or supply storage</td>
<td>70</td>
<td>4 (3%)</td>
<td>7 (2%)</td>
<td>$3 (1%)</td>
</tr>
<tr>
<td>Hallway or corridor</td>
<td>70</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>460</td>
<td>3 (2%)</td>
<td>9 (2%)</td>
<td>$17 (4%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>13,010</td>
<td>159 (100%)</td>
<td>397 (100%)</td>
<td>$450 (100%)</td>
</tr>
</tbody>
</table>

** Excludes residential garage reported as separate property.

---

*“Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.*
Home Fires Involving Premises Wiring Group*, by Area of Origin (Continued)
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

### B. Branch Circuit Wiring

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attic or ceiling/roof assembly or concealed space</td>
<td>480</td>
<td>14 (23%)</td>
<td>7 (19%)</td>
<td>$16 (27%)</td>
</tr>
<tr>
<td>Wall assembly or concealed space</td>
<td>180</td>
<td>7 (11%)</td>
<td>2 (5%)</td>
<td>$7 (13%)</td>
</tr>
<tr>
<td>Ceiling/floor assembly or concealed space</td>
<td>100</td>
<td>0 (0%)</td>
<td>2 (6%)</td>
<td>$7 (12%)</td>
</tr>
<tr>
<td>Bedroom</td>
<td>90</td>
<td>4 (6%)</td>
<td>2 (7%)</td>
<td>$3 (5%)</td>
</tr>
<tr>
<td>Crawl space or substructure space</td>
<td>90</td>
<td>4 (6%)</td>
<td>0 (0%)</td>
<td>$6 (11%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>80</td>
<td>12 (20%)</td>
<td>7 (19%)</td>
<td>$4 (7%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>420</td>
<td>19 (32%)**</td>
<td>16 (45%)</td>
<td>$15 (25%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>1,440</td>
<td>59 (100%)</td>
<td>35 (100%)</td>
<td>$58 (100%)</td>
</tr>
</tbody>
</table>

** The leading area of origin for fire deaths not shown above is living room, family room, or den (32% of deaths).

### C. Electrical Service Supply Wiring

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exterior wall surface</td>
<td>110</td>
<td>0 (NA)</td>
<td>3 (24%)</td>
<td>$3 (18%)</td>
</tr>
<tr>
<td>Conduit, pipe, utility, or ventilation shaft</td>
<td>70</td>
<td>0 (NA)</td>
<td>2 (12%)</td>
<td>$1 (6%)</td>
</tr>
<tr>
<td>Attic or ceiling/roof assembly or concealed space</td>
<td>50</td>
<td>0 (NA)</td>
<td>2 (13%)</td>
<td>$2 (9%)</td>
</tr>
<tr>
<td>Wall assembly or concealed space</td>
<td>50</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (7%)</td>
</tr>
<tr>
<td>Unclassified equipment or service area</td>
<td>40</td>
<td>0 (NA)</td>
<td>2 (12%)</td>
<td>$1 (7%)</td>
</tr>
<tr>
<td>Ceiling/floor assembly or concealed space</td>
<td>30</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$2 (9%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>260</td>
<td>0 (NA)</td>
<td>5 (39%)</td>
<td>$8 (43%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>610</td>
<td>0 (NA)</td>
<td>14 (100%)</td>
<td>$19 (100%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because total is zero.

---

*“Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.*
## Home Fires Involving Premise Wiring Group*, by Area of Origin (Continued)

### D. Wiring From Meter Boxes

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall assembly or concealed space</td>
<td>50 (13%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$2 (14%)</td>
</tr>
<tr>
<td>Crawl space or substructure space</td>
<td>50 (11%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (13%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>40 (10%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (3%)</td>
</tr>
<tr>
<td>Attic or ceiling/roof assembly or concealed space</td>
<td>40 (9%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (4%)</td>
</tr>
<tr>
<td>Laundry room or area</td>
<td>30 (8%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (5%)</td>
</tr>
<tr>
<td>Unclassified equipment or service area</td>
<td>30 (7%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (13%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>180 (42%)</td>
<td>0 (NA)</td>
<td>12 (100%)</td>
<td>$5 (48%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>430 (100%)</td>
<td>0 (NA)</td>
<td>12 (100%)</td>
<td>$11 (100%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because total is zero.

### E. Power (Utility) Line Wiring

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exterior wall surface</td>
<td>70 (19%)</td>
<td>0 (0%)</td>
<td>2 (33%)</td>
<td>$1 (17%)</td>
</tr>
<tr>
<td>Attic or ceiling/roof assembly or concealed space</td>
<td>20 (6%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (10%)</td>
</tr>
<tr>
<td>Exterior roof surface</td>
<td>20 (6%)</td>
<td>0 (0%)</td>
<td>2 (33%)</td>
<td>$1 (8%)</td>
</tr>
<tr>
<td>Unclassified equipment or service area</td>
<td>20 (5%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>250 (64%)</td>
<td>3 (100%)**</td>
<td>2 (33%)</td>
<td>$5 (65%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>380 (100%)</td>
<td>3 (100%)</td>
<td>5 (100%)</td>
<td>$7 (100%)</td>
</tr>
</tbody>
</table>

** The leading area of origin for fire deaths not shown above is on or near highway or public way (100% of deaths).

---

* “Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.

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Home Electrical Fires, 3/09
Standards Council Supplemental Agenda
August 3-5, 2010

NFPA Fire Analysis & Research, Quincy, MA
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### F. Outlets and Receptacles

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>550 (26%)</td>
<td>0 (0%)</td>
<td>49 (55%)</td>
<td>$26 (37%)</td>
</tr>
<tr>
<td>Wall assembly or concealed space</td>
<td>360 (18%)</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$11 (15%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>250 (12%)</td>
<td>11 (74%)</td>
<td>18 (20%)</td>
<td>$7 (10%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>220 (11%)</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$4 (6%)</td>
</tr>
<tr>
<td>Laundry room</td>
<td>120 (6%)</td>
<td>0 (0%)</td>
<td>6 (6%)</td>
<td>$2 (3%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>110 (5%)</td>
<td>4 (26%)</td>
<td>6 (7%)</td>
<td>$3 (5%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>70 (3%)</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>70 (3%)</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$0 (1%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>330 (16%)</td>
<td>0 (0%)</td>
<td>3 (4%)</td>
<td>$15 (22%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>2,070 (100%)</td>
<td>14 (100%)</td>
<td>90 (100%)</td>
<td>$70 (100%)</td>
</tr>
</tbody>
</table>

### G. Wall Switches

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall assembly or concealed space</td>
<td>70 (29%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$2 (30%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>30 (13%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (12%)</td>
</tr>
<tr>
<td>Bedroom</td>
<td>20 (11%)</td>
<td>0 (NA)</td>
<td>2 (18%)</td>
<td>$1 (17%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>110 (47%)</td>
<td>0 (NA)</td>
<td>8 (82%)</td>
<td>$2 (41%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>230 (100%)</td>
<td>0 (NA)</td>
<td>9 (100%)</td>
<td>$5 (100%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because total is zero.

---

* “Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
### H. Panelboards or Switchboards for Fuses or Circuit Breakers

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crawl space or substructure space</td>
<td>130</td>
<td>0 (0%)</td>
<td>4 (13%)</td>
<td>$3 (12%)</td>
</tr>
<tr>
<td>Laundry room or area</td>
<td>120</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (7%)</td>
</tr>
<tr>
<td>Wall assembly or concealed space</td>
<td>100</td>
<td>0 (0%)</td>
<td>2 (6%)</td>
<td>$3 (9%)</td>
</tr>
<tr>
<td>Unclassified equipment or service area</td>
<td>90</td>
<td>0 (0%)</td>
<td>3 (11%)</td>
<td>$2 (7%)</td>
</tr>
<tr>
<td>Bedroom</td>
<td>80</td>
<td>0 (0%)</td>
<td>6 (21%)</td>
<td>$3 (11%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>60</td>
<td>3 (30%)</td>
<td>0 (0%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Garage**</td>
<td>60</td>
<td>0 (0%)</td>
<td>2 (6%)</td>
<td>$4 (14%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>60</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Closet</td>
<td>50</td>
<td>0 (0%)</td>
<td>5 (15%)</td>
<td>$2 (6%)</td>
</tr>
<tr>
<td>Heating equipment room</td>
<td>50</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (2%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>50</td>
<td>0 (0%)</td>
<td>4 (13%)</td>
<td>$1 (3%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>350</td>
<td>6 (70%)**</td>
<td>4 (15%)</td>
<td>$6 (22%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>1,220</td>
<td>9 (100%)</td>
<td>30 (100%)</td>
<td>$28 (100%)</td>
</tr>
</tbody>
</table>

** Excludes residential garage coded as separate property.

*** The leading areas of origin for fire deaths not shown above are lobby or entrance way (41% of deaths) and living room, family room, or den (30%).

### I. Surge Protectors

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>150</td>
<td>4 (35%)</td>
<td>9 (42%)</td>
<td>$5 (32%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>110</td>
<td>7 (65%)</td>
<td>0 (0%)</td>
<td>$4 (26%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>50</td>
<td>0 (0%)</td>
<td>4 (16%)</td>
<td>$1 (5%)</td>
</tr>
<tr>
<td>Office</td>
<td>40</td>
<td>0 (0%)</td>
<td>2 (8%)</td>
<td>$1 (9%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>90</td>
<td>0 (0%)</td>
<td>8 (35%)</td>
<td>$4 (28%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>440</td>
<td>11 (100%)</td>
<td>22 (100%)</td>
<td>$15 (100%)</td>
</tr>
</tbody>
</table>

* “Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
Home Fires Involving Premises Wiring Group*, by Area of Origin (Continued)
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

J. Meters or Meter Boxes

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exterior wall surface</td>
<td>130</td>
<td>(26%)</td>
<td>0 (0%)</td>
<td>$2 (17%)</td>
</tr>
<tr>
<td>Wall assembly or concealed space</td>
<td>50</td>
<td>(10%)</td>
<td>2 (16%)</td>
<td>$5 (32%)</td>
</tr>
<tr>
<td>Conduit, pipe, utility, or ventilation shaft</td>
<td>40</td>
<td>(8%)</td>
<td>0 (0%)</td>
<td>$1 (5%)</td>
</tr>
<tr>
<td>Unclassified equipment or service area</td>
<td>30</td>
<td>(5%)</td>
<td>0 (0%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Laundry room</td>
<td>30</td>
<td>(5%)</td>
<td>2 (14%)</td>
<td>$0 (3%)</td>
</tr>
<tr>
<td>Unclassified outside area</td>
<td>20</td>
<td>(4%)</td>
<td>0 (0%)</td>
<td>$0 (1%)</td>
</tr>
<tr>
<td>Switchgear area or transformer vault</td>
<td>20</td>
<td>(4%)</td>
<td>2 (18%)</td>
<td>$0 (1%)</td>
</tr>
<tr>
<td>Garage**</td>
<td>20</td>
<td>(4%)</td>
<td>2 (16%)</td>
<td>$0 (3%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>170</td>
<td>(33%)</td>
<td>3 (100%)***</td>
<td>$5 (35%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>510</td>
<td>(100%)</td>
<td>3 (100%)</td>
<td>$15 (100%)</td>
</tr>
</tbody>
</table>

** Excludes residential garage reported as separate property.
*** The leading area of origin for fire deaths not shown above is ceiling/floor assembly or space between stories (100% of deaths).

K. Generators

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garage**</td>
<td>50</td>
<td>(22%)</td>
<td>2 (8%)</td>
<td>$7 (45%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>30</td>
<td>(12%)</td>
<td>0 (0%)</td>
<td>$0 (3%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>150</td>
<td>(66%)</td>
<td>21 (92%)**</td>
<td>$9 (52%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>230</td>
<td>(100%)</td>
<td>23 (100%)</td>
<td>$16 (100%)</td>
</tr>
</tbody>
</table>

** Excludes residential garage reported as separate property.
*** The leading area of origin for fire deaths not shown above is laundry room (100% of deaths).

L. Transformers

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switchgear area or transformer vault</td>
<td>30</td>
<td>(10%)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Bedroom</td>
<td>20</td>
<td>(9%)</td>
<td>2 (13%)</td>
<td>$1 (13%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>20</td>
<td>(8%)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>200</td>
<td>(74%)</td>
<td>12 (87%)**</td>
<td>$7 (86%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>270</td>
<td>(100%)</td>
<td>14 (100%)</td>
<td>$8 (100%)</td>
</tr>
</tbody>
</table>

** The leading area of origin for fire deaths not shown above is ceiling/floor assembly or space between stories (100% of deaths).

* "Premises wiring" refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the "premises wiring group" is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.
### M. Unclassified or Unknown-Type Wiring

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attic or ceiling/roof assembly or concealed space</td>
<td>830</td>
<td>25 (48%)</td>
<td>2 (1%)</td>
<td>$25 (14%)</td>
</tr>
<tr>
<td>Bedroom</td>
<td>660</td>
<td>0 (0%)</td>
<td>31 (26%)</td>
<td>$28 (15%)</td>
</tr>
<tr>
<td>Wall assembly or concealed space</td>
<td>480</td>
<td>0 (0%)</td>
<td>12 (10%)</td>
<td>$12 (6%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>360</td>
<td>16 (29%)</td>
<td>14 (11%)</td>
<td>$16 (9%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>350</td>
<td>0 (0%)</td>
<td>8 (7%)</td>
<td>$9 (5%)</td>
</tr>
<tr>
<td>Ceiling/floor assembly or concealed space</td>
<td>330</td>
<td>5 (9%)</td>
<td>6 (5%)</td>
<td>$16 (9%)</td>
</tr>
<tr>
<td>Crawl space or substructure space</td>
<td>230</td>
<td>3 (5%)</td>
<td>8 (6%)</td>
<td>$8 (4%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>190</td>
<td>0 (0%)</td>
<td>10 (8%)</td>
<td>$6 (3%)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>160</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$10 (5%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>150</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Laundry room</td>
<td>150</td>
<td>0 (0%)</td>
<td>4 (4%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Garage**</td>
<td>130</td>
<td>0 (0%)</td>
<td>4 (3%)</td>
<td>$8 (4%)</td>
</tr>
<tr>
<td>Unclassified structural area</td>
<td>100</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Unclassified storage area</td>
<td>80</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Closet</td>
<td>80</td>
<td>0 (0%)</td>
<td>3 (3%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Unclassified equipment or service area</td>
<td>70</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$4 (2%)</td>
</tr>
<tr>
<td>Unclassified area of origin</td>
<td>50</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Heating equipment room</td>
<td>50</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>430</td>
<td>5 (9%)</td>
<td>10 (8%)</td>
<td>$18 (10%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>4,890</td>
<td>53 (100%)</td>
<td>119 (100%)</td>
<td>$184 (100%)</td>
</tr>
</tbody>
</table>

** Excludes residential garage reported as separate property.

*** The leading area of origin for fire deaths not shown above is tool or supply storage room or area (9% of fire deaths).

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Note fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

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*“Premises wiring” refers to all installed wiring equipment between power source and outlet. For purposes of analysis, the “premises wiring group” is defined to exclude light fixtures and to include power sources, including generators, batteries, rectifiers, inverters and chargers.*
Lamps, Light Fixtures, and Light Bulbs

In 2006, an estimated 5,770 reported U.S. non-confined home structure fires involving lamps, light fixtures, or light bulbs resulted in 87 civilian deaths, 186 civilian injuries, and $181 million in direct property damage.

Lamps, light fixtures, and light bulbs include the following specific types of equipment:

- Incandescent light fixtures
- Halogen light fixtures and lamps
- Fluorescent light fixtures
- Sodium or mercury vapor lights
- Decorative lights on line voltage
- Decorative or landscape lighting
- Unclassified or unknown-type lamp, light fixture, or light bulb

- Table or floor lamps
- Light bulbs
- Lanterns and flashlights
- Nightlights
- Work lights and trouble lights
- Signs

Fires involving lamps, light fixtures, or light bulbs declined by nearly one-third from 1980 to 1998. After the transition period of 1999-2001, when NFIRS Version 5.0 was being phased in, the estimates for 2003-2006 have been fairly consistently about one-half lower than the levels of the late 1990s, a much larger decline than would have been expected if the 1980-1998 trend had continued unchanged. Associated losses also showed large declines coinciding with the shift to NFIRS Version 5.0. Some of the decline after 1998 may be due to the changes in data categories, definitions, and rules introduced in NFIRS Version 5.0 rather than a decline in the real size of this fire problem.

Home Structure Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Year
Structure Fire Reported to U.S. Fire Departments

Source: Data from NFIRS Version 5.0 and NFPA survey.  
Note: See Note on year table.
Lamps, light fixtures, and light bulbs accounted for 26% of 2003-2006 non-confined home structure fires involving electrical distribution or lighting equipment, as well as 19% of associated civilian deaths, 27% of associated civilian injuries, and 23% of associated direct property damage.

### Home Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Specific Type of Equipment

**Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments**

(Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Type of Equipment</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table and floor lamps</td>
<td>1,280</td>
<td>35 (49%)</td>
<td>80 (35%)</td>
<td>$40 (24%)</td>
</tr>
<tr>
<td>Incandescent light fixtures</td>
<td>1,030</td>
<td>5 (7%)</td>
<td>23 (10%)</td>
<td>$25 (15%)</td>
</tr>
<tr>
<td>Halogen light fixtures and lamps</td>
<td>440</td>
<td>0 (0%)</td>
<td>19 (8%)</td>
<td>$23 (13%)</td>
</tr>
<tr>
<td>Light bulbs</td>
<td>390</td>
<td>0 (0%)</td>
<td>8 (4%)</td>
<td>$7 (4%)</td>
</tr>
<tr>
<td>Fluorescent light fixtures</td>
<td>250</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$7 (4%)</td>
</tr>
<tr>
<td>Work lights and trouble lights</td>
<td>210</td>
<td>0 (0%)</td>
<td>6 (3%)</td>
<td>$8 (5%)</td>
</tr>
<tr>
<td>Decorative lights on line voltage</td>
<td>170</td>
<td>3 (5%)</td>
<td>14 (6%)</td>
<td>$9 (5%)</td>
</tr>
<tr>
<td>Nightlights</td>
<td>70</td>
<td>0 (0%)</td>
<td>3 (1%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Decorative or landscape lights</td>
<td>50</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Lanterns and flashlights</td>
<td>40</td>
<td>5 (7%)</td>
<td>2 (1%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Signs</td>
<td>10</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Sodium or mercury vapor lights</td>
<td>10</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Unclassified or unknown-type light fixture, lamp, or light bulb</td>
<td>1,560 (28%)</td>
<td>23 (32%)</td>
<td>70 (31%)</td>
<td>$46 (27%)</td>
</tr>
</tbody>
</table>

**Total** 5,500 (100%) 72 (100%) 227 (100%) $169 (100%)

**Note:** Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Totals may not equal sums because of rounding.

**Source:** Data from NFIRS Version 5.0 and NFPA survey.

**Table and floor lamps (23%) and incandescent light fixtures (19%) accounted for the largest shares of the 2003-2006 non-confined home structure fires involving lamps, light fixtures, and light bulbs of detailed types.**

Because of the large share coded as unclassified or unknown-type light fixture, lamp, or light bulb, it is likely that the numbers and percentages are substantially understated for all of the specific types of equipment. Also, there is no category identified for compact fluorescent light bulbs, which might be recorded as fluorescent light fixture, light bulb, or unclassified or unknown-type light fixture, lamp, or light bulb. The U.S. Consumer Product Safety Commission (CPSC) analyzed 402 of their in-depth investigations of lighting-product-related incidents from 2002-2004. That report provides examples of fires, burns, and electric shock involving several types of specialty lighting products that are not specifically identified in the NFIRS categories, including clip-on lamps, lava lamps, rope lights, ceiling-hanging lights, and furniture- or cabinet-mounted light fixtures.16

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Halogen lights have a higher risk of fire than regular incandescent lights or fluorescent lights. Halogen lights are a type of incandescent light that provides 8% more lumens (more light) per watt than regular incandescent lights.\(^\text{17}\) Fluorescent lights are much more efficient but have until recently been much more expensive as well.

Incandescent light fixtures accounted for more 2003-2006 non-confined home structure fires than halogen light fixtures (by a factor of 2.3-to-1) and fluorescent light fixtures (by a factor of 4.1-to-1). If the fires attributed to lamps and light bulbs were all incandescent lighting equipment, then the ratio of fires involving incandescent lighting equipment to fires involving other types of lighting equipment could rise as high as 5.3-to-1 for halogen lights and 9.3-to-1 for fluorescent lights. Even if all the fires attributed to unclassified or unknown-type light fixture, lamp, or light bulb are also assigned to incandescent lighting equipment to halogen lighting equipment, the ratio of incandescent would only rise to 8.8-to-1.

The 1993 usage ratio for incandescent vs. halogen lights – the latest usage data available – ranges from 153-to-1 for all bulbs down to 72-to-1 for the bulbs with heaviest use.\(^\text{18}\) Even the lowest usage ratio is more than eight times higher than the highest incandescent vs. halogen fire incident ratio of 8.8-to-1. Therefore, the fire incident risk with halogen lights is estimated to be several times the fire incident risk with incandescent lights. Even if all the “other or unknown” type bulbs are halogen and even if there has been some growth in the halogen share since 1993, the halogen light risk would still be higher. In view of the extensive publicity about the fire dangers of halogen lighting, it is considered unlikely that the halogen share of lighting has grown since 1993 as much as it would have to have done in order to shift the conclusion that halogen lighting has a higher fire risk than incandescent lighting and probably a much higher risk.

| Share of Lights by Type of Bulb, 1993 |
|-------------------------------|----------------|----------------|----------------|
|                               | Incandescent  | Fluorescent    | Halogen        |
| All bulbs studied             | 87.3%         | 8.7%           | 0.6%           |
| Bulbs used at least 1 hour per day | 86.2%      | 10.2%          | 0.7%           |
| Bulbs used at least 2 hours per day | 84.1%      | 11.8%          | 0.8%           |
| Bulbs used at least 4 hours per day | 80.6%      | 14.8%          | 1.1%           |
| Other or Unknown              | 3.4%          | 2.9%           | 3.2%           |

Source: U.S. Department of Energy

The usage ratio for incandescent vs. fluorescent lights ranges from 10-to-1 for all bulbs down to 5-to-1 for the bulbs with heaviest use. (It is not surprising that usage of the more cost-efficient fluorescent lights increases in applications where bulbs are in use for long periods.) This range of usage ratios overlaps the range in ratios of fire incidents, and it seems likely that the fluorescent share has increased considerably since 1993. Therefore, no conclusions can be made about relative fire risk between incandescent and fluorescent lights.


Nearly two-fifths (38%) of 2003-2006 non-confined home structure fires involving lamps, light fixtures, or light bulbs cited heat source too close to combustibles as a factor contributing to ignition. This is a much higher percentage share for heat source too close to combustibles than is seen with the premises wiring group (2%) and cords and plugs (2%). The percentage share for heat source too close to combustibles was:

- 43% for table or floor lamps fires,
- 20% for incandescent light fixture fires,
- 65% for light bulb fires,
- 63% for halogen light fixture fires,
- 4% for fluorescent light fixture fires (not shown on table),
- 57% for work lights and trouble light fires,
- 10% for decorative lights on line voltage fires (also not shown on table), and
- 35% for unclassified or unknown-type light fixture, lamp, or light bulb fires.

The low percentage for fluorescent light fixtures probably reflects the fact that fluorescent lights emit only about 30% of their energy as heat compared to about 90% for halogen lights and regular incandescent lights. The low percentage for decorative lights probably reflects the low wattage, hence low heat, associated with such lights.

Halogen lights are hotter than comparable regular incandescent lights because the smaller bulbs concentrate heat on a smaller surface and place the bulb surface closer to the filament. This means there is a larger volume of space around a halogen light in which combustibles can be ignited and that would be considered too close to heat source.

More than half (56%) of civilian fire deaths in 2003-2006 non-confined home structure fires involving lamps, light fixtures, or light bulbs resulted from fires that started with ignition of flammable or combustible gas or liquid (20%), mattress or bedding (19%), or unclassified soft goods or clothing (17%).

Other items first ignited accounting for civilian fire deaths in fires involving this equipment were:

- Unclassified furniture or utensil (10%),
- Linen other than bedding (8%),
- Curtain or drape (7%),
- Upholstered furniture (5%), and
- Christmas tree (5%).

Christmas trees also accounted for 24% of fires and all deaths involving decorative lights on line voltage.

Two out of five (38%) 2003-2006 non-confined home structure fires involving lamps, light fixtures, or light bulbs began in a bedroom (27%) or a living room, family room, or den (11%). These two areas of origin combined also accounted for:

- 74% of table or floor lamp fires,
- 14% of incandescent light fixture fires,

• 19% for light bulb fires,
• 39% for halogen light fixture fires,
• 16% for fluorescent light fixture fires,
• 10% for work light or trouble light fires,
• 48% for decorative light (on line voltage) fires, and
• 36% for unclassified or unknown-type light fixture, lamp, or light bulb fires.

The leading area of origin for light bulb was closet (15% of fires). The 2008 edition of the National Electrical Code does not allow “open or partially open incandescent type light fixtures” in closets. In this context, “open” would mean an exposed, unenclosed light bulb.

**In 1995-2001 (excluding 1999), two types of lamp, light fixture, or light bulb accounted for an average of 16 electrocution deaths per year.**

No analysis was done for 1999, and analyses for years after 2001 did not provide separate statistics for these types of equipment.

The share of lighting equipment electrocution deaths associated with work lights and trouble lights (25%) is far greater than their share of home structure fires involving lighting equipment (4%) and is probably far greater than their share of hours of lighting usage (although no statistics on trouble light and work light usage could be found to confirm this). Note the less controlled and possibly more hazardous environments in which work lights and trouble lights, by their nature, will tend to be used, which may include more frequent proximity to water.

### Electrocution Deaths by Year and Type of Equipment

<table>
<thead>
<tr>
<th>Year</th>
<th>Lamp or light fixture</th>
<th>Work or trouble light</th>
<th>Combined total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>14</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>1996</td>
<td>10</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>1997</td>
<td>15</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>1998</td>
<td>12</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>2000</td>
<td>10</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>2001</td>
<td>9</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Average</td>
<td>12</td>
<td>4</td>
<td>16</td>
</tr>
</tbody>
</table>

Source: CPSC analysis of death certificate database.

**In 2006, an estimated 35,330 injuries involving lamps, light fixtures, or light bulbs were reported to hospital emergency rooms.**

Note the large share of injuries involving Christmas tree lights, even though such lights are in heavy and widespread use only about one month out of 12 per year. If adjusted for usage, the Christmas tree light injury total would likely be a much larger share of the injuries. For example, in 2006, the

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combined injury total for light bulbs and floor or table lamps, excluding halogen, was 22,210 or roughly 6-1/2 times higher than the Christmas tree light injury total. In December 2006 alone, the combined injury total for light bulbs and floor or table lamps, excluding halogen, was 2,004 – a roughly proportional share of the year’s total and divided roughly equally between the two groups of equipment. These 2,004 injuries were only 40% higher than the December-only injury total of 1,440 for Christmas tree lights. NFPA publishes a separate study of fires involving Christmas trees and related decorative lights and decorations.\(^{22}\)

### Injuries Involving Lamps, Light Fixtures, or Light Bulbs
**Reported to Hospital Emergency Rooms, 2006**

<table>
<thead>
<tr>
<th>Type of Injury</th>
<th>Total</th>
<th>Laceration</th>
<th>Contusion or abrasion</th>
<th>Thermal burn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light bulb</td>
<td>13,320</td>
<td>5,200</td>
<td>1,170</td>
<td>2,400</td>
</tr>
<tr>
<td>Floor or table lamp, excluding halogen</td>
<td>8,900</td>
<td>4,720</td>
<td>1,460</td>
<td>600</td>
</tr>
<tr>
<td>Light fixture</td>
<td>5,270</td>
<td>3,750</td>
<td>350</td>
<td>60</td>
</tr>
<tr>
<td>Christmas tree lights</td>
<td>3,350</td>
<td>210</td>
<td>860</td>
<td>0</td>
</tr>
<tr>
<td>Flashlight</td>
<td>2,620</td>
<td>820</td>
<td>750</td>
<td>80</td>
</tr>
<tr>
<td>Other or unknown electric lighting equipment</td>
<td>1,020</td>
<td>560</td>
<td>180</td>
<td>60</td>
</tr>
<tr>
<td>Outdoor electric lighting equipment</td>
<td>420</td>
<td>80</td>
<td>110</td>
<td>0</td>
</tr>
<tr>
<td>Night light</td>
<td>350</td>
<td>180</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>Halogen floor or table lamp</td>
<td>90</td>
<td>40</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35,330</strong></td>
<td><strong>15,560</strong></td>
<td><strong>4,890</strong></td>
<td><strong>3,260</strong></td>
</tr>
</tbody>
</table>

Source: CPSC’s National Electronic Injury Surveillance System

The injuries shown above do not include 2,000 injuries involving electric Christmas decorations other than tree lights, because the definition of the category allows for many decorations that are not lights. However, a review of a non-random sample of the injuries showed most of them to be falls sustained while putting up or taking down Christmas lights.

Similarly, the month from December 16 through January 15 accounts for 8% of the days but for 28% of the 2002-2005 non-confined home structure fires involving decorative lights on line voltage, 84% of associated civilian injuries, and all the associated civilian deaths.

### Safety Tips

- Home electrical safety begins with NFPA 70, *National Electrical Code®*, and related documents with special relevance to homes, notably NFPA 73, *Electrical Inspection Code for Existing Dwellings*. However, work on home electrical distribution or lighting equipment should only be conducted by someone qualified as an electrician.

- When you are buying, selling, or remodeling a home, have it inspected by a professional electrician.

• Call a qualified electrician or landlord if you have flickering lights.

• Keep lamps, light fixtures, and light bulbs away from anything that can burn, including lamp shades, furniture, bedding, curtains, clothing, and flammable or combustible gases and liquids.

• Never place clothing over a lamp or a cloth over a light bulb.

• Place lamps away from where people and pets walk or where things might fall against them.

• Buy only appliances that have the label of a recognized testing laboratory.

• Use light bulbs that match the recommended wattage on the lamp or fixture.
### Home Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Year

Structure Fires Reported to U.S. Fire Departments (Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Year</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions) As Reported</th>
<th>In 2006 Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>13,260</td>
<td>48</td>
<td>455</td>
<td>$71</td>
<td>$175</td>
</tr>
<tr>
<td>1981</td>
<td>12,200</td>
<td>82</td>
<td>348</td>
<td>$70</td>
<td>$155</td>
</tr>
<tr>
<td>1982</td>
<td>11,280</td>
<td>70</td>
<td>367</td>
<td>$77</td>
<td>$161</td>
</tr>
<tr>
<td>1983</td>
<td>10,120</td>
<td>72</td>
<td>324</td>
<td>$79</td>
<td>$159</td>
</tr>
<tr>
<td>1984</td>
<td>10,110</td>
<td>96</td>
<td>262</td>
<td>$78</td>
<td>$150</td>
</tr>
<tr>
<td>1985</td>
<td>9,990</td>
<td>48</td>
<td>282</td>
<td>$88</td>
<td>$164</td>
</tr>
<tr>
<td>1986</td>
<td>9,510</td>
<td>126</td>
<td>236</td>
<td>$80</td>
<td>$147</td>
</tr>
<tr>
<td>1987</td>
<td>9,580</td>
<td>36</td>
<td>279</td>
<td>$69</td>
<td>$122</td>
</tr>
<tr>
<td>1988</td>
<td>9,710</td>
<td>56</td>
<td>308</td>
<td>$90</td>
<td>$153</td>
</tr>
<tr>
<td>1989</td>
<td>9,490</td>
<td>36</td>
<td>272</td>
<td>$88</td>
<td>$143</td>
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<tr>
<td>1990</td>
<td>9,010</td>
<td>87</td>
<td>285</td>
<td>$126</td>
<td>$194</td>
</tr>
<tr>
<td>1991</td>
<td>8,690</td>
<td>59</td>
<td>301</td>
<td>$139*</td>
<td>$205*</td>
</tr>
<tr>
<td>1992</td>
<td>9,020</td>
<td>38</td>
<td>323</td>
<td>$89</td>
<td>$127</td>
</tr>
<tr>
<td>1993</td>
<td>9,750</td>
<td>88</td>
<td>367</td>
<td>$109</td>
<td>$153</td>
</tr>
<tr>
<td>1994</td>
<td>9,950</td>
<td>70</td>
<td>344</td>
<td>$123</td>
<td>$168</td>
</tr>
<tr>
<td>1995</td>
<td>10,000</td>
<td>60</td>
<td>349</td>
<td>$146</td>
<td>$193</td>
</tr>
<tr>
<td>1996</td>
<td>10,370</td>
<td>80</td>
<td>362</td>
<td>$135</td>
<td>$174</td>
</tr>
<tr>
<td>1997</td>
<td>11,000</td>
<td>43</td>
<td>377</td>
<td>$179</td>
<td>$225</td>
</tr>
<tr>
<td>1998</td>
<td>9,330</td>
<td>89</td>
<td>271</td>
<td>$134</td>
<td>$166</td>
</tr>
<tr>
<td>1999</td>
<td>9,510</td>
<td>61</td>
<td>210</td>
<td>$228</td>
<td>$275</td>
</tr>
<tr>
<td>2000</td>
<td>7,610</td>
<td>41</td>
<td>243</td>
<td>$208</td>
<td>$244</td>
</tr>
<tr>
<td>2001</td>
<td>7,050</td>
<td>87</td>
<td>332</td>
<td>$177</td>
<td>$202</td>
</tr>
<tr>
<td>2002</td>
<td>6,650</td>
<td>30</td>
<td>221</td>
<td>$159</td>
<td>$179</td>
</tr>
<tr>
<td>2003</td>
<td>5,530</td>
<td>124</td>
<td>210</td>
<td>$136</td>
<td>$149</td>
</tr>
<tr>
<td>2004</td>
<td>5,460</td>
<td>15</td>
<td>272</td>
<td>$154</td>
<td>$164</td>
</tr>
<tr>
<td>2005</td>
<td>5,230</td>
<td>59</td>
<td>241</td>
<td>$210</td>
<td>$217</td>
</tr>
<tr>
<td>2006</td>
<td>5,770</td>
<td>87</td>
<td>186</td>
<td>$181</td>
<td>$181</td>
</tr>
</tbody>
</table>

* All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and civilian injuries are expressed to the nearest one, and property damage is rounded to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution. Inflation adjustment to 2006 dollars is done using the consumer price index.

Source: Data from NFIRS (Version 5.0 after 1998) and NFPA survey.
### Home Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Factor Contributing to Ignition

Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

#### A. All Lamps, Light Fixtures, and Light Bulbs

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat source too close to combustibles</td>
<td>2,080</td>
<td>24 (34%)</td>
<td>115 (50%)</td>
<td>$60 (36%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>780</td>
<td>5 (7%)</td>
<td>8 (4%)</td>
<td>$28 (16%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>580</td>
<td>10 (15%)</td>
<td>14 (6%)</td>
<td>$16 (10%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>370</td>
<td>4 (6%)</td>
<td>18 (8%)</td>
<td>$8 (5%)</td>
</tr>
<tr>
<td>Collision, knock down, or turn over</td>
<td>220</td>
<td>7 (10%)</td>
<td>20 (9%)</td>
<td>$7 (4%)</td>
</tr>
<tr>
<td>Equipment unattended</td>
<td>190</td>
<td>3 (4%)</td>
<td>10 (5%)</td>
<td>$7 (4%)</td>
</tr>
<tr>
<td>Unclassified factor contributed to ignition</td>
<td>170</td>
<td>0 (0%)</td>
<td>5 (2%)</td>
<td>$6 (4%)</td>
</tr>
<tr>
<td>Unclassified misuse of material</td>
<td>150</td>
<td>0 (0%)</td>
<td>11 (5%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Installation deficiency</td>
<td>150</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$4 (2%)</td>
</tr>
<tr>
<td>Animal</td>
<td>140</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Unintentionally turned on or not turned off</td>
<td>140</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Unclassified mechanical failure or malfunction</td>
<td>130</td>
<td>0 (0%)</td>
<td>5 (2%)</td>
<td>$10 (6%)</td>
</tr>
<tr>
<td>Fluorescent light ballast</td>
<td>100</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Arc or spark from operating equipment</td>
<td>90</td>
<td>4 (6%)</td>
<td>5 (2%)</td>
<td>$4 (2%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>70</td>
<td>0 (0%)</td>
<td>3 (1%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Equipment not being operated properly</td>
<td>60</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Abandoned or discarded material or product</td>
<td>60</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Unclassified operational deficiency</td>
<td>60</td>
<td>5 (7%)</td>
<td>7 (3%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Equipment used for not intended purpose</td>
<td>60</td>
<td>0 (0%)</td>
<td>3 (1%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>50</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Failure to clean</td>
<td>50</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>340</td>
<td>20 (27%)*</td>
<td>25 (11%)</td>
<td>$11 (6%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>5,500</td>
<td>72 (100%)</td>
<td>227 (100%)</td>
<td>$169 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>6,040</td>
<td>83 (116%)</td>
<td>254 (112%)</td>
<td>$187 (110%)</td>
</tr>
<tr>
<td>All electrical failure or malfunction</td>
<td>2,050</td>
<td>24 (33%)</td>
<td>48 (21%)</td>
<td>$64 (38%)</td>
</tr>
</tbody>
</table>

* The leading factors contributing to ignition for fire deaths not shown above are flammable liquid or gas spill (22% of deaths) and unclassified fire spread (6%).
### B. Table or Floor Lamps

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat source too close to combustibles</td>
<td>550 (43%)</td>
<td>17 (49%)</td>
<td>33 (41%)</td>
<td>$16 (40%)</td>
</tr>
<tr>
<td>Collision, knock down, or turn over</td>
<td>140 (11%)</td>
<td>3 (9%)</td>
<td>17 (21%)</td>
<td>$7 (17%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>130 (10%)</td>
<td>5 (15%)</td>
<td>0 (0%)</td>
<td>$5 (13%)</td>
</tr>
<tr>
<td>Unspecified short-circuit arc</td>
<td>100 (8%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$4 (13%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>80 (6%)</td>
<td>4 (12%)</td>
<td>10 (12%)</td>
<td>$3 (11%)</td>
</tr>
<tr>
<td>Equipment unattended</td>
<td>60 (5%)</td>
<td>0 (0%)</td>
<td>10 (13%)</td>
<td>$5 (12%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>380 (29%)</td>
<td>5 (15%)*</td>
<td>23 (28%)</td>
<td>$8 (21%)</td>
</tr>
<tr>
<td><strong>Total fires</strong></td>
<td>1,280 (100%)</td>
<td>35 (100%)</td>
<td>80 (100%)</td>
<td>$40 (100%)</td>
</tr>
<tr>
<td><strong>Total factor entries</strong></td>
<td>1,430 (112%)</td>
<td>35 (100%)</td>
<td>92 (116%)</td>
<td>$48 (120%)</td>
</tr>
<tr>
<td><strong>All electrical failures or malfunctions</strong></td>
<td>380 (30%)</td>
<td>9 (27%)</td>
<td>13 (16%)</td>
<td>$14 (35%)</td>
</tr>
</tbody>
</table>

* The leading factor contributing to ignition for fire deaths not shown above is unclassified operational deficiency (15% of deaths).

### C. Incandescent Light Fixtures

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat source too close to combustibles</td>
<td>210 (20%)</td>
<td>3 (50%)</td>
<td>9 (38%)</td>
<td>$7 (26%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>180 (18%)</td>
<td>0 (0%)</td>
<td>3 (12%)</td>
<td>$4 (15%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>180 (18%)</td>
<td>3 (50%)</td>
<td>2 (10%)</td>
<td>$4 (16%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>130 (12%)</td>
<td>0 (0%)</td>
<td>2 (9%)</td>
<td>$2 (8%)</td>
</tr>
<tr>
<td>Installation deficiency</td>
<td>70 (6%)</td>
<td>0 (0%)</td>
<td>2 (9%)</td>
<td>$2 (9%)</td>
</tr>
<tr>
<td>Animal</td>
<td>60 (6%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (5%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>280 (27%)</td>
<td>0 (0%)</td>
<td>5 (22%)</td>
<td>$8 (31%)</td>
</tr>
<tr>
<td><strong>Total fires</strong></td>
<td>1,030 (100%)</td>
<td>5 (100%)</td>
<td>23 (100%)</td>
<td>$25 (100%)</td>
</tr>
<tr>
<td><strong>Total factor entries</strong></td>
<td>1,100 (107%)</td>
<td>5 (100%)</td>
<td>23 (100%)</td>
<td>$28 (110%)</td>
</tr>
<tr>
<td><strong>All electrical failures or malfunctions</strong></td>
<td>560 (54%)</td>
<td>3 (50%)</td>
<td>9 (41%)</td>
<td>$12 (46%)</td>
</tr>
</tbody>
</table>
Home Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Factor Contributing to Ignition (Continued)
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

D. Halogen Light Fixtures and Lamps

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat source too close to combustibles</td>
<td>280 (63%)</td>
<td>0 (NA)</td>
<td>17 (88%)</td>
<td>$12 (53%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>30 (7%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>20 (5%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>140 (31%)</td>
<td>0 (NA)</td>
<td>2 (12%)</td>
<td>$9 (42%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>440 (100%)</td>
<td>0 (NA)</td>
<td>19 (100%)</td>
<td>$23 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>470 (107%)</td>
<td>0 (NA)</td>
<td>19 (100%)</td>
<td>$23 (102%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>70 (16%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$3 (12%)</td>
</tr>
</tbody>
</table>

* Percents not available because all deaths have factor contributing to ignition unknown; total deaths round to zero.

E. Light Bulbs

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat source too close to combustibles</td>
<td>260 (65%)</td>
<td>0 (NA)</td>
<td>8 (100%)</td>
<td>$6 (83%)</td>
</tr>
<tr>
<td>Unintentionally turned on or not turned off</td>
<td>30 (7%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (2%)</td>
</tr>
<tr>
<td>Animal</td>
<td>20 (6%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>140 (36%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$2 (35%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>390 (100%)</td>
<td>0 (NA)</td>
<td>8 (100%)</td>
<td>$7 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>450 (114%)</td>
<td>0 (NA)</td>
<td>8 (100%)</td>
<td>$8 (121%)</td>
</tr>
<tr>
<td>All electrical failure or malfunctions</td>
<td>10 (3%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because total is zero.
### F. Fluorescent Light Fixtures

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent light ballast</td>
<td>110 (43%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$2 (31%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>70 (27%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$3 (45%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>90 (34%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$2 (26%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>250 (100%)</td>
<td>0 (NA)</td>
<td>2 (100%)</td>
<td>$7 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>260 (104%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$7 (102%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>220 (87%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$6 (89%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because total is zero.

### G. Work Lights or Trouble Lights

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat source too close to combustibles</td>
<td>120 (57%)</td>
<td>0 (NA)</td>
<td>3 (56%)</td>
<td>$4 (48%)</td>
</tr>
<tr>
<td>Equipment unattended</td>
<td>30 (16%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (6%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>70 (34%)</td>
<td>0 (NA)</td>
<td>3 (44%)</td>
<td>$4 (48%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>210 (100%)</td>
<td>0 (NA)</td>
<td>6 (100%)</td>
<td>$8 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>220 (108%)</td>
<td>0 (NA)</td>
<td>6 (100%)</td>
<td>$8 (102%)</td>
</tr>
<tr>
<td>All electrical failures or malfunction</td>
<td>20 (8%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (14%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because total is zero.
## Home Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Factor Contributing to Ignition (Continued)

### Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments

(Excluding Fires Reported as Confined Fires)

### H. Decorative Lights on Line Voltage

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unspecified short circuit arc</td>
<td>40 (25%)</td>
<td>3 (100%)</td>
<td>9 (64%)</td>
<td>$2 (24%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>40 (24%)</td>
<td>0 (0%)</td>
<td>3 (18%)</td>
<td>$3 (35%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>100 (60%)</td>
<td>3 (100%)</td>
<td>8 (57%)</td>
<td>$5 (50%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>170 (100%)</td>
<td>3 (100%)</td>
<td>14 (100%)</td>
<td>$9 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>190 (109%)</td>
<td>7 (200%)</td>
<td>19 (139%)</td>
<td>$10 (109%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>110 (65%)</td>
<td>3 (100%)</td>
<td>14 (100%)</td>
<td>$7 (75%)</td>
</tr>
</tbody>
</table>
I. Unclassified or Unknown-Type Light Fixtures and Lamps

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat source too close to combustibles</td>
<td>540</td>
<td>(35%)</td>
<td>4 (16%)</td>
<td>41 (58%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$14 (30%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>320</td>
<td>(21%)</td>
<td>0 (0%)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$11 (24%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>180</td>
<td>(12%)</td>
<td>3 (12%)</td>
<td>3 (5%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3 (6%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>120</td>
<td>(8%)</td>
<td>0 (0%)</td>
<td>3 (5%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3 (6%)</td>
</tr>
<tr>
<td>Unclassified factor</td>
<td>70</td>
<td>(4%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3 (7%)</td>
</tr>
<tr>
<td>Equipment unattended</td>
<td>60</td>
<td>(4%)</td>
<td>3 (12%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$2 (4%)</td>
</tr>
<tr>
<td>Unclassified mechanical failure or malfunction</td>
<td>50</td>
<td>(3%)</td>
<td>0 (0%)</td>
<td>5 (7%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1 (3%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>400</td>
<td>(26%)</td>
<td>20 (87%)*</td>
<td>25 (35%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$13 (28%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>1,560</td>
<td>(100%)</td>
<td>23 (100%)</td>
<td>70 (100%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$46 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>1,740</td>
<td>(112%)</td>
<td>29 (127%)</td>
<td>79 (113%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$50 (109%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>670</td>
<td>(43%)</td>
<td>6 (27%)</td>
<td>12 (17%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$20 (43%)</td>
</tr>
</tbody>
</table>

* The leading factors contributing to ignition for fire deaths not shown above are flammable liquid or gas spill (57% of deaths), arc or spark from operating equipment (15%), and unclassified fire spread or control (15%).

Note: Multiple entries are allowed, resulting in more factor entries than fires. Figures exclude confined fires which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming heat source (codes 40-99) are also treated as unknown equipment and allocated. Home structure fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.
## Home Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Item First Ignited
### Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

### A. All Lamps, Light Fixtures, and Light Bulbs

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>590 (11%)</td>
<td>0 (0%)</td>
<td>15 (7%)</td>
<td>$10 (6%)</td>
</tr>
<tr>
<td>Mattress or bedding</td>
<td>520 (9%)</td>
<td>14 (19%)</td>
<td>45 (20%)</td>
<td>$18 (11%)</td>
</tr>
<tr>
<td>Clothing</td>
<td>480 (9%)</td>
<td>0 (0%)</td>
<td>29 (13%)</td>
<td>$13 (8%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>410 (7%)</td>
<td>0 (0%)</td>
<td>6 (3%)</td>
<td>$16 (10%)</td>
</tr>
<tr>
<td>Insulation within structural area</td>
<td>330 (6%)</td>
<td>0 (0%)</td>
<td>5 (2%)</td>
<td>$12 (7%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>220 (4%)</td>
<td>0 (0%)</td>
<td>5 (2%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>220 (4%)</td>
<td>0 (0%)</td>
<td>6 (3%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Floor covering</td>
<td>210 (4%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$7 (4%)</td>
</tr>
<tr>
<td>Curtain or drape</td>
<td>200 (4%)</td>
<td>5 (7%)</td>
<td>14 (6%)</td>
<td>$7 (4%)</td>
</tr>
<tr>
<td>Interior ceiling covering</td>
<td>180 (3%)</td>
<td>3 (4%)</td>
<td>0 (0%)</td>
<td>$6 (4%)</td>
</tr>
<tr>
<td>Upholstered furniture</td>
<td>180 (3%)</td>
<td>4 (5%)</td>
<td>21 (9%)</td>
<td>$7 (4%)</td>
</tr>
<tr>
<td>Appliance housing or casing</td>
<td>180 (3%)</td>
<td>0 (0%)</td>
<td>7 (3%)</td>
<td>$6 (4%)</td>
</tr>
<tr>
<td>Linen other than bedding</td>
<td>160 (3%)</td>
<td>6 (8%)</td>
<td>4 (2%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Unclassified furniture or utensil</td>
<td>160 (3%)</td>
<td>7 (10%)</td>
<td>6 (3%)</td>
<td>$7 (4%)</td>
</tr>
<tr>
<td>Unclassified structural component or finish</td>
<td>160 (3%)</td>
<td>0 (0%)</td>
<td>3 (1%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Unclassified soft goods or clothing</td>
<td>140 (3%)</td>
<td>12 (17%)</td>
<td>12 (5%)</td>
<td>$4 (2%)</td>
</tr>
<tr>
<td>Light vegetation including grass</td>
<td>120 (2%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Interior wall covering</td>
<td>100 (2%)</td>
<td>0 (0%)</td>
<td>4 (2%)</td>
<td>$4 (3%)</td>
</tr>
<tr>
<td>Unclassified organic materials</td>
<td>90 (2%)</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Box or bag</td>
<td>80 (1%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$4 (2%)</td>
</tr>
<tr>
<td>Papers</td>
<td>80 (1%)</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Cabinetry</td>
<td>70 (1%)</td>
<td>3 (4%)</td>
<td>0 (0%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Multiple items first ignited</td>
<td>70 (1%)</td>
<td>0 (0%)</td>
<td>4 (2%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Decoration</td>
<td>60 (1%)</td>
<td>0 (0%)</td>
<td>5 (2%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Flammable or combustible gas or liquid</td>
<td>50 (1%)</td>
<td>15 (20%)</td>
<td>19 (8%)</td>
<td>$4 (2%)</td>
</tr>
</tbody>
</table>

Other known item first ignited | 450 (8%) | 4 (5%)* | 13 (6%) | $19 (11%) |

Total fires | 5,500 (100%) | 72 (100%) | 227 (100%) | $169 (100%) |

* The leading item first ignited for fire deaths not shown above is Christmas tree (5% of deaths).
Home Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Item First Ignited (Continued)
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

B. Table or Floor Lamps

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mattress or bedding</td>
<td>230</td>
<td>13 (38%)</td>
<td>32 (40%)</td>
<td>$9 (23%)</td>
</tr>
<tr>
<td>Clothing</td>
<td>210</td>
<td>0 (0%)</td>
<td>7 (9%)</td>
<td>$3 (8%)</td>
</tr>
<tr>
<td>Wire or cable insulation</td>
<td>100</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$3 (7%)</td>
</tr>
<tr>
<td>Upholstered furniture</td>
<td>90</td>
<td>4 (11%)</td>
<td>14 (18%)</td>
<td>$5 (13%)</td>
</tr>
<tr>
<td>Curtain or drape</td>
<td>80</td>
<td>5 (13%)</td>
<td>5 (6%)</td>
<td>$3 (8%)</td>
</tr>
<tr>
<td>Unclassified furniture or utensil</td>
<td>80</td>
<td>0 (0%)</td>
<td>4 (4%)</td>
<td>$3 (8%)</td>
</tr>
<tr>
<td>Floor covering</td>
<td>80</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Appliance housing or casing</td>
<td>70</td>
<td>0 (0%)</td>
<td>2 (3%)</td>
<td>$4 (10%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>330</td>
<td>13 (38%)*</td>
<td>14 (17%)</td>
<td>$7 (18%)</td>
</tr>
</tbody>
</table>

| Total fires                         | 1,280 | 35 (100%)       | 80 (100%)         | $40 (100%)                           |

* The leading items first ignited for fire deaths not shown above are unclassified clothing or soft goods (22% of fire deaths) and linen other than bedding (17%).

C. Incandescent Light Fixtures

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>200</td>
<td>0 (0%)</td>
<td>2 (8%)</td>
<td>$2 (7%)</td>
</tr>
<tr>
<td>Structural member of framing</td>
<td>180</td>
<td>0 (0%)</td>
<td>4 (16%)</td>
<td>$6 (24%)</td>
</tr>
<tr>
<td>Insulation within structural area</td>
<td>120</td>
<td>0 (0%)</td>
<td>4 (19%)</td>
<td>$6 (22%)</td>
</tr>
<tr>
<td>Interior ceiling covering</td>
<td>70</td>
<td>3 (50%)</td>
<td>0 (0%)</td>
<td>$4 (16%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>50</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (9%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>410</td>
<td>3 (50%)*</td>
<td>13 (57%)</td>
<td>$6 (22%)</td>
</tr>
</tbody>
</table>

| Total fires                         | 1,030 | 5 (100%)        | 23 (100%)         | $25 (100%)                           |

* The leading item first ignited for fire deaths not shown above is unclassified furniture or utensil (50% of deaths).
Home Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Item First Ignited (Continued)
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

D. Halogen Light Fixtures and Lamps

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clothing</td>
<td>40 (10%)</td>
<td>0 (NA)</td>
<td>7 (38%)</td>
<td>$0 (2%)</td>
</tr>
<tr>
<td>Curtain or drape</td>
<td>40 (9%)</td>
<td>0 (NA)</td>
<td>5 (24%)</td>
<td>$2 (8%)</td>
</tr>
<tr>
<td>Insulation within structural area</td>
<td>40 (8%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>30 (7%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>290 (66%)</td>
<td>0 (NA)</td>
<td>7 (38%)</td>
<td>$20 (86%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>440 (100%)</td>
<td>0 (NA)</td>
<td>19 (100%)</td>
<td>$23 (100%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because all deaths have item first ignited unknown; total deaths round to zero.

E. Light Bulbs

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clothing</td>
<td>70 (17%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$2 (30%)</td>
</tr>
<tr>
<td>Mattress or bedding</td>
<td>50 (12%)</td>
<td>0 (NA)</td>
<td>2 (23%)</td>
<td>$2 (26%)</td>
</tr>
<tr>
<td>Light vegetation including grass</td>
<td>30 (7%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Linen other than bedding</td>
<td>30 (7%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>30 (7%)</td>
<td>0 (NA)</td>
<td>4 (53%)</td>
<td>$1 (12%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>20 (6%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (9%)</td>
</tr>
<tr>
<td>Unclassified organic materials</td>
<td>20 (6%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (1%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>150 (37%)</td>
<td>0 (NA)</td>
<td>2 (23%)</td>
<td>$1 (22%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>390 (100%)</td>
<td>0 (NA)</td>
<td>8 (100%)</td>
<td>$7 (100%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because total is zero.
Home Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Item First Ignited (Continued)
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

F. Fluorescent Light Fixtures

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>60 (23%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (11%)</td>
</tr>
<tr>
<td>Transformer or transformer fluids</td>
<td>30 (13%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Interior ceiling covering</td>
<td>30 (11%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (16%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>30 (10%)</td>
<td>0 (NA)</td>
<td>2 (100%)</td>
<td>$0 (2%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>110 (43%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$5 (71%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>250 (100%)</td>
<td>0 (NA)</td>
<td>2 (100%)</td>
<td>$7 (100%)</td>
</tr>
</tbody>
</table>

NA – Not applicable because total is zero.

G. Work Lights or Trouble Lights

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation within structural areas</td>
<td>50 (25%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$2 (20%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>20 (12%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (3%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>130 (63%)</td>
<td>0 (NA)</td>
<td>6 (100%)</td>
<td>$6 (77%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>210 (100%)</td>
<td>0 (NA)</td>
<td>6 (100%)</td>
<td>$8 (100%)</td>
</tr>
</tbody>
</table>

NA – Not available because all deaths have item first ignited unknown; total deaths round to zero.

H. Decorative Lights on Line Voltage

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christmas tree</td>
<td>40 (24%)</td>
<td>3 (100%)</td>
<td>4 (29%)</td>
<td>$3 (35%)</td>
</tr>
<tr>
<td>Decoration</td>
<td>20 (13%)</td>
<td>0 (0%)</td>
<td>5 (33%)</td>
<td>$1 (11%)</td>
</tr>
<tr>
<td>Wire or cable insulation</td>
<td>20 (12%)</td>
<td>0 (0%)</td>
<td>2 (12%)</td>
<td>$1 (10%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>90 (52%)</td>
<td>0 (0%)</td>
<td>4 (26%)</td>
<td>$4 (44%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>170 (100%)</td>
<td>3 (100%)</td>
<td>14 (100%)</td>
<td>$9 (100%)</td>
</tr>
</tbody>
</table>
## Home Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Item First Ignited (Continued)

Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments (Excluding Fires Reported as Confined Fires)

### I. Unclassified or Unknown-Type Light Fixtures and Lamps

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>180</td>
<td>0</td>
<td>10</td>
<td>$3 (7%)</td>
</tr>
<tr>
<td>Mattress or bedding</td>
<td>140</td>
<td>0</td>
<td>7</td>
<td>$4 (9%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>130</td>
<td>0</td>
<td>0</td>
<td>$8 (17%)</td>
</tr>
<tr>
<td>Clothing</td>
<td>90</td>
<td>0</td>
<td>5</td>
<td>$5 (10%)</td>
</tr>
<tr>
<td>Insulation within structural area</td>
<td>80</td>
<td>0</td>
<td>0</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Unclassified soft goods or clothing</td>
<td>70</td>
<td>4</td>
<td>13</td>
<td>$3 (6%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>70</td>
<td>0</td>
<td>5</td>
<td>$0 (1%)</td>
</tr>
<tr>
<td>Floor covering</td>
<td>70</td>
<td>0</td>
<td>0</td>
<td>$4 (9%)</td>
</tr>
<tr>
<td>Unclassified structural component or finish</td>
<td>70</td>
<td>0</td>
<td>3</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>70</td>
<td>0</td>
<td>0</td>
<td>$0 (1%)</td>
</tr>
<tr>
<td>Upholstered furniture</td>
<td>50</td>
<td>0</td>
<td>3</td>
<td>$2 (4%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>550</td>
<td>19 (84%)*</td>
<td>24</td>
<td>$15 (33%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>1,560</td>
<td>23 (100%)</td>
<td>70</td>
<td>$46 (100%)</td>
</tr>
</tbody>
</table>

* The leading items first ignited for fire deaths not shown above are flammable or combustible gas or liquid (57% of deaths), unclassified furniture or utensil (15%), and cabinetry (12%).

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming heat source (codes 40-99) are also treated as unknown equipment and allocated. Home fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.
# Home Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Area of Origin

Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

## A. All Lamps, Light Fixtures, or Light Bulbs

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires (in Millions)</th>
<th>Deaths (in Millions)</th>
<th>Injuries (in Millions)</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>1,490 (27%)</td>
<td>20 (28%)</td>
<td>92 (40%)</td>
<td>$41 (24%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>630 (11%)</td>
<td>34 (47%)</td>
<td>55 (24%)</td>
<td>$27 (16%)</td>
</tr>
<tr>
<td>Attic or ceiling/roof assembly or concealed space</td>
<td>440 (8%)</td>
<td>0 (0%)</td>
<td>4 (2%)</td>
<td>$14 (8%)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>340 (6%)</td>
<td>3 (4%)</td>
<td>12 (5%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>320 (6%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>250 (5%)</td>
<td>7 (10%)</td>
<td>12 (5%)</td>
<td>$15 (9%)</td>
</tr>
<tr>
<td>Closet</td>
<td>250 (5%)</td>
<td>0 (0%)</td>
<td>8 (3%)</td>
<td>$6 (3%)</td>
</tr>
<tr>
<td>Ceiling/floor assembly or concealed space</td>
<td>240 (4%)</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$11 (6%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>240 (4%)</td>
<td>5 (7%)</td>
<td>4 (2%)</td>
<td>$6 (3%)</td>
</tr>
<tr>
<td>Garage*</td>
<td>160 (3%)</td>
<td>0 (0%)</td>
<td>9 (4%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Exterior balcony or unenclosed porch</td>
<td>160 (3%)</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$4 (2%)</td>
</tr>
<tr>
<td>Crawl space or substructure space</td>
<td>100 (2%)</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Wall assembly or concealed space</td>
<td>100 (2%)</td>
<td>0 (0%)</td>
<td>6 (3%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Laundry room</td>
<td>90 (2%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$5 (3%)</td>
</tr>
<tr>
<td>Lobby or entrance way</td>
<td>70 (1%)</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Unclassified outside area</td>
<td>70 (1%)</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Unclassified storage area</td>
<td>60 (1%)</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Unclassified structural area</td>
<td>60 (1%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Courtyard, terrace or patio</td>
<td>50 (1%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>380 (7%)</td>
<td>3 (4%)</td>
<td>13 (6%)</td>
<td>$9 (6%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>5,500 (100%)</td>
<td>72 (100%)</td>
<td>227 (100%)</td>
<td>$169 (100%)</td>
</tr>
</tbody>
</table>

* Excludes residential garage reported as separate property.

## B. Table or Floor Lamps

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires (in Millions)</th>
<th>Deaths (in Millions)</th>
<th>Injuries (in Millions)</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>720 (56%)</td>
<td>20 (58%)</td>
<td>44 (56%)</td>
<td>$18 (46%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>240 (18%)</td>
<td>9 (25%)</td>
<td>17 (21%)</td>
<td>$13 (31%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>90 (7%)</td>
<td>3 (10%)</td>
<td>4 (5%)</td>
<td>$4 (10%)</td>
</tr>
<tr>
<td>Closet</td>
<td>40 (3%)</td>
<td>0 (0%)</td>
<td>3 (4%)</td>
<td>$0 (1%)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>20 (2%)</td>
<td>0 (0%)</td>
<td>4 (5%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>180 (14%)</td>
<td>3 (8%)</td>
<td>8 (10%)</td>
<td>$5 (12%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>1,280 (100%)</td>
<td>35 (100%)</td>
<td>80 (100%)</td>
<td>$40 (100%)</td>
</tr>
</tbody>
</table>
### C. Incandescent Light Fixtures

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attic or ceiling/roof assembly or concealed space</td>
<td>180 (18%)</td>
<td>0 (0%)</td>
<td>4 (19%)</td>
<td>$8 (31%)</td>
</tr>
<tr>
<td>Ceiling/floor assembly or concealed space</td>
<td>130 (12%)</td>
<td>0 (0%)</td>
<td>2 (9%)</td>
<td>$2 (9%)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>110 (11%)</td>
<td>3 (50%)</td>
<td>2 (8%)</td>
<td>$2 (9%)</td>
</tr>
<tr>
<td>Bedroom</td>
<td>90 (9%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (6%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>80 (8%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (7%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>80 (7%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Exterior balcony or unenclosed porch</td>
<td>60 (6%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Closet</td>
<td>60 (6%)</td>
<td>0 (0%)</td>
<td>2 (9%)</td>
<td>$2 (8%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>50 (5%)</td>
<td>0 (0%)</td>
<td>9 (39%)</td>
<td>$1 (3%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>190 (18%)</td>
<td>3 (50%)*</td>
<td>3 (15%)</td>
<td>$5 (20%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>1,030 (100%)</td>
<td>5 (100%)*</td>
<td>23 (100%)</td>
<td>$25 (100%)</td>
</tr>
</tbody>
</table>

* The leading area of origin for fire deaths not shown above is unclassified area of origin (50% of deaths).

### D. Halogen Light Fixtures and Lamps

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>120 (27%)</td>
<td>0 (NA)</td>
<td>13 (68%)</td>
<td>$5 (21%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>50 (12%)</td>
<td>0 (NA)</td>
<td>2 (13%)</td>
<td>$3 (13%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>50 (12%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$3 (12%)</td>
</tr>
<tr>
<td>Attic or ceiling/roof assembly or concealed space</td>
<td>30 (8%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$2 (7%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>30 (6%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (6%)</td>
</tr>
<tr>
<td>Garage*</td>
<td>20 (5%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>140 (31%)</td>
<td>0 (NA)</td>
<td>4 (19%)</td>
<td>$9 (41%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>440 (100%)</td>
<td>0 (NA)</td>
<td>19 (100%)</td>
<td>$23 (100%)</td>
</tr>
</tbody>
</table>

* Excludes residential garage reported as separate property.

NA – Not applicable because total is zero.
### Home Fires Involving Lamps, Light Fixtures, or Light Bulbs, by Area of Origin (Continued)

Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

#### E. Light Bulbs

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closet</td>
<td>60 (15%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$2 (23%)</td>
</tr>
<tr>
<td>Bedroom</td>
<td>60 (15%)</td>
<td>0 (NA)</td>
<td>2 (23%)</td>
<td>$2 (26%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>40 (11%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (3%)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>40 (10%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (4%)</td>
</tr>
<tr>
<td>Attic or ceiling/roof assembly or concealed space</td>
<td>30 (8%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (14%)</td>
</tr>
<tr>
<td>Exterior balcony or unenclosed porch</td>
<td>20 (6%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (2%)</td>
</tr>
<tr>
<td>Ceiling/floor assembly or concealed space</td>
<td>20 (5%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (6%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>20 (4%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>20 (4%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Garage*</td>
<td>10 (4%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (6%)</td>
</tr>
<tr>
<td>Crawl space or substructure space</td>
<td>10 (4%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>60 (16%)</td>
<td>0 (NA)</td>
<td>6 (77%)</td>
<td>$1 (19%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>390 (100%)</td>
<td>0 (NA)</td>
<td>8 (100%)</td>
<td>$7 (100%)</td>
</tr>
</tbody>
</table>

* Excludes residential garage coded as separate property.

NA – Not applicable because total is zero.

### F. Fluorescent Light Fixtures

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchen</td>
<td>40 (18%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (19%)</td>
</tr>
<tr>
<td>Garage*</td>
<td>30 (12%)</td>
<td>0 (NA)</td>
<td>2 (100%)</td>
<td>$1 (12%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>30 (10%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (10%)</td>
</tr>
<tr>
<td>Ceiling/floor assembly or concealed space</td>
<td>20 (9%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (4%)</td>
</tr>
<tr>
<td>Crawl space or substructure space</td>
<td>20 (7%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (3%)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>20 (7%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (12%)</td>
</tr>
<tr>
<td>Bedroom</td>
<td>10 (6%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (2%)</td>
</tr>
<tr>
<td>Laundry room or area</td>
<td>10 (5%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (17%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>60 (26%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$2 (21%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>250 (100%)</td>
<td>0 (NA)</td>
<td>2 (100%)</td>
<td>$7 (100%)</td>
</tr>
</tbody>
</table>

* Excludes residential garage coded as separate property.

NA – Not applicable because total is zero.
### G. Work Lights or Trouble Lights

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attic or ceiling/roof assembly or</td>
<td>70 (33%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (16%)</td>
</tr>
<tr>
<td>concealed space</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedroom</td>
<td>20 (9%)</td>
<td>0 (NA)</td>
<td>2 (32%)</td>
<td>$2 (21%)</td>
</tr>
<tr>
<td>Garage*</td>
<td>20 (9%)</td>
<td>0 (NA)</td>
<td>2 (40%)</td>
<td>$0 (5%)</td>
</tr>
<tr>
<td>Exterior balcony or unenclosed porch</td>
<td>10 (5%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (12%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>10 (5%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Courtyard, terrace or patio</td>
<td>10 (4%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (0%)</td>
</tr>
<tr>
<td>Crawl space or substructure space</td>
<td>10 (4%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (14%)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>10 (4%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (2%)</td>
</tr>
<tr>
<td>Laundry room or area</td>
<td>10 (4%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$1 (6%)</td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>10 (4%)</td>
<td>0 (NA)</td>
<td>0 (0%)</td>
<td>$0 (2%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>40 (18%)</td>
<td>0 (NA)</td>
<td>2 (28%)</td>
<td>$2 (22%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>210 (100%)</td>
<td>0 (NA)</td>
<td>6 (100%)</td>
<td>$8 (100%)</td>
</tr>
</tbody>
</table>

* Excludes residential garage coded as separate property.

NA – Not applicable because total is zero.

### H. Decorative Lights on Line Voltage

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living room, family room, or den</td>
<td>60 (36%)</td>
<td>3 (100%)</td>
<td>12 (84%)</td>
<td>$4 (43%)</td>
</tr>
<tr>
<td>Bedroom</td>
<td>20 (12%)</td>
<td>0 (0%)</td>
<td>2 (16%)</td>
<td>$0 (5%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>90 (52%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$5 (53%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>170 (100%)</td>
<td>3 (100%)</td>
<td>14 (100%)</td>
<td>$9 (100%)</td>
</tr>
</tbody>
</table>
### Home Fires Involving Lamps, Light Fixture, or Light Bulbs, by Area of Origin (Continued)

**Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments**

(Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>400</td>
<td>0 (0%)</td>
<td>25 (36%)</td>
<td>$11 (24%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>170</td>
<td>16 (72%)</td>
<td>15 (21%)</td>
<td>$6 (13%)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>110</td>
<td>0 (0%)</td>
<td>5 (7%)</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Attic or ceiling/roof assembly or</td>
<td>110</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (5%)</td>
</tr>
<tr>
<td>concealed space</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exterior wall surface</td>
<td>100</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (1%)</td>
</tr>
<tr>
<td>Closet</td>
<td>80</td>
<td>0 (0%)</td>
<td>2 (3%)</td>
<td>$2 (4%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>70</td>
<td>4 (16%)</td>
<td>7 (9%)</td>
<td>$8 (18%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>70</td>
<td>3 (12%)</td>
<td>4 (5%)</td>
<td>$2 (5%)</td>
</tr>
<tr>
<td>Ceiling/floor assembly or</td>
<td>50</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (3%)</td>
</tr>
<tr>
<td>concealed space</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>420</td>
<td>0 (0%)</td>
<td>13 (18%)</td>
<td>$12 (26%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>1,560</td>
<td>23 (100%)</td>
<td>70 (100%)</td>
<td>$46 (100%)</td>
</tr>
</tbody>
</table>

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home structure fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.
Cords and Plugs

In 2006, an estimated 2,950 reported U.S. non-confined home structure fires involving cords or plugs resulted in 135 civilian deaths, 193 civilian injuries, and $98 million in direct property damage.

Cords and plugs include the following specific types of equipment:
- Extension cord
- Permanent power cord or plug
- Detachable power cord or plug

It is possible that some fires involving a power cord are coded in terms of the appliance or equipment powered by that power cord.

Fires involving cords or plugs declined by more than one-third from 1980 to 1998. After the transition period of 1999-2001, when NFIRS Version 5.0 was being phased in, the estimates for 2003-2005 are lower by about two-thirds than the levels in the late 1990s and are much lower than what would have been projected from the trend of the late 1990s. Trends for associated losses have yet to stabilize. Some of the sharp decline after 1998 may be due to the changes in data categories, definitions, and rules introduced in NFIRS Version 5.0 rather than a decline in the real size of this fire problem.

Cords and plugs accounted for 12% of 2003-2006 non-confined home structure fires involving electrical distribution or lighting equipment, as well as 38% of associated civilian deaths, 25% of associated civilian injuries, and 16% of associated direct property damage.
Extension cords accounted for most of the 2003-2006 non-confined home structure fires involving cords or plugs. Permanent and detachable power cords are the other well-defined types of cords distinguishable in the fire incident data. Because one-sixth of these fires are coded as unclassified or unknown-type cord or plug, the numbers and percentages for the other, more specifically defined types are probably understated.

Home Fires Involving Cords or Plugs, by Specific Type of Equipment
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Type of Equipment</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension cord</td>
<td>1,510</td>
<td>108 (77%)</td>
<td>113 (54%)</td>
<td>$70 (60%)</td>
</tr>
<tr>
<td>Permanent power cord or plug</td>
<td>400</td>
<td>18 (13%)</td>
<td>31 (15%)</td>
<td>$11 (10%)</td>
</tr>
<tr>
<td>Detachable power cord or plug</td>
<td>290</td>
<td>6 (5%)</td>
<td>23 (11%)</td>
<td>$13 (11%)</td>
</tr>
<tr>
<td>Unclassified or unknown-type cord or plug</td>
<td>420</td>
<td>7 (5%)</td>
<td>41 (20%)</td>
<td>$23 (19%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2,620</td>
<td>139 (100%)</td>
<td>209 (100%)</td>
<td><strong>$117 (100%)</strong></td>
</tr>
</tbody>
</table>

Note: Figures include confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Four out of five (80%) 2003-2006 non-confined home structure fires involving cords or plugs cited some type of electrical failure or malfunction as a factor contributing to ignition.
Leading factors with details on the nature of the failure were short circuit arc from defective or worn insulation (15%), equipment overloaded (11%), and short circuit arc from mechanical damage (5%).

More than one-third (37%) of 2003-2006 non-confined home structure fires involving cords or plugs began with ignition of wire or cable insulation.
Other leading items first ignited – which suggest unsafe locations for cords and plugs – include floor covering (10%), mattress or bedding (8%), upholstered furniture (6%), clothing (4%), and interior wall covering (4%).

Half (53%) of 2003-2006 non-confined home structure fires involving cords or plugs began in a bedroom (35%) or a living room, family room or den (18%).
Other leading areas of origin were unclassified function area (7%), kitchen (7%), garage (4%), and laundry room (4%). The shares are larger for kitchens (17%) and laundry room (8%) for fires involving permanent power cords.
In 2006, an estimated 12,070 injuries involving electrical cords were reported to hospital emergency rooms. These consisted of 3,360 extension cord injuries and 8,720 injuries involving other or unknown-type electrical cords. The largest share of the 12,070 injuries were 2,810 injuries involving fractures.

Electrocution Deaths Involving Extension Cords, by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>9</td>
</tr>
<tr>
<td>1996</td>
<td>4</td>
</tr>
<tr>
<td>1997</td>
<td>9</td>
</tr>
<tr>
<td>1998</td>
<td>12</td>
</tr>
<tr>
<td>2000</td>
<td>3</td>
</tr>
<tr>
<td>2001</td>
<td>3</td>
</tr>
<tr>
<td>Average</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: CPSC analysis of death certificate database.

In 1995-2001 (excluding 1999 for which no report was issued), extension cords accounted for an average of 7 electrocution deaths per year.

Analysis for years after 2001 did not provide separate statistics for any cords or plugs.

Safety Tips:

- Home electrical safety begins with NFPA 70, National Electrical Code®, and related documents with special relevance to homes, notably NFPA 73, Electrical Inspection Code for Existing Dwellings. However, work on home electrical distribution or lighting equipment should only be conducted by someone qualified as an electrician. When you are buying, selling, or remodeling a home, have it inspected by a professional electrician.

- Never plug a major appliance into an extension cord.

- Buy only appliances that have the label of a recognized testing laboratory.

- Replace cracked electrical cords. If you have older cords with cloth covering, check for and replace frayed cords.

- Pinching cords against walls or furniture or running them under carpets or across doorways can cause a fire.

- Use extension cords for temporary wiring only. Consider having additional circuits or outlets added by a qualified electrician.

---


### Home Fires Involving Cords or Plugs, by Year

Structure Fires Reported to U.S. Fire Departments (Excluding Fires Reported as Confined Fires)

<table>
<thead>
<tr>
<th>Year</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions) As Reported</th>
<th>In 2006 Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>13,450</td>
<td>193</td>
<td>496</td>
<td>$98</td>
<td>$240</td>
</tr>
<tr>
<td>1981</td>
<td>12,240</td>
<td>155</td>
<td>445</td>
<td>$113</td>
<td>$249</td>
</tr>
<tr>
<td>1982</td>
<td>11,660</td>
<td>172</td>
<td>667</td>
<td>$108</td>
<td>$226</td>
</tr>
<tr>
<td>1983</td>
<td>11,130</td>
<td>133</td>
<td>467</td>
<td>$114</td>
<td>$231</td>
</tr>
<tr>
<td>1984</td>
<td>10,080</td>
<td>172</td>
<td>569</td>
<td>$106</td>
<td>$205</td>
</tr>
<tr>
<td>1985</td>
<td>11,040</td>
<td>151</td>
<td>467</td>
<td>$228</td>
<td>$426</td>
</tr>
<tr>
<td>1986</td>
<td>10,870</td>
<td>258</td>
<td>581</td>
<td>$120</td>
<td>$222</td>
</tr>
<tr>
<td>1987</td>
<td>10,420</td>
<td>168</td>
<td>512</td>
<td>$104</td>
<td>$184</td>
</tr>
<tr>
<td>1988</td>
<td>10,770</td>
<td>117</td>
<td>641</td>
<td>$147</td>
<td>$251</td>
</tr>
<tr>
<td>1989</td>
<td>9,370</td>
<td>211</td>
<td>598</td>
<td>$121</td>
<td>$197</td>
</tr>
<tr>
<td>1990</td>
<td>9,570</td>
<td>198</td>
<td>613</td>
<td>$142</td>
<td>$219</td>
</tr>
<tr>
<td>1991</td>
<td>9,390</td>
<td>148</td>
<td>788</td>
<td>$207*</td>
<td>$306*</td>
</tr>
<tr>
<td>1992</td>
<td>8,760</td>
<td>155</td>
<td>610</td>
<td>$141</td>
<td>$203</td>
</tr>
<tr>
<td>1993</td>
<td>9,180</td>
<td>175</td>
<td>718</td>
<td>$154</td>
<td>$215</td>
</tr>
<tr>
<td>1994</td>
<td>8,620</td>
<td>134</td>
<td>544</td>
<td>$143</td>
<td>$195</td>
</tr>
<tr>
<td>1995</td>
<td>8,420</td>
<td>117</td>
<td>554</td>
<td>$142</td>
<td>$188</td>
</tr>
<tr>
<td>1996</td>
<td>8,400</td>
<td>160</td>
<td>522</td>
<td>$165</td>
<td>$213</td>
</tr>
<tr>
<td>1997</td>
<td>8,050</td>
<td>132</td>
<td>420</td>
<td>$152</td>
<td>$191</td>
</tr>
<tr>
<td>1998</td>
<td>8,000</td>
<td>78</td>
<td>477</td>
<td>$178</td>
<td>$220</td>
</tr>
<tr>
<td>1999</td>
<td>4,980</td>
<td>61</td>
<td>105</td>
<td>$115</td>
<td>$139</td>
</tr>
<tr>
<td>2000</td>
<td>3,660</td>
<td>41</td>
<td>647</td>
<td>$96</td>
<td>$112</td>
</tr>
<tr>
<td>2001</td>
<td>3,380</td>
<td>44</td>
<td>142</td>
<td>$89</td>
<td>$101</td>
</tr>
<tr>
<td>2002</td>
<td>2,680</td>
<td>76</td>
<td>177</td>
<td>$89</td>
<td>$100</td>
</tr>
<tr>
<td>2003</td>
<td>2,490</td>
<td>71</td>
<td>192</td>
<td>$156</td>
<td>$171</td>
</tr>
<tr>
<td>2004</td>
<td>2,530</td>
<td>131</td>
<td>149</td>
<td>$96</td>
<td>$103</td>
</tr>
<tr>
<td>2005</td>
<td>2,500</td>
<td>220</td>
<td>303</td>
<td>$121</td>
<td>$124</td>
</tr>
<tr>
<td>2006</td>
<td>2,950</td>
<td>135</td>
<td>193</td>
<td>$98</td>
<td>$98</td>
</tr>
</tbody>
</table>

* All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and civilian injuries are expressed to the nearest one, and property damage is rounded to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution. Inflation adjustment to 2006 dollars is done using the consumer price index.

Source: Data from NFIRS (Version 5.0 after 1998) and NFPA survey.
Home Fires Involving Cords or Plugs, by Factor Contributing to Ignition  
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments  
(Excluding Fires Reported as Confined Fires)

A. All Cords and Plugs

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>810 (31%)</td>
<td>3 (2%)</td>
<td>49 (23%)</td>
<td>$41 (35%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>570 (22%)</td>
<td>27 (19%)</td>
<td>44 (21%)</td>
<td>$25 (22%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>400 (15%)</td>
<td>26 (18%)</td>
<td>42 (20%)</td>
<td>$13 (11%)</td>
</tr>
<tr>
<td>Equipment overloaded</td>
<td>300 (11%)</td>
<td>11 (8%)</td>
<td>30 (14%)</td>
<td>$9 (8%)</td>
</tr>
<tr>
<td>Unclassified misuse of material</td>
<td>150 (6%)</td>
<td>10 (7%)</td>
<td>33 (16%)</td>
<td>$8 (7%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>130 (5%)</td>
<td>25 (18%)</td>
<td>11 (5%)</td>
<td>$6 (5%)</td>
</tr>
<tr>
<td>Arc or spark from operating equipment</td>
<td>80 (3%)</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>80 (3%)</td>
<td>0 (0%)</td>
<td>9 (4%)</td>
<td>$5 (5%)</td>
</tr>
<tr>
<td>Equipment used for not intended purpose</td>
<td>60 (2%)</td>
<td>5 (3%)</td>
<td>8 (4%)</td>
<td>$5 (4%)</td>
</tr>
<tr>
<td>Heat source too close to combustibles</td>
<td>60 (2%)</td>
<td>5 (4%)</td>
<td>8 (4%)</td>
<td>$6 (5%)</td>
</tr>
<tr>
<td>Equipment not being operated properly</td>
<td>50 (2%)</td>
<td>13 (9%)</td>
<td>0 (0%)</td>
<td>$5 (4%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>250 (9%)</td>
<td>21 (15%)*</td>
<td>21 (10%)</td>
<td>$9 (7%)</td>
</tr>
</tbody>
</table>

Total fires: 2,620 (100%)  139 (100%)  209 (100%)  $117 (100%)

Total factor entries: 2,930 (112%)  145 (104%)  257 (123%)  $134 (114%)

All electrical failures or malfunctions: 2,100 (80%)  81 (58%)  157 (75%)  $93 (80%)

* The leading factor contributing to ignition for fire deaths not shown above is unclassified factor (15% of deaths).
### B. Extension Cords

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>420 (28%)</td>
<td>3 (3%)</td>
<td>26 (23%)</td>
<td>$20 (28%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>290 (19%)</td>
<td>24 (22%)</td>
<td>19 (17%)</td>
<td>$16 (23%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>240 (16%)</td>
<td>9 (8%)</td>
<td>24 (22%)</td>
<td>$8 (12%)</td>
</tr>
<tr>
<td>Equipment overloaded</td>
<td>230 (15%)</td>
<td>10 (9%)</td>
<td>18 (16%)</td>
<td>$7 (11%)</td>
</tr>
<tr>
<td>Unclassified misuse of material</td>
<td>100 (7%)</td>
<td>9 (8%)</td>
<td>18 (16%)</td>
<td>$6 (9%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>80 (5%)</td>
<td>19 (17%)</td>
<td>9 (8%)</td>
<td>$5 (7%)</td>
</tr>
<tr>
<td>Equipment used for not intended purpose</td>
<td>50 (3%)</td>
<td>4 (4%)</td>
<td>6 (5%)</td>
<td>$4 (5%)</td>
</tr>
<tr>
<td>Arc from faulty contact or broken conductor</td>
<td>50 (3%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (2%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>230 (15%)</td>
<td>35 (33%)*</td>
<td>24 (21%)</td>
<td>$14 (20%)</td>
</tr>
<tr>
<td><strong>Total fires</strong></td>
<td>1,510 (100%)</td>
<td>108 (100%)</td>
<td>113 (100%)</td>
<td>$70 (100%)</td>
</tr>
<tr>
<td><strong>Total factor entries</strong></td>
<td>1,700 (113%)</td>
<td>112 (104%)</td>
<td>143 (126%)</td>
<td>$81 (116%)</td>
</tr>
<tr>
<td><strong>All electrical failures or malfunctions</strong></td>
<td>1,130 (75%)</td>
<td>54 (51%)</td>
<td>80 (71%)</td>
<td>$51 (73%)</td>
</tr>
</tbody>
</table>

* The leading factors contributing to ignition for fire deaths not shown above are unclassified factor (14% of deaths) and equipment not being operated properly (11%).
Home Fires Involving Cords or Plugs, by Factor Contributing to Ignition (Continued)
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

C. Permanent Power Cords and Plugs

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unspecified short circuit arc</td>
<td>130 (33%)</td>
<td>0 (0%)</td>
<td>8 (27%)</td>
<td>$2 (21%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>90 (23%)</td>
<td>18 (100%)</td>
<td>10 (31%)</td>
<td>$3 (23%)</td>
</tr>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>90 (22%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (20%)</td>
</tr>
<tr>
<td>Short circuit arc from mechanical damage</td>
<td>30 (8%)</td>
<td>0 (0%)</td>
<td>2 (7%)</td>
<td>$1 (9%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>80 (20%)</td>
<td>0 (0%)</td>
<td>11 (35%)</td>
<td>$3 (31%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>400 (100%)</td>
<td>18 (100%)</td>
<td>31 (100%)</td>
<td>$11 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>430 (107%)</td>
<td>18 (100%)</td>
<td>31 (100%)</td>
<td>$12 (105%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>370 (92%)</td>
<td>18 (100%)</td>
<td>29 (94%)</td>
<td>$9 (79%)</td>
</tr>
</tbody>
</table>

D. Detachable Power Cords and Plugs

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>100 (33%)</td>
<td>0 (0%)</td>
<td>7 (29%)</td>
<td>$6 (47%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>60 (22%)</td>
<td>0 (0%)</td>
<td>9 (38%)</td>
<td>$3 (22%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>30 (11%)</td>
<td>6 (100%)</td>
<td>2 (10%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Equipment overloaded</td>
<td>30 (10%)</td>
<td>0 (0%)</td>
<td>2 (10%)</td>
<td>$1 (8%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>110 (39%)</td>
<td>0 (0%)</td>
<td>9 (40%)</td>
<td>$5 (36%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>290 (100%)</td>
<td>6 (100%)</td>
<td>23 (100%)</td>
<td>$13 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>330 (114%)</td>
<td>6 (100%)</td>
<td>30 (127%)</td>
<td>$16 (117%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>240 (81%)</td>
<td>6 (100%)</td>
<td>18 (77%)</td>
<td>$11 (83%)</td>
</tr>
</tbody>
</table>
### Home Fires Involving Cords or Plugs, by Factor Contributing to Ignition (Continued)

**Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments**

*(Excluding Fires Reported as Confined Fires)*

#### E. Unclassified or Unknown-Type Cords and Plugs

<table>
<thead>
<tr>
<th>Factor</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified electrical failure or malfunction</td>
<td>210</td>
<td>0 (0%)</td>
<td>16 (40%)</td>
<td>$12 (53%)</td>
</tr>
<tr>
<td>Unspecified short circuit arc</td>
<td>80</td>
<td>0 (0%)</td>
<td>7 (17%)</td>
<td>$4 (19%)</td>
</tr>
<tr>
<td>Short circuit arc from defective or worn insulation</td>
<td>30</td>
<td>0 (0%)</td>
<td>6 (14%)</td>
<td>$2 (7%)</td>
</tr>
<tr>
<td>Equipment overloaded</td>
<td>20</td>
<td>0 (0%)</td>
<td>10 (25%)</td>
<td>$1 (3%)</td>
</tr>
<tr>
<td>Unclassified misuse of material</td>
<td>20</td>
<td>0 (0%)</td>
<td>10 (24%)</td>
<td>$1 (5%)</td>
</tr>
<tr>
<td>Other known factor contributing to ignition</td>
<td>100</td>
<td>7 (100%)*</td>
<td>4 (10%)</td>
<td>$6 (25%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>420</td>
<td>7 (100%)</td>
<td>41 (100%)</td>
<td>$23 (100%)</td>
</tr>
<tr>
<td>Total factor entries</td>
<td>470</td>
<td>7 (100%)</td>
<td>53 (130%)</td>
<td>$25 (111%)</td>
</tr>
<tr>
<td>All electrical failures or malfunctions</td>
<td>360</td>
<td>7 (100%)</td>
<td>29 (71%)</td>
<td>$22 (98%)</td>
</tr>
</tbody>
</table>

* The leading factor contributing to ignition for fire deaths not shown above is short circuit arc due to mechanical damage (100% of deaths).

Note: Multiple entries are allowed, resulting in more factor entries than fires. Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home structure fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.
### Home Fires Involving Cords or Plugs, by Item First Ignited

**Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments**  
(Excluding Fires Reported as Confined Fires)

#### A. All Cords and Plugs

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>970</td>
<td>42 (30%)</td>
<td>89 (43%)</td>
<td>$44 (38%)</td>
</tr>
<tr>
<td>Floor covering</td>
<td>270</td>
<td>16 (12%)</td>
<td>27 (13%)</td>
<td>$12 (10%)</td>
</tr>
<tr>
<td>Mattress or bedding</td>
<td>200</td>
<td>7 (5%)</td>
<td>29 (14%)</td>
<td>$8 (7%)</td>
</tr>
<tr>
<td>Upholstered furniture</td>
<td>160</td>
<td>37 (27%)</td>
<td>26 (13%)</td>
<td>$7 (6%)</td>
</tr>
<tr>
<td>Clothing</td>
<td>110</td>
<td>3 (2%)</td>
<td>2 (1%)</td>
<td>$4 (4%)</td>
</tr>
<tr>
<td>Interior wall covering</td>
<td>100</td>
<td>8 (6%)</td>
<td>7 (3%)</td>
<td>$4 (3%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>90</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$3 (3%)</td>
</tr>
<tr>
<td>Unclassified furniture or utensil</td>
<td>80</td>
<td>0 (0%)</td>
<td>5 (3%)</td>
<td>$3 (3%)</td>
</tr>
<tr>
<td>Appliance housing or casing</td>
<td>60</td>
<td>0 (0%)</td>
<td>6 (3%)</td>
<td>$2 (2%)</td>
</tr>
<tr>
<td>Cabinetry</td>
<td>60</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$5 (4%)</td>
</tr>
<tr>
<td>Unclassified structural component or finish</td>
<td>50</td>
<td>6 (4%)</td>
<td>0 (0%)</td>
<td>$2 (2%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>50</td>
<td>0 (0%)</td>
<td>4 (2%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Unclassified soft goods or clothing</td>
<td>50</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Multiple items first ignited</td>
<td>50</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>$3 (2%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>310</td>
<td>21 (15%)*</td>
<td>10 (5%)</td>
<td>$14 (12%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>2,620</td>
<td>139 (100%)</td>
<td>209 (100%)</td>
<td>$117 (100%)</td>
</tr>
</tbody>
</table>

* The leading item first ignited for fire deaths not shown above is Christmas tree (10% of deaths).
### B. Extension Cords

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>560 (37%)</td>
<td>35 (32%)</td>
<td>44 (39%)</td>
<td>$28 (40%)</td>
</tr>
<tr>
<td>Floor covering</td>
<td>190 (12%)</td>
<td>9 (9%)</td>
<td>17 (15%)</td>
<td>$9 (13%)</td>
</tr>
<tr>
<td>Mattress or bedding</td>
<td>120 (8%)</td>
<td>7 (7%)</td>
<td>19 (17%)</td>
<td>$4 (5%)</td>
</tr>
<tr>
<td>Upholstered furniture</td>
<td>100 (6%)</td>
<td>22 (20%)</td>
<td>21 (18%)</td>
<td>$3 (5%)</td>
</tr>
<tr>
<td>Clothing</td>
<td>80 (5%)</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>$2 (3%)</td>
</tr>
<tr>
<td>Interior wall covering</td>
<td>60 (4%)</td>
<td>8 (8%)</td>
<td>3 (2%)</td>
<td>$2 (3%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>40 (3%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$2 (2%)</td>
</tr>
<tr>
<td>Unclassified furniture or utensil</td>
<td>30 (2%)</td>
<td>0 (0%)</td>
<td>3 (2%)</td>
<td>$2 (3%)</td>
</tr>
<tr>
<td>Exterior wall covering</td>
<td>30 (2%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (1%)</td>
</tr>
<tr>
<td>Cabinetry</td>
<td>30 (2%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$3 (5%)</td>
</tr>
<tr>
<td>Box or bag</td>
<td>30 (2%)</td>
<td>3 (3%)</td>
<td>0 (0%)</td>
<td>$2 (2%)</td>
</tr>
<tr>
<td>Unclassified soft goods or clothing</td>
<td>30 (2%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Multiple items first ignited</td>
<td>130 (33%)</td>
<td>0 (0%)</td>
<td>7 (23%)</td>
<td>$4 (31%)</td>
</tr>
<tr>
<td>Papers</td>
<td>20 (1%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>160 (11%)</td>
<td>24 (22%)*</td>
<td>4 (4%)</td>
<td>$9 (13%)</td>
</tr>
<tr>
<td><strong>Total fires</strong></td>
<td>1,510 (100%)</td>
<td>108 (100%)</td>
<td>113 (100%)</td>
<td>$70 (100%)</td>
</tr>
</tbody>
</table>

* The leading items first ignited for fire deaths not shown above are Christmas tree (13% of deaths) and unclassified structural component (5%).

### C. Permanent Power Cords and Plugs

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>140 (35%)</td>
<td>3 (19%)</td>
<td>14 (45%)</td>
<td>$3 (28%)</td>
</tr>
<tr>
<td>Upholstered furniture</td>
<td>30 (7%)</td>
<td>8 (44%)</td>
<td>0 (0%)</td>
<td>$2 (18%)</td>
</tr>
<tr>
<td>Structural member or framing</td>
<td>30 (7%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (7%)</td>
</tr>
<tr>
<td>Floor covering</td>
<td>30 (7%)</td>
<td>7 (37%)</td>
<td>2 (6%)</td>
<td>$1 (9%)</td>
</tr>
<tr>
<td>Mattress or bedding</td>
<td>20 (6%)</td>
<td>0 (0%)</td>
<td>6 (19%)</td>
<td>$0 (4%)</td>
</tr>
<tr>
<td>Appliance housing or casing</td>
<td>20 (5%)</td>
<td>0 (0%)</td>
<td>2 (7%)</td>
<td>$0 (4%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>130 (33%)</td>
<td>0 (0%)</td>
<td>7 (23%)</td>
<td>$4 (31%)</td>
</tr>
<tr>
<td><strong>Total fires</strong></td>
<td>400 (100%)</td>
<td>18 (100%)</td>
<td>31 (100%)</td>
<td>$11 (100%)</td>
</tr>
</tbody>
</table>
### D. Detachable Power Cords and Plugs

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>120 (42%)</td>
<td>4 (58%)</td>
<td>14 (60%)</td>
<td>$8 (57%)</td>
</tr>
<tr>
<td>Mattress or bedding</td>
<td>30 (11%)</td>
<td>0 (0%)</td>
<td>2 (8%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>140 (47%)</td>
<td>3 (42%)*</td>
<td>7 (32%)</td>
<td>$5 (39%)</td>
</tr>
<tr>
<td><strong>Total fires</strong></td>
<td>290 (100%)</td>
<td>6 (100%)</td>
<td>23 (100%)</td>
<td>$13 (100%)</td>
</tr>
</tbody>
</table>

* The leading item first ignited for fire deaths not shown above is clothing (42% of deaths).

### E. Unclassified or Unknown-Type Cords and Plugs

<table>
<thead>
<tr>
<th>Item First Ignited</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire or cable insulation</td>
<td>140 (35%)</td>
<td>0 (0%)</td>
<td>16 (40%)</td>
<td>$5 (22%)</td>
</tr>
<tr>
<td>Floor covering</td>
<td>40 (8%)</td>
<td>0 (0%)</td>
<td>8 (18%)</td>
<td>$1 (4%)</td>
</tr>
<tr>
<td>Unclassified structural component or finish</td>
<td>20 (6%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (1%)</td>
</tr>
<tr>
<td>Mattress or bedding</td>
<td>20 (5%)</td>
<td>0 (0%)</td>
<td>2 (6%)</td>
<td>$4 (16%)</td>
</tr>
<tr>
<td>Unclassified item first ignited</td>
<td>20 (5%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (6%)</td>
</tr>
<tr>
<td>Other known item first ignited</td>
<td>170 (41%)</td>
<td>7 (100%)*</td>
<td>15 (35%)</td>
<td>$12 (51%)</td>
</tr>
<tr>
<td><strong>Total fires</strong></td>
<td>420 (100%)</td>
<td>7 (100%)</td>
<td>41 (100%)</td>
<td>$23 (100%)</td>
</tr>
</tbody>
</table>

* The leading item first ignited for fire deaths not shown above is upholstered furniture (100% of deaths).

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported to confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home structure fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.
Home Fires Involving Cords or Plugs, by Area of Origin
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Cords and Plugs

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires (%)</th>
<th>Civilian Deaths (%)</th>
<th>Civilian Injuries (%)</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>920 (35%)</td>
<td>30 (21%)</td>
<td>80 (38%)</td>
<td>$37 (31%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>460 (18%)</td>
<td>64 (46%)</td>
<td>50 (24%)</td>
<td>$22 (19%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>190 (7%)</td>
<td>7 (5%)</td>
<td>11 (5%)</td>
<td>$11 (10%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>180 (7%)</td>
<td>3 (2%)</td>
<td>4 (2%)</td>
<td>$6 (5%)</td>
</tr>
<tr>
<td>Garage*</td>
<td>110 (4%)</td>
<td>0 (0%)</td>
<td>4 (2%)</td>
<td>$5 (4%)</td>
</tr>
<tr>
<td>Laundry room or area</td>
<td>110 (4%)</td>
<td>4 (3%)</td>
<td>4 (2%)</td>
<td>$2 (2%)</td>
</tr>
<tr>
<td>Crawl space or substructure space</td>
<td>60 (2%)</td>
<td>4 (3%)</td>
<td>9 (4%)</td>
<td>$5 (4%)</td>
</tr>
<tr>
<td>Wall assembly or concealed space</td>
<td>50 (2%)</td>
<td>4 (3%)</td>
<td>0 (0%)</td>
<td>$2 (1%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>550 (21%)</td>
<td>23 (16%)**</td>
<td>47 (23%)</td>
<td>$28 (24%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>2,620 (100%)</td>
<td>139 (100%)</td>
<td>209 (100%)</td>
<td>$117 (100%)</td>
</tr>
</tbody>
</table>

* Excludes residential garage reported as separate property.

** The leading area of origin for fire deaths not shown above is office (8% of deaths).

B. Extension Cords

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires (%)</th>
<th>Civilian Deaths (%)</th>
<th>Civilian Injuries (%)</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>560 (37%)</td>
<td>26 (24%)</td>
<td>54 (48%)</td>
<td>$21 (30%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>270 (18%)</td>
<td>54 (50%)</td>
<td>29 (26%)</td>
<td>$14 (20%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>120 (8%)</td>
<td>0 (0%)</td>
<td>5 (4%)</td>
<td>$8 (11%)</td>
</tr>
<tr>
<td>Garage*</td>
<td>70 (5%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$3 (5%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>70 (4%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$3 (4%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>420 (27%)</td>
<td>28 (26%)**</td>
<td>25 (22%)</td>
<td>$22 (31%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>1,510 (100%)</td>
<td>108 (100%)</td>
<td>113 (100%)</td>
<td>$70 (100%)</td>
</tr>
</tbody>
</table>

* Excludes residential garage reported as separate property.

** The leading areas of origin for fire deaths not shown above are office (11% of deaths) and courtyard, terrace or patio (5%).
### C. Permanent Power Cords and Plugs

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>120</td>
<td>0 (0%)</td>
<td>15 (49%)</td>
<td>$3 (23%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>70</td>
<td>3 (19%)</td>
<td>4 (14%)</td>
<td>$2 (15%)</td>
</tr>
<tr>
<td>Living room, family room or den</td>
<td>60</td>
<td>4 (20%)</td>
<td>0 (0%)</td>
<td>$2 (19%)</td>
</tr>
<tr>
<td>Laundry room</td>
<td>30</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (2%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>130</td>
<td>11 (61%)*</td>
<td>12 (38%)</td>
<td>$5 (41%)</td>
</tr>
<tr>
<td><strong>Total fires</strong></td>
<td>400</td>
<td>18 (100%)</td>
<td>31 (100%)</td>
<td>$11 (100%)</td>
</tr>
</tbody>
</table>

* The leading areas of origin for fire deaths not shown above are unclassified function area (37% of deaths) and wall assembly or concealed space (24%).

### D. Detachable Power Cords and Plugs

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>90</td>
<td>4 (58%)</td>
<td>6 (27%)</td>
<td>$2 (11%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>50</td>
<td>0 (0%)</td>
<td>4 (18%)</td>
<td>$2 (12%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>30</td>
<td>0 (0%)</td>
<td>2 (8%)</td>
<td>$3 (19%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>20</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$0 (3%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>110</td>
<td>3 (42%)*</td>
<td>11 (47%)</td>
<td>$7 (55%)</td>
</tr>
<tr>
<td><strong>Total fires</strong></td>
<td>290</td>
<td>6 (100%)</td>
<td>23 (100%)</td>
<td>$13 (100%)</td>
</tr>
</tbody>
</table>

* The leading area of origin for fire deaths not shown above is unclassified structural area (42% of deaths).
### E. Unclassified or Unknown-Type Cords and Plugs

<table>
<thead>
<tr>
<th>Area of Origin</th>
<th>Fires (%)</th>
<th>Civilian Deaths</th>
<th>Civilian Injuries</th>
<th>Direct Property Damage (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom</td>
<td>150 (36%)</td>
<td>0 (0%)</td>
<td>4 (10%)</td>
<td>$12 (51%)</td>
</tr>
<tr>
<td>Living room, family room, or den</td>
<td>80 (20%)</td>
<td>7 (100%)</td>
<td>16 (39%)</td>
<td>$5 (21%)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>30 (7%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>$1 (6%)</td>
</tr>
<tr>
<td>Unclassified function area</td>
<td>30 (7%)</td>
<td>0 (0%)</td>
<td>4 (10%)</td>
<td>$1 (2%)</td>
</tr>
<tr>
<td>Other known area of origin</td>
<td>130 (30%)</td>
<td>0 (0%)</td>
<td>16 (40%)</td>
<td>$5 (20%)</td>
</tr>
<tr>
<td>Total fires</td>
<td>420 (100%)</td>
<td>7 (100%)</td>
<td>41 (100%)</td>
<td>$23 (100%)</td>
</tr>
</tbody>
</table>

Note: Figures exclude confined fires, which are not considered relevant to these types of equipment, because these are fires reported as confined to fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as electrical distribution or lighting equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home structure fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.
Appendix A.
How National Estimates Statistics Are Calculated

The statistics in this analysis are estimates derived from the U.S. Fire Administration’s (USFA’s) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association’s (NFPA’s) annual survey of U.S. fire departments. NFIRS is a voluntary system by which participating fire departments report detailed factors about the fires to which they respond. Roughly two-thirds of U.S. fire departments participate, although not all of these departments provide data every year.

NFIRS provides the most detailed incident information of any national database not limited to large fires. NFIRS is the only database capable of addressing national patterns for fires of all sizes by specific property use and specific fire cause. NFIRS also captures information on the extent of flame spread, and automatic detection and suppression equipment. For more information about NFIRS visit http://www.nfirs.fema.gov/. Copies of the paper forms may be downloaded from http://www.nfirs.fema.gov/_download/nfirspaperforms2007.pdf.

Each year, NFPA conducts an annual survey of fire departments which enables us to capture a summary of fire department experience on a larger scale. Surveys are sent to all municipal departments protecting populations of 50,000 or more and a random sample, stratified by community size, of the smaller departments. Typically, a total of roughly 3,000 surveys are returned, representing about one of every ten U.S. municipal fire departments and about one third of the U.S. population.

The survey is stratified by size of population protected to reduce the uncertainty of the final estimate. Small rural communities have fewer people protected per department and are less likely to respond to the survey. A larger number must be surveyed to obtain an adequate sample of those departments. (NFPA also makes follow-up calls to a sample of the smaller fire departments that do not respond, to confirm that those that did respond are truly representative of fire departments their size.) On the other hand, large city departments are so few in number and protect such a large proportion of the total U.S. population that it makes sense to survey all of them. Most respond, resulting in excellent precision for their part of the final estimate.

The survey includes the following information: (1) the total number of fire incidents, civilian deaths, and civilian injuries, and the total estimated property damage (in dollars), for each of the major property use classes defined in NFIRS; (2) the number of on-duty firefighter injuries, by type of duty and nature of illness; and (3) information on the type of community protected (e.g., county versus township versus city) and the size of the population protected, which is used in the statistical formula for projecting national totals from sample results. The results of the survey are published in the annual report Fire Loss in the United States. To download a free copy of the report, visit http://www.nfpa.org/assets/files/PDF/OS.fireloss.pdf.
Projecting NFIRS to National Estimates
As noted, NFIRS is a voluntary system. Different states and jurisdictions have different reporting requirements and practices. Participation rates in NFIRS are not necessarily uniform across regions and community sizes, both factors correlated with frequency and severity of fires. This means NFIRS may be susceptible to systematic biases. No one at present can quantify the size of these deviations from the ideal, representative sample, so no one can say with confidence that they are or are not serious problems. But there is enough reason for concern so that a second database - the NFPA survey - is needed to project NFIRS to national estimates and to project different parts of NFIRS separately. This multiple calibration approach makes use of the annual NFPA survey where its statistical design advantages are strongest.

Scaling ratios are obtained by comparing NFPA’s projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific fire problems and circumstances are obtained by multiplying the NFIRS data by the scaling ratios.

Analysts at the NFPA, the USFA and the Consumer Product Safety Commission have developed the specific analytical rules used for this procedure. "The National Estimates Approach to U.S. Fire Statistics," by John R. Hall, Jr. and Beatrice Harwood, provides a more detailed explanation of national estimates. A copy of the article is available online at http://www.nfpa.org/osds or through NFPA's One-Stop Data Shop.

Version 5.0 of NFIRS, first introduced in 1999, used a different coding structure for many data elements, added some property use codes, and dropped others.
Figure 1.

Fires Originally Collected in NFIRS 5.0 by Year

- 1999: 7%
- 2000: 21%
- 2001: 48%
- 2002: 65%
- 2003: 79%
- 2004: 88%
- 2005: 94%
Appendix B – What Is an Electrical Fire?

There are several possible approaches to estimating the electrical part of the home fire problem.

The most direct and inclusive approach is to identify fires that began because of some type of electrical failure or malfunction. Version 5.0 of the National Fire Incident Reporting System (NFIRS), first introduced in 1999, introduced many changes in data classifications, definitions, and rules. Among those changes was the creation of an Electrical Failure or Malfunction section in the Factor Contributing to Ignition data element.

Prior to the introduction of NFIRS Version 5.0, the greatest detail on electrical failures was in the Heat Source field, which had 10 categories defined by different failure modes for electrical equipment plus two additional categories for properly or improperly operating electrical equipment and a thirteenth category for electric lamp or light bulb. Because Heat Source also had two categories each for gas-fueled, liquid-fueled, and solid-fueled equipment, the Heat Source field was primarily used to distinguish equipment fires by type of fuel or power.

NFIRS Version 5.0 provides a separate field on Equipment Power, which means it is no longer necessary to use Heat Source codes as a proxy for this purpose. The Heat Source field has removed the 13 categories that had referred to electrical equipment and added one category for electrical arcing. Seven of the 13 categories that used to be in the Electrical Equipment section of Heat Source are now in an Electrical Failure or Malfunction section of the Factor Contributing to Ignition field. Six of the seven (excluding fluorescent light ballast) are defined by some type of arcing. The former Heat Source category of overloaded equipment within the Electrical Equipment section is now an equipment overloaded category applicable to any type of equipment and located within the Operational Deficiency section of Factor Contributing to Ignition. The other five electrical-related categories – electric lamp or light bulb, properly or improperly operating electrical equipment, and unclassified or unknown-type electrical equipment – either no longer exist or are now represented by the “other” (unclassified or unknown-type) electrical failure or malfunction category.

The unclassified and unknown-type electrical equipment categories that were in Heat Source prior to 1999 both referenced “heat from electrical equipment arcing or overloaded.” This phrasing provided a subtle reminder that not all electrical ignitions involve arcing. Overloaded circuits can overheat and ignite nearby combustibles without arcing. The new unclassified and unknown-type electrical failure or malfunction includes no such reminder but is not limited to arcing.

The Heat Source category of electrical arcing results in an estimate 38% lower than the 2003-2006 non-confined home fires estimate for electrical failure or malfunction. If fires with Heat Source coded as unclassified or unknown-type within the Operating Equipment section of Heat Source, which includes electrical arcing, are proportionally allocated over the section, the adjusted electrical arcing estimate is still 14% lower than the 2003-2006 estimate based on electrical failure or malfunction as a factor contributing to ignition. Because the latter also includes more detail on the failure mode resulting in arcing, this report does not use the electrical...
arcing category in Heat Source as the basis of estimates of the size of the electrical failure problem.

In previous years, NFPA analysis of home electrical fires focused on fires where some type of electrical distribution or lighting equipment was the equipment involved in ignition. This approach was not so inclusive as direct analysis of all electrical failures but could be executed more cleanly than the more inclusive approach prior to the introduction of Version 5.0 of NFIRS.

Prior to 1999, NFIRS had 10 electrical distribution equipment categories, including separate categories for unclassified and unknown-type equipment. There was also an eleventh category (rectifier, charger, inverter, battery) that was outside the electrical distribution equipment group prior to NFIRS Version 5.0 but moved into that group as part of the Version 5.0 changes.

In NFIRS Version 5.0, there are 40 distinct electrical distribution or lighting equipment categories. One is for unclassified or unknown-type equipment and is normally proportionally distributed over the other categories for analysis purposes, as was done with the unknown-type category (but not the unclassified category) prior to 1999. There are also three categories for unclassified or unknown-type wiring or related equipment, lighting equipment, or cords or plugs, respectively. These three categories had also been proportionally allocated in the 2008 report in this series but are now kept separate.
9-25 Log #2532 NEC-P09
(314.17(D) (New))

Final Action: Reject

Submitter: Daniel J. Kissane, Pass & Seymour/Legrand
Comment on Proposal No: 9-51
Recommendation: The panel should accept the proposal as a new section 314.17(E) with the text of the original proposal revised as follows:

(D) Protection During Construction. Where outlet or device boxes are secured in place prior to the application of the surface finish and arranged for flush mounting in drywall, the open fronts shall be covered to prevent conductor damage during the surface application construction activities with protective plates identified for this purpose and marked “Not for Permanent Installation.”

Substantiation: As a manufacturer of both flush device boxes and the wiring devices that are installed in the boxes, we are familiar with field reports of both damaged conductors and debris that is left in the box as a result of finishing operations. The devices installed in these boxes are not simply receptacles and mechanical switches, but also receptacle and switch snap in connectors and control and protective devices that are of electronic design, such as, GFCIs, TVSS, dimmers, and occupancy sensors. It is important to be certain that these products are not contaminated due to foreign materials in the enclosure.

The proposal has been revised to provide a less prescriptive requirement. The requirement now states that the open front shall be covered without specifying the specific means for meeting the requirement.

Panel Meeting Action: Reject

Panel Statement: CMP 9 agrees with the importance of keeping the foreign materials out of the boxes during the rough-in phase of construction process. The NEC deals adequately with this issue in 110.12(B). If it becomes necessary to cover the conductors, there are many acceptable methods to accomplish that task including commercial products for the purpose.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
11-51 Log #1084 NEC-P11 (430.24 Exception No. 3) Final Action: Reject

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:

Where the circuitry is interlocked so as to prevent simultaneous operation of selected motors or other loads at the same time, the conductor ampacity shall be permitted to be based on the summation of 125 percent of the largest motor or continuous load, whichever is larger, and the currents of the other motors and other loads to be operated simultaneously, at the same time, that results in the highest current.

Substantiation: Edit. Proposal clarifies that the 125 percent factor is to be applied.

Panel Meeting Action: Reject

Panel Statement: It is the panel's intent to require 125 percent of the largest motor, plus 125 percent of the continuous load for those loads operating simultaneously. No technical substantiation has been provided to the panel for only requiring 125 percent for the largest of the motor or the continuous load. See panel action and statement on 11-48a.

Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

BUNCH, R.: This proposal deals with exception 3 in 430.34. Panel action 11-48a only reworded 430.22 rules for a single motor. This is several motors and other loads, not a single motor so the panel action for 11-48a does not apply. The exception cited is still allowed in 430.24. This proposal was only to clarify for circuit with interlocks and should be accepted.

Comment on Affirmative:

FAHEY, R.: The panel statement referring to proposal 11-48a was incorrectly referenced; the correct panel action and statement should have been 11-50a.

SAUNDERS, L.: Panel statement improperly refers to "see panel action and comment on 11-48a" and should refer to 11-50a.
11-48a Log #CP1100 NEC-P11

(430.22)

**Final Action:** Accept

**Submitter:** Code-Making Panel 11,

**Recommendation:** Delete 430.22 in its entirety and replace with:

430.22 Single Motor.

Conductors that supply a single motor used in a continuous duty application shall have an ampacity of not less than 125 percent of the motor full load current rating as determined by 430.6(A)(1), or not less than the following:

(A) DC Motors-Rectifier Supplied. For dc motors operating from a rectified power supply, the conductor ampacity on the input of the rectifier shall not be less than 125 percent of the rated input current to the rectifier. For dc motors operating from a rectified single-phase power supply, the conductors between the field wiring output terminals of the rectifier and the motor shall have an ampacity of not less than the following percentage of the motor full-load current rating:

(a) Where a rectifier bridge of the single-phase half-wave type is used, 190 percent.

(b) Where a rectifier bridge of the single-phase full-wave type is used, 150 percent.

(B) Multispeed Motor. For a multispeed motor, the selection of branch-circuit conductors on the line side of the controller shall be based on the highest of the full-load current ratings shown on the motor nameplate. The ampacity of the branch-circuit conductors between the controller and the motor shall not be less than 125 percent of the current rating of the winding(s) that the conductors energize.

(C) Wye-Start, Delta-Run Motor. For a wye-start, delta-run connected motor, the ampacity of the branch-circuit conductors on the line side of the controller shall not be less than 125 percent of the motor full-load current as determined by 430.6(A)(1). The ampacity of the conductors between the controller and the motor shall not be less than 72 percent of the motor full-load current rating as determined by 430.6(A)(1).

FPN: The individual motor circuit conductors of a wye-start, delta-run connected motor carry 58 percent of the rated load current. The multiplier of 72 percent is obtained by multiplying 58 percent by 1.25.

(D) Part-Winding Motor. For a part-winding connected motor, the ampacity of the branch-circuit conductors on the line side of the controller shall not be less than 125 percent of the motor full-load current as determined by 430.6(A)(1). The ampacity of the conductors between the controller and the motor shall not be less than 62.5 percent of the motor full-load current rating as determined by 430.6(A)(1).

FPN: The multiplier of 62.5 percent is obtained by multiplying 50 percent by 1.25.

(E) Other Than Continuous Duty. Conductors for a motor used in a short-time, intermittent, periodic, or varying duty application shall have an ampacity of not less than the percentage of the motor nameplate current rating shown in Table 430.22(E), unless the authority having jurisdiction grants special permission for conductors of lower ampacity.

****Insert Existing Table 430.22(E) Duty-Cycle Service****

Note: Any motor application shall be considered as continuous duty unless the nature of the apparatus it drives is such that the motor will not operate continuously with load under any condition of use.

(F) Separate Terminal Enclosure. The conductors between a stationary motor rated 1 hp or less and the separate terminal enclosure permitted in 430.245(B) shall be permitted to be smaller than 14 AWG but not smaller than 18 AWG, provided they have an ampacity as specified in 430.22.

**Substantiation:** The panel has rewritten the section to provide more clarity, to correlate the wye-start, delta-run motors with other sections and to provide some additional information for dc motors.

**Panel Meeting Action:** Accept

**Number Eligible to Vote:** 15

**Ballot Results:** Affirmative: 15
Subject: Content of Appeal to NFPA re CAM 70-12

Mary,

I oppose the proposed new text. I oppose requiring the temporary covers to be marked. It should be permissable to use temporary cover that is obviously temporary without marking. It should be clear that temporary cover need not be labeled, marked, listed, or approved. I oppose requiring protection from power routers. This would require a purpose made cover. It should be sufficient to use duct tape.

I will not be in attendance at the meeting.

Billy Breitkreutz
281-263-2998
ASSOCIATION AMENDMENT
BALLOT RESULTS

DATE: July 13, 2010

Document: NFPA 70®, National Electrical Code®

Motion: To Return a portion of the Report in the form of Proposal 11-107a and related Comments 11-43a, 11-44, 11-45, 11-46, and 11-47

NEC TCC FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS achieved the necessary 3/4 majority vote needed to recommend approval of the Association Action by the Technical Correlating Committee.

The number of affirmative votes needed for the report to be published is 9.

\[12 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 11 \times 0.75 = 8.25\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[12 \text{ eligible} \div 2 = 6 + 1 = 7\text{ (this is the simple majority)}\]

12 Eligible to Vote
1 Not Returned (Drake)

11 Agree
0 Do Not Agree
0 Abstain

Final Action: PASS

CMP-11 FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS achieved the necessary 2/3 majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the amendment to be issued is 10.

\[15 \text{ (eligible to vote)} - 0 \text{ (not returned)} - 0 \text{ (abstentions)} = 15 \times 0.66 = 9.9\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[15 \text{ eligible} \div 2 = 7.5 = 8\text{ (this is the simple majority)}\]

15 Eligible to Vote
0 Not Returned

15 Agree
0 Do Not Agree
0 Abstentions

Final Action: PASS
11-107a Log #CP1102 NEC-P11 Final Action: Accept (430.123)

Submitter: Code-Making Panel 11,
Recommendation: Revise text to read as follows:

430.123 Branch Circuit Short-Circuit and Ground Fault Protection.
(A) Drive Protection and Markings. The branch circuit short-circuit and
ground-fault protection for a circuit supplying power conversion equipment
shall be of the type and size specified by the manufacturer’s instructions
provided with the power conversion equipment. When the instructions do not
specify the type and size, a branch-circuit fuse or inverse-time circuit breaker
shall be used and shall be sized based upon the input current rating of the power
conversion equipment multiplied by the percentage from Table 430.52.

Exception No. 1: Additional branch circuit short-circuit and ground-fault
protection is not required for power conversion equipment where provided with
integral branch circuit rated protection such as: an inverse-time circuit breaker,
branch-circuit fuses or semiconductor fuses, as provided in section 430.52(C)
(5), in all ungrounded input conductors.

Exception No. 2: Unless specified in the manufacturer’s instructions supplied
with the power conversion equipment, “common dc bus” power conversion
equipment is not required to have individual branch circuit protective devices
installed in the dc input conductors.

(B) Drive and Bypass Protection. Where a branch circuit short-circuit and
ground-fault protective device provides protection for both the adjustable speed
drive system and a bypass circuit, the specific branch circuit protective device
and its ratings or settings must not exceed those marked on the adjustable speed
drive controller. Where the bypass circuit requires a different branch circuit
short-circuit and ground-fault protective device, ratings or settings other than
those marked on the adjustable speed drive controller, then separate branch
circuit short-circuit and ground-fault protection shall be provided for both the
adjustable speed drive controller and bypass circuit.

Substantiation: The panel has incorporated the intent of the submitters of both
11-108 and 11-110.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

Proposals to Substantiation in Proposal 11-107a

11-108 Log #4405 NEC-P11 Final Action: Accept in Principle (430.123)

Submitter: Jay Tamblingson, Rockwell Automation
Recommendation: Add new paragraph 430.123 as follows:

430.123 Branch Short-Circuit and Ground Fault Protection. The branch
short-circuit and group fault protection for a circuit supplying power
conversion equipment shall be of the type and size specified by the
manufacturer’s instructions provided with the power conversion equipment.
When the instructions do not specify the type and size, a branch-circuit fuse
or inverse-time circuit breaker shall be used and shall be sized based upon
the input current rating of the power conversion equipment multiplied by the
percentage from Table 430.52.

Exception No. 1: Additional branch short-circuit and ground-fault protection
is not required for a power conversion equipment provided with integral inverse-
time circuit breaker, branch-circuit, or semiconductor fuses in all ungrounded
input conductors.

Exception No. 2: Unless specified in the manufacturer’s instructions supplied
with the power conversion equipment, “common dc bus” power conversion
equipment is not required to have individual branch circuit protective devices
installed in the dc input conductors.

Substantiation: Existing language in Article 430 does not specifically address
how to select the branch circuit protection for power conversion equipment.
As such, questions often arise as to acceptable types of devices and sizing.
The proposed language is directly adapted from the language in UL 508A Paragraph
31.3.2 which provides the needed clarity.

Panel Meeting Action: Accept in Principle
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15


11-43a Log #CC1100 NEC-P11 Final Action: Accept (430-123)

TCC Action: The Technical Correlating Committee directs that in
Exception No. 1, the words “as permitted in” be inserted preceding
“430.52(C)(5)”, and the brackets be removed, from the section reference to
comply with the NEC Style Manual.

The Technical Correlating Committee further directs that in (B) the word “it” be replaced with the word “where” in 2 places to comply with the
NEC Style Manual.

Submitter: Code-Making Panel 11,
Comment on Proposal No: 11-107a
Recommendation: Revise 430.123 to read as follows:

430.123 Branch Circuit Short-Circuit and Ground Fault Protection.
(A) Drive Protection and Markings. The branch circuit short-circuit and
ground-fault protection for a circuit supplying an adjustable-speed drive system
shall be of a type and amperage rating or setting not exceeding that specified
by the manufacturer’s instructions provided with the adjustable-speed drive
system. If the instructions do not specify a type and amperage rating or setting,
a branch-circuit fuse or inverse-time circuit breaker shall be used and shall

be sized in accordance with 430.52 based upon the input current rating of the adjustable-speed drive system. The rating or setting of the overcurrent protective device shall not exceed that allowed by 430.52.

Exception No. 1: Additional branch circuit short-circuit and ground-fault protection for an adjustable-speed drive system is not required if the adjustable-speed drive system is provided with integral branch circuit rated protection such as: an inverse-time circuit breaker, ground-fault protective device shall be permitted to provide protection for both the adjustable-speed drive system and the bypass circuit.

Substantiation: The panel has modified the language accepted by Proposal 11-107a to incorporate the changes accepted in the actions on Comments 11-44, 45, 46 and 47. The panel has included additional revisions for clarity.

Panel Meeting Action: Accept Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-44 Log #1240 NEC-P11 Final Action: Accept in Principle in Part (430.123)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Comment on Proposal No: 11-107a
Recommendation: The following statement should be added as the last sentence for the paragraph under (A).

“In no event shall the rating or setting of the overcurrent protective device exceed that allowed by 430.52.”

Exception 2 should be deleted.

Substantiation: This will prevent manufacturers from specifying oversized overcurrent devices that will not provide the protection for the conductors required by 430.52. It reinserts the proposed sentence from proposal 11-110 for the end of article 430.130(A).

Exception 2 should be deleted.

Substantiation: This will prevent manufacturers from specifying oversized overcurrent devices that will not provide the protection for the conductors required by 430.52. It reinserts the proposed sentence from proposal 11-110 for the end of article 430.130(A).

11-45 Log #1715 NEC-P11 Final Action: Accept in Principle in Part (430.123)

Submitter: Lori L. Tennant, Schneider Electric North America
Comment on Proposal No: 11-107a
Recommendation: The following statement should be added as the last sentence for the paragraph under (A).

“In no event shall the rating or setting of the overcurrent protective device exceed that allowed by 430.52.”

Exception 2 should be deleted.

Substantiation: This will prevent manufacturers from specifying oversized overcurrent devices that will not provide the protection for the conductors required by 430.52. It reinserts the proposed sentence from proposal 11-110 for the end of article 430.130(A).

Exception 2 should be deleted.

Substantiation: This will prevent manufacturers from specifying oversized overcurrent devices that will not provide the protection for the conductors required by 430.52. It reinserts the proposed sentence from proposal 11-110 for the end of article 430.130(A).

11-46 Log #2612 NEC-P11 Final Action: Accept (430.123)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Comment on Proposal No: 11-107a
Recommendation: Accept the proposal in principle.

Substantiation: This is a NEC Style Manual issue; “shall not exceed” is the correct terminology.

Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-47 Log #2813 NEC-P11 Final Action: Accept in Principle in Part (430.123)

Submitter: Jay Tamblingon, Rockwell Automation
Comment on Proposal No: 11-107a
Recommendation: Revise accepted new text as follows:

(430.123) Branch Circuit Short-Circuit and Ground Fault Protection.
(A) Drive Protection and Markings. The branch circuit short-circuit and ground-fault protection for a circuit supplying power conversion equipment shall be of the type and maximum size specified by the manufacturer’s instructions provided with the power conversion equipment. If the instructions do not specify the type and size of the branch-circuit fuse or inverse-time circuit breaker, the instructions provided with the power conversion equipment, with the size not to exceed that permitted under Article 430 Part IV for the type of device selected.

B) Drive and Bypass Protection. For an adjustable speed drive system that includes a bypass device, where a common branch circuit short-circuit and ground-fault protective device shall be permitted to provide protection for both the adjustable-speed drive system and the bypass circuit, where the specific branch circuit protective device and its ratings or settings is selected must not to exceed those marked on the adjustable speed drive controller that permitted under Article 430.123(A) for the power conversion equipment and that permitted under Article 430 Part IV for the bypass circuit.

Relative to rejection to delete Exception No. 2, common adjustable-speed drive system topography utilizes multiple “cell” technology which converts drive input AC to DC which is isolated in each individual cell and protected by cell DC bus protection that trips the short circuit protective device feeding the drive in the event of a short circuit or other DC “out of limit” value such as overvoltage or undervoltage. This technology feeds a single motor and not multiple motors.

Number Eligible to Vote: 15
Ballot Results: Affirmative: 15
Panel Meeting Action: Accept in Principle in Part - The panel rejects the proposed references to Part IV in 430.123(A) and (B), and the language associated with “Listed common dc bus” in Exception No. 2. The panel accepts in principle the remainder of the recommendation with revisions for clarity.

Panel Statement: See recommendation on Comment 11-43a.

The panel rejected the reference to “430 Part IV” as the sizing of the short circuit and ground fault protection is specifically given in 430.52, the remainder of Part IV is not pertinent to the sizing requirements required by this Code section.

The panel rejected the language associated with “Listed common dc bus” in Exception No. 2 because those products are not always listed and drive topography does not always require additional dc bus overcurrent protection.

Number Eligible to Vote: 15
Ballot Results: Affirmative: 15
1 Thank you.
2 All opposed?
3 Motion fails.
4 We'll move on to Motion Sequence Number 70-16.
5 Microphone 5.
6 MS. TENNANT: Thank you. I'm Lori Tennant with Schneider Electric. I am one of the submitters on certified amending Motion 70-16.
7 Mr. Chairman, I would like to make the motion to return a portion of a report in the form of a proposal, 11-107a and related Comment 11-43a, 11-44, 11-45, 11-46, and 11-47.
8 MR. BELL: You said that very well. I'm not going to repeat it. Is there a second?
9 MS. TENNANT: Thank you.
10 UNIDENTIFIED SPEAKER: Second.
11 MR. BELL: Please proceed.
12 MS. TENNANT: Thank you. Part 10 of Article 430 addresses the overcurrent protection that drives in conductors. Simply, if a new language of 430.123 is included in the code, it will allow larger overcurrent protectors devices than those the drawing is tested and evaluated for.
13 Also, if included, the code would be in conflict with the product standards -- per drives. So I
am requesting that my motion be supported.

Thank you.

MR. BELL: Thank you, Mr. Carpenter.

MR. CARPENTER: I'd like to defer to chairman of Panel 11, Wayne Brinkmeyer.

MR. BRINKMEYER: Thank you, Mr. Chairman.

Wayne Brinkmeyer, Chair of Code Making Panel, Panel 11, and I speak in support of the committee action.

Two proposals: 11-108 and 11-110 were submitted and CMP 11 recommending language to be added to wit: "Address Branch Short-Circuit and Ground Fault Protection requirements for adjustable speed drives," thereby, creating a new section 431.3.

A CMP 11 incorporating intent of the recommendations of both proposals by creating panel proposal 11-107A. CMP 11 concluded that the panel proposal was the best way to capture the recommendation of both proposals which address -- address the same subject.

It's actually recorded in the ballot on Proposal 11-107A was fifteen to zero in the affirmative.

During the ROC meeting, CMP 11 developed Panel 11-43A in an effort to modify the language accepted by Panel Proposal 11-107a to incorporate -- incorporate the recommended changes accepted in the actions in the
actions on Comments 11-44, 45, 46, and 47.

CMP also included additional revisions for clarity. The action recorded in the ballot on Comment 43a was fifteen to zero unanimously affirmative.

Thank you.

MR. BELL: Thank you. Further discussion.

Microphone 5.

MR. KOVACIK: Thank you, Mr. Chair. I am John Kovacik; Underwriters Laboratories, and I'm speaking as the representative for the Electrical Section of the National Fire Protection Association, and I speak in support of the motion.

The Electrical Section met earlier this week and at that meeting the members of the Section voted to support the motion on the floor.

Thank you.


MR. TAMBLINGSON: Good afternoon, Mr. Chairman. I am Jay Tamblingson with Rockwell Automation. I'm speaking in support of the motion.

I'm also one of the submitters of one of the original proposals that 11-107a was based on as well as one of the Comments. This new section 431-23 is intended to clarify the requirements for the selection of ground short-circuit and ground fault protection for
1 adjustable speed drives.

   However, review of the final language has revealed some unintended consequences. The primary issue is that the provisions in the second sentence reference size of protection based on the input current to the drive.

   Further review after the ROC has shown that this is inconsistent with the listing requirements for drives as the current ratings of protective devices for testing are based on the output current of the drives as it is common for drives to have fire input currents than output currents.

   Sizing protection based on this higher input current could result in selection of a fuse or circuit breaker exceeding that for which a drive was tested.

   This clearly was not intended.

   This issue was meant -- was missed during the ROC process and any specific language to address it was not included in live or any ROC comments submitted to the panel. As such, I'm asking the membership vote in favor of the motion to return the section.

   Thank you.

MR. BELL: Thank you. Microphone 5.

MR. SAPARENA: Vince Saparena (phonetic);

Cooper Bussmann speaking in favor of the motion. I sit
on Code Panel 11.

Basically, we didn't look at this aspect of the requirements that we voted into place. If we had looked at this aspect of it, we wouldn't have passed.

In reality, what this would do is it would allow people to apply drives with overcurrent devices larger than those with which the devices had been tested, and that's something we don't want to do from a safety standpoint.

So I urge you to support this.

MR. BELL: Thank you. Microphone 1.

MR. ODIE: Mike Odie, Underwriters Laboratories, in support of the motion.

I think if you go back and look at the -- the new part 10, we reorganized that a couple code cycles ago and moved all of the -- of the adjustable speed drive information back to part 10.

The -- the opening 431-20 says, in general, "The installation provisions of Part 1 through Part 9 of Article 430 apply unless modified or supplemented by the information in -- in this Part 10."

The issue here is that if I go back to 430-52 (C)(1), exception number 2, that gives us the largest size overcurrent protective device. If I can't get the motor to start using a -- a smaller level of protection
than I can go to a maximum value, and -- and what this
is going to do is it's going to say, "Okay. If -- if I
-- I can even go in excess of what that maximum value
overcurrent protection would be. And -- and I think
that's a wrong -- it's a very wrong move.

I think that that should be -- be either
withheld or -- or -- or -- or again taken out of the --
the 2011 Code brought back in 2014 and they should take
a look at this again.

When we go back in UL 508(A), for example, and
UL 508 when we're dealing for industrial control and --
and these kinds of -- of motors, oftentimes, you know,
if I'm going to put a lower size overcurrent protected
device, then I'm going to put that on the main plate
of -- of the adjustable speed drive.

If not, then I'm going to -- to utilize the
National Electrical Code, and, again, that's very
prescriptive in what we're going to do based on
430-52(C)(2) with a maximum size overcurrent protected
device is what's permitted by the UL Standards.

So I think that this is -- we should support
this motion to -- to -- to -- to leave 431-23.

MR. BELL: Thank you. Microphone 5.

MR. KOVACIK: Thank you, Mr. Chair. John
Kovacik, Underwriters Laboratories, speaking as an
1 employee of UL, speaking in support of the motion.

2 I had a meeting with the technical experts of

3 UL who are responsible for variable frequency drives
4 which are the products affected by the actions of the
5 Panels, and we concluded that while the original
6 intentions of the Panel were good, that the ultimate
7 result was fraught with flaws and was not good code,
8 and, therefore, we felt that it would be better to
9 return to the material in the current code, the 2008
10 Edition, and we urge the members of this body to support
11 the motion on the floor.

12 Thank you.


14 MR. LARSEN: Ed Larsen; Schneider Electric
15 speaking in favor of the motion.

16 I, too, am a member of Panel 11. Speaking for
17 myself, I think it's unfortunate that the information
18 that has been presented by -- in these motions was not
19 made available to the Panel and I suggest that if we had
20 that information, we might have had a different result,
21 so I urge you to support the motion.


23 MR. WILKERSON: Robert Wilkerson, IEC, call
24 the question.

25 UNIDENTIFIED SPEAKER: Second.
MR. BELL: Motion on the floor to call the question. I hear a second. All is in favor of calling the question, please raise your hand.

Thank you.

All those opposed.

Motion carries.

We'll move directly to the vote.

The motion on the floor which is to return a portion of the report in the form of a proposal 11-107a and related Comments 11-43a, 11-44, 11-45, 11-46, and 11-47.

All those in favor of the motion, please raise your hand.

Thank you.

All those opposed.

Motion carries.

Okay. We'll move on to Motion Sequence Number 70-17. Is there a motion on the floor related to Motion Sequence 70-17? Microphone 5.

MR. CARON: Yes. I'm Dan Caron, a principal at B.R. plus Athanas as consulting engineer from Boston, Massachusetts. I'm a registered professional engineer, and I'm also a member of Code Making Panel 13. I make a motion to accept Comment 13-96 as modified by the Panel.

MR. BELL: The motion on the floor is to
ASSOCIATION AMENDMENT
BALLOT RESULTS
DATE: July 13, 2010

AMENDMENT

Document: NFPA 70®, National Electrical Code®

Motion: To Accept as modified by Panel for Comment 13-96

NEC TCC PRELIMINARY Ballot Results (Final due 7/16/10)

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment IS achieving the necessary 3/4 majority vote needed to recommend approval of the Association Action by the Technical Correlating Committee.

The number of affirmative votes needed for the report to be published is 8.

[12 (eligible to vote) - 2 (not returned) - 0 (abstentions) = 10 × 0.75 = 7.5]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

[12 eligible ÷ 2 = 6 + 1 = 7 (this is the simple majority)]

12 Eligible to Vote
2 Not Returned (Drake, Liggett)

8 Agree
2 Do Not Agree (Kovacik, LaBrake)
0 Abstain

Final Action: PASSING

CMP-13 FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS achieved the necessary 2/3 majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the amendment to be issued is 12.

[18 (eligible to vote) – 1 (not returned) – 0 (abstentions) = 17 × 0.66 = 11.22]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

[18 eligible ÷ 2 = 9 + 1 = 10 (this is the simple majority)]

18 Eligible to Vote
1 Not Returned (Mouton)

16 Agree (Caron w/comment)
1 Does Not Agree (Ode)
0 Abstentions

Final Action: PASS
Amendment:  Accept as modified by the Panel for Comment 13-96

☐ Agree

If you agree with this amendment, the result will be to accept the action to revise 695.4(B)(3) as modified by the Panel for Comment 13-96 as follows:

(3) Disconnecting Means. All disconnecting devices that are unique to the fire pump loads shall comply with items (a) through (d). [20:9.2.3.1]
   (a) Features and Location
      (1) The disconnecting means for the normal power source shall comply with all of the following [20:9.2.3.1]:
         a. Be identified as suitable for use as service equipment
         b. Be lockable in the closed position
         c. Not be located within equipment that feeds loads other than the fire pump
         d. Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent operation at the same time would be unlikely

   (2) The disconnecting means for an on-site standby generator(s) used as the alternate power source shall be installed in accordance with 700.9(B)(5) for emergency circuits and shall be lockable in the closed position.
   No changes to (b), (c), and (d) in Proposal 13-77a.

☒ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The text that is being proposed as a change is extracted from NFPA 20 and has not been cleared through the NFPA 20 committee which has jurisdiction over the recommended text. The NEC TCC has directed that this material should be sent to the NFPA 20 committee for adoption before the text is inserted into the NEC.

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

John Kovacik

Signature: _____________________________

Name - Please Print:  John Kovacik

Date:  July 7, 2010

June 2010
Standards Council Supplemental Agenda
August 3-5, 2010

Amendment: Accept as modified by the Panel for Comment 13-96

☐ Agree

If you agree with this amendment, the result will be to accept the action to revise 695.4(B)(3) as modified by the Panel for Comment 13-96 as follows:

(3) Disconnecting Means. All disconnecting devices that are unique to the fire pump loads shall comply with items (a) through (d). [20:9.2.3.1]

   (a) Features and Location
   (1) The disconnecting means for the normal power source shall comply with all of the following [20:9.2.3.1]:
      a. Be identified as suitable for use as service equipment
      b. Be lockable in the closed position
      c. Not be located within equipment that feeds loads other than the fire pump
      d. Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent operation at the same time would be unlikely
   (2) The disconnecting means for an on-site standby generator(s) used as the alternate power source shall be installed in accordance with 700.9(B)(5) for emergency circuits and shall be lockable in the closed position.

No changes to (b), (c), and (d) in Proposal 13-77a.

☒ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The Technical Correlating Committee’s direction on this comment is in accordance with 3.2.7.3.2 of the NEC Style Manual and 2.6.2 of the Manual of Style for NFPA Technical Committee Documents and I agree with the Technical Committee member Mr. Ode’s ballot statement. A return to the original text will not have an adverse affect on correlation in the Code.

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: 

Name: Neil F. Labrake, Jr. – TCC Principal, EEI rep.
(Please Print)

Date: 09 July 2010

June 2010
Amendment: Accept as modified by the Panel for Comment 13-96

☐ Agree

If you agree with this amendment, the result will be to accept the action to revise 695.4(B)(3) as modified by the Panel for Comment 13-96 as follows:

(3) Disconnecting Means. All disconnecting devices that are unique to the fire pump loads shall comply with items (a) through (d). [20-9.2.3.1]
   (a) Features and Location
   (1) The disconnecting means for the normal power source shall comply with all of the following [20-9.2.3.1]:
      a. Be identified as suitable for use as service equipment
      b. Be lockable in the closed position
      c. Not be located within equipment that feeds loads other than the fire pump
      d. Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent operation at the same time would be unlikely
   (2) The disconnecting means for an on-site standby generator(s) used as the alternate power source shall be installed in accordance with 700.9(B)(5) for emergency circuits and shall be lockable in the closed position.
   No changes to (b), (c), and (d) in Proposal 13-77a.

☒ Do Not Agree*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The text that is being proposed as a change is extracted from NFPA 20 and has not been cleared through the NFPA 20 committee which has jurisdiction over the recommended text. The NEC TCC has directed that this material should be sent to the NFPA 20 committee for adoption before the text is inserted into the NEC.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

June 2010
Attachment 10-8-1-h
Page 6 of 18

NFPA 70
TC BALLOT for Code Making Panel 13
June 2010 ASSOCIATION AMENDMENT
(To Accept as modified by Panel for Comment 13-96)

Amendment: Accept as modified by the Panel for Comment 13-96

X Agree

If you agree with this amendment, the result will be to accept the action to revise 695.4(B)(3) as modified by the Panel for Comment 13-96 as follows:

(3) Disconnecting Means. All disconnecting devices that are unique to the fire pump loads shall comply with items (a) through (d). [20:9.2.3.1]
   (a) Features and Location
      (1) The disconnecting means for the normal power source shall comply with all of the following [20:9.2.3.1]:
         a. Be identified as suitable for use as service equipment
         b. Be lockable in the closed position
         c. Not be located within equipment that feeds loads other than the fire pump
         d. Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent operation at the same time would be unlikely
      (2) The disconnecting means for an on-site standby generator(s) used as the alternate power source shall be installed in accordance with 700.9 (B)(5) for emergency circuits and shall be lockable in the closed position.
         No changes to (b), (c), and (d) in Proposal 13-77a.

☐ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

________________________________________________________________________________________

________________________________________________________________________________________

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: [Daniel J. Caron]

Date: [6/14/10]

June 2010
Thank you Mr. Chairman; I am Daniel Caron, Principal at Bard, Rao + Athanas Consulting Engineers in Boston, MA. I am a registered Professional Engineer and am also a member on Code Making Panel 13.

I make a motion to accept comment 13-96 as modified by Panel 13

Article 695.4 Continuity of Power; was substantially revised by Proposal 13-77a submitted by CMP 13 during the ROP due to many proposals presented to clarify the language and better align the section with NFPA 20, Chapter 9.

Comment 13-96 was submitted to correct an inconsistency between NFPA 20 and the revised version of 695.4. The Comment was “Accepted in Principal” by CMP-13 following a revision by a task group of members of the Committee. The final version of the Comment was accepted by the Committee 17-1.

Subsequently, the TCC directed that Comment 13-96 be reported as, “Reject” as it is extracted material from NFPA 20, and is under the purview of the NFPA 20 Technical Committee.

I respectfully disagree with the TCC. The extract material referenced comes from NFPA 20:9.2.3.1. The parent text of this section states certain requirements for a fire pump disconnecting means and specifically refers to the normal source of power. In fact, Chapter 9.2 is entitled Normal Power, and all references specifically refer to the normal source of power.

Both 695.4(B)(3) and NFPA 20:9.2.3.1 require the disconnecting means for a fire pump to comply with the following:

- They shall be identified as being suitable for use as service equipment.
- They shall be lockable in the closed position.
- They shall be located remote from other building disconnecting means.
- They shall be located remote from other fire pump source disconnecting means.

NFPA 20, Chapter 9.2, Normal Power, Section 9.2.3.1 states; “Where the disconnecting means permitted by 9.2.3 is installed, the disconnecting means shall meet all of the following” 695.4(B)(3) states; “All disconnecting means that are unique to the fire pump loads shall comply with items (a) thru (d):”

If this is extract material, then it lost something in the translation. The language in the rewritten section of 695 is NOT verbatim extract material. The meaning has been completely changed by adding the term “All”. NFPA 20 does not require ALL fire pump disconnecting means to meet the stated requirements, just these devices if provided on the normal source of power in certain circumstances.

As 695.4(B)(3) is currently written, the term “All” could correctly be interpreted to include disconnecting devices that originate from an alternate source of power. However, if the alternate source of power is an on-site stand-by generator, NFPA 20, Chapter 9.3 (Alternate Power) and NFPA 20: Chapter 9.6 (On-Site Standby Generator Systems) are silent on the issue and there is no other extract material in 695 clarifying this requirement.

Requiring the alternate source disconnecting means to comply is in direct conflict with other sections of NFPA 20 and 695 where it states; “A tap ahead of the generator disconnecting means shall not be required.” If the breaker from the generator is not a tap, then it would not be possible to have the breaker suitable for use as service entrance equipment, among other inconsistencies.
Comment 13-96 clarifies that the disconnecting means required to meet the stated requirements is the disconnecting means on the Normal Source of power as NFPA 20 requires. In addition, the Comment clarifies that the disconnecting means on the alternate source of power must comply with 700.9 B.5.

This revised language is necessary to maintain the intent of NFPA 20 chapter 9.2. Again, the majority of the members of Panel 13 agreed with the intent of the original Comment and 17 of the 18 Members of the Panel voted in favor of “Accept in Principle”.

In conclusion, this additional language does not change extract material from NFPA 20 chapter 9. It reinforces the extract material and makes the two documents more consistent. The Motion I am making on the floor today should be accepted and the Comment should be reconsidered for acceptance by the Technical Committee and TCC. I urge this body to support this motion as the reference text is not extract material.

Thank you
COMMENT 13-96 (A2010) Accept as Modified by the TC

13-96 Log #592 NEC-P13

Final Action: Reject

(695.4)(B)(3)(a))

TCC Action: The Technical Correlating Committee directs that this comment be reported as “Reject” as it is extracted material from NFPA 20, and is under the purview of the NFPA 20 Technical Committee.

Submitter: Code-Making Panel 13, Recommendation: Revise Section 695.4 to read:

10-8-1-h

"695.4 Contiguity of Power."

Circuits that supply electric motor-driven fire pumps shall be supervised from inadvertent disconnection as covered in 695.4(A) or (B).

(A) Direct Connection. The supply conductors shall directly connect the power source to either a listed fire pump controller or listed combination fire pump controller and power transfer switch.

(B) Connection Through Disconnecting Means and Overcurrent Device. (1) Number of Disconnecting Means.

a. General: A single disconnecting means and associated overcurrent protective device(s) shall be permitted to be installed between the fire pump power source(s) and one of the following:

1. A listed fire pump controller
2. A listed fire pump power transfer switch
3. A listed combination fire pump controller and power transfer switch

b. Feeder Sources. For systems installed under the provisions of 695.3(B) (2) only, additional disconnecting means and associated overcurrent protective device(s) shall be permitted as required to comply with other provisions of this Code.

c. On-Site Standby Generator. Where an on-site generator is used to supply a fire pump, an additional disconnecting means and associated overcurrent protective device(s) shall be permitted.

(2) Overcurrent Device Selection. Overcurrent devices shall comply with a or b.

a. Individual Sources. Overcurrent protective device(s) shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. Where the locked rotor current value does not correspond to a standard overcurrent device size, the next standard overcurrent device size shall be used in accordance with 240.6. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s) [20:9.2.3.4].

b. On-Site Standby Generators. Overcurrent protective devices between an on-site standby generator and a fire pump controller shall be selected and sized to allow for instantaneous pickup of the full pump room load, but shall not be larger than the value selected to comply with 430.62 to provide short-circuit protection only [20:9.6.1.1].

(3) Disconnecting Means. All disconnecting devices that are unique to the fire pump loads shall comply with items a through d [20:9.2.3.1].

a. Features and Location. The disconnecting means shall comply with all of the following:

1. Be identified as suitable for use as service equipment
2. Be lockable in the closed position
3. Not be located within equipment that feeds loads other than the fire pump
4. Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent operation at the same time would be unlikely

b. Disconnect Marking. The disconnecting means shall be marked “Fire Pump Disconnecting Means.” The letters shall be at least 25 mm (1 in.) in height, and they shall be visible without opening enclosure doors or covers [20:9.2.3.1.5].

c. Controller Marking. A placard shall be placed adjacent to the fire pump controller, stating the location of this disconnecting means and the location of the key (if the disconnecting means is locked) [20:9.2.3.2].

d. Supervision. The disconnecting means shall be supervised in the closed position by one of the following methods:

1. Central station, proprietary, or remote station signal device
2. Local signaling service that causes the sounding of an audible signal at a constantly attended point
3. Locking the disconnecting means in the closed position
4. Sealing of disconnecting means and approved weekly recorded inspections when the disconnecting means are located within fenced enclosures or in buildings under the control of the owner [20:9.2.3.3].

Substantiation: This revision incorporates the concepts contained in the public proposals on which the panel accepted in whole, in part or in principle. The revision provides correlation and proper extract attribution between Article 695 and the recommendation for Chapter 9 in the 2010 edition of NFPA 20 based on the ROP and ROC actions of the NFPA 20 Technical Committee.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative: CARON, D.: Although I agree with the panel decision and statement, the revised section 695.4(B)(3) now requires the disconnecting means from an on-site standby generator to comply with the provisions of “sufficiently remote” I do not believe this is the intent of NFPA 20. Additional wording, or an exception should be provided to clarify the requirements for the disconnecting means from an on-site standby generator.
MR. BELL: Motion on the floor to call the question. I hear a second. All is in favor of calling the question, please raise your hand.

Thank you.

All those opposed.

Motion carries.

We'll move directly to the vote.

The motion on the floor which is to return a portion of the report in the form of a proposal 11-107a and related Comments 11-43a, 11-44, 11-45, 11-46, and 11-47.

All those in favor of the motion, please raise your hand.

Thank you.

All those opposed.

Motion carries.

Okay. We'll move on to Motion Sequence Number 70-17. Is there a motion on the floor related to Motion Sequence 70-17? Microphone 5.

MR. CARON: Yes. I'm Dan Caron, a principal at B.R. plus Athanas as consulting engineer from Boston, Massachusetts. I'm a registered professional engineer, and I'm also a member of Code Making Panel 13. I make a motion to accept Comment 13-96 as modified by the Panel.

MR. BELL: The motion on the floor is to
accept Comment 13-96 as modified by the Panel. Is there a second?

UNIDENTIFIED SPEAKER: Second.

MR. BELL: Please proceed.

MR. CARON: Article 695.4, Continuity of Code, was substantially revised by Proposal 13-77a; submitted by CMP 13 during the ROP due to many proposals presented to clarify the language and better align the section with NFPA Section Chapter 9.

Comment 13-96 was submitted to correct an inconsistency between NFPA 20 and the revised version of 695.4. The comment was accepted in principle by CMP 13 following a revision by a task group of members of the committee.

The final version of the comment was accepted by the committee seventeen to one. Subsequently, the Technical Correlating Committee directed that the Comment 13-96 be recorded as quote, "reject" as extracted material from NFPA 20 and is under the purview of the NFPA 20 Technical Committee.

I respectfully disagree with the position of the TCC. The extract material reference comes from NFPA 20, Chapter 9.2, paragraphs 3.1. The text of this section states certain requirements for a fire pump disconnecting means, and, specifically, refers to the
normal source of power.

In fact, Chapter 9.2 is entitled to normal power and all references specifically refer to the normal source of power.

Both 695.4(B)(3) and NFPA 20 923-1 require the disconnecting means for a fire pump to comply with the following: They should be identified as being suitable for use of service equipment. They should be locked low in the closed position. They shall be located remote from other building disconnecting means, and they shall be located remote from other fire pumps to its disconnecting means.

Again, Chapter 20, 9.2, normal power states, quote, where the disconnecting means provided -- permitted by 9.2.3 is installed, the disconnecting means shall meet all of the following."

695.4(B)(3) states, "All disconnecting means that a unique fire pump loads shall comply with items A through D."

If this is extract material than it lost something in the translation. The language in the rewritten section of 695 is not verbatim extract material. The meaning has been completely changed by adding the term, "All."

NFPA 20 does not require all fire pump
disconnecting means to meet the standard requirements.

Just these devices -- provided on the normal source of power in certain circumstances.

As 695.4(B)(3) is currently written, the term, "All" could correctly be interpreted to include the disconnecting means that originate from an alternate source of power.

However, if the alternate source of power is an Onsite Standby Generator, NFPA 20, Chapter 9.3, Alternate Power, and Chapter 9.6 Onsite Standby Generator Systems are silent on the issue and there is no other extract materials in 695 clarifying this requirement, requiring the alternate source disconnecting means to comply with the stated items is in direct conflict with other sections of NFPA 20 and 695 where they state, quote, a tap to the head of the disconnect -- generator disconnecting means shall not be required, unquote.

If the breaker from the generator is not tapped then it would not be possible to have the breakers suitable for use of service equipment among other inconsistencies.

Comment 13-96 clarifies it. "The disconnecting means required to meet the stated requirements is the disconnecting means on the normal
source of power as NFPA requires."

In addition, the comment clarifies that the disconnecting means on the alternate source of power, if the alternate source of power is a generator, must comply with 700.9(B)(5).

This revised language is necessary to maintain the intent of NFPA 20, Chapter 9.2. Again, a majority of the members of Panel 13 agreed with the intent of the original comment and seventeen of the eighteen members of the Panel voted in favor of accepting principle.

In conclusion, this additional language does not change extract material from Chapter -- NFPA 20, Chapter 9. It reinforces the material and makes the two documents more consistent.

The motion I'm making on the floor today should be accepted and the comments should be considered for acceptance by the Technical -- Technical Committee and the TCC. I urge this body to support this motion.

Thank you.

MR. BELL: Thank you. Mr. Carpenter.

MR. CARPENTER: Yes. Thank you. I would like to -- to defer to Jack -- Mr. Kovacik, member of the TCC for his, and then I will call on Don Bliss, the chairman of Panel 13, for his comments.

MR. BELL: Microphone 2.
MR. KOVACIK: Thank you, Mr. Chair. Jack Kovacik, Underwriters Laboratories, speaking as a member of the NEC Technical Correlating Committee, and speaking against the motion.

When the TCC looked at the panel action in its review of the ROC meeting for Panel 13, we considered what the panel had done strictly from a procedural prospective. We had no issue with the technical aspects of what the Panel had done; however, we felt that the Panel had acted on material that was clearly identified as being extracted out of the NFPA 20 document for stationary fire pumps, and we felt that the material has always been considered to be extracted, and the material I'm referring to is in Section 695 dot 4, the NEC.

It is currently identified as extract material, and we felt from a procedural issue the Panel had erred. We felt that it was an oversight on their part that had to be corrected.

I'd also like to point out that the Panel had looked at other comments in the ROC meeting that had taken similar actions to not act on them recognizing that they were part of material extract and -- from NFPA 20.

I'd like to also point out that the extract policy does not require that the language extracted out
of the base document be verbatim. The only requirement
is that the intent be the same.

While I recognize that if you compared the two
documents one could argue that perhaps there are some
differences; however, the arguments are loaded with
subjectivity so the decision of the TCC was that it's
extract material. It should be first acted upon by the
20 Committee and that the material was inadvertently
acted on by the Panel.

Thank you.

MR. CARPENTER: Thank you. Now, I'd like to
call on Don Bliss, Chairman of Panel 11 -- 13.

MR. BLISS: Thank you, Mr. Chairman. My name
is Donald Bliss. I chair Panel 13. I represent the
National Infrastructure Institute of Durham (phonetic),
New Hampshire.

I'm speaking on behalf of Panel 13 and in
support of the motion and our original action.

During our deliberations, the Panel was very
sensitive to the purview of NFPA 20 Technical Committee,
and we believe that our actions separated the alternate
standby generator source disconnect from the
requirements for the normal disconnect in order to
correlate with NFPA 20, Section 9.2.

The Panel respectfully believes that its
action does not fall into the purview of NFPA 20, and,
in fact, that we have made the two documents more
consistent with one another, although, I will agree with
Mr. Kovacik that it is a subjective matter, and we urge
you to support our original action.

Thank you.

MR. BELL: Thank you. Microphone 5. No?

Microphone 7.

MR. WILKERSON: Robert Wilkerson. IEC, call
for the question.

MR. BELL: Is there a second?

UNIDENTIFIED SPEAKER: Second.

MR. BELL: I hear a second. All those in
favor of calling the question, please raise your hand.

Thank you.

All those opposed.

The motion carries.

We'll move directly to the vote which is to
accept Comment 13-96 as modified by the Panel.

All those in favor of this motion, please
raise your hand.

Thank you.

All those opposed.

Motion carries.

UNIDENTIFIED SPEAKER: One moment, Mr.
Chairman. Could I request a standing count please for the record?

MR. BELL: Oh, I don't -- really wasn't that close.

UNIDENTIFIED SPEAKER: Okay.

MR. BELL: We'll move onto Motion Sequence 70-18, and as I understand, the maker of that motion has decided not to pursue that and has notified NFPA accordingly, and so we'll move on to Motion Sequence number 70-19.

Is there a motion on the floor related to 70-19?

Microphone 1.

MR. WECHSLER: Mr. Chairman, I am David Wechsler. I'm the principle American Chemistry Council representative on Code Making Panel 14. I'm the designated speaker for Mr. Michael Wells -- Walls of the American Chemistry Council.

Our motion -- our motion is to accept the Comment 14-92 which would result in the elimination of the fine -- the new fine print note dealing with EPL and if -- with your permission I would also like to extend and modify this action to Comment 14-93 dealing with the exact same text, but located in a slightly different section; if that's permissible?
ASSOCIATION AMENDMENT
BALLOT RESULTS

DATE: July 19, 2010

AMENDMENT

Document: NFPA 70®, National Electrical Code®

Motion: To Accept as modified by Panel for Comment 13-96

NEC TCC FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS achieved the necessary 3/4 majority vote needed to recommend approval of the Association Action by the Technical Correlating Committee.

The number of affirmative votes needed for the report to be published is 9.

\[12 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 11 \times 0.75 = 8.25\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[12 \text{ eligible} ÷ 2 = 6 + 1 = 7 \text{ (this is the simple majority)}\]

12 Eligible to Vote
1 NotReturned (Drake)

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<th>Agree</th>
<th>Do Not Agree</th>
<th>Abstain</th>
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</thead>
<tbody>
<tr>
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Final Action: PASS

CMP-13 FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS achieved the necessary 2/3 majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the amendment to be issued is 12.

\[18 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 17 \times 0.66 = 11.22\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[18 \text{ eligible} ÷ 2 = 9 + 1 = 10 \text{ (this is the simple majority)}\]

18 Eligible to Vote
1 Not Returned (Mouton)

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<th>Abstentions</th>
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</tr>
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Final Action: PASS
Amendment: Accept as modified by the Panel for Comment 13-96

☐ Agree

If you agree with this amendment, the result will be to accept the action to revise 695.4(B)(3) as modified by the Panel for Comment 13-96 as follows:

(3) Disconnecting Means. All disconnecting devices that are unique to the fire pump loads shall comply with items (a) through (d). [20:9.2.3.1]
   (a) Features and Location
   (1) The disconnecting means for the normal power source shall comply with all of the following [20:9.2.3.1]:
      a. Be identified as suitable for use as service equipment
      b. Be lockable in the closed position
      c. Not be located within equipment that feeds loads other than the fire pump
      d. Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent operation at the same time would be unlikely
   (2) The disconnecting means for an on-site standby generator(s) used as the alternate power source shall be installed in accordance with 700.9 (B)(5) for emergency circuits and shall be lockable in the closed position.
   No changes to (b), (c), and (d) in Proposal 13-77a.

☒ Do Not Agree*  If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:
The text that is being proposed as a change is extracted from NFPA 20 and has not been cleared through the NFPA 20 committee which has jurisdiction over the recommended text. The NEC TCC has directed that this material should be sent to the NFPA 20 committee for adoption before the text is inserted into the NEC.

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

[Signature]

Name - Please Print: John Kovacik

Date: July 7, 2010

June 2010
Supplemental Attachment 10-8-1-h

NFPA 70
NEC TECHNICAL CORRELATING COMMITTEE
June 2010 ASSOCIATION AMENDMENT
(To Accept as modified by Panel for Comment 13-96)

Amendment: Accept as modified by the Panel for Comment 13-96

☐ Agree

If you agree with this amendment, the result will be to accept the action to revise 695.4(B)(3) as modified by the Panel for Comment 13-96 as follows:

(3) Disconnecting Means. All disconnecting devices that are unique to the fire pump loads shall comply with items (a) through (d). [20:9.2.3.1]

(a) Features and Location

(1) The disconnecting means for the normal power source shall comply with all of the following [20:9.2.3.1]:

a. Be identified as suitable for use as service equipment
b. Be lockable in the closed position
c. Not be located within equipment that feeds loads other than the fire pump
d. Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent operation at the same time would be unlikely

(2) The disconnecting means for an on-site standby generator(s) used as the alternate power source shall be installed in accordance with 700.9 (B)(5) for emergency circuits and shall be lockable in the closed position.

No changes to (b), (c), and (d) in Proposal 13-77a.

☒ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The Technical Correlating Committee’s direction on this comment is in accordance with 3.2.7.3.2 of the NEC Style Manual and 2.6.2 of the Manual of Style for NFPA Technical Committee Documents and I agree with the Technical Committee member Mr. Ode’s ballot statement. A return to the original text will not have an adverse affect on correlation in the Code.

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

[Signature]

Name: Neil F. LaBrake, Jr. – TCC Principal, EEI rep.
(Please Print)

Date: 09 July 2010

June 2010
Amendment: Accept as modified by the Panel for Comment 13-96

☐ Agree

If you agree with this amendment, the result will be to accept the action to revise 695.4(B)(3) as modified by the Panel for Comment 13-96 as follows:

(3) Disconnecting Means. All disconnecting devices that are unique to the fire pump loads shall comply with items (a) through (d). [20:9.2.3.1]

(a) Features and Location

(1) The disconnecting means for the normal power source shall comply with all of the following [20:9.2.3.1]:

a. Be identified as suitable for use as service equipment
b. Be lockable in the closed position
c. Not be located within equipment that feeds loads other than the fire pump
d. Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent operation at the same time would be unlikely

(2) The disconnecting means for an on-site standby generator(s) used as the alternate power source shall be installed in accordance with 700.9 (B)(5) for emergency circuits and shall be lockable in the closed position.

No changes to (b), (c), and (d) in Proposal 13-77a.

☒ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The text that is being proposed as a change is extracted from NFPA 20 and has not been cleared through the NFPA 20 committee which has jurisdiction over the recommended text. The NEC TCC has directed that this material should be sent to the NFPA 20 committee for adoption before the text is inserted into the NEC.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

June 2010
NFPA 70  
TC BALLOT for Code Making Panel 13  
June 2010 ASSOCIATION AMENDMENT  
(To Accept as modified by Panel for Comment 13-96)

Amendment: Accept as modified by the Panel for Comment 13-96

☐ Agree  
If you agree with this amendment, the result will be to accept the action to revise 695.4(B)(3) as modified by the Panel for Comment 13-96 as follows:
(3) Disconnecting Means. All disconnecting devices that are unique to the fire pump loads shall comply with items (a) through (d). [20-2.3.1]
   (a) Features and Location
   (1) The disconnecting means for the normal power source shall comply with all of the following [20-2.3.1]:
      a. Be identified as suitable for use as service equipment
      b. Be lockable in the closed position
      c. Not be located within equipment that feeds loads other than the fire pump
      d. Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent operation at the same time would be unlikely
   (2) The disconnecting means for an on-site standby generator(s) used as the alternate power source shall be installed in accordance with 700.9 (B)(5) for emergency circuits and shall be lockable in the closed position.
      No changes to (b), (c), and (d) in Proposal 13-77a.

☐ Do Not Agree*  
If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

________________________________________________________________________
________________________________________________________________________

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: Daniel J. Caron

Date: 6/14/10

June 2010
Thank you Mr. Chairman; I am Daniel Caron, Principal at Bard, Rao + Athanas Consulting Engineers in Boston, MA. I am a registered Professional Engineer and am also a member on Code Making Panel 13.

I make a motion to accept comment 13-96 as modified by Panel 13

Article 695.4 Continuity of Power; was substantially revised by Proposal 13-77a submitted by CMP 13 during the ROP due to many proposals presented to clarify the language and better align the section with NFPA 20, Chapter 9.

Comment 13-96 was submitted to correct an inconsistency between NFPA 20 and the revised version of 695.4. The Comment was “Accepted in Principal” by CMP-13 following a revision by a task group of members of the Committee. The final version of the Comment was accepted by the Committee 17-1.

Subsequently, the TCC directed that Comment 13-96 be reported as,”“Reject” as it is extracted material from NFPA 20, and is under the purview of the NFPA 20 Technical Committee”

I respectfully disagree with the TCC. The extract material referenced comes from NFPA 20:9.2.3.1. The parent text of this section states certain requirements for a fire pump disconnecting means and specifically refers to the normal source of power. In fact, Chapter 9.2 is entitled Normal Power, and all references specifically refer to the normal source of power.

Both 695.4(B)(3) and NFPA 20:9.2.3.1 require the disconnecting means for a fire pump to comply with the following:

- They shall be identified as being suitable for use as service equipment.
- They shall be lockable in the closed position.
- They shall be located remote from other building disconnecting means.
- They shall be located remote from other fire pump source disconnecting means.

NFPA 20, Chapter 9.2, Normal Power, Section 9.2.3.1 states; “Where the disconnecting means permitted by 9.2.3 is installed, the disconnecting means shall meet all of the following” 695.4(B)(3) states; “All disconnecting means that are unique to the fire pump loads shall comply with items (a) thru (d):”

If this is extract material, then it lost something in the translation. The language in the rewritten section of 695 is NOT verbatim extract material. The meaning has been completely changed by adding the term “All”. NFPA 20 does not require ALL fire pump disconnecting means to meet the stated requirements, just these devices if provided on the normal source of power in certain circumstances.

As 695.4(B)(3) is currently written, the term “All” could correctly be interpreted to include disconnecting devices that originate from an alternate source of power. However, if the alternate source of power is an on-site stand-by generator, NFPA 20, Chapter 9.3 (Alternate Power) and NFPA 20: Chapter 9.6 (On-Site Standby Generator Systems) are silent on the issue and there is no other extract material in 695 clarifying this requirement.

Requiring the alternate source disconnecting means to comply is in direct conflict with other sections of NFPA 20 and 695 where it states; “A tap ahead of the generator disconnecting means shall not be required.” If the breaker from the generator is not a tap, then it would not be possible to have the breaker suitable for use as service entrance equipment, among other inconsistencies.
Comment 13-96 clarifies that the disconnecting means required to meet the stated requirements is the disconnecting means on the Normal Source of power as NFPA 20 requires. In addition, the Comment clarifies that the disconnecting means on the alternate source of power must comply with 700.9 B.5.

This revised language is necessary to maintain the intent of NFPA 20 chapter 9.2. Again, the majority of the members of Panel 13 agreed with the intent of the original Comment and 17 of the 18 Members of the Panel voted in favor of “Accept in Principle”.

In conclusion, this additional language does not change extract material from NFPA 20 chapter 9. It reinforces the extract material and makes the two documents more consistent. The Motion I am making on the floor today should be accepted and the Comment should be reconsidered for acceptance by the Technical Committee and TCC. I urge this body to support this motion as the reference text is not extract material.

Thank you
Panel Meeting Action: Accept in Principle

References fire pumps as equipment that emergency systems normally serve. Are not required to meet the stricter requirements of 20.9.2. Also, this exception safeguard life and property as a fire pump, therefore the requirements of Article 20, and is under the purview of the NFPA 20 Technical Committee.

Exception to (B)(3)(a)(4): Where a fire pump has an On-Site Standby GeneratorM as the alternate source of power, the alternate source disconnecting means shall be permitted to be located within equipment that feeds other Article 700 loads [20:9.3.6l].

Substantiation: The proposed exception provides relief to the requirements in 695.4(B)(3)(a)(4) for disconnecting means derived from an on-site standby generator where the generator serves other Emergency Systems. Emergency power for egress lighting, smoke control systems, etc. is just as essential to safeguard life and property as a fire pump, therefore the requirements of Article 700 should be the basis for emergency power to a fire pump. The proposed 2010 version of NFPA 20 (9.3.6) indicates that conductors and disconnecting means for the power source (such as an on-site standby generator) are not required to meet the stricter requirements of 20.9.2. Also, this exception provides additional validity to Fine Print Note No. 3 of Article 700.1 which references fire pumps as equipment that emergency systems normally serve.

Panel Meeting Action: Accept in Principle

(a) Features and Location. The disconnecting means shall comply with all of the following:

1. Be identified as suitable for use as service equipment
2. Be lockable in the closed position
3. Not be located within equipment that feeds loads other than the fire pump
4. Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent operation at the same time would be unlikely

Substantiation: Where an on-site generator is used to supply a fire pump, an additional disconnecting means and associated overcurrent protective device(s) shall be permitted as required to comply with other provisions of this Code.

(b) On-Site Standby Generator. Where an on-site generator is used to supply a fire pump, an additional disconnecting means and associated overcurrent protective device(s) shall be permitted as required to comply with other provisions of this Code.

(b) Disconnecting Means. All disconnecting devices that are unique to the fire pump loads shall comply with items (a) through (d) [20:9.2.3.1]

1. Be identified as suitable for use as service equipment
2. Be lockable in the closed position
3. Not be located within equipment that feeds loads other than the fire pump
4. Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent operation at the same time would be unlikely

(b) Disconnecting Means. All disconnecting devices that are unique to the fire pump loads shall comply with items (a) through (d) [20:9.2.3.1]

Panel Statement: The intent of the recommendation has been satisfied, in that, the disconnecting means from an on-site standby generator used as the alternate source no longer must comply with the requirements for the normal power disconnecting means. The panel has separated the alternate standby generator source disconnect from the requirements for the normal disconnect to correlate with NFPA 20 Section 9.2.

Number Eligible to Vote: 18

Ballot Results: Affirmative: 17 Negative: 1

Comment on Negative: ODE, M.: The Section of Article 695 being affected by this Comment is extracted from Section 9.2.3.1 of NFPA 20. Such extract text is under the jurisdiction of the NFPA 20 Committee. The comment should be rejected to be consistent with the panel action on other Comments affecting extract material such a 13-80, 13-86 and 13-87.
ASSOCIATION AMENDMENT
BALLOT RESULTS

DATE: July 13, 2010

AMENDMENT

Document: NFPA 70®, National Electrical Code®

Motion: To Reject Comment 15-101

NEC TCC PRELIMINARY Ballot Results (Final due 7/16/10)

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment IS NOT achieving the necessary 3/4 majority vote needed to recommend approval of the Association Action by the Technical Correlating Committee.

The number of affirmative votes needed for the report to be published is 8.

\[12 \text{ (eligible to vote)} - 2 \text{ (not returned)} - 0 \text{ (abstentions)} = 10 \times 0.75 = 7.5\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[12 \text{ eligible ÷ 2} = 6 + 1 = 7 \text{ (this is the simple majority)}\]

12 Eligible to Vote
2 Not Returned (Drake, Liggett)

3 Agree (Fiske w/comment)
7 Do Not Agree (Brunssen, Bunker, Carpenter, Daly, Hittingr, Kovacik, LaBrake)
0 Abstain

Final Action: FAILING

CMP-15 FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS NOT achieved the necessary 2/3 majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the amendment to be issued is 9.

\[13 \text{ (eligible to vote)} - 0 \text{ (not returned)} - 0 \text{ (abstentions)} = 13 \times 0.66 \approx 8.58\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[13 \text{ eligible ÷ 2} = 6.5 = 7 \text{ (this is the simple majority)}\]

13 Eligible to Vote
0 Not Returned

8 Agree (Talka w/comment)
5 Do Not Agree (Duncan, Erickson, Nash, Seabury, Wiseman)
0 Abstentions

Final Action: FAIL
NFPA 70
NEC TECHNICAL CORRELATING COMMITTEE
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs., if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
☒ Do Not Agree*
☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I agree with those Technical Committee members who voted in the Negative. Further, the ballot is moot as either way the text will revert to the 2008 NEC, i.e., no text.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature:________________________

Name - Please Print: James E. Brunssen

Date: July 4, 2010

June 2010
Warren, Mary

From: mertonbunker [mertonbunker@aol.com]
Sent: Thursday, July 08, 2010 4:56 PM
To: Warren, Mary
Subject: Re: Final Ballot Results for Comment 15-101

Mary:

As I am outside the US and cannot fax my ballots back, please accept this as my ballot.

Please record me as voting "DISAGREE" on 15-101.
Reason: By the memo from Jean O'Connor, dated July 2, 2010, CMP-15 has not achieved consensus in the ballot of this issue. This means that the previous text will be used and CMP-15 can re-evaluate this in the next cycle.

Merton Bunker, PE, CFEI
US Dept of State

----Original Message----
From: Warren, Mary <mwarren@Nfpa.org>
To: Warren, Mary <mwarren@Nfpa.org>
Cc: Coughlin, Ann <acoughlin@Nfpa.org>; Walker, Nancy <nwalker@Nfpa.org>
Sent: Fri, Jul 2, 2010 10:04 am
Subject: Final Ballot Results for Comment 15-101

To the Members of the NEC Technical Correlating Committee:

The above referenced ballot is enclosed for your information. I believe the cover memo and ballot are self-explanatory.

Please review this material, complete the attached ballot, and return it as soon as possible, but no later than Friday, July 9, 2010.

Also enclosed are the final ballot results of the Code Making Panel including comments on vote, if any.

This is # 5 of 6 Amendments that will be sent to you.

Thank you.

Mary

Mary Warren
Administrative Assistant
Electrical Department
(617) 984-7946
Fax No. (617) 984-7070
mwarren@nfpa.org

1
NFPA 70
NEC TECHNICAL CORRELATING COMMITTEE
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regr"). Under the Regr, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regr at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.3(c)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regr, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Whereas the TC (CNP-15) did not achieve consensus the previous edition text will stay. This will allow the panel to re-examine and develop specific language for the 2014 NEC

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [signature]
Name - Please Print: James W. Carpenter
Date: [date]

June 2010
NFPA 70
NEC TECHNICAL CORRELATING COMMITTEE
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment:  Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reg's"). Under the Reg's, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Reg's at 4.7.1(e). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(Z) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Reg's, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☑ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I agree with the negative vote of James Wiseman on CMP-15

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [signature]

Name - Please Print: James M. Daly

Date: 7/7/10

June 2010
Standards Council Supplemental Agenda

NFP 70

NEC TECHNICAL CORRELATING COMMITTEE

June 2010 ASSOCIATION AMENDMENT

(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":
The TC has determined that this wiring method is appropriate and can be used in health care facilities.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-284-7030

Signature: ____________________________

Name - Please Print: David Hutingen

Date: July 8, 2010

June 2010
NFPA 70
NEC TECHNICAL CORRELATING COMMITTEE
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

X Do Not Agree*

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The Underwriters Laboratories fact finding report provided detailed listing of an MC cable identified as providing crush, impact, and penetration circuit protection performance comparable to electrical metallic tubing so the Panel accepted the recommended change. The NEC Technical Correlating Committee made some minor changes, necessitating a change from accept to accept in principle, for the new (3) and its text based on the Comment action by Panel 15, plus the renumbering of (4), (5), and (6). The Technical Correlating Committee also directed that the remainder of the text remains as written in the 2008 Edition of the National Electrical Code. There has been no compelling reason provided by the submitter of the NITMAM that this MC cable, identified and tested for appropriate crush, impact, and penetration does not provide the same protection as EMT.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

[Signature]

Name - Please Print: John Kovacik

Date: July 7, 2010

June 2010
NFPA 70
NEC TECHNICAL CORRELATING COMMITTEE
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

The Technical Committee has not reached consensus for this amendment. A return to the original text will not have an adverse affect on correlation in the Code.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

[Signature]

Name: Neil F. LaBrake, Jr. – TCC Principal, EEI rep.
(Please Print)

Date: 09 July 2010

June 2010
NFP A 70  
NEC TECHNICAL CORRELATING COMMITTEE  
June 2010 ASSOCIATION AMENDMENT  
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs., if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☐ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

Comment on affirmative: Absent any evidence of procedural faults, the Code-Making Panel’s findings should be given considerable deference. In this instance, CMP-15 voted 11-0 to reject the comment.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-984-7070

W. T. Fiske

Signature: __

Name - Please Print: William T. Fiske

Date: 2010-07-07

June 2010
TC BALLOT for Code Making Panel 15  
June 2010 ASSOCIATION AMENDMENT  
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot in the Technical Committee pursuant to subsec. 5.1.3.1 of the Registration/Elaborating Committee Procedures ("Reg"). Under the Reg., if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment reverts to its previous edition form (Sec. Reg. at 4.7.1(c)). Please note that the Amendment that is submitted for this ballot recommends a return to previous edition text, or in this case, delete recommended new 1.6.8.6.3(C)(1) since there is no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the technical recommendations presented by the Panel, this recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree* 

☐ Abstain* 

*Please give reasons for voting "Do Not Agree" or "Abstain":

The MC cable issues has been debated for 4 code cycles and the code panel committee has accepted it as a safe for health care occupancies.

Please return as soon as possible, but no later than Tuesday, June 22, 2010:

Mary V. Warren  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-234-2070

Signature: [Signature]

Name: Please print, James R. Duncan  
Date: June 22, 2010

June 2010  

Standards Council Supplemental Agenda  
August 3-5, 2010  
Page 356 of 1603
NFPA 70
TC BALLOT for Code Making Panel 15
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs., if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

X Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

Panel 15 has been hearing technical support for this method of wiring for numerous cycles. The submitter has taken the time and gone through the expense of having the cabling tested by an approved laboratory. Returning this back to the Panel will send a wrong message to those that believe in the use of this type of cabling.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: __________________________

Name - Please Print: Douglas Erickson

Date: June 15, 2010

June 2010
Standards Council Supplemental Agenda

August 3-5, 2010
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Revised Page Number 358 of 813
NFPA 70
TC BALLOT for Code Making Panel 15
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

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☐ Agree

☑ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":
No single instance, history, or substantiation has ever been given to establish that MC cable installed in walls or ceilings has ever been damaged in a health care facility. The committee has discussed this for years and clearly believes there is no added risk from type MC cable. Moreover, it can be argued that anchored and immovable EMT is actually more likely to be damaged (i.e. by an electric drill) than type MC cable. The submitter has gone to the additional length to get the cable listed for the purpose.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: Hugh O. Nash, Jr.

Date: 6/28/10

June 2010
Standards Council Supplemental Agenda

NFPA 70
TC BALLOT for Code Making Panel 15
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

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☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

THE ORIGINAL ACTION OF THE COMMITTEE TO INSERT THE NEW TEXT IS THE
APPROPRIATE ACTION. THE ORIGINAL ACTION WAS 11-2, THE ORIGINAL
ACTION SHOULD BE UPHOLD.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature:

Name - Please Print: JAMES C. SEABURY, E.I. P.E.

Date: 6/22/10

June 2010

Standards Council Supplemental Agenda

August 3-5, 2010

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Revised Page Number 360 of 813
NFPA 70
TC BALLOT for Code Making Panel 15
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs., if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

XXX Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

NEMA contends that Listed MC cable identified as providing crush, impact and penetration circuit protection performance comparable to electrical metallic tubing should be acceptable in this application.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: James L Wiseman

Name - Please Print: James L. Wiseman

Date: June 18, 2010
NFPA 70
TC BALLOT for Code Making Panel 15
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☐ Do Not Agree*

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Comment of the affirmative vote: It is immaterial whether the panel agrees or disagrees with the association action as the net result in either case will be a return to present language

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature:  

Name - Please Print: _Don Talka_

Date: _June 18, 2010_

June 2010
Standards Council Supplemental Agenda
COMMENT 15-101 (A2010) Reject Comment

15-101 Log #2797 NEC-P15  (517.30(C)(3)) Final Action: Reject

TCC Action: The Technical Correlating Committee directs that this comment be reported as “Accept in Principle” by accepting the new (3) and its language, plus the renumbering of (4), (5), and (6).

The Technical Correlating Committee also directs that the remainder of the text remains as written in the 2008 Edition of the National Electrical Code.

Submitter: Richard Temblador, Southwire Company

Comment on Proposal No: 15-78

Recommendation: (3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and 517.13(B). The following wiring methods shall be permitted:

1. Nonflexible metal raceways, Type MI cable, or Schedule 80 rigid nonmetallic conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

2. Listed MC cable identified as providing crush, impact and penetration circuit protection performance equivalent to electrical metallic tubing.

3. Listed flexible metal raceways and listed metal-sheathed cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

4. Listed flexible metal raceways and listed metal-sheathed cable assemblies in any of the following:
   a. Where used in listed prefabricated medical headwalls
   b. In listed office furnishings
   c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage
   d. Where necessary for flexible connection to equipment

5. Flexible power cords of appliances or other utilization equipment connected to the emergency system.

6. Secondary circuits of Class 2 or Class 3 communication or signaling systems

Substantiation: Type MC cable can be constructed to provide enhanced mechanical protection comparable to EMT while maintaining ground path integrity before, during and after installation. The revised proposal should be accepted. I have provided supporting information.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept

Number Eligible to Vote: 13

Ballot Results: Affirmative: 11 Negative: 2

Explanation of Negative: LIPSTER, S.: I disagree with the panel action and statement permitting an unproven wiring method not yet available to installers, with limited laboratory testing and no field installation record, to be used in health care facilities. The panel is prematurely approving a product that is not in production and not available on the market. There are several opportunities for the use of a crush resistant MC cable in other occupancies where a track record for this nonexistent wiring method can be established. Health care installations are not a place to test new cable wiring methods and hope they are safety-compatible with EMT. The panel was presented a Underwriters Laboratories fact finding report that detailed the testing of two prototype cables. The crush and impact tests of the two prototype cables vs. EMT concluded that one of the prototype cables evaluated better and one was worse than that of listed EMT, however, it is important to note that product standards do not exist for crush resistant cable so the test have limited value. The means for cable termination at a box connection (the prototype cable being much larger than standard MC cable) were not investigated by UL creating concerns about real life performance and grounding/bonding at connection points. The acceptance of this comment by the panel was clearly made with the hope and desire of a supposably cheaper alternative to EMT. It remains to be seen that a manufactured cable product with the same protective qualities as EMT can be fabricated and made available to the market. Patient safety, should be foremost over unproven installation methods.

The aforementioned Underwriters Laboratory fact finding report presented to the code making panel was dated December 3, 2009. The comment period for this code cycle closed on October 23, 2009, therefore the introduction of this material after the published comment closing date is a violation of the Regulations Governing Committee Projects, 4.4.1, 4.4.3.1, 4.4.4, 4.4.5 and 4.4.6.

SHELLY, B.: The use of MC cable identified as providing crush impact and penetration circuit protection performance equivalent to EMT is not an improvement to the codes as there will be a severe hazard created in the installation of the emergency wiring.

PROPOSAL 15-78 (A2010) Backup

15-78 Log #22 NEC-P15 Final Action: Reject

NOTE: This proposal appeared as Comment 15-39 on Proposal 15-54 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 15-54 was:

Revise text to read as follows:

3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and 517.13(B). The following wiring methods shall be permitted:

1. Nonflexible metal raceways, Type MI cable, or Schedule 80 rigid nonmetallic conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

2. Listed MC cable identified as providing crush, impact and penetration circuit protection performance equivalent to Electrical Metallic Tubing.

3) Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid nonmetallic conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

4) Listed flexible metal raceways and listed metal-sheathed cable assemblies in any of the following:
   a. Where used in listed prefabricated medical headwalls
   b. In listed office furnishings
   c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage
   d. Where necessary for flexible connection to equipment

4) Flexible power cords of appliances or other utilization equipment connected to the emergency system.

5) Secondary circuits of Class 2 or Class 3 communication or signaling systems

Submitter: Phil Simmons, Rep. National Armored Cable Manufacturers

Recommendation: Revise 517.30(C)(3) as follows:

3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and 517.13(B). The following wiring methods shall be permitted:

1) Nonflexible metal raceways, Type MI cable, or Schedule 80 rigid PVC conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

2) Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid PVC conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

3) Listed flexible metal raceways and listed metal-sheathed cable assemblies in any of the following:
   a. Where used in listed prefabricated medical headwalls
   b. In listed office furnishings
   c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage
   d. Where necessary for flexible connection to equipment

4) Flexible power cords of appliances or other utilization equipment connected to the emergency system.

5) Secondary circuits of Class 2 or Class 3 communication or signaling systems with or without raceways.

FPN: See 517.13 for additional grounding requirements in patient care areas.

Substantiation: Listed Type AC and Type MC cables are more than adequate to provide mechanical protection of the emergency systems in hospitals and should be accepted for that purpose. In fact, Code Panel 15 made that appropriate conclusion in its Panel Statement on Proposal 15-42 for the 2005 NEC. CMP 15 stated in part, “Types AC and MC cables that are listed provide adequate physical and mechanical protection for the emergency system of health care facilities.” We agree with the Panel’s conclusion. However, we feel the Panel inappropriately, and without technical justification for supposition, limited the use of Type MC and AC cables as shown in the 2005 NEC.
Adequate documentation on the rigorous testing Type AC and MC cables must pass to be listed was submitted with Proposal 15-42. This documentation, plus the satisfactory field experience of CMP-15 members, no doubt led to the conclusion reached by the Panel in processing the 2005 NEC.

Type AC and MC cables are required to satisfactorily pass brutal treatment during the listing process. The testing includes crushing, bending and elongating. The tests the cables must satisfactorily pass are no doubt harsher than would be expected during installation of the cables.

The UL Fact-Finding Report on Nail Penetration of Types AC and MC Cable Installed Parallel to Framing Members (provided) show the cable is more resistant to damage from nails and screws than is Electrical Metallic Tubing. Type MC and AC cables need to be accepted for mechanical protection of the emergency system in hospitals to be treated equally.

It should be noted that items (3)(1) and (3)(2) in the list of accepted uses of listed flexible metal raceways and listed metal-sheathed cables seem to be incorrect as the wiring methods used in the construction of listed equipment by the manufacturer is controlled by the UL Safety Standard that regulates the construction of such equipment. See also 90.7 for an explanation of field examination or evaluation of listed equipment.

The information in this comment should not be considered a new concept as the issue has been before the Panel during the processing of both the 2005 and 2008 NECs.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: At this time the panel is not aware of any MC cable that has the crush, impact, and penetration circuit protection performance equivalent to EMT. The submitter has not referenced any type MC cable that performs equivalent to EMT in this regard. The panel is not receptive to writing code around products that do not exist yet.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.
ASSOCIATION AMENDMENT
BALLOT RESULTS

DATE: July 19, 2010

AMENDMENT

Document: NFPA 70®, National Electrical Code®

Motion: To Reject Comment 15-101

NEC TCC FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS NOT achieved the necessary \( \frac{3}{4} \) majority vote needed to recommend approval of the Association Action by the Technical Correlating Committee.

The number of affirmative votes needed for the report to be published is 9.

\[
[12 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 11 \times 0.75 = 8.25]
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
[12 \text{ eligible} \div 2 = 6 + 1 = 7 \text{ (this is the simple majority)}]
\]

12 Eligible to Vote
1 Not Returned (Drake)

3 Agree (Fiske w/comment)
8 Do Not Agree (Brunssen, Bunker, Carpenter, Daly, Hittingr, Kovacik, LaBrake, Liggett)
0 Abstain

Final Action: FAIL

CMP-15 FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS NOT achieved the necessary \( \frac{2}{3} \) majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the amendment to be issued is 9.

\[
[13 \text{ (eligible to vote)} - 0 \text{ (not returned)} - 0 \text{ (abstentions)} = 13 \times 0.66 = 8.58]
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
[13 \text{ eligible} \div 2 = 6.5 = 7 \text{ (this is the simple majority)}]
\]

13 Eligible to Vote
0 Not Returned

8 Agree (Talka w/comment)
5 Do Not Agree (Duncan, Erickson, Nash, Seabury, Wiseman)
0 Abstentions

Final Action: FAIL
NFPA 70
NEC TECHNICAL CORRELATING COMMITTEE
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

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☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I agree with those Technical Committee members who voted in the Negative. Further, the ballot is moot as either way the text will revert to the 2008 NEC, i.e., no text.

 Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: ______________________________

Name - Please Print: James F. Brunssen

Date: July 4, 2010

June 2010
Warren, Mary

From: mertonbunker [mertonbunker@aol.com]
Sent: Thursday, July 08, 2010 4:56 PM
To: Warren, Mary
Subject: Re: Final Ballot Results for Comment 15-101

Mary:

As I am outside the US and cannot fax my ballots back, please accept this as my ballot.

Please record me as voting “DISAGREE” on 15-101.
Reason: By the memo from Jean O’Connor, dated July 2, 2010, CMP-15 has not achieved consensus in the ballot of this issue. This means that the previous text will be used and CMP-15 can re-evaluate this in the next cycle.

Merton Bunker, PE, CFEI
US Dept of State

——Original Message——
From: Warren, Mary <mwarsenn@nfpa.org>
To: Warren, Mary <mwarsenn@nfpa.org>
Cc: Coughlin, Ann <acoughlin@nfpa.org>; Walker, Nancy <nwalker@nfpa.org>
Sent: Fri, Jul 2, 2010 10:04 am
Subject: Final Ballot Results for Comment 15-101

To the Members of the NEC Technical Correlating Committee:

The above referenced ballot is enclosed for your information. I believe the cover memo and ballot are self-explanatory.

Please review this material, complete the attached ballot, and return it as soon as possible, but no later than Friday, July 9, 2010.

Also enclosed are the final ballot results of the Code Making Panel including comments on vote, if any.

This is # 5 of 6 Amendments that will be sent to you.

Thank you.

Mary

Mary Warren
Administrative Assistant
Electrical Department
(617) 984-7946
Fax No. (617) 984-7070
mwarsenn@nfpa.org
NFPA 70
NEC TECHNICAL CORRELATING COMMITTEE
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally refers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

Whereas the TC (CRP-15) did not achieve consensus, the previous edition text will stay. This will allow the panel to re-examine and develop specific language for the 2014 NEC.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: James W. Carpenter

Date: 6-7-2010

June 2010

Standards Council Supplemental Agenda August 3-5, 2010 Page 367 of 1603

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NFPA 70
NEC TECHNICAL CORRELATING COMMITTEE
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

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☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I agree with the Negative vote of James Wiseman on CMP-15

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Watters
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature:

[Signature]

Print Name: JAMES M. DALY

Date: 7/7/10

June 2010
June 2010
ASSOCIATION AMENDMENT
(To Reject Comment 15-101)


NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.3.1 of the Regulations Governing Committee Projects ("RegA"). Under the RegA, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See RegA at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends returning to previous edition text, or as in this case, deleting recommended text. Since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the RegA, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council in light of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree
☐ Do Not Agree
☐ Abstain

Please give reasons for voting "Do Not Agree" or "Abstain":
The text has determined that the voting method is inappropriate and can be used in healthcare facilities.

Please return as soon as possible, not later than Friday, July 9, 2010.

MAY V. WATSON
National Executive - Associate
1. Darnayuch Park
Quincy, MA 02170
FAX: 617-224-7970

Signature:

Name: May V. Watson
Date: July 8, 2010
NFPA 70
NEC TECHNICAL CORRELATING COMMITTEE
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("RegS"). Under the RegS, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See RegS at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the RegS, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The Underwriters Laboratories fact finding report provided detailed listing of an MC cable identified as providing crush, impact, and penetration circuit protection performance comparable to electrical metallic tubing so the Panel accepted the recommended change. The NEC Technical Correlating Committee made some minor changes, necessitating a change from accept to accept in principle, for the new (3) and its text based on the Comment action by Panel 15, plus the renumbering of (4), (5), and (6). The Technical Correlating Committee also directed that the remainder of the text remains as written in the 2008 Edition of the National Electrical Code. There has been no compelling reason provided by the submitter of the NITMAM that this MC cable, identified and tested for appropriate crush, impact, and penetration does not provide the same protection as EMT.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

[Signature]

Name - Please print: John Kovacic

Date: July 7, 2010

June 2010
Standards Council Supplemental Agenda
August 3-5, 2010

NFPA 70  
NEC TECHNICAL CORRELATING COMMITTEE  
June 2010 ASSOCIATION AMENDMENT  
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regz"). Under the Regz, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regz at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regz, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":
The Technical Committee has not reached consensus for this amendment. A return to the original text will not have an adverse affect on correlation in the Code.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-984-7070

_______________________________
Signature:

_______________________________
Name: Neil F. LaBrake, Jr. – TCC Principal, FEI rep.  
(Please Print)

_______________________________
Date: 09 July 2010  

June 2010

Standards Council Supplemental Agenda August 3-5, 2010 Page 371 of 1603
Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs., if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs., that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

The action of the Panel and TCC were appropriate. I continue to support those actions

________________________________________

________________________________________

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Name]

Name - Please Print: [Name]

Date: 7/16/2010

June 2010
NFPA 70
NEC TECHNICAL CORRELATING COMMITTEE
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☐ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

Comment on affirmative: Absent any evidence of procedural faults, the Code-Making Panel’s findings should be given considerable deference. In this instance, CMP-15 voted 11-0 to reject the comment.

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature:

Name - Please Print: William T. Pike

Date: 2010-07-07

June 2010
NEPA.70
TC BALLOT for Code Making Panel 15
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

The Association is adopting the following Amendment to the Technical Committee minutes in a meeting of the Technical Committee Minutes: The Amendment is in accordance with the Association's bylaws, the Bylaws of the Technical Committee, and the Association's policies and procedures. The Amendment is in accordance with the Technical Committee's procedures for making recommendations to the Standards Council. If the Amendment is adopted, it will be included in the next edition of the Code. The Amendment is in accordance with the Association's bylaws, the Bylaws of the Technical Committee, and the Association's policies and procedures. The Amendment is in accordance with the Technical Committee's procedures for making recommendations to the Standards Council. The Amendment is in accordance with the Association's bylaws, the Bylaws of the Technical Committee, and the Association's policies and procedures. The Amendment is in accordance with the Technical Committee's procedures for making recommendations to the Standards Council. The Amendment is in accordance with the Association's bylaws, the Bylaws of the Technical Committee, and the Association's policies and procedures. The Amendment is in accordance with the Technical Committee's procedures for making recommendations to the Standards Council. The Amendment is in accordance with the Association's bylaws, the Bylaws of the Technical Committee, and the Association's policies and procedures. The Amendment is in accordance with the Technical Committee's procedures for making recommendations to the Standards Council.

[Box with options: Agree, Do Not Agree, Abstain]

*Please state reasons for voting "Do Not Agree" or "Abstain":

The Amendment has been drafted for a code project and the code project Committee has adopted a code for healthcare, occupancies.

Please return as soon as possible before 10:00 a.m. on Wednesday, June 22, 2010.

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169

Signature: [Signature]

Name: [Name]

Date: June 22, 2010.
Supplemental Attachment 10-8-1-i
Page 12 of 18

Standards Council Supplemental Agenda
August 3-5, 2010

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

X Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

Panel 15 has been hearing technical support for this method of wiring for numerous cycles. The submitter has taken the time and gone through the expense of having the cabling tested by an approved laboratory. Returning this back to the Panel will send a wrong message to those that believe in the use of this type of cabling.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: Douglas Erickson

Date: June 15, 2010
NFPA 70
TC BALLOT for Code Making Panel 15
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regx"). Under the Regx., if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regx at 4.7.1(e). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regx, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☑ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

No single instance, history, or substantiation has ever been given to establish that MC cable installed in walls or ceilings has ever been damaged in a health care facility. The committee has discussed this for years and clearly believes there is no added risk from type MC cable. Moreover, it can be argued that anchored and immovable EMT is actually more likely to be damaged (i.e. by an electric drill) than type MC cable. The submitter has gone to the additional length to get the cable listed for the purpose.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: Hugh O. Nash, Jr.

Date: 6/28/10

June 2010
Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs., if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

THE ORIGINAL ACTION OF THE COMMITTEE TO INSECT THE NEW TEXT IS THE
APPROPRIATE ACTION. THE ORIGINAL ACTION WAS 11-2, THE ORIGINAL
ACTION SHOULD BE UPHELD.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: JAMES C. SEABURY, P.E.

Date: 6/22/10

June 2010

Standards Council Supplemental Agenda August 3-5, 2010

Revised Page Number 378 of 813
Standards Council Supplemental Agenda

NFPA 70
TC BALLOT for Code Making Panel 15
June 2010 ASSOCIATION AMENDMENT
(To Reject Comment 15-101)

Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reg")s. Under the Regs., if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☐ ☐ Do Not Agree*

☐ ☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

NEMA contends that Listed MC cable identified as providing crush, impact and penetration circuit protection performance comparable to electrical metallic tubing should be acceptable in this application.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: James L. Wiseman

Name - Please Print: James L. Wiseman

Date: June 18, 2010

June 2010
Amendment: Reject Comment 15-101

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot of the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends a return to previous edition text, or as in this case, delete recommended new 517.30(C)(3)(2) since there was no corresponding previous edition text. This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☐ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

Comment of the affirmative vote: It is immaterial whether the panel agrees or disagrees with the association action as the net result in either case will be a return to present language

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary V. Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: ____________________________

Name - Please Print: Don Talka

Date: _______June 18, 2010__________
COMMENT 15-101 (A2010) Reject Comment

15-101 Log #2797 NEC-P15 Final Action: Reject (517.30(C)(3))

TCC Action: The Technical Correlating Committee directs that this comment be reported as “Accept in Principle” by accepting the new (3) and its language, plus the renumbering of (4), (5), and (6).

The Technical Correlating Committee also directs that the remainder of the text remains as written in the 2008 Edition of the National Electrical Code.

Submitter: Richard Temblador, Southwire Company
Comment on Proposal No: 15-78
Recommends: (3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and 517.13(B). The following wiring methods shall be permitted:

(1) Nonflexible metal raceways, Type MI cable, or Schedule 80 rigid nonmetallic conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
(2) Listed MC cable identified as providing crush, impact and penetration circuit protection performance comparable to electrical metallic tubing.
(3) Where enased in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid nonmetallic conduit, flexible nonmetallic or jacketed metal raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
(4) Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:
   a. Where used in listed prefabricated medical headwalls
   b. In listed office furnishings
   c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage
   d. Where necessary for flexible connection to equipment
(4) Flexible power cords of appliances or other utilization equipment connected to the emergency system.

Substantiation: Type MC cable can be constructed to provide enhanced mechanical protection comparable to EMT while maintaining ground path integrity before, during and after installation. The revised proposal should be accepted. I have provided supporting information.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept
Number Eligible to Vote: 13
Ballot Results: Affirmative: 11 Negative: 2
Explanation of Negative: LIPSTER, S.: I disagree with the panel action and statement permitting an unproven wiring method not yet available to installers, with limited laboratory testing and no field installation record, to be used in health care facilities. The panel is prematurely approving a product that is not in production and not available on the market. There are several opportunities for the use of a crush resistant MC cable in other occupancies where a track record for this nonexistent wiring method can be established. Health care installations are not a place to test new cable wiring methods and hope they are safety-compatible with EMT. The panel was presented a Underwriters Laboratories fact finding report that detailed the testing of two prototype cables. The crush and impact tests of the two prototype cables vs. EMT concluded that one of the prototype cables evaluated better and one was worse than that of listed EMT, however, it is important to note that product standards do not exist for crush resistant cable so the test have limited value. The means for cable termination at a box connection (the prototype cable being much larger than standard MC cable) were not investigated by UL creating concerns about real life performance and grounding/bonding at connection points. The acceptance of this comment by the panel was clearly made with the hope and desire of a supposedly cheaper alternative to EMT. It remains to be seen that a manufactured cable product with the same protective qualities as EMT can be fabricated and made available to the market. Patient safety, should be foremost over unproven installation methods.

The aforementioned Underwriters Laboratory fact finding report presented to the code making panel was dated December 3, 2009. The comment period for this code cycle closed on October 23, 2009, therefore the introduction of this material after the published comment closing date is a violation of the Regulations Governing Committee Projects, 4.4.1, 4.4.3.1, 4.4.4, 4.4.5 and 4.4.6.

SHELLY, B.: The use of MC cable identified as providing crush impact and penetration circuit protection performance equivalent to EMT is not an improvement to the codes as there will be a severe hazard created in the installation of the emergency wiring.

PROPOSAL 15-78 (A2010) Backup

15-78 Log #22 NEC-P15 Final Action: Reject (517.30(C)(3))

NOTE: This proposal appeared as Comment 15-39 on Proposal 15-54 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 15-54 was:

Revise text to read as follows:
(3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and 517.13(B). The following wiring methods shall be permitted:

(1) Nonflexible metal raceways, Type MI cable, or Schedule 80 rigid nonmetallic conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
(2) Listed MC cable identified as providing crush, impact and penetration circuit protection performance equivalent to Electrical Metallic Tubing.
(3) Where enased in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid nonmetallic conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
(4) Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:
   a. Where used in listed prefabricated medical headwalls
   b. In listed office furnishings
   c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage
   d. Where necessary for flexible connection to equipment
(4) Flexible power cords of appliances or other utilization equipment connected to the emergency system.

(5) Secondary circuits of Class 2 or Class 3 communication or signaling systems.
(6) Secondary circuits of Class 2 or Class 3 communication or signaling systems.

Submitter: Phil Simmons, Rep. National Armored Cable Manufacturers
Recommendation: Revise 517.30(C)(3) as follows:

(3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and 517.13(B). The following wiring methods shall be permitted:

(1) Nonflexible metal raceways, Type MI cable, or Schedule 80 rigid PVC conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
(2) Where enased in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid PVC conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

(3) Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:
   a. Where used in listed prefabricated medical headwalls
   b. In listed office furnishings
   c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage
   d. Where necessary for flexible connection to equipment
(4) Flexible power cords of appliances or other utilization equipment connected to the emergency system.

(5) Secondary circuits of Class 2 or Class 3 communication or signaling systems.

Field installations of EMT have not been maintained in the installation of MC cables. Areas above the drop ceilings in Health Care Facilities are burdened with many systems, and subsequently the inadequate installation methods used for MC will jeopardize the safety of the patients.
Adequate documentation on the rigorous testing Type AC and MC cables must pass to be listed was submitted with Proposal 15-42. This documentation, plus the satisfactory field experience of CMP-15 members, no doubt led to the conclusion reached by the Panel in processing the 2005 NEC.

Type AC and MC cables are required to satisfactorily pass brutal treatment during the listing process. The testing includes crushing, bending and elongating. The tests the cables must satisfactorily pass are no doubt harsher than would be expected during installation of the cables.

The UL Fact-Finding Report on Nail Penetration of Types AC and MC Cable Installed Parallel to Framing Members (provided) show the cable is more resistant to damage from nails and screws than is Electrical Metallic Tubing. Type MC and AC cables need to be accepted for mechanical protection of the emergency system in hospitals to be treated equally.

It should be noted that items (3)(1) and (3)(2) in the list of accepted uses of listed flexible metal raceways and listed metal-sheathed cables seem to be incorrect as the wiring methods used in the construction of listed equipment by the manufacturer is controlled by the UL Safety Standard that regulates the construction of such equipment. See also 90.7 for an explanation of field examination or evaluation of listed equipment.

The information in this comment should not be considered a new concept as the issue has been before the Panel during the processing of both the 2005 and 2008 NECs.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: At this time the panel is not aware of any MC cable that has the crush, impact, and penetration circuit protection performance equivalent to EMT. The submitter has not referenced any type MC cable that performs equivalent to EMT in this regard. The panel is not receptive to writing code around products that do not exist yet.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.
July 9, 2010

To: NFPA Standards Council

From: Dave Mercier
   Director, Codes and Standards
   Southwire Company

Reference
Supporting information requesting NFPA Standards Council to overturn the floor action on CAM 70-20 to reject NEC Comment 15-101.

Introduction

The appeal is based on misleading and incorrect information provided by those speaking in favor of rejection of Comment 15-101 during the June 2010 Association Technical Meeting. The submitter of the comment did not have the opportunity to respond to the comments made on the floor due to a single member who repeatedly moved to call the question and a membership quick to vote in favor of these motions late in the day. After 20 years of debating this issue and after following the NFPA codes and standards development process, the process come up short in allowing incorrect and misleading information to stand without adequate rebuttal. This falls well short of the design of the NFPA consensus process.

This appeal presents a clear and substantial basis on which to overturn the floor action. By not allowing the submitter of the comment to correct misleading information presented to the NFPA membership at the annual meeting, the submitter of the comment was not provided the due process that is to be expected from the NFPA codes and standards development process.

Background

Since the 1990 NEC Code cycle, the technical panel responsible for Essential Electrical Systems for Hospitals, NEC 517.30, has rejected the proposed general use of metal clad cables such as Types MC and AC Cables for the wiring of the emergency system and the equipment systems in hospitals. The rejection has been based on the requirement of 517.30(C)(3) where “The wiring of emergency systems in hospitals shall be mechanically protected.” This additional protection is not normally required in other occupancies. Wiring considered mechanically protected has generally been limited to nonflexible metal raceways, Type MI Cable or Schedule 80 PVC Conduit. Other wiring installations with specific restrictions have been added over time. It should be noted that the use of Type MC Cable has been allowed under specified restrictions since the 1996 NEC as shown in Attachment 1.

For 20 years, the panel statement for rejecting the general use of Types MC and AC cables has been clear and consistent. The panel clearly states that standard constructions
of Types MC and AC Cables do not provide equivalent mechanical protection of the specified raceways allowed in NEC 517.30. During the 2002 NEC cycle, the Panel stated that the submitter had not provided a Fact-Finding Report showing that that the proposed cables have an equivalent level of mechanical protection to the current specified methods. The Panel stayed consistent with the request for a Fact-Finding Report in the 2008 and 2011 NEC Cycles. Attachment 2 references the submitted proposals or comments for the general use of Types MC or AC Cables during the 1990, 1993, 1996, 2002, 2005, 2008, and 2011 NEC Code cycles.

At the 2010 NEC ROC Meeting, an Underwriters Laboratories Fact-Finding Report was provided to the Panel in response to the 20 years of panel statements requiring mechanical protection equivalent to allowed wiring methods. After reviewing the report, the panel accepted the comment based on the Fact-Finding Report showing metal clad cable constructions meeting the mechanical protection of allowed raceways, specifically required to have the performance equivalence to EMT. Attachment 3 includes the UL Fact-Finding Report.

**Basis for the Appeal**
The following information will show that during the June 2010 Association Technical Meeting the membership was provided incorrect and misleading information provided by those speaking in favor of rejection of Comment 15-101.

**Page 33 – Lipster…**
19 The comment closing period was in the end of 20 October 2009. The UL report was not published until 21 December 3rd, 2009. The introduction of this report violates the rules governing committee projects as detailed in the published ROC.

**Response:** Claim is incorrect. The rules do not disallow new supporting information to be presented to the code making panel.

**Page 34 – Lipster…**
7 again. "No product standards" exist for this cable.
8 Without a product standards, there are 9 benchmark for meaningful evaluation and assessment.

**Response:** Claim is misleading. The process typically starts with the technical panel setting the performance criteria in the Code. Once that is established, UL develops or in this case, adds optional requirements to an existing standard. The panel clearly set the performance criteria as “… Listed MC Cable that has the crush, impact, and penetration circuit protection performance equivalent to EMT.”

**Page 34 – Lipster…**
10 Because this product is a wiring system and entirely new, the proposal and comment should have been sent to 12 Code Making Panel 7 for review.

**Response:** Claim is incorrect. Panel 7 stated during the 2010 ROC meeting that there was...
no need for this to be sent to Panel 7. In fact, precedence is set with Type MC-HL used in hazardous locations. Additional requirements were set by the panel for hazardous locations and then these requirements were added to the UL Standard for MC Cable. This wiring system is not new; it simply adds additional mechanical tests to assure equivalent performance to EMT.

**Page 34 – Lipster…**
18 scope, many questions remain unanswered. The insulation 19 again on the prototype is significantly larger than 20 normal branch circuit wire.

**Response:** Claim is misleading. I can only assume Mr. Lipster is referring to THHN wire as “normal”. The Code clearly allows many different types of wire constructions with many different thickness. The referenced “significantly larger” is the thickness required for commonly used RHH or RHW conductors. The NEC nor UL has a maximum insulation thickness requirement for conductors for general use.

**Page 34 – Lipster…**
21 It seems as though the insulation is actually 22 being used as a strength member rather than a Dialector, 23 which in and of itself, is kind of disturbing. The 24 large physical layer of insulation poses some real-world 25 issues.

**Response:** Claim is incorrect. Type USE, RHH, and RHW conductors have the same insulation thickness as referenced. The USE product is used everyday for direct burial installations that take advantage of the extra thickness for physical protection. Type USE Cable is terminated, spliced, and used with displacement devices without issues.

**Page 35 – Lipster…**
9 And, finally, what I consider the most 10 significant technical problem at all are box-fill 11 calculations which are based on standard number 12 wire. 12 Well, we go ahead and significantly increase the 13 insulation on the wire, of course, they're going to 14 impact that.

**Response:** Claim is incorrect. Box-fill is not based on standard number 12 wire. Again, I am not aware of a “standard 12 wire”. Wire types are different across the country as installation practices change from city to city. Box fill is based on the metal conductor size and not the insulation thickness. What Mr. Lipster would refer as non-standard wire thicknesses are already allowed to be used in the wiring methods allowed by 517.30.

**Page 35 – Lipster…**
19 clear. Allowing the use of a prototype cable that is 20 not available for use, has no product standards, has 21 never been tested as a wiring system has no field 22 performance record, in any case, is bad code.
Response: Claim is incorrect. This cable is based on the UL Standard for MC cables and must meet these requirements. The standard exists and the additional requirements were accepted by the panel. The product must be listed to these requirements to be used for these installations. The field performance is well known for armored cables. Claiming no performance history is false. The panel members know the level of protection provided by MC Cable and have set an even higher performance requirement by accepting this comment.

Page 39 – Horton …
13 proposal and comment meeting, and that was that there is no standard and no criteria, and there at least needs to be some criteria.
Response: Claim is incorrect. Criteria exist for MC Cable in the UL standard. The panel added additional criteria to meet the needs for additional mechanical protection in this installation.

Page 39 – Horton …
16 This is a proprietary product. Unless there's some criteria for what you test, other manufacturers don't even know what they have to meet, and it's not the policy of the NFPA to put in a proprietary product that nobody else has or can make.
Response: Claim is incorrect. This is a performance standard that can be met with many different enhancements to standard MC Cable construction. If the performance can be met many different ways, a proprietary issue does not exist

Page 39 – Horton …
21 I'm going to point out -- Steve pointed out a lot of the problems with installation, and the two
Response: Claim is misleading as it references false claims by Mr Lipster. The “issues” that were pointed out are not unique and already exist today with the allowed wire practices for this installation.

Page 39 – Horton …
23 voters against this were IBW and NEMA (phonetic) people who deal with the installation and knowing what they're going to face in the field.
Response: Claim is misleading. Ms Horton failed to mention that Independent Electrical Contractors voted in favor of the comment. IBEW and NECA (not NEMA) work closely together.

Page 39 – Horton …
1 I am going to point out some of the things that are missing in the test procedure that was done. Thru line 10 of page 41
Response: Claim is incorrect and is misleading. Fact-Finding reports provide direction for developing test procedures and are not expected to be complete. Fact-Finding reports that I have been involved with in no way were intended to be the final test procedure. The test procedure is developed using the UL Standard development process. A lot of time was spent by Ms. Horton pointing out issues that are not relevant.

Page 40 – Horton …
4 to test, and, at least, this is what we've always done, 5 the smallest and the largest size that we've been 6 permitted to be used and determine if the in-between 7 sizes fall within there. That's one of the things.  
Response: Claim is misleading. For the product to be listed, it will be required to meet this requirement.

Page 40 – Horton …
12 When you perform the number of tests, it says 13 that they go by 15-69, and on the impact test, the rule 14 is that you test ten specimens and no more than two can 15 fail. They never tested more than five, and, usually, 16 just tested three. The determined effect of resistance 17 was one of the things that made it be done.  
Response: Claim is incorrect. The requirement in UL 1569, Section 24.7 for impact and Section 25.3 for crush requires a single continuous length of cable with the cable being crushed at ten points along that length.

Page 40 – Horton …
18 In all instances, the EMT did not increase in 19 resistance on the impact test. The new MC increased 20 resistance by as much as two hundred and fifty-three 21 percent.  
Response: Claim is misleading. The requirements for minimum resistance values will be required to be met for listing based on UL and NEC minimum required resistance. Secondly this statement incorrectly ties the resistant test results to the impact test. The increase due to impact was 12%. A separate vibration test was performed. Page T1-6 of the Fact-Finding Report (Attachment 3), shows an increase for Sample 2 of 253%, however this test sample met both the final resistance requirements and fault current test requirements.

Page 41 – Horton …
11 I'd just -- trying to read to you what -- what 12 UL said in their report. "In consideration of a 13 fact-finding nature of the investigation, the foregone 14 report is to be construed as providing factual 15 information only, and should not be regarded in 16 conveying any conclusions or recommendations on the part
of Underwriters Laboratories regarding the construction of a product or recognition by any code or standard or for any other purpose."

Now, that's very similar to their normal caveat which appears on the front of any investigation; however, it is somewhat more specific. They also say that since this report focuses on the mechanical characteristics of the (undecipherable) as the type seek instruction as Page 42 (undecipherable) compared to listed type EMT, the means of terminating the cable or other aspects of its use were not investigated.

**Response:** Claim is misleading. All UL Fact Finding reports provide this type of language. UL develops a Fact-Finding Report to the Panel for the Panel to draw their own conclusion. UL always makes it clear the type of work that is done and that it does not include any conclusions or recommendations.

**Page 41 – Horton …**

19 MS. HORTON: Okay. Well, I just wanted to go on record that we do see procedural issues, and one of them is that it can really review the written document, **Response:** Claim is incorrect. The rules do not disallow providing a written document to the panel at the panel meeting.

**Page 44 – Benninger …**

20 MR. BENNINGER: My name is Jake Benninger, and I represent the IBW. I support the motion to reject Comment 15-101. It seems to me that patient care areas are probably not a place you want to minimize the integrity of what's been a proven wiring method especially with a product that doesn't have a product standard.

2 Also, the Committee didn't have adequate time to review the fact-finding report, and there was no opportunity for the peer review of fact-finding report for a product that doesn't exist.

**Response:** Claim is incorrect. The metal clad wiring method has a long proven record. The panel increased the performance criteria for use in this installation building on the UL MC Cable standard. The fact-finding report was short and concise. The panel was looking for proof with already established performance criteria that a more robust MC Cable could be constructed before adding it to the Code. An opportunity for “peer” review of all information discussed at a panel meeting would bring the process to an abrupt halt.
Summary
Unchanged for twenty years, the technical committee requirement to demonstrate that a metal clad cable could meet the mechanical protection provided by an allowed wiring method was met with a UL Fact-Finding Report at the 2010 NEC ROC meeting. This was accepted by the panel after much debate. For twenty years the NFPA process was followed with the panel responding with a positive vote when their request was met. The methodical misrepresentation of the facts at the annual meeting with the tendency of the members to cut discussion short resulted in process that came up short in providing due process in the NFPA codes and standards development process.

I look forward to presenting this appeal to the Standards Council on August 3, 2010.

Regards,

Dave Mercier
Director, Codes and Standards
Southwire Company

Phone: 770-832-4522
Fax: 770-832-5047
Limited uses of Type MC cable since 1996 in NEC 517.30(C)(3).

Added text is underlined.

1996 NEC Added …

**Exception No. 6:** Flexible metal raceways and cable assemblies shall be permitted to be used in prefabricated medical headwalls or where necessary for flexible connection to equipment.

1999, 2002 NEC expanded…

**Exception No. 5:** Flexible metal raceways and cable assemblies shall be permitted to be used in listed prefabricated medical headwalls, listed office furnishings, or where necessary for flexible connection to equipment.

2005, 2008 NEC expanded…

(2) Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 PVC conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

(3) Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:
   a. Where used in listed prefabricated medical headwalls
   b. In listed office furnishings
   c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage
   d. Where necessary for flexible connection to equipment
NEC references to proposals and comments
submitted over a 20 year period to
add Type MC or AC Cables.

2011 NEC

2010 ROP page 691-692
Proposal 15-78
Panel Meeting Action: Reject
Panel Statement: At this time the panel is not aware of any MC Cable that has the crush, impact, and penetration circuit protection performance equivalent to EMT. The submitter has not referenced any type MC cable that performs equivalent to EMT in this regard. The panel is not receptive to writing code around products that do not exist yet.

Proposal 15-84
Panel Meeting Action: Reject
Panel Statement: The requirement for protection of these systems is to maintain an uninterrupted supply of power in the event of an outage that is not limited to protection from nail or screw penetration during or after construction. The overall survivability of the emergency system must be assured. At this time the panel is of the opinion that the physical protection of these circuits are best served by non-flexible metallic raceways. The proposal includes all types of MC and AC cable, even those not found to fair well during the previously conducted fact-finding investigation. The panel’s concern is the mechanical integrity of the wiring method both during and after installation.

2010 ROC
Comment 15-101 add .. (2) Listed MC cable identified as providing crush, impact and penetration circuit protection performance comparable to electrical metallic tubing. (Note that a Underwriters Laboratories Fact-Finding Report was provided to the Panel at the ROC meeting.)
Panel Meeting Action: Accept
(Note this was later revised to Accept in Principle due to re-numbering the list.)

2008 NEC

2007 ROP page 59
Proposal 15-54
Add… (2) Listed MC cable identified as providing crush, impact and penetration circuit protection performance equivalent to Electrical Metallic Tubing.
Panel Action: Reject
Panel Statement: The panel is reluctant to expand the use of MC Cable beyond its permitted uses.
The substantiation indicates that MC Cable “can be designed and constructed to provide the needed mechanical protection”. This statement does not provide the evidence or data to warrant acceptance of this proposed change.

The panel recommends that the submitter provide the panel with a fact finding report to substantiate this change and evidence that this product can be listed and identified as special construction.

In addition, the panel recommends that this information would be more appropriately located in Article 330 under Uses Permitted.

2007 ROC page 330
Comment 15-39
Panel Action: Hold
Panel placed the Comment on hold due to new material requesting the unrestricted use of both Type AC and MC cables without additional mechanical protection.

2005 NEC

2004 ROP page 1333
15-42 Accept in Principle
* Panel action did not accept unrestricted use Type MC or AC Cables.

2004 ROC – No comments submitted.

2002 NEC

2001 ROP page 987
Proposal 17-34
Panel Action: Reject
Panel Statement: “The types of metal sheathed cable, armored cable and metal clad cable, mentioned in the submitter’s proposal, do not provide the mechanical protection required for Emergency system conductors. The intent is to provide a high level of protection for emergency conductors. The panel has chosen to accomplish this by requiring nonflexible metallic raceway systems, MI or in encasement of concrete. There has been no fact finding information presented to the panel to suggest that armored cable or metal clad cable has equivalent mechanical protection to the current methods specified.”

Proposal 17-35
Panel Action: Reject
Panel Statement exert: “There has been no fact finding information presented to the panel to suggest that metal clad cable has equivalent mechanical protection to the current methods specified. When there is a listing for this cable and a distinctive Type designation, the cable may be considered if it can be shown to have equivalent mechanical protection.”
2001 ROC – No Comments Submitted

1999 NEC

No proposals submitted to expand use of Type MC or AC Cable.

1996 NEC

1995 ROC page 386
Comment 17-51
Panel Action: Reject
Panel Statement: Type AC Cable does not provide the required physical protection in a general emergency system application.

1995 ROP page 600
Proposal 17-40 Add Exception No. 5. Armored, Type AC cables where the outer metal jacket is an approved grounding means of a listed cable assembly, shall not be required to be enclosed in raceways.
Panel Action: Reject
Panel Statement: Section 333-3 precludes the use of type AC cable where subject to physical damage which would not allow it to meet the requirements of 517-30(c)(3).

1993 NEC

1992 TCR page 471
17-75 add Exception No. 1: Metal Raceways shall not be required where Type MI Cable, Types MC and AC Cables where the outer metal jacket is an approved grounding means of a listed cable assembly.
Panel Action: Reject
Panel Statement: Insufficient documentation was presented to the Panel to support the mechanical protection offered by Type MC and AC Cables....

1990 NEC

1989 TCR page 486
17-30 Add the words "Type MI Cable, Type MC Cable, or Type AC cable with an insulated grounding conductor."
Panel Action: Reject
Panel Comment: “Proposal would not provide equivalent mechanical protection for requirement that the cable be protected in raceways.”
File E96627
Project 09ME09196

December 3, 2009

FACT-FINDING REPORT

on

METAL-CLAD CABLE

Southwire Co.
Carrollton, GA

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<td>Plan of Investigation</td>
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<td>T1-3</td>
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<td>T1-3</td>
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<td><strong>Summary</strong></td>
<td>S1</td>
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GENERAL

OBJECTIVE:

The purpose of this investigation was to develop data to be used by the submitter, Southwire Company, to support their proposal to amend Article 517 of the National Electrical Code. The proposal is as follows:

517.30(C)

(3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and 517.13(B). The following wiring methods shall be permitted:

(1) Nonflexible metal raceways, Type MI cable, or Schedule 80 rigid nonmetallic conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
(2) Listed MC cable identified as providing crush, impact and penetration circuit protection performance equivalent to Electrical Metallic Tubing.
(3) Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid nonmetallic conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
(4) Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:
   a. Where used in listed prefabricated medical headwalls
   b. In listed office furnishings
   c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage
   d. Where necessary for flexible connection to equipment
(5) Flexible power cords of appliances or other utilization equipment connected to the emergency system.
(6) Secondary circuits of Class 2 or Class 3 communication or signaling systems
PLAN OF INVESTIGATION:

Testing was planned to compare the proposed cable construction’s mechanical properties to those for Listed Type EMT.

The test program for this investigation focused on the mechanical abuse characteristics of a particular construction of Type MC as compared to those for Type EMT. Crushing and Impact tests were conducted on the 3 conductor Type MC and ½ in trade size EMT filled with three Listed THHN/THWN conductors. In addition, the Type MC and the Listed EMT, with the appropriate fitting, were subjected to vibration testing followed by the fault current test described in the Standard for Metal-Clad Cables, UL 1569. Resistance measurements were taken prior to and after all tests on the aluminum armor/bonding wire to determine any detrimental affects on the ground path.

The cables selected for testing were two particular constructions of No. 12 AWG Type MC employing interlocked aluminum armor intended as the ground path in accordance with paragraph 6.1.5A of UL 1569. One cable incorporated a large filler while the other used a PVC jacket under the armor.

Since this report focuses on the mechanical characteristics of the Type MC construction as compared to Listed Type EMT, the means of terminating the cable or other aspects of its use were not investigated.
TEST RECORD NO. 1

SAMPLIES

The following samples were provided as determined by the manufacturer:

Sample No. 1  3/C, No. 12 AWG cable employing interlocked aluminum armor with aluminum bonding wire, 98 mil thick filler and containing 30-mil insulated solid copper conductors.

Sample No. 2  3/C, No. 12 AWG cable employing interlocked aluminum armor with aluminum bonding wire, 93 mil thick jacket and containing 45-mil insulated stranded copper conductors with fillers.

Sample No. 3  Listed ½ in trade size EMT containing three (12) No. 12 AWG Type THHN conductors

The cables tested were constructed in accordance with the Standard for Metal-Clad Cable, UL 1569. However, it should be noted that sample 2 is not a Listed construction.

The following tests were conducted:

<table>
<thead>
<tr>
<th>DETAILLED EXAMINATION:</th>
<th>SAMPLE 1</th>
<th>SAMPLE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of insulated circuit conductors</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Aluminum binding strip present?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Conductor diameter, mils</td>
<td>79.2</td>
<td>-</td>
</tr>
<tr>
<td>Number of strands</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Strand diameter, mils</td>
<td>-</td>
<td>9.9</td>
</tr>
<tr>
<td>Lay of strands, inches</td>
<td>-</td>
<td>1.3</td>
</tr>
<tr>
<td>CM area</td>
<td>-</td>
<td>6371</td>
</tr>
<tr>
<td>AWG Size</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Lay of conductors, in</td>
<td>1.1</td>
<td>3.1</td>
</tr>
<tr>
<td>Tape</td>
<td>Polyester</td>
<td>Paper*</td>
</tr>
<tr>
<td>Tape thickness, mils</td>
<td>1.1</td>
<td>6.0</td>
</tr>
<tr>
<td>Average insulation thickness, mils</td>
<td>32</td>
<td>48</td>
</tr>
<tr>
<td>Minimum insulation thickness, mils</td>
<td>30</td>
<td>45</td>
</tr>
<tr>
<td>Average filler thickness, mils</td>
<td>98</td>
<td>93</td>
</tr>
<tr>
<td>Minimum filler thickness, mils</td>
<td>91</td>
<td>76</td>
</tr>
<tr>
<td>Armor dimensions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min thickness at any point, mils</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Width of strip, in</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Diameter under armor, mils</td>
<td>545</td>
<td>660</td>
</tr>
</tbody>
</table>

* - two paper tapes provided with a combined thickness of 6 mils
CRUSHING TEST:

METHOD

Samples of each cable were crushed between a flat steel plate and a 3/4 in diameter mandrel in a compression machine whose jaws closed at a rate of 0.2 inches per minute. The length of the sample was parallel to the dimension of the plate and mandrel.

The plate and mandrel were electrically connected together, to the metal of the testing machine and to earth ground. The machine was started and the samples were subjected to increasing force of the plate and mandrel moving towards one another until a short occurred between the conductors or between the conductor and the earth grounded plate or mandrel. The maximum force to cause exerted on the sample before the short occurred was recorded as the crushing force for that sample. Resistance measurements were taken along the entire sample length prior to and after testing.

RESULTS

<table>
<thead>
<tr>
<th>Sample</th>
<th>Resistance of armor/bonding wire before Crushing Test (ohms per 1000 ft)</th>
<th>Crushing Force, lbf</th>
<th>Resistance of armor/bonding wire after Crushing Test (ohms per 1000 ft)</th>
<th>Percent change in Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.037</td>
<td>2976</td>
<td>1.093</td>
<td>+ 5.4</td>
</tr>
<tr>
<td>2</td>
<td>1.068</td>
<td>6361</td>
<td>1.373</td>
<td>+ 28.6</td>
</tr>
<tr>
<td>3</td>
<td>0.757</td>
<td>3929</td>
<td>0.757</td>
<td>0</td>
</tr>
</tbody>
</table>
IMPACT TEST:

METHOD

Samples of the wire submitted were subjected to the impact of a freely falling flat-faced rectangular steel weight. For each trial a new section of each specimen was laid on a 3/4 inch diameter drill rod. Each of the two circuit conductors in the samples tested was connected in series with a 3-W 120-V neon lamp to one of the energized conductors of a 208-V 48-62 Hz 4-wire grounded-wye AC supply circuit. The grounding conductor, and armor (for the Type MC) of the samples were connected to all parts of the impact apparatus, earth ground and the grounded supply wire. The EMT and one 12 AWG THHN/THWN conductor were connected to all parts of the impact apparatus, earth ground and the grounded supply wire. Various weights were dropped from various heights until failure was obtained. Failure for the EMT was recorded as either conductor to conductor contact, conductor to EMT contact as indicated by a three watt neon lamp connected in series with the conductor under test, ground, and 120 volt ac supply as indicated by one of the 3 lamps lighting. Compliance with the test is determined by no more than two failures out of ten trials. Resistance measurements were taken along the entire sample length prior to and after testing.

RESULTS

<table>
<thead>
<tr>
<th>Sample</th>
<th>Resistance of armor/bonding wire before (ohms per 1000 ft)</th>
<th>Impact Force (ft-lb)</th>
<th>Resistance of armor/bonding wire after (ohms per 1000 ft)</th>
<th>Percent change in Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.885</td>
<td>25</td>
<td>1.220</td>
<td>+ 37.9</td>
</tr>
<tr>
<td>2</td>
<td>0.865</td>
<td>150</td>
<td>0.975</td>
<td>+ 12.7</td>
</tr>
<tr>
<td>3</td>
<td>0.695</td>
<td>75</td>
<td>0.710</td>
<td>+ 2.2</td>
</tr>
</tbody>
</table>
VIBRATION FOLLOWED BY FAULT CURRENT TEST:

METHOD

The Fault current test (section 26A) was conducted after the complete test assembly had been subjected to vibration as described below.

For the EMT samples, two 2½ foot lengths of ½ in trade size EMT were joined together by means of an EMT coupler. Three (3) Listed No. 12 AWG Type THHN/THWN wires were then placed inside the EMT.

An assembly as shown in Figure 26A.1 or 26A.2 of UL 1569 consisted of the metal plate or enclosure, fitting, connector and clamp, and a 5 foot length of sample to be tested. The plate or enclosure was securely attached to the platform of a vibrating machine. The cable was straight and supported. The platform vibrated for a period of 30 hours at 1000 cycles per minute with an amplitude of 1/8 inch. Amplitude is the maximum displacement of sinusoidal motion from position of rest or one-half of the total displacement of the assembly. After this conditioning, the assembly was carefully removed from the vibration machine and the fault current test was conducted.

A Listed MC cable fitting that was acceptable for grounding and for the size of cable being tested was installed on one end of each test sample. For the EMT filled with THHN conductors, an appropriate Listed EMT fitting was used. The fitting was connected to an unpainted, plated or unplated, steel enclosure as shown in Figure 26A.1. The thickness of the enclosure or plate was as specified in 26A.4 and 26A.5. A fitting locknut, wire lead, and wire connector were installed per 26A.3. The test assembly was connected to each side of an adjustable nominal 600-V AC supply circuit. This supply was adjusted to deliver the test current.

Resistance measurements were taken again from the plate to a point one-foot away and from the plate to the end of the specimen both prior to and after vibration.

The assemblies were laid out on a wide, flat, horizontal surface of a fire-resistant, chemically inert, and electrically nonconductive material. After this connection was made, the supply was energized and the test current in Table 26A.1 was passed through the sample for 4 seconds.
RESULTS FOR SAMPLE 1

**RESISTANCE FROM PLATE TO ONE FOOT AWAY**

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Resistance Before Vibration Test, ohms</th>
<th>Resistance After Vibration Test, ohms</th>
<th>Percent change In Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.0024</td>
<td>.0103</td>
<td>+ 312.0</td>
</tr>
<tr>
<td>2</td>
<td>.0029</td>
<td>.0035</td>
<td>+ 20.7</td>
</tr>
<tr>
<td>3</td>
<td>.0043</td>
<td>.0034</td>
<td>- 21.0</td>
</tr>
</tbody>
</table>

**RESISTANCE FROM PLATE TO END OF SPECIMEN**

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Resistance Before Vibration Test, ohms</th>
<th>Resistance After Vibration Test, ohms</th>
<th>Percent change In Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.0055</td>
<td>.0171</td>
<td>+ 210.9</td>
</tr>
<tr>
<td>2</td>
<td>.0056</td>
<td>.0097</td>
<td>+ 73.2</td>
</tr>
<tr>
<td>3</td>
<td>.0062</td>
<td>.0108</td>
<td>+ 74.2</td>
</tr>
</tbody>
</table>

Test Current, A | Observations# | Specimen No. 1
470             | 1?            | Yes
                | 2?            | Yes
                | 3?            | Yes

Test Current, A | Observations# | Specimen No. 2
470             | 1?            | Yes
                | 2?            | Yes
                | 3?            | Yes

Test Current, A | Observations# | Specimen No. 3
470             | 1?            | Yes
                | 2?            | Yes
                | 3?            | Yes

### OBSERVATION CODES:

1. The bonding/grounding conductor or the interlocked armor strip did not open the circuit when subjected to the test current.

2. The bonding/grounding conductor or the interlocked armor strip did not melt during the 4 seconds of current flow.

3. Continuity exists between the points noted in 26A.6
## RESULTS FOR SAMPLE 2

### RESISTANCE FROM PLATE TO ONE FOOT AWAY

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Resistance Before Vibration Test, ohms</th>
<th>Resistance After Vibration Test, ohms</th>
<th>Percent change In Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.0038</td>
<td>.0049</td>
<td>+ 28.9</td>
</tr>
<tr>
<td>2</td>
<td>.0035</td>
<td>.0032</td>
<td>- 8.9</td>
</tr>
<tr>
<td>3</td>
<td>.0052</td>
<td>.0043</td>
<td>- 17.3</td>
</tr>
</tbody>
</table>

### RESISTANCE FROM PLATE TO END OF SPECIMEN

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Resistance Before Vibration Test, ohms</th>
<th>Resistance After Vibration Test, ohms</th>
<th>Percent change In Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.0062</td>
<td>.0131</td>
<td>+ 111.3</td>
</tr>
<tr>
<td>2</td>
<td>.0041</td>
<td>.0145</td>
<td>+ 253.7</td>
</tr>
<tr>
<td>3</td>
<td>.0054</td>
<td>.0099</td>
<td>+ 83.3</td>
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Test Current, A Observations# Specimen No. 1

<table>
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<tr>
<td>3?</td>
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Test Current, A Observations# Specimen No. 2

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<td></td>
</tr>
<tr>
<td>3?</td>
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<td></td>
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Test Current, A Observations# Specimen No. 3

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<td>Yes</td>
<td></td>
</tr>
<tr>
<td>3?</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

### OBSERVATION CODES:

1. The bonding/grounding conductor or the interlocked armor strip did not open the circuit when subjected to the test current.

2. The bonding/grounding conductor or the interlocked armor strip did not melt during the 4 seconds of current flow.

3. Continuity exists between the points noted in 26A.6
RESULTS FOR SAMPLE 3

RESISTANCE FROM PLATE TO ONE FOOT AWAY

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Resistance Before Vibration Test, ohms</th>
<th>Resistance After Vibration Test, ohms</th>
<th>Percent change In Resistance</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.040</td>
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<td>0.086</td>
<td>0.060</td>
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</tr>
<tr>
<td>5</td>
<td>0.079</td>
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<td>6</td>
<td>0.088</td>
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RESISTANCE FROM PLATE TO END OF SPECIMEN

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<tr>
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<th>Resistance Before Vibration Test, ohms</th>
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<th>Percent change In Resistance</th>
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<td>0.059</td>
<td>- 35.9</td>
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Test Current, A Observations# Specimen No. 1 Specimen No. 2

| 470 | 1? | N/A | N/A |
| 2? | N/A | N/A |
| 3? | Yes | Yes |

Test Current, A Observations# Specimen No. 3 Specimen No. 4

| 470 | 1? | N/A | N/A |
| 2? | N/A | N/A |
| 3? | Yes | Yes |

Test Current, A Observations# Specimen No. 5 Specimen No. 6

| 470 | 1? | N/A | N/A |
| 2? | N/A | N/A |
| 3? | Yes | Yes |

#OBSERVATION CODES:

1. The bonding/grounding conductor or the interlocked armor strip did not open the circuit when subjected to the test current.

2. The bonding/grounding conductor or the interlocked armor strip did not melt during the 4 seconds of current flow.

3. Continuity exists between the points noted in 26A.6
SUMMARY

In consideration of the fact-finding nature of the investigation, the foregoing report is to be construed as providing factual information only, and should not be regarded as conveying any conclusions or recommendations on the part of Underwriters Laboratories Inc., regarding the construction or performance of the product for Recognition by any code or Standard or for any other purpose.

Crushing Test – The average of values obtained in the Crushing Test of one of the Type MC constructions evaluated was better and one was worse than that of Listed Type EMT filled with three (3) THHN/THWN conductors. The resistance of the armor for both MC constructions increased more after testing than that of the EMT.

Impact Test - The results obtained in the Impact Test of one of the Type MC constructions was better and one was worse than that of Listed Type EMT filled with three (3) THHN/THWN conductors. The resistance of the armor for both MC constructions increased more after testing than that of the EMT.

Vibration Followed by Fault Current Test – The resistance of the MC constructions increased after vibration while the resistance on all but one specimen of the EMT decreased. However, the fault current test results for both of the Type MC constructions are comparable with those of Listed Type EMT filled with three (3) THHN/THWN conductors.

Report by:  
PHILIP T. LAUDICINA  
Senior Staff Engineer  
Conformity Assessment Services

Reviewed by:  
MARIO A. XERRI  
Section Manager  
Conformity Assessment Services

RICHARD A. MARTIN  
Business Manager  
Conformity Assessment Services
Standards Council Supplemental Agenda

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Metallic Tubing

(2) Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid nonmetallic conduit, flexible nonmetallic or jacketed metallic raceway, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

(3) Listed flexible metal raceways and listed metal-sheathed cable assemblies in any of the following:
   a. Where used in listed prefabricated medical headwalls
   b. Listed office furnishings
   c. Where placed into existing walls or ceilings, not otherwise accessible and not subject to physical damage
   d. Where necessary for flexible connection to equipment

(4) Flexible power cords of appliances or other utilization equipment connected to the emergency system.

(5) Secondary circuits of Class 2 or Class 3 communication or signaling systems.

Submitter: Game Simons, Rep. National Armored Cable Manufacturers Association

Revisions: Revise 517.30(C)(3) as follows:

(3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and 517.13(B). The following wiring methods shall be permitted:

- Nonmetallic raceways, Type MI cable, or Schedule 80 rigid PVC conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
- Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid PVC conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
- Listed flexible metal raceways and listed metal-sheathed cable assemblies in any of the following:
  a. Where used in listed prefabricated medical headwalls
  b. Listed office furnishings
  c. Where placed into existing walls or ceilings, not otherwise accessible and not subject to physical damage
  d. Where necessary for flexible connection to equipment
- Flexible power cords of appliances or other utilization equipment connected to the emergency system.
- Secondary circuits of Class 2 or Class 3 communication or signaling systems with or without raceways.

FPN. See 517.13 for additional grounding requirements in patient care areas.

Subsection: Listed Type AC and Type MC cables are more than adequate to provide mechanical protection of the systems in hospitals and should be accepted for that purpose. In fact, Code Panel 15 made that appropriate conclusion in itsPanel Statement on Proposal 15-42 for the 2008 NEC. CMP 15 stated in part, "Types AC and MC cables that are listed provide adequate physical and mechanical protection for the emergency system of health care facilities." We agree with the Panel's conclusion. However, we feel the Panel inappropriately, and without technical justification for such action, limited the use of Type AC and MC cables as shown in the 2005 NEC. Type AC and MC cables must pass to be listed was submitted with Proposal 15-42. This documentation, plus the satisfactory field experience of CMP-15 members, no doubt led to the conclusion reached by the Panel in processing the 2005 NEC. Type AC and MC cables are required to satisfactorily pass brutal treatment during the testing process. The testing includes crushing, bending and elongating. The tests the cables must satisfactorily pass are no doubt harsher than would be expected during installation of the cables.

The UL Fact-Finding Report on Niel Penetration of Type AC and MC Cable Installed Parallel to Framing Members (provided) show the cable is more resistant to damage from nails and screws than in Electrical Metallic Tubing. Type MC and AC cables need to be accepted for mechanical protection of the emergency system in hospitals to be treated equally.

It should be noted that items (3)(a) and (3)(c) in the list of accepted uses of listed flexible metal raceways and listed metal-sheathed cables seem to be incorporated as the wiring methods used in the construction of listed equipment by the manufacturer is controlled by the UL Safety Standard that regulates the construction of such equipment. See also 90.7 for an explanation of field examination or evaluation of listed equipment.

The information in this comment should not be considered a new concept as the issue has been before the Panel during the processing of both the 2005 and 2008 NECs.

Panel Meeting Action: Reject

Panel Statement: At this time the panel is not aware of any MC cable that has the crush, impact, and penetration circuit protection performance equivalent to EMT. The submitter has not referenced any type MC cable that performs equivalent to EMT in this regard. The panel is not receptive to writing code around products that do not exist yet.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11
Ballot Not Returned: 1

NOTE: This proposal appeared as Comment 15-39 on Proposal 15-54 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 15-54 was:

Revise text to read as follows:

(3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and 517.13(B). The following wiring methods shall be permitted:

- Nonmetallic raceways, Type MI cable, or Schedule 80 rigid nonmetallic conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
- Listed MC cable identified as providing crush, impact and penetration circuit protection performance equivalent to Electrical Metallic Tubing.
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15-101 Log #2797 NEC-P15 (517.30(C)(3))

Final Action: Accept in Principle

TCC Action: The Technical Correlating Committee directs that this comment be reported as “Accept in Principle” by accepting the new (3) and its language, plus the renumbering of (4), (5), and (6). The Technical Correlating Committee also directs that the remainder of the text remains as written in the 2008 Edition of the National Electrical Code.

Submitter: Richard Temblador, Southwire Company

Comment on Proposal No: 15-76

Recommendation: (3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and 517.13(B). The following wiring methods shall be permitted:

1. Nonflexible metal raceways, Type MI cable, or Schedule 60 rigid nonmetallic conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

2. Listed MC cable identified as providing crush, impact and penetration circuit protection performance comparable to electrical metallic tubing.

3. Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid nonmetallic conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

4. Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:
   a. Where used in listed prefabricated medical headwalls
   b. In listed office furnishings
   c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage
   d. Where necessary for flexible connection to equipment

5. Flexible power cords of appliances or other utilization equipment connected to the emergency system.

6. Secondary circuits of Class 2 or Class 3 communication or signaling systems

Substantiation: Type MC cable can be constructed to provide enhanced mechanical protection comparable to EMT while maintaining ground path integrity before, during and after installation. The revised proposal should be accepted. I have provided supporting information.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept

Number Eligible to Vote: 13

Ballot Results: Affirmative: 11 Negative: 2

Explanation of Negative:

LIPSTER, S.: I disagree with the panel action and statement permitting an unproven wiring method not yet available to installers, with limited laboratory testing and no field installation record, to be used in health care facilities. The panel is prematurely approving a product that is not in production and not available on the market. There are several opportunities for the use of a crush resistant MC cable in other occupancies where a track record for this nonexistent wiring method can be established. Health care installations are not a place to test new cable wiring methods and hope they are safety-compatible with EMT. The panel was presented a Underwriters Laboratories fact finding report that detailed the testing of two prototype cables. The crush and impact tests of the two prototype cables vs. EMT concluded that one of the prototype cables evaluated better and one was worse than that of listed EMT, however, it is important to note that product standards do not exist for crush resistant cable so the test have limited value. The means for cable termination at a box connection (the prototype cable being much larger than standard MC cable) were not investigated by UL creating concerns about real life performance and grounding/bonding at connection points. The acceptance of this comment by the panel was clearly made with the hope and desire of a supposedly cheaper alternative to EMT. It remains to be seen that a manufactured cable product with the same protective qualities as EMT can be fabricated and made available to the market. Patient safety, should be foremost over unproven installation methods.

The aforementioned Underwriters Laboratory fact finding report presented to the code making panel was dated December 3, 2009. The comment period for this code cycle closed on October 23, 2009, therefore the introduction of this material after the published comment closing date is a violation of the Regulations Governing Committee Projects, 4.4.1, 4.4.3.1, 4.4.4, 4.4.5 and 4.4.6.

SHEELLY, B.: The use of MC cable identified as providing crush impact and penetration circuit protection performance equivalent to EMT is not an improvement to the codes as there will be a severe hazard created in the installation of the emergency wiring. Field installation of EMT has an integrity that has not been maintained in the installation of MC. The areas above the
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drop ceilings in Health Care Facilities are burdened with many systems, and subsequently the inadequate installation methods used for MC will jeopardize the safety of the patients.

12-24 Log #1404 NEC-P12 (625.2.Electric Vehicle) Final Action: Accept

TCC Action: The Technical Correlating Committee notes that only the legislative text changes were to be incorporated into this definition.


Comment on Proposal No: 12-44

Recommendation: Revise text to read as follows:

Electric Vehicle. An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. For the purpose of this article, electric motorcycles and similar type vehicles and off-road, self-propelled electric vehicles, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like, are not included.

Substantiation: Battery capacities of vehicles for on-road use are not covered under the scope of the NEC. EVs can be charged using 120 VAC, 15A receptacles as are electric motorcycles using similar EVSE. Several electric motorcycles currently on the market can be charged by either 120 or 240 VAC, 15A supply. Adopting similar requirements for electric motorcycles would allow them to use the same public infrastructure as EVs.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

12-111 Log #2536 NEC-P12 (670.5) Final Action: Reject

TCC Action: The Technical Correlating Committee directs the text of Proposal 12-177 be revised to read as follows since the proposal would have required industrial machinery at all locations where short-circuit current was not exceeded:

"670.5 Short-Circuit Current Rating. Industrial machinery shall not be installed where the available fault current exceeds its short-circuit current rating as marked in accordance with 670.3(A)(4)."

Submitter: James M. Imlah, City of Hillsboro

Comment on Proposal No: 12-177

Recommendation: Revise text to read as follows:

670.5 Short Circuit Current Rating. Industrial machinery shall be marked in accordance with 670.3(A)(4) and shall be installed where the available fault current does not exceed the marked short circuit current rating as marked in accordance with 670.3(A)(4).

Substantiation: Suggesting the above wording because first, the equipment marking needs to be known and will be on the equipment prior to the equipment installation. Secondly, the other change was to remove the words “its” for clarity of the language to “assure the available fault current does not exceed the industrial machinery short circuit rating.” “Its” is difficult to enforce because of different interpretations on what “its” is intended to describe.

Panel Meeting Action: Reject

Panel Statement: The current wording is adequate and clear. The rewording does not provide any additional clarity.

The submitter has not proved any technical substantiation for the revision.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12
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Number Eligible to Vote: 13
Ballot Results: Affirmative: 12
Ballot Not Returned: 1 Conwy, C.

15-52 Log #881 NEC-P15
(F17.30(3)(b))

Final Action: Reject

Submitter: Marvin J. Fischer, Monroe Township, NJ
Recommendation: Add at end of paragraph 1, add: "[NFPA 99: 4.4.2.2.4.4]"
Substantiation: 1. Test is performance criteria and the responsibility of TCC on Health Care Facilities.
2. Conform to NFPA Standards Council on policy for extracted text.
Panel Meeting Action: Reject
Panel Statement: Since the two requirements are substantially different, 517.30(C)(1), should not be identified as extracted material.
Section 517.30(C)(1) has additional requirements beyond Section 4.4.2.2.4.1 of NFPA 99.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 12
Ballot Not Returned: 1 Conwy, C.

15-53 Log #818 NEC-P15
(F17.30(C)(3))

Final Action: Reject

Submitter: Marvin J. Fischer, Monroe Township, NJ
Recommendation: Add at end of paragraph 1, before subparagraph 1, add: "[sentences 1: NFPA 99: 4.4.2.2.4.4]."
Substantiation: 1. Test is performance criteria and the responsibility of TCC on Health Care Facilities.
2. Conform to NFPA Standards Council on policy for extracted text.
Panel Meeting Action: Reject
Panel Statement: NFPA 99, Section 4.4.3.3.4.4, refers to NFPA 70 for requirements, therefore 517.30(C)(3) is not extracted text.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 12
Ballot Not Returned: 1 Conwy, C.

15-54 Log #8380 NEC-P15
(F17.30(C)(3))

Final Action: Reject

Submitter: Richard Temblador, Southwire Company
Recommendation: Revise text to read as follows:
(3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13A(1) and 517.13(3). The following wiring methods shall be permitted:
1. Nonmetallic metal raceways, Type MI cable, or Schedule 80 rigid nonmetallic conduit.
2. Plastic or rigid metal conduit, flexible nonmetallic or jacketed metal raceways, or jacketed metal cable assemblies installed in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
3. (4) Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:
   a. Where used in listed prefabricated medical headwalls.
   b. In listed office furnishings.
   c. Where fixed into existing walls or ceilings, not otherwise accessible and not subject to physical damage.
   d. Where necessary for flexible connection to equipment.
   e. Flexible power cord(s) of appliances or other utilization equipment connected to the emergency system.
   f. Secondary circuits of Class 2 or Class 3 communication or signaling systems.
Substantiation: Traditionally, nonmetallic raceways and MI cable have been used to provide the needed mechanical protection as required for emergency and critical branch circuits along with redundant ground paths as required by 517.13. MI cable can be designed and constructed to provide the needed mechanical protection - crush, impact and penetration - for emergency and critical branch that is equivalent to that of electrical metallic tubing with redundant ground paths as required by 517.13.
Panel Meeting Action: Reject
Panel Statement: The panel is reluctant to expand the use of MI cable beyond its permitted uses.

Substantiation indicates that MI cable can be "designed and constructed to provide the needed mechanical protection."
This statement does not provide the evidence or data to warrant acceptance of this proposed change.
The panel recommends that the submitter provide the panel with a fact finding report to substantiate this change and evidence that this product can be listed and identified as special construction.
In addition, the panel recommends that this information be more appropriately located in Article 330 under Uses Permitted.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 12
Ballot Not Returned: 1 Conwy, C.

15-53 Log #8269 NEC-P15
(F17.30(C)(3)(d))

Final Action: Reject

Submitter: James H. Maxfield, Dover, NH
Recommendation: Add 517.30(C)(3)(c).
Substantiation: Where protected from physical damage for its entire length by any raceway identified in (1) and (2).
Panel Meeting Action: Reject
Panel Statement: All raceways identified and installed in accordance with (1) or (2) provide adequate physical protection for branch circuit conductors that supply patient care area.
Similarly, when installed for its entire length in such raceways listed flexible metal raceways and listed metal sheathed cable assemblies will be as well protected from physical damage.
The requirements of 517.13A(1) and 517.30(C)(3) are not compromised by the installation of listed flexible metal raceways and listed metal sheathed cable assemblies protected by a nonmetallic raceway. Raceway sections identified in (1) and (2) already permit such an installation. For example, 535.22 "cables shall be permitted to be installed where such use is prohibited by the respective raceway article."
Panel Meeting Action: Reject
Panel Statement: Listed cable assemblies are not tested for performance when installed entirely within a raceway system. Installation of a cable within another raceway "along its entire length" becomes an installation problem for proper termination of the raceway system and the raceway at junction points. Proper sizing of a raceway to contain a single cable is unfamiliar to many installers and inspectors.
Section 517.30(C)(3)(c) covers the use of flexible methods. Installation in accordance with the submitter’s proposal would constitute a nonflexible installation.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 12
Ballot Not Returned: 1 Conwy, C.

15-56 Log #8433 NEC-P15
(F17.30(C)(3)(3))

Final Action: Reject

Submitter: William A. Wolfe, Steel Tubing Institute of North America
Recommendation: Revise the charging paragraph of the exceptions to read as follows:
1. Listed flexible metal raceways and listed metal sheathed cable assemblies complying with 250.118 and 517.13 are permitted in any of the following:
2. Substantiation: Both Section 250.118 and 517.13 contain important information regarding specific grounding requirements for the wiring methods named in (3). Without these references this code could be interpreted that these requirements are satisfied by the exceptions in 517.30(C)(3). While there is a PNH calling the user’s attention to 517.13, this is not enforceable and the safety in patient care areas could be compromised. This revised text should assure that necessary grounding requirements and limitations are met.
Panel Meeting Action: Reject
Panel Statement: Compliance with 517.13 is unnecessary for cables in office furnishings where fixed into existing walls or ceilings, or to connect equipment outside the patient care area. Paragraph (3) clearly states the requirement for compliance with 517.13 where located in a patient care area, and 517.13A contains the needed reference to 250.118.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 12
Ballot Not Returned: 1 Conwy, C.

15-57 Log #1031 NEC-P15
(F17.30(C)(3)(4) and 517.30(C)(3)(3))

Final Action: Accept

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action on Proposal 8-53. This action will be considered by the Panel as a Public Comment. The Technical Correlating Committee also directs that this proposal be forwarded to Code-Making Panel 8 for Comment.
Submitter: William Wiegner, Certification Solutions
Recommendation: Revis 517.30(C)(3)(1) and 517.30(C)(3)(2) as follows:
1. Nonmetallic metal raceways, Type MI cable, or Schedule 80 rigid nonmetallic PVC conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
2. Where exposed in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid nonmetallic PVC conduit, flexible nonmetallic or jacketed metal raceways, or jacketed metal cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
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Recommendation:
- Revise existing Section 517.30(C)(3) as follows:

  (3) Mechanical Protection of the Emergency System. The wiring of the emergency system of a hospital shall be mechanically protected by installation in nonflexible metal raceways, or shall be wired with Type MI cable or listed Type MC cable or listed Type AC cable.

Substantiation:
- Type AC and MC cables that are listed provide more than adequate physical and mechanical protection for the emergency system of health care facilities. The fact finding study that accompanies this proposal shows Type AC and MC cables provide excellent protection from penetration by nails and screws. This protection is superior to some of the wiring methods presently accepted in some of the exceptions.
- In addition, please review the level of protection required in the UL product safety standard for Type AC and Type MC cable. As can be seen, Type AC and MC cables are extremely robust, sturdy and offer more than adequate protection from physical damage.
- Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle
- Replace the existing 517.30(C)(3) with the following:

  "(3) Mechanical Protection of the Emergency System. The wiring of the emergency system in a hospital shall be mechanically protected. The following wiring methods shall be permitted:

  (1) Nonflexible metal raceways, Type MI cable, or Schedule 80 rigid nonmetallic conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

  (2) Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid nonmetallic conduit or flexible nonmetallic raceways listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

  (3) Flexible metal raceways and metal sheathed cable assemblies as follows:

  (a) When used in listed prefabricated medical headwalls,

  (b) In listed office furnishings,

  (c) Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage, or

  (d) Where necessary for flexible connection to equipment. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and (B).

  (e) Flexible power cords of appliances or other utilization equipment connected to the emergency system.

  (5) Secondary circuits of Class 2 or Class 3 communication or signaling systems.

Delete Exceptions No. 1 through No. 5."

Retain fine print note.

Panel Statement:
- The panel reworded Section 517.30(C)(3) to provide information for wiring in existing patient care areas.
- Additionally, the new language replaces existing exceptions 1 through 5 with positive statements, and incorporates the essence of Proposals 15-42 through 15-46.

- Types AC and MC cables that are listed provide adequate physical and mechanical protection for the emergency system of health care facilities. The panel limits these wiring methods only to existing installations where it is impractical to install nonflexible metal raceway.

Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

Comment on Affirmative:
- WHITE: Add the word "listed" before Flexible metal raceways and metal sheathed cable assemblies as follows:

Panel Meeting Action: Accept in Principle
Final Action: Accept in Principle

Submitter: Thomas J. Garvey, State of Wisconsin

Recommendation:
- Revise Exception No. 3 to read: "Schedule 80 rigid nonmetallic conduit shall be permitted, except for branch circuits serving patient care areas. Schedule 80 rigid shall not be permitted to be used in locations prohibited by other areas of this code."

Substantiation:
- The existing text is interpreted to preclude the use of Schedule 80 conduit for feeders on the emergency system.

Panel Meeting Action: Accept in Principle
Panel Statement:
- See panel action and statement in Proposal 15-42 (Log #2695).

Number Eligible to Vote: 13
Ballot Results: Affirmative: 13
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SUBSTANTIATION: The current figure does not show the separation of the life safety and critical branches from other systems as required in the text of NEC 517-30(c). The current figure seems to create confusion between it and the text.

PANEL ACTION: Accept, Principle.

PANEL STATEMENT: The Panel Proposal 17-31c accomplishes the submitter's intent.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 15

VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 3 Clark, Nash, Telecy

17-33 - (517-30(c) (3)): Accept

SUBMITTER: Jonathan Dalboi Saravia, E. Freeport, MA

RECOMMENDATION: Delete the second sentence.

SUBSTANTIATION: This new (1989) sentence does not add clarity and has created much controversy. This new sentence is being interpreted by some to allow the use of MC or AC for branch circuit conductors serving patient care areas since 517-13 Exception No. 1 permits their use.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 15

VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 3 Clark, Nash, Telecy

17-34 - (517-30(c) (3)): Reject

SUBMITTER: George W. Fisch, Nat'l Armored Cable Mfrs Assn.

RECOMMENDATION: Revise text to read as follows:

3) Mechanical Protection of the Emergency System: The wiring of the emergency system of a hospital shall be mechanically protected by installation in nonflexible metal raceway, metal sheathed cables, or shall be wired with Type MI cable. Where installed as branch circuit conductors serving patient care areas, the installation shall comply with the requirements of Section 517-13.

SUBSTANTIATION: Armored Cable and Metal Clad cable provide greater mechanical protection than the other Chapter 3 cable wiring methods that are excluded by this section. Metal-sheathed cables are inherently suitable for more severe mechanical environments by virtue of their metallic outer covering. Mechanical Protection of the Emergency System is an appropriate application for metal-sheathed cables.

PANEL ACTION: Reject.

PANEL STATEMENT: The types of metal sheathed cable, armored cable, and metal clad cable, mentioned in the submitter's proposal, do not provide the mechanical protection required for emergency system conductors. The intent is to provide a high level of protection for emergency conductors. The panel has chosen to accomplish this by requiring nonflexible metallic raceway systems, MI or in encasement of concrete.

There has been no finding information presented to the panel to suggest that armored cable or metal clad cable has equivalent mechanical protection to the current methods specified.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 15

VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 3 Clark, Nash, Telecy

17-35 - (517-30(c) (3)): Reject

SUBMITTER: James Conrad, Rochester-Surprenta Cable Corp.

RECOMMENDATION: Revise text to Section 517-30(c) (3) as follows:

"The wiring of the emergency system of a hospital shall be mechanically protected in nonflexible metal raceway, or shall be Type MI cable. When limited to feeder circuits. Type MC having a welded corrugated sheath shall be permitted. Where installed as branch circuit conductors serving patient care areas, the installation shall comply with the requirements of Section 517-15."

SUBSTANTIATION: Type MC cable having a welded corrugated sheath offers a level of mechanical protection and should be allowed for this use in this (feeder circuit) application.

PANEL ACTION: Reject.

PANEL STATEMENT: Metal clad cable does not provide the mechanical protection required for emergency system conductors. There is no intent to provide a high level of protection for emergency conductors. The panel has chosen to accomplish this by requiring nonflexible metallic raceway systems, MI or in encasement of concrete.

There has been no finding information presented to the panel to suggest that metal clad cable has equivalent mechanical protection to the current methods specified.

When there is a listing for this cable and a distinctive Type designation, the cable may be considered if it can be shown to have equivalent mechanical protection.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 15

VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 3 Clark, Nash, Telecy

17-36 - (517-30(c) (3) Exception No. 5): Reject

SUBMITTER: David Dagenais, Dover, NH

RECOMMENDATION: Revise text to read as follows:

Exception No. 5: Flexible metal raceways and cable assemblies shall be permitted to be used in listed prefabricated medical headwalls, listed office furnishings, or where necessary for flexible connection to equipment and devices.

SUBSTANTIATION: This addition would permit the listing of approved cable assemblies in those areas that are not readily accessible, i.e., preexisting walls. Making this change would be more consistent with Article 518-4 requirements.

PANEL ACTION: Reject.

PANEL STATEMENT: The panel does not intend to expand the use of flexible metal raceways and cable assemblies beyond the uses presently covered in this section.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 15

VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 3 Clark, Nash, Telecy

17-37 - (517-30(c) (3) Exception No. 6 (New)): Reject

SUBMITTER: Ric Thomas, Consultant, Hospital, Engr Dept.

RECOMMENDATION: Add an exception as follows:

(AC cable)

Exception No. 6: Listed armored cable assemblies can be used to fish branch circuits in existing walls.

SUBSTANTIATION: In existing facilities, it is hard to justify tearing out a section of wall to add one emergency receptacle "ac" cable, as is acceptable wiring method, except where emergency circuits are being used. I believe the ac cable would protect the wiring, and meet the intent of the NEC.

PANEL ACTION: Reject.

PANEL STATEMENT: The panel does not intend to expand the use of flexible metal raceways and cable assemblies beyond the uses presently covered in this section.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 15

VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 3 Clark, Nash, Telecy

17-38 - (517-30(c) (3) Exception No. 6 (New)): Reject

SUBMITTER: Mark Putkin, City of Phoenix, AZ

RECOMMENDATION: Add a new Exception No. 2 to read:

517-30(c) (3) Exception No. 2: For tap connections to light fixtures as permitted in Section 410-67(c).

SUBSTANTIATION: The present wording for this section will not permit flexible fixture whips to be used on the emergency systems lighting circuits. Some have interpreted Exception No. 5 as permitting this installation. This new proposal, if accepted, will give clear guidance on this or if denied will clarify that this installation method was never permitted by the NEC.

PANEL ACTION: Reject.

PANEL STATEMENT: The allowance intended by the proposed exception is already permitted by 517-30(c) (3) Exception No. 5.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 15

987

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Revised Page Number 412 of 813
17-40a - (517-50)(c)(3) and Exception - (New)): Accept

RECOMMENDATION: (1) AFTER "installation in" insert the word "nonflexible" ... BEFORE "metal".
(5) ADD A NEW EXCEPTION NO. 6 FOLLOWING EXCEPTION NO. 5 AS FOLLOWS: "Exception No. 6: Flexible metal raceways and cable assemblies shall be permitted to be used in prefabricated medical headwalls or when necessary for flexible connection to equipment."
(5) ALL THIS SHOULD OCCUR BEFORE THE FINE PRINT.

NOTE: In Chapter 5, Wiring Methods and Materials, flexible metal raceways are not permitted for use "where subject to physical damage" and therefore should not be permitted in this application.

Within medical headwalls, flexible metal raceways and cable assemblies are mechanically protected. Flexible connections to equipment are required for certain applications.

$\text{PANEL ACTION: Accept.}$

$\text{NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 16}$

$\text{VOTE ON PANEL ACTION:}$

$\text{AFFIRMATIVE: 15}$

$\text{NOT RETURNED: Friendlich}$

17-41 - (517-50)(d): Reject

SUBMITTER: Robert E. Snider, Sherlock, Smith and Adams, Inc.

RECOMMENDATION: Add the following paragraph to 517-50(d): (1) It shall be permissible to yield part or all of the equipment system load not required for fire protection in order to start and/or run the fire pump. Critical and Life Safety Branch loads shall be shed in order to start or run the fire pump.

SUBSTANTIATION: The purpose of the text is to clarify which loads within hospitals are allowed to be shed as allowed by NFPA 20 paragraph 6-7.2 which states, "Automatic shedding of loads not required for fire protection is permitted prior to starting the fire pump." NFPA 20 appears to allow shedding of the critical and equipment branch. Shredding of the critical system could put lives in danger that are not even close to the fire and this should not be allowed.

$\text{PANEL ACTION: Reject.}$

$\text{NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 16}$

$\text{VOTE ON PANEL ACTION:}$

$\text{AFFIRMATIVE: 15}$

$\text{NOT RETURNED: Friendlich}$

17-42 - (517-50)(d) and (b)(5) - (New)): Reject

SUBMITTER: Walt Vernon, California Society of Hospital Engineers

RECOMMENDATION: Add (b)(5) as follows:
"Any loads served by the standby generators not required to be on the essential system shall be served by their own transfer switch(es), such that these loads shall be shed upon standby generator overloading, and such that standby generators may be sized based upon essential system loads."

$\text{SUBSTANTIATION:}$ For 517-50(b)(5):
1. Many facilities would like to provide all loads on the generators, and eliminate the various branches of the essential system. This item would clarify this issue.
2. Many facilities want to place loads onto the standby generators that are not required. The addition of this item will allow that only when these loads are isolated from the required essential system loads.
3. This addition will make it clear that the generator need only be sized to serve the essential system loads.

$\text{PANEL ACTION: Reject.}$

$\text{NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 16}$

$\text{VOTE ON PANEL ACTION:}$

$\text{AFFIRMATIVE: 15}$

$\text{NOT RETURNED: Friendlich}$
by the connected load of the essential electrical system(s) at any one time.

Note: It is the intent of this section to mandate generator sizing based upon actual demand likely to be produced by the connected load of the essential electrical system(s) at any one time. It is not the intent of this section that generators be sized based upon connected load or feeder calculation procedures described in Article 220.

Demand calculations should be based upon prudent demand factors and historical data.

SUBSTANTIATION: The proposed wording in this comment is the same as the version accepted by the NFPA 70 Electrical Systems Committee for 3-3.2.1.7 (except NFPA 70 is changed to Article 220) and Panel 17 should include this proposed revision so that the two documents are consistent.

Many authorities having jurisdiction in California and Washington are interpreting “demand” as all loads connected to the essential electrical system operating simultaneously, resulting in the installation of oversized generators. This results in operating the generators at less than 50 percent of their rated capacity which is detrimental to engine performance and not in conformance with NFPA 99 and JCAH requirements for generator testing.

NFPA's own electrical engineers have contributed to the confusion on generator sizing by issuing opinions such as the letter dated May 19, 1994 stating that NEC Article 220 is not applicable to the loads on the Essential Electrical System and the letter dated September 30, 1994 that indicates that Article 220 is applicable for the calculation of emergency system load.

I have provided a load analysis of five hospitals that indicates that the actual demand load as a percentage of connected load is in all cases less than 50 percent of the connected load. As a result of AHJ's requiring that emergency generator(s) be sized for the connected load the increased costs for equipment, fuel storage and testing is excessive with any real benefit to hospital operation.

Code Panel 17 must clarify this issue.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Action: Accept in Principle.

Panel Statement: See Panel Action and Statement on Comment 17.50.

Number of Panel Members Eligible to Vote: 16

Vote on Panel Action: Affirmative: 15

Not Returned: Friendlich

17.54 - (517:34(a)) - Accept

Submitter: National Electric Code Technical Correlating Committee

Comment on Proposal No: 17-52A

Recommends: that the action of the Technical Correlating Committee that this Proposal be reconsidered and correlated with the action on Proposal 17-52a as to the location of the Exception.

Substantiation: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 24.2 and 24.3 of the Regulations Governing Committee Projects.

Panel Action: Accept

Relocate the Exception of Proposal 17-52a from Section 517.34(a)(5) and place it after Section 517.34(a)(5)

Panel Statement: This Panel Action complies with the direction of the Correlating Committee.

Number of Panel Members Eligible to Vote: 16

Vote on Panel Action: Affirmative: 15

Not Returned: Friendlich
17.70- (517-30(b) (4)): Accept in Principle  
SUBMITTER: Glenn W. Zieseck, Crown Point, IN  
RECOMMENDATION: On page 70-429, 517-30(b) (4) remove period at end of last sentence and add “as shown in diagram 517-30(b),” so that last sentence reads: One transfer switch shall be permitted to serve one or more branches in a facility with a maximum demand on the essential electrical system of 150 kva as shown in diagram 517-30(b).  
SUBSTANTIATION: The diagram is shown, but there no text to refer to the diagram as there is in the 2nd sentence of 517-30(b) (4) to diagrams 517-50(1) and 517-30(2).  
PANEL ACTION: Accept in Principle  
CHANGE OF "KVA" TO "KVA."  
PANEL STATEMENT: The change was made to comply with the NEC Style Manual, Part C9(a).  
VOTE ON PANEL ACTION: Unanimously Affirmative.

17.71- (517-30(b) (4)): Accept in Principle  
SUBMITTER: Stanley D. Kahn, New York, NY  
RECOMMENDATION: Add the following at the end of the last sentence of paragraph 517-30(b) (4), “or 150kVA” and this appears to be the appropriate place for such. The text should reference all diagrams in the Code.  
PANEL ACTION: Accept in Principle  
PANEL STATEMENT: See panel action and panel statement on proposal 17-70 (log # 470).  
VOTE ON PANEL ACTION: Unanimously Affirmative.

17.72- (517-30(b) (4) and 517-41(b)): Reject  
SUBMITTER: Thomas Munson, Tilden, Lobnitz & Cooper, Inc.  
RECOMMENDATION: Revise as follows: One transfer switch shall be permitted to serve one or more branches in a facility with a maximum essential system capability of 150 KVA or less.  
SUBSTANTIATION: Facilities can initially install large essential system generators and show only 150 KVA loads or less. Renovations and major projects quickly raise this beyond the unit without proper code enforcement.  
PANEL ACTION: Reject  
PANEL STATEMENT: There is insufficient documentation to justify the change. There are certain conditions where generator sets need to be oversized due to altitude, de-rating, age, and motor starting requirements.  
VOTE ON PANEL ACTION: Unanimously Affirmative.

17.73- (517-30(c) (1)): Reject  
SUBMITTER: John H. Schwab, Jr., International Electrical Inspector  
RECOMMENDATION: Insert as a second paragraph the following: “No main overcurrent device shall be installed between the alternate source of power and the overcurrent devices protecting those systems as defined in 517-30 (b) (1), (2) and (3), as indicated by diagrams 517-30 (1) and (2).”  
The existing language following this shall remain.  
SUBSTANTIATION: By not having this language in the overcurrent code, a person could install a main device. If one is installed, there is a remote chance that if a fault occurred in the life safety system, it could break the main breaker thus killing power to critical care and electrical equipment. Because this is the emergency back-up for hospitals, we must insure that in no way could the power go out in both systems, except for generator failure. This language would also eliminate the conflict between NFPA 70, Diagram 517-30 (2), and NFPA 110 Appendix B, Diagram B-1 (enclosed).  
Note: Supporting Material Available For Review At NFPA Headquarters.  
PANEL ACTION: Reject  
PANEL STATEMENT: The proposal would prevent the ability to protect the generator and would not allow for paralleling of multiple generator installations.  
VOTE ON PANEL ACTION: Unanimously Affirmative.

17.74- (517-30(c) (3)): Reject  
SUBMITTER: L.J. Milne, Pyrotenx USA Inc.  
RECOMMENDATION: Change 517-30(c) (8) Mechanical Protection of the Emergency System, to read: “The wiring of the emergency system of a hospital shall be type MI cable, or shall be mechanically protected by metal raceways.”  
SUBSTANTIATION: In fact Article 380-22, OUTER SHEATH, requires the outer sheath of "Type MI cable to be "of a continuous construction to provide mechanical protection and moisture seal." The current 517-30(c) (8) allows the use of electrical metallic tubing to achieve this mechanical protection which is much less than the mechanical protection afforded by Type MI. Tests are being performed now to quantify the mechanical protection of Type MI cable. These results will be forwarded.  
PANEL ACTION: Reject  
PANEL STATEMENT: Insufficient information was provided to the Panel to support the proposal.  
VOTE ON PANEL ACTION: Unanimously Affirmative.

17.75- (517-30(c) (9), Exception No. 1-(New)): Reject  
SUBMITTER: James C. Dollins, ASC  
RECOMMENDATION: Add a new Exception No. 1:  
Exception No. 1: Metal Raceways shall not be required where Type MI Cable and Types MC and AC Cables where the outer metal jacket is an approved grounding means of a listed cable assembly. (Present Exclusions Nos. 1, 2 and 8 become Nos. 2, 3 and 4.)  
SUBSTANTIATION: The present wording of 517-13(a) Exception No. 1 and similarly 517-18(a) and 517-19(a) permit the use of MC and AC Cables where the outer metal jacket is an approved grounding means of a listed cable assembly for branch circuit applications.  
Essential electrical systems are an integral segment of the patient care area and subject to the same installation parameters. The addition of the new exception No. 1 would be consistent with the referenced sections presently in the code and would permit retrofitting of other health care facilities.  
The proposed new exception was permitted in 517-60(b) (3) except No. 9 of the 1987 NEC and apparently omitted in error for the 1990 revision.  
PANEL ACTION: Reject  
PANEL STATEMENT: Insufficient documentation was presented to the Panel to support the mechanical protection offered by Type MC and AC cables. The exception in the 1987 NEC was a reference to cable assemblies applicable to another section of the article which had been amended without realizing its ultimate effect on Section 517-60(b) (9), exception #3 of the 1987 National Electrical Code.  
This error was consciously corrected by adoption of Proposal 17.38 when processing the 1990 edition of the NEC.  
VOTE ON PANEL ACTION: Unanimously Affirmative.

17.76- (517-30(c) (3), Exception No. 4-(New)): Accept  
SUBMITTER: Thomas Munson, Tilden, Lobnitz & Cooper, Inc.  
RECOMMENDATION: New text: Exception #4  
Concrete encased schedule 40 PVC shall be permitted except for branch circuits serving patient care areas.  
SUBSTANTIATION: Exception would provide same or better protection of wiring.  
PANEL ACTION: Accept  
VOTE ON PANEL ACTION: Unanimously Affirmative.  
COMMENT ON VOTE: BORDEN: I agree with the Panel Action, but believe that "concrete encased" should be further defined in inches of cover and whether or not it interferes concrete slabs or only underground.

17.77- (517-30(c) (3), Exception No. 4-(New)): Reject  
SUBMITTER: Robert A. McCullough, Ocean County Const. Insp. Dept.  
RECOMMENDATION: Add new Exception #4 as follows:  
Exception No. 4: Where flexibility is required or for individual fixture taps, wiring methods listed in 517-15(b) shall be permitted.  
SUBSTANTIATION: 517-30(c) requires metallic raceways be used for emergency systems. FFN references 517-18(b), 517-15(b) does not allow the use of flexible metal conduit for branch circuits serving patient care areas. What we are left with is rigid metal, intermediate
will automatically be restored to service. The first consideration for doing this is to save energy - the lighting fixtures on the critical branch will be turned off along with the room lights when the room is not in use.

A secondary reason for the proposal is that it is simple and will be less costly than installing a relay system to restore lighting in an occupied room.

PANEL ACTION: Reject

PANEL COMMENT: Proposal would place Section 517-60(b)(1) in conflict with Section 210-4. NFPA 90A-1999 mandates that life safety branch and critical branch of emergency system be kept entirely independent of all other wiring and equipment.

VOTE ON PANEL ACTION: Unanimously Affirmative.

Log # 729

17- 30 - (517-60(b)(3)): Reject
SUBMITTER: Lowell Lisker, AFC/A Nortek Company
RECOMMENDATION: Add after "metallic raceways" the words "Type MI Cable, Type MC Cable, or Type AC Cable with an insulated grounding conductor."

SUBSTANTIATION: Type MI, Type MC, and Type AC Cable with an insulated grounding conductor has been used for several years with no known problems as allowed per Sections 517-11 and 517-81.

PANEL ACTION: Reject

PANEL COMMENT: Proposal would not provide equivalent mechanical protection for requirement that wiring be protected in raceways.

VOTE ON PANEL ACTION: AFFIRMATIVE: 13
NEGATIVE: Erickson, Stauffer.

EXPLANATION OF VOTE:

ERICKSON: Types MI, MC and AC Cable will provide sufficient mechanical protection when properly installed.

STAUFFER: Types of cable proposed - MI, MC, and AC - will provide adequate mechanical protection and electrical safety if installed properly.

COMMENT ON VOTE:

GERBER: While I am voting in support of the panel action, I believe the panel substantiation needs to include the following statement:

In addition Section 3-4.2.2.4(d) of NFPA 99 requires that circuit conductors be installed using raceway systems. The use of metallic cable assemblies would be in conflict with that NFPA standard.

Log # 3233

17- 31 - (517-60(b)(3)): Accept in Principle

Secretary's Note: The Correlating Committee directs that this proposal be referred to the NFPA Committee on the Toxicity of the Products of Combustion for comment.

SUBMITTER: Charles W. Forberg, The Carlson Company
RECOMMENDATION: Revise to read: "The wiring of the emergency system of a hospital shall be mechanically protected by installation in raceways."

SUBSTANTIATION: This is a companion to by proposals for Sections 517-11 and 81-1(a) which would recognize nonmetallic raceways. Nonmetallic raceways are recognized in other sections of the Code as providing adequate mechanical protection for conductors. Schedule 80 rigid nonmetallic conduit is listed for use where it may be exposed to physical damage.

PANEL ACTION: Accept in Principle

Add Exception No. 4 to Section 517-60(b)1 and FPN as follows:

"Schedule 80 rigid nonmetallic conduit shall be permitted except for branch circuits serving patient care areas."

(FPN): See Part F for additional grounding requirements in patient care areas.

PANEL COMMENT: Panel agrees with submitter, but desires this section to be clear as to what type of raceways are acceptable to physically protect wiring of emergency system in hospitals.

FPP is to call attention to different intent of Section 517-60(b) from Section 517-81.

If Proposal 17-2 is adopted, this change will be made in Section 517-30(c)(3) of the restructured version of Article 517.

VOTE ON PANEL ACTION:

AFFIRMATIVE: 13
NEGATIVE: Erickson, Stauffer.

Log # 2175

17-32 - (517-60(b)(3), Exception No. 3): Reject
SUBMITTER: Chris Smith, MME-Foley
RECOMMENDATION: Revise 517-60(b)(3) Exception No. 3 to read as follows:

"Exception No. 3: Metallic raceways are not required for branch circuits where Type MC cable, Type MI cable, or Type AC cable with an insulated ground conductor is used.

SUBSTANTIATION: There appears to be a correlation problem between 517-60(b)(3) which requires metallic raceways to protect the wiring of emergency systems and 517-81(a) which permits Type MI & MC in Patient Care Areas. Probably the most confusing situation arises from the present wording of 517-60(b)(3) Exception No. 3 which permits Types MI & MC above Hazardous Anesthetizing Location and additionally permits Type AC cable in Other-than-Hazardous Anesthetizing Locations. The intent is that the wiring be mechanically protected and these methods, properly installed, afford that protection.

PANEL ACTION: Reject

PANEL COMMENT: Criticality of emergency system in hospitals requires maximum mechanical protection. This is not afforded by use of cable assemblies. See Panel Action on Proposal 17-33 which deletes Exception No. 3.

VOTE ON PANEL ACTION:

AFFIRMATIVE: 13
NEGATIVE: Erickson, Stauffer.

EXPLANATION OF VOTE:

ERICKSON: Same as Proposal 17-30.

STAUFFER: Same as Proposal 17-30.

Log # 2401

17-33 - (517-60(b)(3), Exception No. 4-(New)): Accept in Principle

SUBMITTER: Leonard L. Johnson, Baltimore, MD
RECOMMENDATION: New text:

ADD:

"Exception No. 4: Branch-circuit wiring as permitted in Section 517-81(a).

SUBSTANTIATION: As written the Code allows AC cable with an insulated grounding conductor to be used for critical branch circuits in a other-than-Hazardous Anesthetizing Location but does not allow it for critical branch circuits in patient care areas. Either exception No. 3 should be removed, so as not to allow the AC cable in anesthetizing locations, or exception No. 4 added so it is allowed in patient care areas. With the addition of this exception it would make the Code consistent as to the wiring method for critical branch circuits.

PANEL ACTION: Accept in Principle

Delete Exception No. 3 to Section 517-60(b)(3).

PANEL COMMENT: Panel agrees with substantiation to remove Exception No. 3. Panel recognizes need for consistency in requirements for mechanical protection via raceways for wiring on emergency system in hospitals. If Proposal 17-2 is adopted, this change will be made in Section 517-30(c)(3). Example No. 4 of the restructured version of Article 517.

VOTE ON PANEL ACTION:

AFFIRMATIVE: 13
NEGATIVE: Erickson, Stauffer.

EXPLANATION OF VOTE:

ERICKSON: Same as Proposal 17-30.

STAUFFER: Same as Proposal 17-30.
We'll move on to Motion Sequence number 70-20 and 70-21. These are two motions made by two different individuals, and we'll accept the motion from either motion maker, and the other item I wanted to note that there was an err in the action as reported in the report on comments -- on Comment 15-101, and the correct action should be, "Accept in principle," and not "Reject" as indicated in the report on comments.

Is there a motion related to either 70-20 or 70-21? Microphone 5.

UNIDENTIFIED FEMALE SPEAKER: Mr. Chairman, I don't see Mr. Lipster.

MR. LIPSTER: Mic 3.

MR. CARPENTER: He's over here.

UNIDENTIFIED SPEAKER: He's over there. I'm sorry. I couldn't find him.

MR. CARPENTER: Okay.

UNIDENTIFIED FEMALE SPEAKER: I yelled at him.

MR. BELL: Microphone 3. I'm sorry.

MR. LIPSTER: Mr. Chairman, I have to tell you that's one of the rare occasions when a guy of my size goes unseen, so I do appreciate that.

(LAUGHTER.)

MR. BELL: My apology.

MR. LIPSTER: I'm Steve Lipster with the IBW,
and I'm a member of Code Making Panel 15, and I move the rejection of Comment 15-101 and return to the 2008 text.

MR. BELL: Okay. Motion on the floor is to reject Comment 15-101. Is there a second?

UNIDENTIFIED SPEAKER: Second.

MR. BELL: I hear a second. Please proceed.

MR. LIPSTER: Mr. Chairman, this makes a real case study of the kind of unintended consequences that can transpire in a ROC meeting.

Back in Redondo Beach at our Code Making Panel 15 meeting, we had a young gentleman from Southwire making a presentation in support of Comment 15-101.

This comment allows the use of MC Cable having the mechanical characteristics of electrical metallic tubing in patient care areas.

And, as a side, these branch circuits of patient care areas are, in my opinion, I believe most of Code Making Panel 15, the most important branch circuits in any installation at all. Lives are on the line and for years, they've been required to be metallic pipe.

During the course of the young man's presentation he produced a UL fact-finding report. The subject of which was a new style MC cable designed to have the mechanical characteristics of electrical metallic tubing. This new style cable assembly was a
1 prototype not manufactured or available for general use.
   The date of the report that was passed out to everyone was December 3rd, 2009, which was very interesting considering the Code Making Panel meeting began on December 7th, 2009; only two working days after the release of the UL fact-finding report.
   I distinctly remember during the course of the meeting trying to skim the report and trying to pay attention to the young man's presentation. We learned that the prototype cable is substantially larger than normal MC cable, and the conductor installation was significantly larger, by that, I mean, thicker, than that of normal number 12 copper wire.
   After the presentation, a motion was made and seconded to accept the comment based on the UL report. A vote was taken and the motion passed. This brings to the point some procedural issues that occurred during this whole scenario.
   The comment closing period was in the end of October 2009. The UL report was not published until December 3rd, 2009. The introduction of this report violates the rules governing committee projects as detailed in the published ROC.
   And, in fact, as the scenario unfolds, it is a wonderful example of why these rules are in place and
should have been followed.

On the airplane ride home from the Redondo Beach I had a chance to thoroughly review the UL fact-finding report. A number of real-world issues became readily apparent. This stuff only exists as a prototype. No product standards -- let me say that again. "No product standards" exist for this cable.

Without a product standards, there are benchmark for meaningful evaluation and assessment.

Because this product is a wiring system and entirely new, the proposal and comment should have been sent to Code Making Panel 7 for review. They need to determine the suitability of this product before the healthcare folks get a crack at it.

Because the scope of the UL test was focused only on crushibility, the prototype was not tested as part of the wiring system. Because of this narrow scope, many questions remain unanswered. The insulation again on the prototype is significantly larger than normal branch circuit wire.

It seems as though the insulation is actually being used as a strength member rather than a Dialector, which in and of itself, is kind of disturbing. The large physical layer of insulation poses some real-world issues.
When you consider device connections, many device connections are designed for standard insulation levels. What happens when the insulation is significantly larger? Are they able to work? Do we have to pigtail it? Splices, particularly insulation displacement devices, are they able to work with this? Will they have -- is there going to be a significant problem with that?

And, finally, what I consider the most significant technical problem at all are box-fill calculations which are based on standard number 12 wire. Well, we go ahead and significantly increase the insulation on the wire, of course, they're going to impact that.

Well, considering the procedural technical uses as usually is involved with adopting 5 or 15-10 --

MR. BELL: Twenty seconds, please.

MR. LIPSTER: -- the head -- for that day is clear. Allowing the use of a prototype cable that is not available for use, has no product standards, has never been tested as a wiring system has no field performance record, in any case, is bad code.

It's really bad code when you consider this stuff maybe used in the most important branch circuits installed; those involved with patient care protecting
1 patient lives.

Please join me in supporting this motion and

rejecting Comment 15-101.

Thank you.

MR. BELL: Thank you. Mr. Carpenter.

MR. CARPENTER: Yes. Thank you. I'd like to
defer to Don Tanka, Chairman of Panel 15.

MR. BELL: You got to go to the microphone.

UNIDENTIFIED MALE SPEAKER: I'd just like to
get a -- get a clarification. In the book it says the
action is: "Reject," and down below it says, "Accept."
Is the action of the panel "accept" or "reject?"

MR. BELL: As noted in the in the errata, the
correct action in the report of comments is, "Accept in
principle." And your name for the record?

MR. GOLDSMITH: Sorry. Jeff Goldsmith from GE
Power and Water.

MR. BELL: Okay. So does that answer your
question?

MR. GOLDSMITH: Yes.

MR. BELL: Thank you.

MR. GOLDSMITH: Below it says, "Reject above."

It says, "Accept," below, and then it's actually --

MR. BELL: But there was an errata issued
indicating the correct action which is, "Accept in
principle."

MR. GOLDSMITH: Thank you.

MR. BELL: Mr. Carpenter.

MR. CARPENTER: Now, I'd like to defer to Don Tanka, Chairman of Panel 15 at microphone 2.

MR. TANKA: Thank you. I'm Don Tanka, Chair of Panel 15 speaking on behalf of the panel action in opposition to the motion.

The subject of including MC cable into section 517-30(C)(3) has been debated by Panel 15 for the three cycles that I have been involved as panel chair.

During the previous cycles, the panel rejected proposals to -- to include MC cable due to concerns regarding the mechanical integrity of the MC cable. The panel requested the submittal of the proposals and comments to provide evidence that MC cable could exhibit resistance to crush and impact equivalent to accepted wiring methods.

At the end of the two thousand and eight code cycle, the TCC directed the panel to hold Comment 15-39 for further study during the two thousand and eleven cycle.

During the proposal stage of the two thousand and eleven cycle, additional information in the form of the UL fact-finding investigation dealing with relative
protection against screw penetration was provided. The Panel sought additional data showing the crush and impact data equivalent to EMT.

At the ROC meeting, a new UL fact-finding investigation was submitted demonstrating that it was possible to design MC cable which exhibits crush and impact properties similar to that of EMT.

The Panel heard presentations by both proponents and opponents to Comment 15-101. In the end, the Panel voted eight in favor, three against with one abstention at the actual ROC meeting, and nine to two in favor during the formal ballot in favor of Comment 15-101.

This is a case of the Panel indicating during the ROP stage what additional evidence it needed to be convinced that special construction MC cable could be considered as acceptable wiring methods in 15 dot 30(C)(3).

This evidence was provided during the ROC as shown by the overwhelming vote in favor of Comment 15-101. Concerning the comments suggesting that a new product should not be written into code until it is commercially available, I would like to point out that there are numerous instances where code revisions have driven product development.
Thank you.

MR. BELL: Thank you. Further discussion,

Microphone 5.

MS. HORTON: Pat Horton for the

(undecipherable) Institute and I am in support of the

motion.

Steve covered quite a bit of what I was going
to cover and that's great because I want to -- like to
reply to a little bit of what Mr. Tanka had to say.

Yes, they have been discussing this but it was
unanimously rejected at the proposal stage, and the
problem is one that the Chair pointed out at both
proposal and comment meeting, and that was that there is
no standard and no criteria, and there at least needs to
be some criteria.

This is a proprietary product. Unless there's
some criteria for what you test, other manufacturers
don't even know what they have to meet, and it's not the
policy of the NFPA to put in a proprietary product that
nobody else has or can make.

I'm going to point out -- Steve pointed out a
lot of the problems with installation, and the two
voters against this were IBW and NEMA (phonetic) people
who deal with the installation and knowing what they're
going to face in the field.
I am going to point out some of the things that are missing in the test procedure that was done. You need -- they only tested half-inch EMT. They need to test, and, at least, this is what we've always done, the smallest and the largest size that we've been permitted to be used and determine if the in-between sizes fall within there. That's one of the things.

They tested half-inch and the predominant use would probably be three-quarters, and when you go three-quarters, your mechanical protection is almost doubled.

When you perform the number of tests, it says that they go by 15-69, and on the impact test, the rule is that you test ten specimens and no more than two can fail. They never tested more than five, and, usually, just tested three. The determined effect of resistance was one of the things that made it be done.

In all instances, the EMT did not increase in resistance on the impact test. The new MC increased resistance by as much as two hundred and fifty-three percent.

Number of conductors; there were only three conductors in the EMT. I don't think that's realistic and it may make a difference. If it's three-quarters, it would certainly be more there. You need termination
decisions as Steve pointed out. I think Mr. Lloyd is

going to address the differences in all kinds of MC
cable.

It's the thing that we need something to go by
so people know what they're evaluating. I have sat in
co-panel meetings since 1981. I have seen many
investigation reports, and in those investigation
reports we went through them minutely. This was not
done. We determined the things like that, that go back
and said, "Go back and get this done."

I'd just -- trying to read to you what -- what
UL said in their report. "In consideration of a
fact-finding nature of the investigation, the foregone
report is to be construed as providing factual
information only, and should not be regarded in
conveying any conclusions or recommendations on the part
of Underwriters Laboratories regarding the construction
of performance of the product or recognition by any code
or standard or for any other purpose."

Now, that's very similar to their normal
caveat which appears on the front of any investigation;
however, it is somewhat more specific.

They also say that since this report focuses
on the mechanical characteristics of the
(undecipherable) as the type seek instruction as
(undecipherable) compared to listed type EMT, the means of terminating the cable or other aspects of its use were not investigated.

I don't think it says the review that it should have. There are a lot of things that need to be looked and, besides that, I would like to go on record as saying, "We probably will be appealing to the Standards Council on procedural issues," and I believe that's what you don't want to hear on the floor; am I correct?

No, you don't want to hear why.

MR. BELL: No.

MS. HORTON: Okay.

MR. BELL: You can say anything you want on the floor.

MS. HORTON: Okay. But, procedurally --

MR. BELL: But you -- you got twenty-three seconds left.

MS. HORTON: Okay. Well, I just wanted to go on record that we do see procedural issues, and one of them is that it can really review the written document, the item they want it in, Item 2, and not even the TCC approved Item 2. They approved a new 3 which used to be the old 2, so it got a lot of problems with how this was done -- handled.
MR. BELL: Thank you. Microphone --

MS. HORTON: Thank you very much. I urge you to vote affirmative.


MR. MERCER: Yeah. Dave Mercer with Southwire Company. I'm opposed to the motion, and it's been awhile -- I want to be recognized as the young man that gave the presentation. I haven't been called a young man in a long time, so thank you.

(LAUGHTER)

With this, as said, the Panel's been looking at this for awhile. There's not restriction on when information can be submitted to the Panel. Working with multiple parties, sometimes you don't get that information as quickly as you'd like it.

We got it -- we got the information and got it quickly to the Panel. There are no regs prohibiting -- bringing information like that to the Panel.

The Panel reviewed the results and considered the results enough information to add to the 2011 Code.

I am a member of Panel 7 so after doing this presentation, went back to Panel 7, and asked for input on this, and Panel 7 has no issues with a -- another article enhancing the performance for that specific application.
A good example is that -- is Article 501 where there is MC cable listed as a hazardous location because it has enhanced performance characteristics and those are set by a different Panel.

The Panel set a high level of physical protection of the EMT. In it, standard MC cable cannot achieve this higher level of protection. So that was what -- the fact-finding report was there to show proof of non-sub (indecipherable) that an MC cable can be built with a more robust performance and it can actually make these higher requirements which is what the Panel asked to see.

And, finally, the Panel asked for additional information with a fact-finding report. They were provided this information they requested. The Panel clearly accepted the information and ask you to support the Technical (indecipherable) Panel and oppose this motion.

MR. BELL: Thank you. Microphone 7.

MR. BENNINGER: My name is Jake Benninger, and I represent the IBW. I support the motion to reject Comment 15-101. It seems to me that patient care areas are probably not a place you want to minimize the integrity of what's been a proven wiring method especially with a product that doesn't have a product
1 standard.
2 Also, the Committee didn't have adequate time
3 to review the fact-finding report, and there was no
4 opportunity for the peer review of fact-finding report
5 for a product that doesn't exist.
6 So I encourage you to support you to support
7 the motion.
8 MR. BELL: Thank you. Microphone 4.
9 MR. ODIE: Mark Odie, Underwriters Laboratories, speaking against the motion. If you look
10 in 90.4, last paragraph as far as enforcement is
11 concerned, the code requires -- it says, "This code may
12 require new products construction of materials may not
13 yet be available at the time the code is adopted. In
14 such event, the authority having jurisdiction may permit
15 the use of products, construction, or materials that
16 comply to the most recent previous addition of the code
17 until, obviously, the -- the new material comes out
18 and -- and it's an approved, oftentimes, listed
19 material."
20 Similar applications throughout the history of
21 the code have occurred. For example, I could have a
22 low-water level light fixture in a swimming pool. When
23 those first came out I don't think that they were
24 available on the market for about two years, and -- and,
again, it wasn't until the industry caught up with the National Electrical Code that -- that that material, that low-water light was actually available.

AFCI's, same thing. So we have a history of sometimes being in front of the -- of the issues and requiring something or permitting something that may not yet be available.

MR. BELL: Thank you. Microphone 7.

MR. WILKERSON: Robert Wilkerson, IEC, call for the question.

MR. BELL: Okay. A motion's on the floor to call the question. Is there a second?

UNIDENTIFIED SPEAKER: Second.

MR. BELL: All those in favor of the motion to call the question, please raise your hand?

Thank you.

All opposed.

Motion carries.

We're going to move to the motion on the floor which is to reject Comment 15-101.

All those in favor of the motion, please raise your hand.

Thank you.

All those opposed.

Motion carries.
TO: NFPA Standards Council  
Re: Appeal to NFPA re CAM 70-20 (Comment 15-101)  

I would like to comment in favor of the appeal presented by Southwire Company to overturn the association action to reject comment 15-101. Unfortunately the issues dealing with comment 15-101 were not completely aired during the association meeting as a motion to call the question was made before all points of view were discussed.

I would like address comment 15-101 from two angles; first as the chair of NEC Panel 15 in order to clarify statements concerning the conduct of the ROC TC meeting made by Mr. Lipster, and second as an employee of UL in order to clarify the difference between UL Standards development and Fact Finding Reports.

Chair of NEC Panel 15
The statements made by Mr. Lipster during the Association meeting require clarification.
Panel 15 has discussed the issue of MC cable for the last three cycles. It is not a new subject to the panel, with both sides of the argument airing their views during the past three code making cycles. During the ROP stage of this past cycle the panel requested data showing crush and impact strength equivalency to EMT.

1. Action of the TC – The comments made by Mr. Lipster makes it appear that a presentation was made by Southwire and then a vote was taken without any debate in between. This was not the case. Both Mr. Mercier and Ms. Horton made presentations to the TC. Following the presentations there was a lengthy debate over the merits of the comment and the panel action being considered. To say the discussion was heated and passionate would be an understatement. Anyone who has participated in a TC with Mr. Lipster knows that he is very passionate and is not easily dissuaded. As the debate wore on, someone made a motion to call the question on the motion to accept comment 15-101. That motion carried. The meeting vote on comment 15-101 was 8-3 in favor with one abstention.

2. Violation of Rules Governing Committee Projects – Mr. Lipster's testimony during the association meeting states that the introduction of the UL fact finding report violated the Rules Governing Committee Projects. He also presented the same argument in his statement supporting his negative vote during the ROC balloting. The statement accompanying his ballot suggests that paragraphs 4.4.1, 4.4.3.1, 4.4.4, 4.4.5 and 4.4.6 were violated. In general, Section 4.4 of the regulations deals with the submittal of comments. In the case of comment 15-101, the actual comment itself was made in full compliance with section 4.4. Paragraph 4.4.5 defines what constitutes a comment. Subparagraph (f) states that two copies of any document being proposed as a reference standard or publication needs to be provided. Paragraph 4.4.5 ends with a statement that indicates that a TC may reject a comment that does not include all of the required information listed in subparagraphs (a) through (e). Note that subparagraph (f) is not included. I would also like to refer you to paragraph 3.3.3.3 of the same regulations. This paragraph permits a guest to address the TC in order to make a presentation. It stands to reason that additional information will be delivered to the TC during such a presentation, as was the case here. So while we would like to have all supporting documentation available prior to the TC meeting, regulations as presently written do not require it.

3. Code Requirement before Product Standard – At the Association meeting, Mr. Lipster stated “Allowing the use of a prototype cable that is not available for use, has no product standards, has never been tested as a wiring system, has no field performance record in any case, is bad code.” Obviously everyone is entitled to his own opinion; however I believe the NEC process drives product innovation. There are numerous cases of requirements being placed into the NEC prior to a product being commercially available to satisfy the requirement. Some examples that come to mind are: The
requirement for immersion protection for hairdryers in Article 422; the introduction of Arc Fault Circuit Interrupters (specifically combination type); Article 625, Electric Vehicle Charging Stations; Article 382, Nonmetallic Extensions. A manufacturer will often hold the development of a product until it is referenced in the NEC. Once it is in the NEC, the manufacturer works with the product testing organizations to develop appropriate certification requirements. The successful emergence of many innovative products as a result of requirements being written into the NEC suggests that the practice is not bad code but rather proactive code writing.

UL Standards vs. Fact Finding

From time to time UL is asked to conduct testing in association with a code proposal. UL refers to this service as Fact Finding. It is what its title suggests. Tests are conducted to gain data and the findings are stated factually. No interpretation of data is made, no support of the proposal or comment is given. The data generated is used by the submitter of the proposal or comment in support of their proposal or comment. The service does not lead to product certification, nor does it mean that certification will ever take place. In this particular case, the goal of the fact finding was to demonstrate that MC cable could be produced in such a manner that it exhibited crush and impact properties equivalent to EMT. The presence of a fact finding investigation alone does not mean the product subjected to the fact finding work will be certified. Using data generated during the fact finding as a starting point, other criteria to demonstrate that the product can be installed and used in accordance with the NEC are defined. UL safety requirements are developed, and proposals made to the Standards Technical Panel (STP) to revise the Standard to recognize a product with enhanced performance. It is only after the STP has reviewed and accepted the proposed revisions to the Standard, is there a possibility for product certification.

In my opinion comment 15-101 was handled properly during the TC meeting. The panel asked for additional information, which was provided in the form of a fact finding report. It is important that the NEC remain a stimulus for new, innovative and safe product products. I therefore respectfully request the Standards Council to uphold the appeal made by Southwire to overturn the action at the Association Meeting to reject comment 15-101.

Very truly yours,

Don Talka
Senior Vice President & Chief Engineer
Mary,

This is my response to the notice of appeal of NFPA 70 Comment 15-101 (Motion 70-20).

I urge the NFPA Standards Council to reject this appeal and support the NFPA membership vote and Technical Panel 15 vote to return to the language of the 2008 NEC for the following reasons:

- Metallic conduit has proven effective for many years. This new product uses a larger conductor or insulation on the conductor and test data was not provided for dielectric insulation and device connection protocol. How does this product work with device installation and wire connection devices?
- It appears the conductor is used as a strengthen member for the MC wire system. Further testing should be provided before this product is approved for critical care areas of a hospital.
- The Panel did not have adequate time to review the UL report on this matter. The UL report is dated two days before the ROC meeting. Committee members were given a copy of the report during the ROC discussion. I believe some procedure issues are part of this decision.
- The most common wire method for this installation is ¾ inch EMT. The test was performed on smaller size wire methods using ½ inch systems.
- There is no performance standard, listing, and labeling is available for this wiring method.

Please continue to support the 2008 NEC language.

Gary A. Beckstrand

UEJATC
3400 West 2100 South
Salt Lake City, UT
84119

“Mistakes made in the classroom are cheaper than mistakes made on the job.”

James Carpenter
IAEI
3205 Carpenter Road
Durham, NC 27704

Donald Talka
Underwriters Laboratories, Inc.
1285 Walt Whitman Road
Melville, NY 11747-3081

Messrs. Carpenter and Talka:
Enclosed is a copy of a letter of appeal from D. Mercier, Southwire Company, requesting that the Council overturn the floor action on CAM 70-20. The motion to reject comment 15-101 passed at the Association Technical Meeting. This is being considered an Appeal under 1-6 of the Regulations Governing Committee Projects. A copy of this appeal can be found on the NFPA Website: www.nfpa.org or by contacting Codes and Standards Administration.

The Council will be considering Appeals on **Tuesday, August 3, and Wednesday, August 4 (if needed) at NFPA Headquarters, One Batterymarch Park, Quincy, MA, 02169.** A preliminary Hearings list, with scheduled appeal times, will be posted on the NFPA website in mid July.

**Note:** The website should be checked for the most up-to-date scheduling of appeals at the following link: http://www.nfpa.org/categoryList.asp?categoryID=834

Under the Regulations Governing Committee Projects, interested parties are invited to appear before the Council or submit written information for the Council’s consideration. If you or any member of the Committee have any comments that they would like to have before the Council when it considers this issue, please submit them by **July 16, 2010** (if via e-mail, please use mmaynard@nfpa.org). Please let me know at your early convenience if you can be in attendance to address the Council on this issue. In addition, if any member of the Committee wishes to be in attendance to address the Council on this issue, please let me know.

Thank you for your assistance.

Very truly yours,

Linda Fuller, Manager
Codes and Standards Administration

c: J. Pauley, A. Cronin, R. Burke, M. Earley, J. O’Connor
   Standards Council
   NEC-AAC
   NEC-P15
Friday, July 16, 2010

To: National Fire Protection Association Standards Council

From: Stephen Lipster, Principal, NFPA 70 Code Making Panel 15

Re: Mercier appeal of June 2010 Association Technical Meeting Action on Motion 70-20 regarding NFPA 70 Comment 15-101

The action taken on the floor of the June, 2010 Association Technical Meeting supporting Motion 70-20 and rejecting Comment 15-101 is the proper response to this particular comment.

Code Making Panel 15’s action on comment 15-101 in Redondo Beach was based solely on an Underwriters Laboratory fact-finding report dated December 3, 2009, only two working days before the committee began their work on the 7th. Obviously, this report was not available for the end of October, 2009 deadline for submitting comments and supporting material. Introducing this report during the ROC meeting is a clear violation of the Regulations Governing Committee Projects 4.4.1, 4.4.3.1, 4.4.4, 4.4.5 and 4.4.6. These regulations provide a reasonable timeframe for code making panel members to study, review and research comments and supporting materials before the meetings occur.

This significant procedural error has created many technical issues that should have been addressed at Redondo Beach, these technical issues are centered on the fact that **no product standards exist for this cable**. This cable utilizes conductor insulation as a strength member. This insulation is physically much larger in diameter than standard insulated conductors, my notes from Redondo Beach detail insulation six times the standard. Using conductors with this extreme degree of insulation presents any number of significant installation issues. For example, it is unsure how terminating and splicing conductors with this extreme level of physical insulation will be safely accomplished. Utilization devices and splicing equipment are designed for conductors with standard insulation. Furthermore, the National Electrical Code has strict requirements concerning the number of conductors that may be contained in a junction or device box of a particular volume. The calculations supporting these requirements are based on conductors with standard insulation levels. Conductors with six times the physical insulation level would be physically much larger than standard conductors and therefore take up more volume per conductor in a box. Installing these conductors with extreme insulation under existing box fill calculations will create unsafe conditions. Unsafe conditions in patient care areas.

Gentleman, this is a perfect case study of why the Regulations Governing Committee Projects provides a window for study and review. Please support the action of the Association Technical Meeting and reject Mr. Mercier’s appeal. Thank You.
AGENDA ITEM 10-8-1-i
SOUTHWIRE APPEAL ON CAM-70 TO REJECT COMMENT 15-101

COMMENTS IN OPPOSITION TO THE APPEAL
SUBMITTED BY THE STEEL TUBE INSTITUTE OF NORTH AMERICA
(STINA)

JULY 25, 2010

Issue 1 – Delay in requesting permission to speak

Southwire’s appeal is based on their opinion that misleading and incorrect information was presented by those speaking in favor of CAM 70-20 (rejection of Comment 15-101) during the June 2010 Association Technical Meeting and that the submitter of the comment did not have an opportunity to respond.

During the Association meeting dealing with NEC® CAMs, there was a call for the question on 10 different CAMs. Since the Standards Council was presiding and NFPA staff was assisting, we assume the meeting was conducted in accordance with association meeting rules and that there was no violation. Association meeting rules permit the question to be called and require that debate be ended if the association votes in favor of calling the question.

Richard Temblador, the Southwire representative who submitted Comment 15-101, was in attendance at the meeting and had the opportunity to approach the microphone at any time but apparently decided to delay until he had heard testimony from several speakers. Mr. Mercier of Southwire addressed the association directly following Mr. Lipster and Ms. Horton, two speakers whose comments he claims are misleading and incorrect. He had an opportunity to correct these “misleading and incorrect” statements but chose not to. When using a delaying strategy, there is always a risk that the question could be called, resulting in the inability to address opposition comments. Since the question was called on eight other CAMs before CAM 70-20 was heard, the Southwire representatives should have been aware of the risk involved in waiting to comment against the motion. Additional supporters of the motion were also at the microphone when the question was called and their comments were not heard either.

If the Council rules in favor of Southwire for this reason, we believe all of the other nine CAMs where the question was called would have to be overturned or at least revisited. We also believe a ruling in favor of the Southwire appeal on these grounds would represent a dramatic change in the Association meeting proceedings and would require new guidelines for conducting the meetings.

Issue 2 – Lack of public review
The “misleading and incorrect information” referred to in Southwire’s appeal is addressed in Issue 6. The UL Fact-Finding Report dated 12-03-2010 was the basis of most of the testimony against comment 15-101. This report was not presented to CMP 15 members until the comment was addressed during the ROC meeting. Panel members had very limited time to review the information and ask questions. Much of the “misleading and incorrect information” is attributed to the CMP 15 member, Mr. Lipster, who made the motion to accept CAM 70-20 at the meeting. Had Southwire provided the UL Fact Finding Report as substantiation when they submitted Comment 15-101, panel members and others following the process would have had time to review the information and to ask questions during the ROC meetings. Southwire itself is responsible for questions about the Fact-Finding Report being raised during the Association Meeting, since this was the only occasion in which the “public” had the opportunity to raise concerns.

**Issue 3 –Improper handling of held-over comment**

During the 2008 NEC cycle, Mr. Temblador first submitted proposal 15-54 to add “listed MC cable identified as providing crush, impact and penetration circuit protection performance equivalent to Electrical Metallic Tubing” to NEC Section 517.30(C)(3), Mechanical Protection of the Emergency System. The proposal was rejected unanimously with the panel statement: “The Panel recommends that the submitter provide the panel with a fact finding report to substantiate this change and evidence that this product can be listed and identified as special construction”. No fact-finding report was submitted during the 2008 comment period.

However, during the 2008 ROC stage, Mr. Simmons submitted Comment 15-39 on Proposal 15-54. This comment did not address the new type MC cable. The comment recommended the permission to use standard MC and AC cables in this critically important application. In his substantiation, Mr. Simmons referred to a UL Fact-Finding Report on nail and screw penetration. This 1993 report has been submitted to Panel 3 during several NEC cycles as substantiation for removing the steel plate requirement for AC and MC cable. Panel 3 has consistently rejected these proposals and the substantiation. Panel 15 held Comment 15-39 with the statement: “The Panel intends to hold the comment only. The proposed revision(s) dealing with AC cable and unrestricted use constitutes new material that has not had the benefit of public review during this cycle and cannot be considered at this stage of the Code-making cycle. Refer to 4.4.6.2.2 of the Regulations Governing Committee Projects.”

During the 2011 cycle, the held-over comment 15-39 became Proposal 15-78. However, both the 2008 Proposal 15-54 and Comment 15-39 were included in Proposal 15-78. We find this inappropriate since the Panel expressly intended to hold the comment only. When the Panel acted on Proposal 15-78, they addressed the concept of the rejected Proposal 15-54 (new type MC cable) instead of the “new material” held over in Comment 15-39 (standard MC cable). The panel stated that they were not aware of any MC cable that had the crush, impact and circuit protection performance
equivalent to EMT and that they were not “receptive to writing code around products that do not exist yet.”

During the 2011 ROC stage, Mr Temblador submitted Comment 15-101 on Proposal 15-78 which again introduced the concept of a new MC cable for mechanical protection. Although the Report on Comments indicated that there was supporting information at NFPA headquarters, it is our understanding that no Fact-Finding Report was submitted with the comment, which was due October 23, 2009. The only Fact-Finding Reports of which we are aware are dated October 30, 2009 and December 3, 2009, long after the October 23 deadline for comments.

In summary, in 2008 CMP 15 said they had no information on a type of MC cable that could be listed and identified as a special construction (equivalent to EMT in mechanical protection) and when the comments closed in 2011 they still had no evidence that this type of cable could be listed and identified. In addition, even with the December 3, 2009 Fact-finding Report, sufficient information and review still does not exist.

**Issue 4: Lack of consensus**

A review of the NFPA balloting of CMP 15 on this CAM shows that there is no longer 2/3 support to go forward with the proposed change in the NEC. When CAM 70-20, which was accepted by the vote of association members, was returned to CMP 15 for balloting, 8 members of CMP 15 supported the amendment; only five voted to reject it. The voting comments of Mr. Nash show that he appears to think the proposed new MC cable is listed; it is not and the December 3, 2009 report so states (page T1-1 of 4).

Voting comments by the Technical Correlating Committee indicate a possible confusion as to whether or not they were really accepting or rejecting the CAM. We submit that some of the TCC ballot comments appear to support retaining the 2008 text although the vote was: “do not agree.” For example, the negative voting comments of Mr. Bunker, Mr. Carpenter and Mr. LaBrake all mention that the panel has not achieved consensus and that this means the issue can be addressed again during the next NEC cycle.

The votes of the UL representative on the TC and the UL representative on the TCC are different and the vote of the UL TCC representative is in conflict with the statements in the two UL Fact-Finding Reports. The TC chair voted affirmative on CAM 70-20. The TCC representative voted “do not agree” and states “There has been no compelling reason provided by the submitter of the NITMAM (sic) that this MC cable, identified and tested for appropriate crush, impact, and penetration does not provide the same protection as EMT.” This contradicts the Southwire 12/03/10 UL Fact-Finding Report that states on page C1 that the report “….should not be regarded as conveying any conclusions or recommendations on the part of Underwriters Laboratories Inc., regarding the construction or performance of the product for Recognition by any code or Standard or for any other purpose.”
**Issue 5: Confusion as to product type could compromise safety**

The language accepted in Comment 15-101 describes a listed product identified as being comparable to EMT. There is no listed MC cable currently available that can be so identified and there is no assurance there will be when the 2011 NEC is adopted by jurisdictions.

If this language appears in the NEC but no product is forthcoming due to the inability to meet fully-developed standards requirements, there could be confusion in the marketplace. A user could mistakenly believe that standard listed MC cable has the mechanical protection characteristics named in comment 15-101 and use that product in error.

UL makes it clear on page G2 of the 12/03/10 UL Fact Finding Report that the test program focused only on the mechanical abuse characteristics of a prototype MC cable. UL Standard 1569 for MC cable contains a number of other requirements. No information has been submitted relative to how this larger and thicker MC would perform in the other tests of UL 1569 such as tightness of the armor, flexibility, and cold bend at -25° C tension test. Why was the crush test in the Fact-Finding Report performed with a “jaws” closing speed of 0.2 inches per minute when UL 1569 requires 0.5 inches per minute? Why was comparison made to trade size ½ EMT instead of the ¾ trade size more typically used in this application? Do the increased insulation thickness and the added paper filler affect fire test performance? We believe that the chair of CMP 15 recognized the need for developing overall criteria for the new MC cable. He suggested to the Panel during the 2011 ROP meeting that such criteria would need to be developed and it has not.

We support the observation in TCC Chair Carpenter’s ballot that “Whereas the TC (CMP 15) did not achieve consensus, the previous edition text will stay. This will allow the panel to re-examine and develop specific language for the 2014 NEC”.

**Issue 6: “Misleading and incorrect information”**

The appeal attributes certain “incorrect” statements to Ms. Horton who spoke in favor of CAM 70-20 on the floor of the Association Technical Meeting. After reviewing the transcripts, Ms. Horton realized she had misspoken but it was not intentional. For example, the 253% increase in resistance occurred after the vibration test not the impact test. That does not change the fact there was a substantial increase. The Southwire representative spoke directly after Ms. Horton and had ample time and opportunity to correct anything he thought was misleading or incorrect. He did not do so.

We ask that the Standards Council deny this appeal and uphold the floor action on CAM 70-20.
ASSOCIATION AMENDMENT
BALLOT RESULTS

DATE: July 13, 2010

Document: NFPA 70®, National Electrical Code®

Motion: To Accept Comment 17-86

NEC TCC PRELIMINARY Ballot Results (Final due 7/16/10)

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment IS NOT achieving the necessary \(\frac{3}{4}\) majority vote needed to recommend approval of the Association Action by the Technical Correlating Committee.

The number of affirmative votes needed for the report to be published is 9.

\[
12 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 11 \times 0.75 = 8.25
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
12 \text{ eligible} ÷ 2 = 6 + 1 = 7 \text{ (this is the simple majority)}
\]

12 Eligible to Vote
1 Not Returned (Drake)

2 Agree
9 Do Not Agree (Brunssen, Bunker, Carpenter, Daly, Fiske, Hittinger, Kovacik, LaBrake, McNeil)
0 Abstain

Final Action: FAILING

CMP-17 FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS NOT achieved the necessary \(\frac{2}{3}\) majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the amendment to be issued is 6.

\[
10 \text{ (eligible to vote)} - 0 \text{ (not returned)} - 0 \text{ (abstentions)} = 9 \times 0.66 = 5.94
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
10 \text{ eligible} ÷ 2 = 5 + 1 = 6 \text{ (this is the simple majority)}
\]

10 Eligible to Vote
0 Not Returned

3 Agree
7 Do Not Agree (Blewitt, Maldonado, Ramirez, Rock, Schapp, Sandberg, West)
0 Abstentions

Final Action: FAIL
NEC TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8-AWG bare solid copper shall be provided.
(2) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
(3) The conductors shall follow the contour of the perimeter surface.
(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(5) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(6) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

I agree with the Technical Committee members who voted in the Negative that insufficient data has been presented to: (1) establish that the present 8 AWG loop is inadequate and (2) to justify the increased cost of establishing a grid structure around the pool. I also agree that a Task Group should be formed to address this issue for the 2014 NEC revision cycle to identify parameters for the protection of persons from stray currents at swimming pools. Further, the Amendment is poorly written. Item (1) states that the grid shall be constructed of 8 AWG solid bare copper; copper wire is implied but not explicitly stated. Item (4) is not a sentence and is grammatically inconsistent with the introductory paragraph of 680.26(B)(2)(b) and the other list items (1) through (3).

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

June 2010

Standards Council Supplemental Agenda
August 3, 2010
Warren, Mary

From: mertonbunker [mertonbunker@aol.com]
Sent: Thursday, July 08, 2010 4:51 PM
To: Warren, Mary
Subject: Re: Final Ballot Results for Comment 17-86

Mary:

As I am outside the US and cannot fax my ballots back, please accept this as my ballot.

Please record me as voting "DISAGREE" on 17-86.
Reason: By the memo from Jean O'Conner, dated July 2, 2010, CMP-17 has not achieved consensus in the ballot of this issue. This means that the previous text will be used and I do not see any documentation proving other methods are unsafe.

Merton Bunker, PE, CFEI
US Dept of State

-----Original Message-----
From: Warren, Mary <mwarren@NFPA.org>
To: Warren, Mary <mwarren@NFPA.org>
Cc: Coughlin, Ann <acoughlin@NFPA.org>; Walker, Nancy <nwalker@NFPA.org>
Sent: Fri, Jul 2, 2010 10:21 am
Subject: Final Ballot Results for Comment 17-86

To the Members of the NEC Technical Correlating Committee:

The above referenced ballot is enclosed for your information. I believe the cover memo and ballot are self-explanatory.

Please review this material, complete the attached ballot, and return it as soon as possible, but no later than Friday, July 9, 2010.

Also enclosed are the final ballot results of the Code Making Panel including comments on vote, if any.

This is # 6 of 6 Amendments that will be sent to you.

Thank you.

Mary

Mary Warren
Administrative Assistant
Electrical Department
(617) 984-7946
Fax No. (617) 984-7070
mwarren@nfpa.org
NEC TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:

(1) At least one minimum 8 AWG bare solid copper shall be provided.
(2) The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
(3) Only listed splices shall be permitted.
(4) The required conductor shall be 150 to 600 mm (6 to 24 in.) from the inside walls of the pool.
(5) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(6) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (6 to 24 in.) from the underside of the deck.

☐ Do Not Agree*  If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Whereas CMP-17 did not achieve consensus the previous edition text and remains, no documentation has been presented that the present alternate method is unsafe.

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: James W. Carpenter

Date: 7-7-2010

June 2010
NEC TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8 AWG bare solid copper shall be provided.
(2) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged and meeting the requirements of 680.26(B)(1)(b)(3).
(3) The conductors shall follow the contour of the perimeter surface.
(4) The copper grid shall follow the contour of perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
(5) Only listed splices shall be permitted.
(6) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(7) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(8) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☒ Do Not Agree* If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

I agree with the Negative Ballot by B. Rod on CMF-17

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617- 984-7070

Signature: James M. Daly

Name - Please Print: JAMES M. DALY

Date: 7/7/10

June 2010
NEC TECHNICAL CORRELATING COMMITTEE BALLOT  
June 2010 ASSOCIATION AMENDMENT  
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8-AWG bare solid copper shall be provided.
(2) The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
(3) Only listed splices shall be permitted.
(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(5) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(4) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The 7 members of CMP-17 who voted NO have it exactly right – there was no objective evidence presented that the equipotential bonding method(s) permitted by 680.26(B) of NEC 2008 do not provide “practical safeguarding of persons and property from hazards arising from the use of electricity.”

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: __________

Name - Please Print: William T. Fiske

Date: 2010-07-07

June 2010
NEC TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8 AWG bare solid copper shall be provided.
(2) The conductor(s) shall follow the contour of the perimeter surface extending 1 m (3 ft) horizontally beyond the inside walls of the pool.
(3) Only listed splices shall be permitted.
(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(5) The required conductor shall be secured with in or under the perimeter surface, 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(6) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The submitters substantiation provides evidence that a ground grid reduces voltage gradients. However, sufficient substantiation has not been provided that the existing Code requirement 680.26(B)(2)(b) does not do the same. The Technical Committee ballots and their associated negative comments arrive at the same conclusion.

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
Fax: 617-984-7070

Signature: [Signature]

Name - Please Print: David Hittinger

Date: July 8, 2010

June 2010
NEC TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:

(1) At least one minimum 8 AWG bare solid copper shall be provided.
(2) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
(3) The conductors shall follow the contour of the perimeter surface.
(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(5) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(6) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☒ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

This proposal was originally turned down as a TIA to the 2008 NEC. For the 2011 Code process, Proposal 17-179 was rejected by CMP-17 with the following comment: “The present alternate means of perimeter bonding was not demonstrated to be unsafe.” The test data provided by NEETRAC, the testing organization that established the test criteria and the test data, has not shown that the difference in voltage gradients between the ground mat installation proposed and the ground ring installation, as currently permitted under the 2008 NEC, is unsafe. According to the test report from NEETRAC, dated August 2006, there was a voltage of 12.5 volts at a distance of 3 feet away from the pool at the furthest test point from the source, while with the bonding grid, the level at the same location was 1.5 volts. Neither this test data nor other documentation has been submitted to show that an installation using just a ground ring results in a difference in potential to a level that is dangerous or has caused injury. The panel evaluated the report from NEETRAC and had many concerns, not least of which was the test procedure did not have a test control to establish the baseline before any additional tests were done.

Comment 17-86 was rejected by CMP-17 with the following comment: “The panel does not agree that the submitter’s substantiation provides adequate justification to change the alternate means of perimeter bonding. The submitter has not documented that the existing alternative means in the existing NEC results in unsafe voltage gradients”. The submitter’s substantiation on Comment 17-86 stated that “A number of shock incidents in and around pools have been recorded and addressed by Georgia Power and Singing River Utility in Mississippi which supports the copper grid over the single conductor application. These shock incidents have forced utilities to implement more stringent rules (procedures) over conductor application, since the single conductor falls short on providing the necessary protection.”

June 2010

Standards Council Supplemental Agenda

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First, no documentation was provided of those incidents mentioned in the substantiation to show that these incidents involved pools that had either method of equipotential bonding installed to equalize voltage gradients around the pool area.

Second, the NEETRAC test report does show that the grid system is more effective than the single conductor ring, but does not show that the single conductor ring is unsafe and would not provide a safe level of equipotential plane.

I recommend that this motion be rejected since no new information has been provided. If new and compelling science or field experience is introduced, CMP 17 should be given an opportunity to consider it.

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: ________________________________

Name - Please Print: John Kovacik

Date: July 7, 2010

John Kovacik

June 2010

Standards Council Supplemental Agenda
NEC TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8 AWG bare solid copper shall be provided.
(2) The conductors shall follow the contour of the perimeter surface.
(3) Only listed splices shall be permitted.
(4) The conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(5) The conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(6) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☒ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The Technical Committee has not reached consensus for this amendment. A return to the original text will not have an adverse affect on correlation in the Code. I agree with comments in some of the TC members’ ballot statements for the need of a Task Group to evaluate this issue thoroughly in the next Code cycle.

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: ____________________________

Name: Neil F. LaBrake, Jr. – TCC Principal, EEI rep. (Please Print)

Date: 09 July 2010

June 2010
NEC TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8 AWG bare solid copper shall be provided.
(2) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
(3) The conductors shall follow the contour of the perimeter surface.
(4) The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
(5) Only listed splices shall be permitted.
(6) The required conductor shall be 450 to 690 mm (18 to 24 in.) from the inside walls of the pool.
(7) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(8) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☒ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

We support the actions of the code making panel.

________________________________________________________________________

________________________________________________________________________

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: Michael McNeil

Name - Please Print: Michael McNeil

date: 7/9/2010

June 2010

Standards Council Supplemental Agenda  August 3-5, 2010   Page 452 of 1603

Revised Page Number 453 of 813
NFPA 70
TC BALLOT for Code Making Panel 17
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:

1. At least one minimum 8-AWG bare solid copper shall be provided.
2. The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
3. The conductors shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
4. Only listed splices shall be permitted.
5. The required conductor shall be 450 to 600 mm (18 to 24 in) from the inside walls of the pool.
6. The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in to 6 in) below subgrade.
7. Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in to 6 in) from the underside of the deck.

X Do Not Agree* If you do not agree with this amendment, the recommendation is to return to previous edition text.

*Please give reasons for voting "Do Not Agree":

For several years CMP17 has been presented with information from a variety of sources characterizing the performance of alternative methods of equipotential bonding around pools. This information has served to educate Panel members on sources of ground currents and how differing electrode and bonding configurations may perform under specified test conditions. The sum total of all the information presented to the Panel before, during and after its meetings is that the more copper used in the equipotential bonding system, the better the performance of that system.

Test data obtained on alternative methods is relative to an approximation of the Article 680.26 requirements, not the actual Code requirements. Narratives accompanying the data focus on comparing methods and not whether the Code requirement represents an unsafe installation. This is also true of the document provided with the Letter Ballot on Amendment, which is an excerpted summary of a larger report that is not currently available to the Panel.

To date, the Panel has considered and affirmed by its several votes that the minimum 8-AWG bare solid copper wire meets the objective of reducing voltage gradients in the pool area. The subject of electric shock hazard has not been taken lightly by CMP17 and there has been a good deal of willingness to carefully research and consider new information as it becomes available. The Panel should therefore be given the opportunity to thoroughly review and consider the latest information and not make a judgment on incomplete information and entreaty from a floor vote.

For these reasons, we do not agree with the Amendment. We do, however, support the creation of a Panel Task Group that can better define the safety expectations of equipotential bonding for pools and testing criteria that definitively determines whether these expectations are met.

Signature:  

Name - Please Print: Thomas Blewitt

Date: June 22, 2010

June 2010
NFPA 70
TC BALLOT for Code Making Panel 17
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductive grid shall be utilized where the following requirements are met:
(1) At least one minimum 8 AWG bare solid copper shall be provided.
(2) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
(3) The conductors shall follow the contour of the perimeter surface.
(4) The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
(5) Only listed splices shall be permitted.
(6) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(7) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(8) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☑ Do Not Agree* If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

I do not agree with the action taken at the Annual NFPA Meeting. CMP-17 has reviewed the data provided during the ROP (proposal 17-179) and ROC (comment 17-86) process and did not accept the assumptions that data provided. There has been no new substantiation provided, to show that the current requirements found in the 2008 NEC are inadequate to protect individuals from stray voltages that will cause them bodily harm. I agree that a task group needs to be formed in order to review any future data that may be provided to show that the current method of addressing these stray voltages is inadequate. First tests need to be conducted to show what maximum voltage gradients are dangerous when the person is immersed. Then tests conducted with methods specified in the 2008 NEC need to be conducted to show that the current code is inadequate. The data provided so far is incomplete and is only a summary of the full report. Even the summary showed that something similar to the code allowed single ring will keep the voltages to an acceptable level around swimming pools.

Signature: [Signature]
Name - Please Print: JAMES MALDONADO
Date: 6/21/10
Standards Council Supplemental Agenda August 3-5, 2010 Page 454 of 1603 Revised Page Number 455 of 813
NFPA 70
TC BALLOT for Code Making Panel 17
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2)(b) *Alternate Means.* Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:

1) At least one minimum 8 AWG bare solid copper shall be provided.
2) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
3) The conductors shall follow the contour of the perimeter surface.
4) The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
5) Only listed splices shall be permitted.
6) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
7) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
8) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

❑ Do Not Agree* If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Regarding proposal 17-179 and comment 17-86, the available test data provided by EPRI during the annual NFPA Conference, do not purport to identify or substantiate that the current 2008 code requirements in 680.26 (B) (2) (b) to be unsafe or inadequate to mitigate dangerous voltage gradients. I, therefore, continue to reject this proposal. I do recommend that a task force be formed for the 2014 NEC to address any future data from this submitter or others.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature:

Name - Please Print: Marcus Ramirez

Date: June 21, 2010

June 2010
NFPA 70
TC BALLOT for Code Making Panel 17
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(c) grid shall be utilized where the following requirements are met:
   (1) At least one minimum 8 AWG bare solid copper shall be provided
   (2) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
   (3) The conductors shall follow the contour of the perimeter surface.
   (4) The conductors shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
   (5) Only listed splices shall be permitted.
   (6) The required conductor shall be 650 to 600 mm (18 to 24 in.) from the inside walls of the pool.
   (7) The required conductor shall be secured in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
   (8) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Comment 17-86 seeks to declare a grid arrangement of 8 AWG solid copper conductors, rather than a ring (loop) arrangement of 8 AWG solid copper conductor, as the alternate means to achieve equipotential bonding in the absence of unencapsulated steel rebar as that means. The test data provided and field experience introduced, available to Code Making Panel 17 (CMP17) during deliberations of Proposal 17-179 and Comment 17-86, were not sufficient to establish definitively that a ring (loop) of a single 8 AWG solid copper conductor is inadequate to mitigate voltage gradients around swimming pools. NEMA remains receptive to consideration in the next Code cycle of a separate test study underway (EPRI Project 08-132, available only as an abstract and without test data to CMP17 members prior to this ballot) that may provide analytically clearer insight.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

[Signature]

Name - Please Print: Brian E. Rock

Date: 2010-June-21

June 2010

Standards Council Supplemental Agenda
August 3-5, 2010
Page 456 of 1603
Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8-AWG bare solid copper shall be provided.
(1) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(D)(1)(b)(3).
(2) The conductors shall follow the contour of the perimeter surface.
(2) The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
(3) Only listed splices shall be permitted.
(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(5) The required conductor shall be secured with-in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(4) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (6 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

* Please give reasons for voting “Do Not Agree” or “Abstain”:

At our meeting the panel evaluated all of the material presented in support of this proposal and unanimously agreed that there was no evidence provided that the present system is unsafe. Material made available to the panel since then points to the grid system providing a reduced voltage gradient compared to the single #8 bare copper loop. The question remains as to what constitutes a safe design. A task group needs to be formed to gather applicable test data and incident reports that supports the requirement of the grid or the adequacy of the single #8 ring. This material and possible new material needs to be thoroughly evaluated by the task group without the present constraints of time. Their recommendation can be made to the panel for action during the 2014 code cycle. Through this process we should come to a solution supported by facts.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: __________________________
June 2010
Standards Council Supplemental Agenda  
August 3-5, 2010  

NFPA 70 
TC BALLOT for Code Making Panel 17 
June 2010 ASSOCIATION AMENDMENT  
(To Accept Comment 17-86) 

Amendment:  Accept Comment 17-86

☐ Agree 
If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows: 
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met: 
(1) At least one minimum 8-AWG bare solid copper shall be provided. 
(1) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3). 
(2) The conductor shall follow the contour of the perimeter surface. 
(2) The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool. 
(3) Only listed splices shall be permitted. 
(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool. 
(4) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade. 
(4) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck. 

☒ Do Not Agree* 
If you do not agree with this amendment, the recommendation is to return to previous edition text. 

☐ Abstain* ☒ 

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Per the e-mail discussion from Code Panel 17, this should be agreed to by the panel, not at the Annual Meeting. This should be addressed with proper engineering input in the 2014 Code.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary Warren  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-984-7070

Signature: ____________________________

Name - Please Print:  Chester Sandberg

Date:  June 21, 2010

June 2010
Standards Council Supplemental Agenda
August 3-5, 2010
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NFPA 70
TC BALLOT for Code Making Panel 17
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:

1. At least one minimum 8 AWG bare solid copper shall be provided.
2. The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(2).
3. The conductors shall follow the contour of the perimeter surface.
4. The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
5. Only listed splices shall be permitted.
6. The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
7. The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
8. Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree* If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The purpose of Comment 17-86 is to require a grid arrangement of 8 AWG solid copper conductors, rather than a ring (loop) arrangement of 8 AWG solid copper conductor, as the alternate means to achieve equipotential bonding in the absence of unencapsulated steel rebar as that means. The available test data provided and field experience introduced, available to Code Making Panel 17 (COMIT) during deliberations of Proposal 17-179 and Comment 17-86, were not sufficient to establish definitively that a ring (loop) of a single 8 AWG solid copper conductor is inadequate to mitigate dangerous voltage gradients around swimming pools.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature:

Name - Please Print: L. L. West

Date: June 2010
COMMENT 17-86 (A2010) Accept Comment

PROPOSAL 17-179 (A2010) Backup

17-86 Log #1779 NEC-P17 Final Action: Reject

Submitter: Wayne H. Robinson, Lothian, MD
Comment on Proposal No: 17-179
Recommendation: Revise text to read as follows:
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8 AWG bare solid copper shall be provided;
(2) The copper grid shall follow the contour of the perimeter surface extending 1 m (3 ft) horizontally beyond the inside walls of the pool.
(3) Only listed splices shall be permitted.
(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(5) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(6) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (6 in. to 24 in.) from the underside of the deck.

Substantiation: Corrections to TIA Log No. 936 were implemented at the advice and suggestion of Code-Making Panel 17 after a positive vote of 6-3 for the TIA.

Panel Meeting Action: Reject
Panel Statement: The vote in Hilton Head, SC on Proposal 17-179, Log 805, NEC-P17 was prior to comments and vote on the TIA Log 936. The testing documentation from NEETRAC presented to Code-Making Panel 17 substantiated that the single conductor application may not provide adequate protection that a copper grid system, as originally outlined in the 2005 Edition of the NEC. NEETRAC Test data reveals a 70 percent to 90 percent increase in step voltages, when comparing a single conductor installation over a copper grid system.

Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-179 Log #805 NEC-P17 Final Action: Reject

Submitter: Wayne Robinson, Lothian, MD
Recommendation: Revise text to read as follows:
680.26(B)(2)(b). Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8 AWG bare solid copper shall be provided. Copper conductor grid shall be utilized and shall comply with (b)(1) through (b)(5).
(2) The conductors shall follow the contour of the perimeter surface extending 1 m (3 ft) horizontally beyond the inside walls of the pool.
(3) Only listed splices shall be permitted. (4) Only listed splices shall be permitted. (4) The required conductor shall be secured within or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(5) The required conductor shall be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

Substantiation: Test data from NEETRAC refutes a single copper conductor application for decks, pavers, unpaved surfaces and supports an equipotential plane or copper grid system, as originally outlined in the 2005 Edition of the NEC. NEETRAC Test data reveals a 70 percent to 90 percent increase in step voltages, when comparing a single conductor installation over a copper grid system.

Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: CMP-17 does not accept the submitter’s substantiation.
The present alternate means of perimeter bonding was not demonstrated to be unsafe.

Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
ASSOCIATION AMENDMENT
BALLOT RESULTS

DATE: July 19, 2010

Document: NFPA 70®, National Electrical Code®

Motion: To Accept Comment 17-86

NEC TCC FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment **HAS NOT** achieved the necessary $\frac{3}{4}$ majority vote needed to recommend approval of the Association Action by the Technical Correlating Committee.

The number of affirmative votes needed for the report to be published is **9**.

$$[12 \text{ eligible to vote} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 11 \times 0.75 = 8.25]$$

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

$$[12 \text{ eligible} \div 2 = 6 + 1 = 7 \text{ (this is the simple majority)}]$$

<table>
<thead>
<tr>
<th>12 Eligible to Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Not Returned (Drake)</td>
</tr>
<tr>
<td>2 Agree</td>
</tr>
<tr>
<td>9 Do Not Agree (Brunssen, Bunker, Carpenter, Daly, Fiske, Hittinger, Kovacik, LaBrake, McNeil)</td>
</tr>
<tr>
<td>0 Abstain</td>
</tr>
</tbody>
</table>

**Final Action: FAIL**

CMP-17 FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment **HAS NOT** achieved the necessary $\frac{2}{3}$ majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the amendment to be issued is **6**.

$$[10 \text{ eligible to vote} - 0 \text{ (not returned)} - 0 \text{ (abstentions)} = 9 \times 0.66 = 5.94]$$

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

$$[10 \text{ eligible} \div 2 = 5 + 1 = 6 \text{ (this is the simple majority)}]$$

<table>
<thead>
<tr>
<th>10 Eligible to Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Not Returned</td>
</tr>
<tr>
<td>3 Agree</td>
</tr>
<tr>
<td>7 Do Not Agree (Blewitt, Maldonado, Ramirez, Rock, Schapp, Sandberg, West)</td>
</tr>
<tr>
<td>0 Abstentions</td>
</tr>
</tbody>
</table>

**Final Action: FAIL**
Standards Council Supplemental Agenda
August 3-5, 2010

NEC TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:

1. At least one minimum 8 AWG bare solid copper shall be provided.
2. The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
3. The conductors shall follow the contour of the perimeter surface.
4. The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
5. Only listed splices shall be permitted.
6. The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
7. The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
8. Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I agree with the Technical Committee members who voted in the Negative that insufficient data has been presented to: (1) establish that the present 8 AWG loop is inadequate and (2) to justify the increased cost of establishing a grid structure around the pool. I also agree that a Task Group should be formed to address this issue for the 2014 NEC revision cycle to identify parameters for the protection of persons from stray currents at swimming pools. Further, the Amendment is poorly written. Item (1) states that the grid shall be constructed of 8 AWG solid bare copper; copper wire is implied but not explicitly stated. Item (4) is not a sentence and is grammatically inconsistent with the introductory paragraph of 680.26(B)(2)(b) and the other list items (1) through (3).

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

June 2010
Warren, Mary

From: mertonbunker [mertonbunker@aol.com]
Sent: Thursday, July 08, 2010 4:51 PM
To: Warren, Mary
Subject: Re: Final Ballot Results for Comment 17-86

Mary:

As I am outside the US and cannot fax my ballots back, please accept this as my ballot.

Please record me as voting "DISAGREE" on 17-86.
Reason: By the memo from Jean O'Connor, dated July 2, 2010, CMP-17 has not achieved consensus in the ballot of this issue. This means that the previous text will be used and I do not see any documentation proving other methods are unsafe.

Merton Bunker, P.E., CFEI
US Dept of State

---Original Message---
From: Warren, Mary <mwarren@NFPA.org>
To: Warren, Mary <mwarren@NFPA.org>
Cc: Coughlin, Ann <acoughlin@NFPA.org>; Walker, Nancy <nwalker@NFPA.org>
Sent: Fri, Jul 2, 2010 10:21 am
Subject: Final Ballot Results for Comment 17-86

To the Members of the NEC Technical Correlating Committee:

The above referenced ballot is enclosed for your information. I believe the cover memo and ballot are self-explanatory.

Please review this material, complete the attached ballot, and return it as soon as possible, but no later than Friday, July 9, 2010.

Also enclosed are the final ballot results of the Code Making Panel including comments on vote, if any.

This is #6 of 6 Amendments that will be sent to you.

Thank you.

Mary

Mary Warren
Administrative Assistant
Electrical Department
(617) 984-7946
Fax No. (617) 984-7070
mwarren@nfpa.org
Supplemental Attachment 10-8-1-j
Page 5 of 21

NEC TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree
If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8 AWG bare solid copper shall be provided.
(2) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
(4) The required conductor shall be 150 to 600 mm (18 to 24 in) from the inside walls of the pool.
(5) The required conductor shall be secured within or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(4) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree*
If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

While comment CMP-17 did not achieve consensus, the previous editor text and comment, No documentation has been provided that the present alternate method is unsafe.

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]
Name - Please Print: James W. Carpenter
Date: 7-2-2010

June 2010

Standards Council Supplemental Agenda August 3-5, 2010 Page 466 of 1603

Revised Page Number 467 of 813
NEC TECHNICAL CORRELATING COMMITTEE BALLOT  
June 2010 ASSOCIATION AMENDMENT  
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree  
If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:  
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:  
(1) At least one 8-AWG bare solid copper shall be provided.  
(2) The conductor shall be arranged to meet the requirements of 680.26(B)(1)(b)(3).  
(3) The conductor shall follow the contour of the perimeter surface.  
(4) The conductor shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.  
(5) Only listed splices shall be permitted.  
(6) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.  
(7) The required conductor shall be secured with or under the perimeter surface 100-mm to 150-mm (4 in. to 6 in.) below grade.  
(8) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree*  
If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain* 

*Please give reasons for voting "Do Not Agree" or "Abstain":

I agree with the Negative Ballot by B. Rock on comment 17

---

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: JAMES M. DALY

Date: 7/7/10

June 2010
Supplemental Attachment 10-8-1-j
Page 7 of 21

NEC TECHNICAL CORRELATING COMMITTEE BALLOT
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
1. At least one minimum 8-AWG bare solid copper shall be provided.
2. The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(2).
3. The conductors shall follow the contour of the perimeter surface.
4. The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
5. Only listed splices shall be permitted.
6. The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
7. The required conductor shall be secured with-in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
8. Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The 7 members of CMP-17 who voted NO have it exactly right – there was no objective evidence presented that the equipotential bonding method(s) permitted by 680.26(B) of NEC 2008 do not provide “practical safeguarding of persons and property from hazards arising from the use of electricity.”

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: _

Name - Please Print: William T. Pisko

Date: 2010-07-07

June 2010

Standards Council Supplemental Agenda August 3-5, 2010 Page 468 of 1603

Revised Page Number 469 of 813
Supplemental Attachment 10-8-1-j
Page 8 of 21

NEC TECHNICAL CORRELATING COMMITTEE BALLOT

June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

If you agree with this amendment, the result will be to amend 680.26(B)(3)(c) as shown in Comment 17-86 to read as follows:

260.26(B)(3)(c)
faceplate:
(1) The required conductors shall be constructed of 8 AWG round copper and be arranged meeting the requirements of 260.26(B)(3)(c).
(2) The required conductors shall be arranged to pass through the faceplate as shown.
(3) Only male threads shall be permitted.
(4) The required conductors shall be 150 mm to 500 mm (6 in. to 20 in.) from the inside walls of the conduit.
(5) The required conductors shall be secured with to be under the partition surface 100 mm to 150 mm (4 in. to 6 in.) above the finished grade.
(6) Positioned within the cavity or required for the interior of the duct.

X Do Not Agree

If you do not agree with this amendment, the recommendation is to return to previous edition text.

*Please give reasons for voting "Do Not Agree" or "Abstain"*

The submitter's substantiation provides evidence that a ground path reduces voltage gradients. However, sufficient substantiation has
not been provided that the joining at the cut-off point of 260.26(B)(3)(c) does not constitute the Technical Committee's final
recommendations negative comments awaits the same conclusion.

Please return as soon as possible before 11:59 AM, JULY 5, 2010.

Mary Warren,
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-783-7360

Signature:

Name/Session Chair: David Etherton

Date: July 8, 2010

June 2010
Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:

1. At least one minimum 8 AWG bare solid copper shall be provided.
2. The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
3. The conductors shall follow the contour of the perimeter surface.
4. The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
5. Only listed splices shall be permitted.
6. The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
7. The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
8. Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

This proposal was originally turned down as a TIA to the 2008 NEC. For the 2011 Code process, Proposal 17-179 was rejected by CMP-17 with the following comment: “The present alternate means of perimeter bonding was not demonstrated to be unsafe.” The test data provided by NEETRAC, the testing organization that established the test criteria and the test data, has not shown that the difference in voltage gradients between the ground mat installation proposed and the ground ring installation, as currently permitted under the 2008 NEC, is unsafe. According to the test report from NEETRAC, dated August 2008, there was a voltage of 12.5 volts at a distance of 3 feet away from the pool at the furthest test point from the source, while with the bonding grid, the level at the same location was 1.5 volts. Neither this test data nor other documentation has been submitted to show that an installation using just a ground ring results in a difference in potential to a level that is dangerous or has caused injury. The panel evaluated the report from NEETRAC and had many concerns, not least of which was the test procedure did not have a test control to establish the baseline before any additional tests were done.

Comment 17-86 was rejected by CMP-17 with the following comment: “The panel does not agree that the submitter’s substantiation provides adequate justification to change the alternate means of perimeter bonding. The submitter has not documented that the existing alternative means in the existing NEC results in unsafe voltage gradients”. The submitter’s substantiation on Comment 17-86 stated that “A number of shock incidents in and around pools have been recorded and addressed by Georgia Power and Singing River Utility in Mississippi which supports the copper grid over the single conductor application. These shock incidents have forced utilities to implement more stringent rules (procedures) over conductor application, since the single conductor falls short on providing the necessary protection.”

June 2010
First, no documentation was provided of those incidents mentioned in the substantiation to show that these incidents involved pools that had either method of equipotential bonding installed to equalize voltage gradients around the pool area.

Second, the NEETRAC test report does show that the grid system is more effective than the single conductor ring, but does not show that the single conductor ring is unsafe and would not provide a safe level of equipotential plane.

I recommend that this motion be rejected since no new information has been provided. If new and compelling science or field experience is introduced, CMP 17 should be given an opportunity to consider it.

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617- 984-7070

[Signature]

Name - Please Print: John Kovacik

Date: July 7, 2010

June 2010
Amendment: Accept Comment 17-86

☐ Agree  
If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8-AWG bare solid copper shall be provided:
(1) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
(2) The conductors shall follow the contour of the perimeter surface.
(2) The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
(3) Only listed splices shall be permitted.
(3) Only listed splices shall be permitted.
(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(5) The required conductor shall be secured with in or under the perimeter surface-100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(5) The required conductor shall be secured with in or under the perimeter surface-100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(4) Be secured within or under the deck or unoccupied surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☒ Do Not Agree*  If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*  
*Please give reasons for voting "Do Not Agree" or "Abstain":

The Technical Committee has not reached consensus for this amendment. A return to the original text will not have an adverse affect on correlation in the Code. I agree with comments in some of the TC members’ ballot statements for the need of a Task Group to evaluate this issue thoroughly in the next Code cycle.

Please return as soon as possible, but no later than FRIDAY, JULY 9, 2010 to:

Mary Warren  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-984-7070  

Signature:  

Name: Neil F. LaBrake, Jr. – TCC Principal, EBI rep.  
(Please Print)

Date: 09 July 2010  

June 2010.
Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:

1. At least one minimum 8-AWG bare solid copper shall be provided.
2. The conductor shall be constructed of 8 AWG solid bare copper and shall be arranged meeting the requirements of 680.26(B)(1)(b)(3).
3. The conductors shall follow the contour of the perimeter surface.
4. The copper grid shall follow the continue of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
5. Only listed splices shall be permitted.
6. The required conductor shall be 450 to 600 mm (18 to 24 in) from the inside walls of the pool.
7. The required conductor shall be secured in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
8. Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

We support the actions of the Code Making Panel

______________________________________________________________

Please return as soon as possible, but no later than Friday, July 9, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: Danny Liggett

Name - Please Print: ________________________________

Date: 7-16-2010

June 2010
Supplemental Attachment 10-8-1-j

NFPA 70
TC BALLOT for Code Making Panel 17
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:

1. At least one minimum 8-AWG bare solid copper shall be provided.
2. The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
3. The conductors shall follow the contour of the perimeter surface.
4. The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
5. Only listed splices shall be permitted.
6. The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
7. The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
8. Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

X Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

*Please give reasons for voting "Do Not Agree":

For several years CMP17 has been presented with information from a variety of sources characterizing the performance of alternative methods of equipotential bonding around pools. This information has served to educate Panel members on sources of ground currents and how differing electrode and bonding configurations may perform under specified test conditions. The sum total of all the information presented to the Panel before, during and after its meetings is that the more copper used in the equipotential bonding system, the better the performance of that system.

Test data obtained on alternative methods is relative to an approximation of the Article 680.26 requirements, not the actual Code requirements. Narratives accompanying the data focus on comparing methods and not whether the Code requirement represents an unsafe installation. This is also true of the document provided with the Letter Ballot on Amendment, which is an excerpted summary of a larger report that is not currently available to the Panel.

To date, the Panel has considered and affirmed by its several votes that the minimum 8-AWG bare solid copper wire meets the objective of reducing voltage gradients in the pool area. The subject of electric shock hazard has not been taken lightly by CMP17 and there has been a good deal of willingness to carefully research and consider new information as it becomes available. The Panel should therefore be given the opportunity to thoroughly review and consider the latest information and not make a judgment on incomplete information and entirety from a floor vote.

For these reasons, we do not agree with the Amendment. We do, however, support the creation of a Panel Task Group that can better define the safety expectations of equipotential bonding for pools and testing criteria that definitively determines whether these expectations are met.

Signature: [Signature]

Name - Please Print: Thomas Blewitt

Date: June 22, 2010

June 2010
Accept Comment 17-86

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2)(B) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:

1. At least one minimum 8-AWG bare solid copper shall be provided.
2. The conductor grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(B)(3).
3. The conductor shall follow the contour of the perimeter surface.
4. The conductor grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
5. Only listed splices shall be permitted.
6. The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
7. The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
8. Be secured within or under the deck or unavowed surfaces no more than 150 mm to 600 mm (6 in. to 6 in.) from the underside of the deck.

Do Not Agree* If you do not agree with this amendment, the recommendation is to return to previous edition text.

*Please give reasons for voting "Do Not Agree" or "Abstain":

I do not agree with the action taken at the Annual NFPA Meeting. CMP-17 has reviewed the data provided during the ROP (Proposal 17-179) and ROC (Comment 17-86) process and did not accept the assumptions that data provided. There has been no new substantiation provided, to show that the current requirements found in the 2008 NEC are inadequate to protect individuals from stray voltages that will cause them bodily harm. I agree that a task group needs to be formed in order to review any future data that may be provided to show that the current method of addressing these stray voltages is inadequate. First tests need to be conducted to show what maximum voltage gradients are dangerous when the person is immersed. Then tests conducted with methods specified in the 2008 NEC need to be conducted to show that the current code is inadequate. The data provided so far is not complete and is only a summary of the full report. Even the summary showed that something similar to the code allowed single ring will keep the voltages to an acceptable level around swimming pools.

Signature: JAMES MALDONADO

Date: 6/21/10

Standards Council Supplemental Agenda August 3-5, 2010 Page 475 of 1603 Revised Page Number 476 of 813
Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2)(b) *Alternate Means.* Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8 AWG bare solid copper shall be provided.
(2) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
(3) The conductors shall follow the contour of the perimeter surface.
(4) The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
(5) Only listed splices shall be permitted.
(6) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(7) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(8) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

Regarding proposal 17-179 and comment 17-86, the available test data provided by EPRI during the annual NFPA Conference, do not purport to identify or substantiate that the current 2008 code requirements in 680.26 (B) (2) (b) to be unsafe or inadequate to mitigate dangerous voltage gradients. I, therefore, continue to reject this proposal. I do recommend that a task force should be formed for the 2014 NEC to address any future data from this submittal or others.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: __________________________
Name - Please Print: Marcus Ramirez
Date: June 21, 2010

June 2010
Supplemental Attachment 10-8-1-j
Page 16 of 21

NFPA 70
TC BALLOT for Code Making Panel 17
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(e) grid shall be utilized where the following requirements are met:

(1) At least one minimum 8-AWG bare solid copper shall be provided.
(2) The conductor shall follow the contour of the perimeter surface.
(2) The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
(3) Only listed splices shall be permitted.
(4) The required conductor shall be 150 to 600 mm (6 to 24 in.) from the inside walls of the pool
(5) The required conductor shall be secured with, in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(6) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (6 in. to 6 in.) from the underside of the deck.

☐ Do Not Agree*

*If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Comment 17-86 seeks to declare a grid arrangement of 8 AWG solid copper conductors, rather than a ring (loop) arrangement of 8 AWG solid copper conductor, as the alternate means to achieve equipotential bonding in the absence of unencapsulated steel rebar as that means. The test data provided and field experience introduced, available to Code Making Panel 17 (CMP17) during deliberations of Proposal 17-179 and Comment 17-86, was not sufficient to establish definitively that a ring (loop) of a single 8 AWG solid copper conductor is inadequate to mitigate voltage gradients around swimming pools. NEMA remains receptive to consideration in the next Code cycle of a separate test study underway (EPRI Project 08-132, available only as an abstract and without test data to CMP17 members prior to this ballot) that may provide analytically clearer insight.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: Brian E. Rock

Date: 2010-June-21
June 2010

Standards Council Supplemental Agenda
August 3-5, 2010
Page 477 of 1603
Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:
680.26(B)(2) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
1. At least one minimum 8 AWG bare solid copper shall be provided.
2. The grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(D)(3).
3. The conductors shall follow the contour of the perimeter surface.
4. The copper grid shall follow the contour of the perimeter surface extending 1 m (3 ft) horizontally beyond the inside walls of the pool.
5. Only listed splices shall be permitted.
6. The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
7. The required conductor shall be secured with-in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
8. Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (6 in. to 24 in.) from the underside of the deck.

☐ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

At our meeting the panel evaluated all of the material presented in support of this proposal and unanimously agreed that there was no evidence provided that the present system is unsafe. Material made available to the panel since then points to the grid system providing a reduced voltage gradient compared to the single #8 bare copper loop. The question remains as to what constitutes a safe design. A task group needs to be formed to gather applicable test data and incident reports that supports the requirement of the grid or the adequacy of the single #8 ring. This material and possible new material needs to be thoroughly evaluated by the task group without the present constraints of time. Their recommendation can be made to the panel for action during the 2014 code cycle.

Through this process we should come to a solution supported by facts.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: ________________________________
June 2010
Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2)(b) **Alternate Means.** Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:

1. At least one minimum 8 AWG bare solid copper shall be provided.
2. The conductor(s) grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(B)(3).
3. The conductor(s) grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
4. Only listed splices shall be permitted.
5. The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
6. The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
7. Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

X Do Not Agree* If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*X

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Per the e-mail discussion from Code Panel 17, this should be agreed to by the panel, not at the Annual Meeting. This should be addressed with proper engineering input in the 2014 Code.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature:  

Name - Please Print: Chester Sandberg

Date:  June 21, 2010

June 2010
Standards Council Supplemental Agenda  August 3-5, 2010  Page 481 of 1603

NFFA 70
TC BALLOT for Code Making Panel 17
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 17-86)

Amendment: Accept Comment 17-86

☐ Agree

If you agree with this amendment, the result will be to revise 680.26(B)(2) as shown in Comment 17-86 to read as follows:

680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:

(1) At least one minimum 8 AWG bare solid copper shall be provided.
(2) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(2).
(2) The conductors shall follow the contour of the perimeter surface.
(2) The copper grid shall follow the contour of the perimeter surface extending 1 M (3 ft) horizontally beyond the inside walls of the pool.
(2) Only listed splices shall be permitted.
(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(5) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade.
(4) Be secured within or under the deck or unpaved surfaces no more than 150 mm to 600 mm (4 in. to 6 in.) from the underside of the deck.

☑ Do Not Agree* If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The purpose of Comment 17-86 is to require a grid arrangement of 8 AWG solid copper conductors, rather than a ring (loop) arrangement of 8 AWG solid copper conductor, as the alternate means to achieve equipotential bonding in the absence of unencapsulated steel rebar as that means. The available test data provided and field experience introduced, available to Code Making Panel 17 (CMPT7) during deliberations of Proposal 17-179 and Comment 17-86, were not sufficient to establish definitively that a ring (loop) of a single 8 AWG solid copper conductor is inadequate to mitigate dangerous voltage gradients around swimming pools.

Please return as soon as possible, but no later than Tuesday, June 22, 2010 to:

Mary Warren
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070

Signature: [Signature]

Name - Please Print: L. L. WEST

Date: ______________________

June 2010
17-86 Log #1779 NEC-P17
(680.26(B)(2)(b))

Final Action: Reject

Submitter: Wayne H. Robinson, Lothian, MD
Comment on Proposal No: 17-179
Recommendation: Revise text to read as follows:
680.26(B)(2)(b) Alternate Means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met:
(1) At least one minimum 8 AWG bare solid copper shall be provided.
(2) The conductors shall follow the contour of the perimeter surface.
(3) Only listed splices shall be permitted.
(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool. (5) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade. (6) The copper grid shall follow the contour of the perimeter surface extending 1 m (3 ft) horizontally beyond the inside walls of the pool.

Substantiation: Corrections to TIA Log No. 936 were implemented at the advice and suggestion of Code-Making Panel 17 after a positive vote of 6-3 for the TIA.

Change the 8 AWG bare copper to 8 AWG solid bare copper. The vote in Hilton Head, SC on Proposal 17-179, Log 805, NEC-P17 was prior to comments and vote on the TIA Log 936. The testing documentation from NEETRAC presented to Code-Making Panel 17 substantiated that the single conductor application may not provide adequate protection that a copper grid provides. A number of shock incidents in and around pools have been recorded and addressed by Georgia Power and Singing River Utility in Mississippi which supports the copper grid over a single conductor application. These shock incidents have forced utilities to implement more stringent rules (procedures) over the present 2008 NEC application, since the single conductor falls short on providing the necessary protection.

Panel Meeting Action: Reject
Panel Statement: The panel does not agree that the submitter’s substantiation provides adequate justification to change the alternate means of perimeter equipotential bonding. The submitter has not documented that the existing alternate means results in unsafe voltage gradients.

Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-179 Log #805 NEC-P17
(680.26(B)(2)(b))

Final Action: Reject

Submitter: Wayne Robinson, Lothian, MD
Recommendation: Revise text to read as follows:
680.26(B)(2)(b). Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) grid shall be utilized where the following requirements are met: (1) At least one minimum 8 AWG bare solid copper conductor shall be provided. Copper conductor grid shall be utilized and shall comply with (b)(1) through (b)(5). (2) The conductors shall follow the contour of the perimeter surface. (3) The copper grid shall follow the contour of the perimeter surface extending 1 m (3 ft) horizontally beyond the inside walls of the pool. (4) Only listed splices shall be permitted. (5) Only listed splices shall be permitted. (6) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool. (7) The copper grid shall be constructed of 8 AWG solid bare copper and be arranged in accordance with 690.25(B)(1)(b)(3). (8) The required conductor shall be secured with in or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below subgrade. (9) The copper grid shall be secured within or under the deck or unpaved surfaces no more than 150 mm (4 in. to 6 in.) from the underside of the deck.

Substantiation: Test data from NEETRAC refutes a single copper conductor application for decks, pavers, unpaved surfaces and supports an equipotential plane or copper grid system, as originally outlined in the 2005 Edition of the NEC. NEETRAC Test data reveals a 70 percent to 90 percent increase in step voltages, when comparing a single conductor installation over a copper grid system.

Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: CMP-17 does not accept the submitter’s substantiation.

The present alternate means of perimeter bonding was not demonstrated to be unsafe.

Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
July 9, 2010

Linda Fuller
Manager, Codes & Standards Administration
National Fire Protection Association
1 Batterymarch Park, Quincy, MA  02169-7471

Dear Linda:

Please accept this letter as a request for appeal to the Standards Council on ROC 17-86, (CAM 70-22) Log # 1779, Comment on Proposal 17-179. The basis for my appeal is:

- Overwhelming majority (almost unanimous) vote for the NITMAN at the Technical Session meeting in Las Vegas.
- Overwhelming support at the Electrical Section meeting in Las Vegas.
- Edison’s Electric Institute’s unanimous support of the grid system.
- The adoption of a single wire method in the 2008 NEC was without any testing that supported the change.
- NITMAN submission for the 2008 code cycle to uphold the 2005 NEC version of 680.26(C) was denied. The 2005 NITMAN identified that there was no technical substantiations or testing to support a single wire.
- The motion was denied by CMP 17 because they refuse to accept substantiation for only one reason: there was no baseline measurement taken to compare other tests against. This point has been completely refuted by NEETRAC in the March 10, 2010 letter. Baselines (or controls) are used in experiments when developing theories. This was an actual field measurement of a common condition, not an experiment.
- NECTRAC August 2008 test and field measurement of the 2005 NEC application of a copper wire grid to the 2008 single wire method under deck pavers (perimeter surfaces) identified the single wire provided no protection.
- EPRI Testing (FUN in the Sun 2000) identified a single wire with 14 points of connection (grid) as a workable solution for mitigation of stray voltage on pool decks.
- EPRI draft report verifying the single wire method provided no protection (EPRI’S Massachusetts pool testing facility). A single wire only works (mitigates partially) with multiple points of connection of ground rods.
- This motion does not make new code, only effectively takes us back to 2005 code.
- This motion does not add costs to public, only eliminates the possibility of reducing costs by not providing protection.
- Multiple claims of individuals being shocked on pool decks referenced in NEETRAC March 29, 2010 letter.
After rejection of TIA 936, I was instructed by CMP 17 and the Standards Council in Miami to submit the changes during the normal 2011 Code Development Process.

When codes have conflicting levels of safety, if they are all rational, enforcement agencies always decide on the more stringent level of safety. Also consider Arc-Fault Circuit Protection in the home. These instances could be rarer than shocks on pool decks, yet we as a community decided to ensure the safety of the public and require Arc-Fault breakers. In a single wire installation around perimeter surfaces of a pool, if you have an electrical event, i.e. utility ground faults, neutral to ground events both customer and utility, stray voltage on electrical systems supplying pool equipment, a single wire provides no protection. Why do we not afford the public walking on pool decks the same level of safety? We do so for dairy cattle on concrete floors.

In summary, there is no supporting documentation that a single wire provides protection for individuals on pool decks. However, we do have documentation proving that a single wire is only acceptable if there is no electrical event.

Sincerely,

Wayne Robinson
MS. HORTON: (Inaudible.)

UNIDENTIFIED SPEAKER: (Inaudible.)

MR. BELL: I said the motion carries.

UNIDENTIFIED SPEAKER: (Inaudible.)

MR. BELL: I don't -- I don't think the vote was close.

Move on to Motion Sequence number 70-22. Is there a motion on the floor related to Sequence number 70-22? Microphone 9 or is it microphone 7?

MR. CARPENTER: Seven; yes.

MR. ROBINSON: My name is Wayne Robinson. A retired chief electrical inspector from Anne Arundel County, Maryland. I'm making a motion to accept 70-22.

MR. BELL: Okay. Just make sure I understand the motion. The motion is to accept Comment 17-86; is that correct?

MR. ROBINSON: It's 17 -- let me see. I've got 17-22.

MR. BELL: Well, that's the motion sequence number. Your motion is to accept 17-86; is that correct?

MR. ROBINSON: That's correct; 17-86. Yes.

MR. BELL: Okay. Is there a second?

UNIDENTIFIED SPEAKER: Second.

MR. BELL: I hear a second. Please proceed.
MR. ROBINSON: Well, I just want to start off firstly by saying that I was rejected on the basis that a test that I had done -- that a manufacturer had done by NEETRAC that it did not provide enough substantiation that the single-wire method that was adopted in the 2008 was substantial.

So to give you a history of that, I want you to go back to the 2005 application where we did not have a single wire. The single-wire in the 2008 application was submitted by UL. I think Gary Stiggins, it was his proposal, and that -- what -- what happened was there was no documentation in the 2008 process that verifies that a single wire provides protection.

There was zero testing documentation. During a process for TIA, I contacted UL -- I mean, NFPA. Talked with many NFPA members. "We never provided a test."

Not 'til the TIA that was issued with a six to three vote with one abstention that they agreed -- expect for an emergency nature -- that it should have been accepted.

During that process, there were some issues that was fought out by Code Making Panel 17 members. They told me to go through the process and make the corrections that they requested. I did that. And then,
again, in Redondo Beach, they rejected it again on the same basis.

The whole issue is is that that construction has changed. We used to have metal decking or steel decking around pools. This provided a potential plane. We have lost that plane.

We no longer have that plane. So we've gone to fiber crete, and now we've got a single wire with no documentation for that single wire. Okay. So, now, did the test. A test through NEETRAC which is the same organization that did testing under the 2008 application for buying a pool water under 6-80-26(C).

The Code Making Panel had no issue with the NEETRAC Test under 6-80-26(C), but, again, now they're having problems with that based on no zero -- no baseline done on the testing. But it's an actual test, and it's proven that the single-wire's unsafe.

And, again, remember in the 2000 -- I was here in the 2005 process -- no, 2008 process, and I said, "There's no documentation for a single wire." We still don't have it. But yet we have it in the code still.

So it's -- this motion to do away with that single wire. This is just an alternate method. We're not talking about doing away with steel decking or putting steel in decks; but, on the alternate methods,
1 we try and eliminate the single wire because there is no
2 support documentation.
3 I have testing it says it doesn't work. So
4 that's where I stand.
5 Thank you.
6 MR. BELL: Thank you. Mr. Carpenter.
7 MR. CARPENTER: Yes. I'd like to defer to Don
9 MR. JOHNSON: Thank you, Mr. Chairman. My
10 name is Don Johnson. I'm the chairman of Panel 17. As
11 chairman, I support the committee's action on Proposal
12 17-179 and Comment 17-86.
13 The proposal returns the present code
14 requirement of a single-wire ground ring to the 2005
15 code requirement for a ground grid required to reduce
16 step and touch potential at the three-foot perimeter
17 surface area around the swimming pool to a safe level.
18 The Committee reviewed the submitter's
19 presentation, substantiation, and documentation
20 including the NEETRAC project 08-132 report titled,
21 "Evaluation of Ground Ring versus Equal Protection Math"
22 at a swimming pool in Buford, Georgia.
23 The submitter's verbal mention of a report
24 titled, "Elevated Neutral to Earth in Voltages and
25 Distribution Systems: Evaluation of Mitigation Options
Around Swimming Pools and Spas," by E.P.R -- by E.P.R.I.
in support of his position was not reviewed as it was
still in draft forms and not published.

The Committee does not agree that the
submitter substantiation provides adequate justification
to change the alternate means of perimeter bonding per
the current code. The Committee does not agree the
submitter has documented the present alternate means of
perimeter bonding results in unsafe voltage gradings.

Thank you.

MR. BELL: Thank you. Further -- further
discussion? Microphone 4.

MR. ODIE: Mark Odie, Underwriters
Laboratories, speaking against the motion.

If you look at this, this was put in as a TIA
for the 2008 NEC. It did not pass. It was brought up
then again in the 2011 as a new proposal. Proposal
17-179 again was rejected by Panel 17 with the following
comment.

"Present alternative method of perimeter
bonding was not demonstrated to be unsafe. The test
data provided by NEETRAC, the testing organization that
established the test criteria and test data, has not
shown that the difference in voltage gradients between
the ground mat installation proposed and the ground ring
1 installation as currently permitted under the 2008 NEC
2 is unsafe."
3
4 According to the test report of NEETRAC dated
5 August 2008, there was a voltage of 12.5 volts at a
6 distance of three feet away from the pool at the further
7 test point from the source.
8
9 Well, with the bonding grid, the level of the
10 same location was 1.5 volts. Neither this test data nor
11 other demonstrated or documentation has been submitted
12 to show that an installation using just a ground ring
13 results in a difference in potential to a level that's
14 dangerous or has caused injury.
15
16 The Panel evaluated the report from NEETRAC
17 and had many concerns, not the least of which was a test
18 procedure, did not have a test control to establish the
19 baseline before any additional tests were done.
20
21 If you're going to do a test, you need to
22 establish the baseline first and then that gives you a
23 basis for all of your other tests.
24
25 Comment 17-86 was rejected by Panel 17 with
26 the following comment: "Panel does not agree with the
27 submitter's substantiation in that it provides adequate
28 justification to change the alternate means of perimeter
29 bonding. Submitter has not documented that existing
30 alternate means in the existing NEC results in unsafe
voltage gradients."
Again, there's no documentation showing in
their testing that the single conductor bonding, the
loop, in other words, is any less safe than -- than what
the other system that they're proposing is.

I think this needs to go back. I think they
need to do the proper testing and then submit that
information back to Panel 17. It needs to have full
documentation. They need to establish a baseline. All
of the test parameters should be shown including the
test parameters for the individual conductors not just
the bonding methods.

Thank you.

MR. BELL: Thank you. Microphone 5.

MR. KOVACIK: Thank you, Mr. Chair. John
Kovacik, Underwriters Laboratories, speaking as the
representative for the electric section of the National
Fire Protection Association, and speaking in support of
the motion on the floor.

The Electrical Section of NFPA had a meeting
earlier this week, and at its meeting the members of the
section voted to support the motion on the floor. Thank
you.

MR. BELL: Thank you. Microphone 7.

MR. ASSENSHAWK: Randy Assenshawk (phonetic)
representing International Brotherhood of Electrical Workers.

I'm the voting member of Panel 17. At the time Panel 17 voted, we were looking at a draft report. This was an alternate method in the draft report. But, looking at the final NEETRAC report that was issued to us now, there is a difference in the safety factor. And since we have different constructions in swimming pools, fiberglass versus the old grid -- grid and iron -- rod iron method, this does make sense.

And in the -- IBW is standing in support of this comment.

MR. BELL: Thank you. Microphone 7 again.

MR. ROBINSON: Wayne Robinson. Representing myself. My -- my -- my only basis is --

MR. BELL: Speaking for or against the motion?

MR. ROBINSON: I'm for the motion.

MR. BELL: Thank you.

MR. ROBINSON: The original change in the 2005 to the 2008 application to a single wire had no testing documentation submitted by UL. It was their proposal. They didn't do any testing. So had they turned to us after we did testing saying, "We didn't do any testing," when they made no effort when they submitted it to provide any documentation on a single wire.
So it's kind of a double-standard and I'm not quite sure why. Thank you.


MR. HICKMAN: Palmer Hickman with the IBW.

I'd like to call the question.

MR. BELL: Okay. There's a motion to call the question. Is there a second?

UNIDENTIFIED SPEAKER: Second.

MR. BELL: All those in favor of calling the question, please raise your hand.

Thank you.

All opposed?

Motion carries.

We'll move directly to the vote on the motion on the floor which is to accept Comment 17-86.

All those in favor of the motion, please raise your hand.

Thank you.

All those opposed.

Motion carries.

Is there any further discussion on NFPA 70 at this time? Microphone 2.

MR. KOVACIK: Thank you, Mr. Chairman. John Kovacik, Underwriters Laboratories. The point of information could you explain if -- and if you have
At its meeting of 04 March 2009, the Standards Council considered an appeal from Wayne Robinson, Lothian, MD requesting that the Council issue proposed Tentative Interim Amendment (TIA) No. 936 on the 2008 edition of NFPA 70, *National Electrical Code®*. The proposed TIA seeks to modify 680.26(B)(1) and 680.26(B)(2) which address bonding of the perimeter surfaces of a permanently installed pool. If issued, the TIA would require a copper equipotential bonding grid rather than a single wire copper conductor along the pool perimeter.

As background, the material that is the subject of the TIA was originally added to the 2008 edition of the NEC in the Annual 2007 cycle in Proposal 17-114a and revised in Comment 17-92. In the current revision cycle, Annual 2010, the material that is the subject of the TIA was submitted by the TIA proponent to Code-Making Panel 17 (Panel 17) as Proposals 17-173 and 17-179. The proposals are currently undergoing the ballot process and the results will be reported in the NEC Annual 2010 Report on Proposals (ROP).

Proposed TIA 936 was balloted through Panel 17 and the NEC Technical Correlating Committee (TCC). Balloting was completed in accordance with the Regulations Governing Committee Projects to determine if it had the necessary three-fourths majority support of the Panel and TCC on merit (technical and correlation, respectively) and emergency nature to establish a recommendation for issuance. The ballot failed to achieve the necessary support of both Panel 17 and the TCC on both technical/correlation merit and emergency nature for issuance of proposed TIA 936. Nine public comments on the proposed TIA were received. Where the ballot does not pass both the Panel and TCC on merit and emergency nature, the default recommendation to the Council is to not issue the TIA.

The appeal requests that the Council overturn the action recommended by the NFPA codes and standards development process and issue the TIA. On an appeal, the Standards Council accords great respect and deference to the NFPA codes and standards development process. In conducting its review, the Council will overturn the result recommended through that process, only where a clear and substantial basis for doing so is demonstrated. The Council has reviewed the entire record concerning this matter and has considered all of the arguments raised in this appeal. In the view of the Council, this appeal does not present any clear and substantial basis on which to overturn the results recommended by the NFPA codes and standards development process. Accordingly, the Council has voted to deny the appeal and not issue TIA 936.

As noted above, the revisions proposed by the TIA have already been submitted for consideration as proposals during the full NEC revision cycle that is now under way. Therefore, the appellant

*NOTE: Participants in NFPA’s codes and standards making process should know that limited review of this decision may be sought from the NFPA Board of Directors. For the rules describing the available review and the method for petitioning the Board for review, please consult section 1.7 of the NFPA Regulations Governing Committee Projects and the NFPA Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council. Since this Council decision is not “related to the issuance of a document” as referenced in 1.7.2 of the Regulations Governing Committee Projects, notice of the intent to file such a petition must be submitted to the Clerk of the Board of Directors within a reasonable time period.*
or others may continue to advocate their positions through this process including, as they deem appropriate, the eventual filing of Public Comments. In doing so, they are urged to provide full technical substantiation of their positions to the responsible panel and TCC. The Council noted that the NEC will publish its ROP by July 14, 2009. The deadline for the submission of Public Comments is October 23, 2009.
Comments on Certified Amending Motion 70-22  
Re: Swimming Pool Perimeter Equipotential Bonding  
July 9, 2010

My name is Bruce Hirsch. I work for Baltimore Gas and Electric, a publicly owned gas and electric utility, and represent the Edison Electric Institute as a Principal Member of Code Making Panel 17 which has the responsibility for this issue. My purpose in writing is to ensure the facts are known and given the proper consideration.

This Proposal (17-179), Comment (17-86) and Certified Amending Motion (70-22) is an attempt to remove the “alternate means” (680.26(8)(2)(b)) of providing equipotential bonding under the perimeter surfaces (defined as 3’ horizontal surface from the inside wall) of a swimming pool. At issue is the effectiveness of using a single #8 AWG, bare, solid copper conductor, 18-24 inches from the pool edge to accomplish equipotential bonding.

**History**

The use of a single #8AWG, bare, solid copper conductor to establish a Common Bonding Grid was allowed in the 1999 NEC (680-22(B)(3)).

In the 2002 Code Cycle, the Panel completely reorganized Article 680. The use of a single #8 AWG, bare, solid copper conductor remained as an acceptable option in the 2002 NEC (680.26(C)(3)).

In the 2005 Code Cycle, the Panel began to utilize the term Equipotential Bonding Grid and for the first time defined just how to construct such a grid. The acceptance of a single #8AWG, bare, solid copper conductor was not included in the work done by that Panel. The only option was to use existing structural reinforcing steel or to construct a 12”x12” grid using #8AWG, bare, solid copper conductor. Please note that Article 680.26(C) was titled “Equipotential Bonding Grid”. (At this time the Panel felt that the requirement of a grid was essential. The removal of the single #8AWG, bare, solid copper conductor was not the result of any substantiation supplied.)

In the 2008 Code Cycle, the Panel was challenged with how to handle installation in an existing environment. The panel chose to resurrect the concept of a single #8 AWG, bare, solid copper conductor but made it an alternate means which was intended only to be utilized when existing conditions do not allow the use of structural reinforcement or construction of a grid. (Since the removal of the single #8 AWG, bare, solid copper conductor in the previous Code cycle was not done as a result of any substantiation, the re-introduction of this method was done without any concern by the Panel.)

**2011 Code Cycle**

During the 2011 Code Cycle, Panel 17 was given the opportunity (via Proposals and Comments) to reconsider the use of a single #8 AWG, bare, solid copper conductor as a means of providing equipotential bonding.
• Fact – The Panel was never supplied with any detailed information on actual cases that suggests that a single #8 AWG, bare, solid copper conductor failed to provide the protection it was intended to supply. References were made to problems, but none were detailed for Panel review.

• Fact - During the cycle, independent testing was being done on the various means of accomplishing equipotential bonding. NEETRAC and EPRI either had done or were performing tests for the utility industry and the Panel tried to tap into the results of that testing. Testing indicated that a single #8 AWG, bare, solid copper conductor does provide protection at lower stray voltage levels but does not provide the same level of protection as a grid when the stray voltage levels increase.

• Fact – While NEETRAC testing provided specific information, the Panel did not feel it was completely representative of actual field conditions.

• Fact - EPRI testing had just recently been completed. Because of the EPRI confidentiality agreement, only an overview of the EPRI test results was made available to the Panel and then this was made available only within the past few weeks (after the NFPA Convention). The Panel had seen some preliminary test results but was not inclined to act on a preliminary report. (Personal observation – the EPRI testing is much more representative of the various situations found in the field and their test pool was constructed to allow flexible testing alternatives. If the Panel feels additional testing needs to be done, this would be an ideal opportunity to use NFPA funding for this testing.)

The Edison Electric Institute Task Force Members have reviewed the information available at this time. We believe that the EPRI test results have identified an exposure level that needs to be corrected to meet the Code’s intention of practical safeguarding of persons and property from hazards arising from the use of electricity. As a result, we support CAM 70-22 and urge the Council to uphold the action taken on the floor of the NFPA Convention.

In closing we would like to point out that the actions taken by Panel 17 on this issue were completely in line based on the information they had at the time they were making their decisions. The EEI supported the Panel actions throughout this Code Cycle. The results of recent testing, however, have led to a better understanding of the potential consequences of not improving the alternate method of establishing perimeter equipotential bonding around pools.

Bruce R. Hirsch
Management Consultant
Baltimore Gas and Electric
CMP 17 Principal representing EEI
Submission to Appeals Council on Comment 17-86 (CAM 70-22)

For Council Appeals Hearing August 3 & 4, 2010

Submitter:

Jennifer Hatfield
Florida Swimming Pool Association (FSPA)
2555 Porter Lake Drive, Suite 206, Sarasota, Florida 34240
941-345-3263

Appeal Description:

Appeal of Comment 17-86 (CAM 70-22)

NEC 680.26(B)(2) Requirement of Copper Grid in Perimeter Pool and Spa Surfaces.

Position of Submitter:

Oppose the appeal.

Argument Against the Appeal:

The Florida Swimming Pool Association (FSPA) fully supports the arguments against the appeal that were submitted by the Association of Pool & Spa Professionals. Those arguments are pasted below:

The Appellant of Comment 17-86, W. Robinson of Prince George’s County Government, has not substantiated that the Code-recognized single buried 8-gauge wire method for equipotential bonding of pool perimeter surfaces in the deck area around a pool or spa (680.26(B)(2)(b)) creates any risk of injury or death justifying replacement with a copper grid for perimeter surface bonding:

1. The Appellant proposes to replace the existing Code-recognized single wire approach to equipotential bonding of perimeter surfaces with a 12” x 12” 8-gauge buried copper wire grid. Under the current edition of the NEC, both technologies are acceptable.
2. The NEETRAC study provided to the CMP by the Appellant and the grid manufacturer, that was claimed to substantiate the safety benefits of the copper grid, was done on behalf of what was at that time the single manufacturer of the copper grid material and addressed a single data point (one pool in Georgia) and did not even address all the existing in-ground pool types. Code should never be changed based on a single biased study.

3. The study provided by the Appellant and the grid manufacturer did not result in any data showing that the existing Code-recognized single wire approach (above) resulted in unsafe levels of voltage potentially resulting in the risk of injury or death, so it provides no scientifically-supportable proof that (a) the existing single wire approach presents a tangible risk of injury or death, (b) elimination of the single wire approach is mandated, or (c) the copper grid offers such superior safety performance that it must be the sole national mandate.

4. The study provided by the Appellant has been found to be misleading and not scientifically supportable by CMP members, and was rejected by CMP-17. CMP-17 has repeatedly rejected the Appellant’s proposal on technical grounds.

5. During the appeals process, the members of CMP-17 were recently provided with summaries of an EPRI study and an EPRI paper that some have purported show that the existing Code-recognized single wire approach is unsafe. This study does nothing of the kind, and in fact never even reported any test data for either the single wire installed per current Code or the proposed copper wire mesh. Nor is the EPRI study intended to address the relative safety of any Code-required equipotential bonding technology. It is a study to identify viable remedial approaches for addressing stray voltage problems in existing pools. Moreover, the wire mesh tested in the EPRI study was a 6” x 6” structural steel wire mesh embedded in a slab-on-grade concrete deck installed in conformance with Article 680.26(B)(2)(a), and is not the copper wire mesh proposed by the
Appellant in his modification of Article 680.26(B)(2)(b). Further, the EPRI study was performed on only one pool type, and does not even represent the most prevalent pool type (concrete) when viewed on a nation-wide basis, even though it admits that data would indicate lower values of voltage for a concrete pool. Nevertheless, the new EPRI materials provided to the CMP members do not indicate (or even claim to indicate) that the existing Code-recognized single wire approach is unsafe. Even with this new information, 70% of the Panel members still rejected the Appellant’s proposal and recommended establishment of a Task Group to address the issue for the 2014 Code cycle. APSP agrees that this is the correct and prudent way to approach this issue, which is far more complicated than the Appellant and proponents indicate.

6. No study, nor any independent database organization such as the CPSC, has found any reports of injury or death related to perimeter bonding. The Council and NEC Code Making Panel are obligated to promote public safety from injury or death, and neither copper grid or single copper wire method of perimeter bonding demonstrate safety issues. Slight “tingle shocks” may be reduced by either bonding method, but are not a safety issue and cannot drive public code-making.

7. If the proposed copper grid provides far superior safety performance over a single copper wire as the Appellant purports, the Council should also reject the use of reinforcing steel as a bonding conductor since its electrical characteristics are far worse than the single copper wire. Such a rejection, of course, would be nonsensical. In reality, all three methods provide far lower electrical impedance than any deck material, all three provide the bonding effect desired, and all three should remain as acceptable.

8. The single wire perimeter bonding method has been in use for years in multiple states with no reported injuries or deaths due to the perimeter bonding.
9. At the original time of submission to CMP-17, Mr. Robinson and the owner of the single (at that time) manufacturer of the copper grid (CMI) made the presentations. Now there are just three known manufacturers. The manufacturer’s affiliation with this Comment and potentially with Mr. Robinson is obviously self-promoting. In contrast, the single wire approach is not specific to any small group of manufacturers and is accepted by States, building departments, and electrical engineers.

10. In contrast to the positions of the Appellant and some proponents, the issue under consideration here is not whether the proposed copper wire mesh is better than the existing single copper wire method of perimeter bonding. In order to replace this existing method with the proposed method, the Appellant must be able to show with scientific defensibility that the existing method (single wire method) does not result in the practical safeguarding of persons and property from hazards arising from the use of electricity. Neither the Appellant nor the referenced documents provided to CMP-17 show such a result, and the only scientifically-defensible action is to reject the proposal and the Appeal. This is exactly what CMP-17 has repeatedly done. The formation of a Task Group as proposed will allow the Panel to address the complicated issues associated with this matter and is the scientifically proper course of action.

After rejection at the ROC level, the Appellant Mr. Robinson and the manufacturer then presented a motion at the general NFPA meeting and were able to acquire a passing vote. A general meeting is just that - general. One cannot assume or conclude that the general meeting members who attended have the necessary in-depth understanding of the complex issues surrounding potential shock hazards of pools and spas.

The CMP-17 then rejected the proposal again with 70% opposed, and recommended establishment of a Task Group to address the issue for the 2014
Code cycle. The opinion of CMP-17 should be respected as pool and spa code-making is their area of expertise and understanding. Please refer to the members comments on that vote. APSP agrees that this is the correct and prudent way to approach this issue, which is far more technically complicated than the Appellant and proponents indicate.

An appeal of that vote does not change the fact that there is no substantiation of safety improvement over any other method of perimeter equipotential bonding and will promote the commercial interests of a few manufacturers in conflict with good public policy making.

Statement of Recommended Council Action

This submitter opposes acceptance of the Appeal of Comment 17-86 and recommends that the Council reject it.

Jennifer Hatfield
Director of Government & Public Affairs
Florida Swimming Pool Association
July 16, 2010

National Fire Protection Association
Standards Council (Appeals)
1 Batterymarch Park
Quincy, MA 02169-7471

Dear Council Members:

This is a letter urging you to reject the appeal of CAM 70-22 (Comment 17-86) reaffirming the Code Making Panel’s previous decision.

The single wire pool and spa perimeter bonding method established and recognized in Section 680.26(B)(2) of the 2008 National Electrical Code is more than adequate. There is not a single report of injury from stray current since that time. The #8 single wire is sufficient to reduce the potential for voltage gradients in a pool area or spa area. This has the support of building departments and electrical engineers as an alternative to the grid.

This is no more than a manufacturer pushing their product on an industry and consumers. This bonding mesh is extremely hard to get and is very expensive. This impacts our portable hot tub industry to the extent that most installs on existing concrete pads would not be allowed. These pads would have to be totally ripped up and replaced.

We request that you reaffirm the CMP’s previous decision and reject this appeal. It does not increase safety! It would however provide an unnecessary cost increase to consumers even though the single wire provides the necessary safety requirements.

Thank you for reviewing these comments.

Best regards,

Mitch Brooks
Executive Director

Cc: IHTA Engineering Committee
IHTA Board of Directors
Submission to Appeals Council on Comment 17-86 (CAM 70-22)

For Council Appeals Hearing August 3 & 4, 2010

Submitter:

Carvin DiGiovanni

Association of Pool and Spa Professionals (APSP)

2111 Eisenhower Avenue, Alexandria, VA 22314

703-838-0083

Appeal Description:

Appeal of Comment 17-86 (CAM 70-22)

NEC 680.26(B)(2) Requirement of Copper Grid in Perimeter Pool and Spa Surfaces.

Position of Submitter:

Oppose the appeal.

Argument Against the Appeal:

The Appellant of Comment 17-86, W. Robinson of Prince George’s County Government, has not substantiated that the Code-recognized single buried 8-gauge wire method for equipotential bonding of pool perimeter surfaces in the deck area around a pool or spa (680.26(B)(2)(b)) creates any risk of injury or death justifying replacement with a copper grid for perimeter surface bonding:

1. The Appellant proposes to replace the existing Code-recognized single wire approach to equipotential bonding of perimeter surfaces with a 12” x 12” 8-gauge buried copper wire grid. Under the current edition of the NEC, both technologies are acceptable.
2. The NEETRAC study provided to the CMP by the Appellant and the grid manufacturer, that was claimed to substantiate the safety benefits of the copper grid, was done on behalf of what was at that time the single manufacturer of the copper grid material and addressed a single data point (one pool in Georgia) and did not even address all the existing in-ground pool types. Code should never be changed based on a single biased study.

3. The study provided by the Appellant and the grid manufacturer did not result in any data showing that the existing Code-recognized single wire approach (above) resulted in unsafe levels of voltage potentially resulting in the risk of injury or death, so it provides no scientifically-supportable proof that (a) the existing single wire approach presents a tangible risk of injury or death, (b) elimination of the single wire approach is mandated, or (c) the copper grid offers such superior safety performance that it must be the sole national mandate.

4. The study provided by the Appellant has been found to be misleading and not scientifically supportable by CMP members, and was rejected by CMP-17. CMP-17 has repeatedly rejected the Appellant’s proposal on technical grounds.

5. During the appeals process, the members of CMP-17 were recently provided with summaries of an EPRI study and an EPRI paper that some have purported show that the existing Code-recognized single wire approach is unsafe. This study does nothing of the kind, and in fact never even reported any test data for either the single wire installed per current Code or the proposed copper wire mesh. Nor is the EPRI study intended to address the relative safety of any Code-required equipotential bonding technology. It is a study to identify viable remedial approaches for addressing stray voltage problems in existing pools. Moreover, the wire mesh tested in the EPRI study was a 6” x 6” structural steel wire mesh embedded in a slab-on-grade concrete deck installed in conformance with Article 680.26(B)(2)(a), and is not the copper wire mesh proposed by the Appellant in his modification of Article
680.26(B)(2)(b). Further, the EPRI study was performed on only one pool type, and does not even represent the most prevalent pool type (concrete) when viewed on a nation-wide basis, even though it admits that data would indicate lower values of voltage for a concrete pool. Nevertheless, the new EPRI materials provided to the CMP members do not indicate (or even claim to indicate) that the existing Code-recognized single wire approach is unsafe. Even with this new information, 70% of the Panel members still rejected the Appellant’s proposal and recommended establishment of a Task Group to address the issue for the 2014 Code cycle. APSP agrees that this is the correct and prudent way to approach this issue, which is far more complicated than the Appellant and proponents indicate.

6. No study, nor any independent database organization such as the CPSC, has found any reports of injury or death related to perimeter bonding. The Council and NEC Code Making Panel are obligated to promote public safety from injury or death, and neither copper grid or single copper wire method of perimeter bonding demonstrate safety issues. Slight “tingle shocks” may be reduced by either bonding method, but are not a safety issue and cannot drive public code-making.

7. If the proposed copper grid provides far superior safety performance over a single copper wire as the Appellant purports, the Council should also reject the use of reinforcing steel as a bonding conductor since its electrical characteristics are far worse than the single copper wire. Such a rejection, of course, would be nonsensical. In reality, all three methods provide far lower electrical impedance than any deck material, all three provide the bonding effect desired, and all three should remain as acceptable.

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presentations. Now there are just three known manufacturers. The manufacturer’s affiliation with this Comment and potentially with Mr. Robinson is obviously self-promoting. In contrast, the single wire approach is not specific to any small group of manufacturers and is accepted by States, building departments, and electrical engineers.

10. In contrast to the positions of the Appellant and some proponents, the issue under consideration here is not whether the proposed copper wire mesh is better than the existing single copper wire method of perimeter bonding. In order to replace this existing method with the proposed method, the Appellant must be able to show with scientific defensibility that the existing method (single wire method) does not result in the practical safeguarding of persons and property from hazards arising from the use of electricity. Neither the Appellant nor the referenced documents provided to CMP-17 show such a result, and the only scientifically-defensible action is to reject the proposal and the Appeal. This is exactly what CMP-17 has repeatedly done. The formation of a Task Group as proposed will allow the Panel to address the complicated issues associated with this matter and is the scientifically proper course of action.

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The CMP-17 then rejected the proposal again with 70% opposed, and recommended establishment of a Task Group to address the issue for the 2014 Code cycle. The opinion of CMP-17 should be respected as pool and spa code-making is their area of expertise and understanding. Please refer to the members comments on that vote. APSP agrees that
this is the correct and prudent way to approach this issue, which is far more technically complicated than the Appellant and proponents indicate.

An appeal of that vote does not change the fact that there is no substantiation of safety improvement over any other method of perimeter equipotential bonding and will promote the commercial interests of a few manufacturers in conflict with good public policy making.

Statement of Recommended Council Action

This submitter opposes acceptance of the Appeal of Comment 17-86 and recommends that the Council reject it.

Carvin DiGiovanni, Technical Director
Association of Pool and Spa Professionals
Comments on Certified Amending Motion 70-22  
Re: Swimming Pool Perimeter Equipotential Bonding  
July 15, 2010  

Submitter:  
E.P. Hamilton III, Ph.D., P.E.  
(Voting Alternate representing APSP, CMP-17)  
Hamilton & Associates - Architecture, Engineering, Technical Services  
1406 Three Points Rd.  
Bldg A, Ste 100  
Pflugerville TX 78660  

Appeal Description:  
Appeal of Comment 17-86, (NEC 680.26(B)(2) Requirement of Copper Grid in Perimeter Pool and Spa Surfaces.  

Argument Opposing the Appeal:  
Please refer to discussion below. As stated in my Accept Comment Ballot on this matter:  

“The purpose of Comment 17-86 is to require a buried grid arrangement of 8 AWG solid copper conductors, rather than a ring (loop) arrangement of 8 AWG solid copper conductor, as the alternate means to achieve equipotential bonding of in-ground pool perimeter surfaces in the absence of bonded structural steel as that means. The available test data provided and field experience introduced, available to Code Making Panel 17 (CMP17) during deliberations of Proposal 17-179 and Comment 17-86, were insufficient to establish definitively that a buried ring (loop) of a single 8 AWG solid copper conductor as currently allowed is inadequate to mitigate any dangerous voltage gradients around swimming pools.  

“I will be willing to serve on any P17 Task Group convened regarding this matter.”  

The discussion below is provided to assist the Council in understanding the events, deliberations and reasons supporting the position to reject taken by 70% of the eligible voters on CMP-17, including APSP’s representative, and endorsing the formation of a Task Group.  

Position ofSubmitter:  
Oppose the appeal.  

Recommended Council Action:  
Reject the Appeal.  

Discussion:  
To the Honorable Council:  

My name is E. P. Hamilton III, Ph.D., P.E. I am a Licensed Professional Engineer in the State of Texas, no. 44700, in good standing since 1979. I hold the B.S., M.S., and Ph.D. degrees in Electrical Engineering. I serve in an uncompensated volunteer capacity on CMP-17 as voting alternate to Principal Mr. Lee West,
representing the Association of Pool and Spa Professionals (APSP). I am also a member of the APSP Technical Committee, as is Mr. West.

I am president of Hamilton & Associates, an Austin, Texas area architecture, engineering and technical services firm. I have over 25 years of direct hands-on experience addressing grounding, bonding and other electrical issues associated with pools and spas, for both the manufacturing industry and for pool and spa owners, builders and maintainers. I am co-developer of the test protocols commonly utilized in the pool and spa industry to evaluate the efficacy of in-ground pool/spa grounding and bonding, as well as other electrical safety-related issues associated with fixed electrical plant serving pools and spas. My professional work has encompassed addressing bonding and stray current issues at several hundred pools and spas, ranging from simple residential spa installations to major facilities at Oregon State University, Oklahoma State University, the Texas School for the Deaf, and the National Triathlon Training Center, to name a few. In some cases these include matters of injuries and deaths associated with electricity in or near the pool or spa. Over the last 25 years I have served as a consultant regarding bonding and other related pool/spa issues to a number of governmental agencies including the State of New Jersey, Alameda and Contra Costa Counties (CA), the Texas Department of Health, and the City of Farmington NM. I authored the electrical section of the latest edition of the APSP Pool Builder’s Handbook. I regularly teach invited industry seminars regarding safe and proper electrical installation and electrical grounding/bonding testing techniques at major pool and spa industry functions including the Western Pool and Spa Show and the Atlantic City Pool and Spa Show, as well as for various industry groups.

I have been informed by APSP that Principal Mr. West is out of town and unavailable until July 20, and therefore, at the request of APSP, I am speaking in his stead herein as Alternate and a member of CMP-17 to provide the Council relevant background information regarding this matter.

APSP has submitted, under separate cover, an official response opposing adoption of this Certified Amending Motion.

APSP is the preeminent standards-promulgating body in the United States regarding pools, spas and related aquatic facilities. APSP’s primary interest is safety, as is mine and as is Mr. West’s. APSP also understands the necessity for promulgating standards and industry requirements that are adequately supported by conclusive and scientifically defensible data. In that regard we share a common empathy with you regarding the task at hand.

The appeal before you asks that you overturn the consistent and repeated conclusions of CMP-17 to reject Proposal 17-179, Comment 17-86 and the June 2010 Association Amendment to replace the established #8 AWG copper perimeter bonding ring allowed in Article 680.26(B)(2)(b) with a 12” x 12” #8 AWG welded copper mesh. This same proposal also was made in a companion Comment 17-85 by Mr. Reuben Clark of Consolidated Manufacturing International (CMI), with whom the Appellant appeared and made presentations at the CMP-17 ROC meeting. CMI was the first and is one of only three known U.S. manufacturers of this specific copper wire grid product. Clearly this Amendment proposal is self-serving.

Please review the comments of the CMP-17 members from the final June 2010 Association Amendment vote to reject this proposed action. In the final June 2010 Association Amendment vote, the CMP voted 7-3 to reject the June 2010 Association Amendment. Both APSP representatives voted to reject (correctly, only the Principal’s vote was counted).

It is my understanding that my colleague Mr. Hirsch from Baltimore Gas and Electric, Principal on CMP-17
representing the Edison Electric Institute, has submitted comments on behalf of EEI regarding this Certified Amending Motion. His comments should be useful to the Council insofar as they provide a portion of the history of this matter, and he is to be commended for this effort.

In order to make an informed evaluation of this Appeal, the Council also needs a complete picture of the events and leading up to and the technical reasoning behind the CMP’s consistent and generally overwhelming rejection of this Amendment and its predecessor Proposal and Comments (all of which were rejected unanimously by the Panel). Further, the Council should be aware that the EEI position on this most recent Amendment was in the minority by a vote of slightly over two-to-one. Votes to reject the Certified Amending Motion were cast not only by representatives of APSP, but also by the representatives of the Institute of Electrical and Electronics Engineers (IEEE), Underwriters Laboratories (UL), the National Electrical Manufacturers Association (NEMA), the International Association of Electrical Inspectors (IAEI), the Independent Electrical Contractors, Inc. (IECI), and Intertek Testing Services. The discussions regarding the technical issues in this matter were in-depth, and were handled with the utmost seriousness by the Panel members.

Therefore, the Council should be made aware of the following additional facts regarding the CMP’s rejection of this Proposal, Comment, and Amendment:

- This matter deals solely with bonding of the perimeter area immediately surrounding and within 3 feet horizontally of the inside walls of a permanently installed in-ground pool or spa, and not with bonding of the pool or spa itself.

- The NEETRAC report cited by the Appellant in his original Proposal and Comment was found by the CMP to be seriously deficient in a number of technical areas, including failure to even define the methodology being utilized to obtain measurements, inconsistencies in what should otherwise have been consistent field data, and failure to identify any levels of voltage that could be even remotely construed to be of concern regarding safe levels of exposure in a pool environment. Both the Appellant and Mr. Clark of CMI appeared and presented before the CMP at the ROC meeting, and neither could answer even the most elementary technical questions posed by CMP members regarding methodology and findings of the NEETRAC study (which was commissioned by Mr. Clark and CMI). The finding of the CMP at both the ROP and ROC meetings was that the NEETRAC report was deficient and provided no substantive basis for accepting either the Proposal or the Comments of the Appellant and Mr. Clark, and the CMP voted unanimously to reject the Proposal and Comments.

- At the ROC meeting, the CMP was provided with a preliminary summary report of EPRI findings regarding a testing program aimed at remediation methodologies for utilities confronted with customer complaints regarding stray voltage in pool areas. It was agreed that this report was useful but did not provide any basis for determining if the existing requirements for perimeter bonding were deficient. At that point, a Task Group was appointed to develop a proposal for a study to determine what constituted a dangerous level of voltage and what perimeter bonding strategies were appropriate based on that finding; this proposal was reduced to writing and submitted to CMP Chair Mr. Jhonson for submittal to NFPA. I was a member of that Task Group, along with Mr. Hirsch and the EEI Alternate Mr. Stephen Richbourg. I wrote a significant portion of the technical portion of the proposed Scope of Work. It was unanimously agreed by the CMP, including the EEI and both APSP representatives, that the issue here was not “comfort issues” or “tingle voltages,” but actual hazards of injury or death.
On June 17, 2010, approximately two weeks prior to the CMP vote on the June 2010 Association Amendment, CMP-17 Chairman Mr. Jhonson sent an email to all members referencing a “new” EPRI study that he requested we consider prior to voting. The results of this study were restricted to its sponsors, and were available to others for $25,000 (I checked). Mr. Hirsch graciously obtained a copy of an incomplete partial summary report (which had corrections made even during the time we had to review it) and an EPRI paper encompassing what it states to be a “review of the literature on human and animal response to ac current along with a review of the standards and documents that presently have published values for voltage, current, or resistance” and circulated them to the CMP for consideration prior to voting. I copiously studied these documents in detail, and the email traffic I received from the Panel members indicated that they did the same.

Even after seriously considering and in some cases discussing by telephone the newly-supplied EPRI data, the CMP voted 7-3 to reject the Amendment, with citations being made that the EPRI work was not complete and did not show that the existing perimeter bonding methodology (#8 AWG copper wire perimeter bonding ring) was unsafe. The consensus of the Panel was to recommend the formation of a Task Group and to evaluate any additional data, including a full edition of the EPRI study (as opposed to a partial summary), for the 2014 Code cycle.

The new information regarding EPRI work that was provided to the Panel does not at this time support changing the CMP’s finding to reject the Proposal, Comment and Amendment.

The EPRI test work (I will be happy to supply copies of the documents if the Council desires) is clearly purposed to provide guidance to utilities regarding remediation measures in cases where there are customer complaints to the utility regarding stray voltage at existing pools and spas. The tests they have performed and the results they show are clearly and obviously to that end. The EPRI work does not attempt to determine if either the existing or proposed perimeter bonding technologies are unsafe.

Additional EPRI presentations regarding this testing program that are available on the EPRI website encompass other conductive surfaces as well, such as water hydrants, bathtubs, showers, etc., in dealing with potential complaint remediation strategies.

The EPRI materials received by the CMP in this matter do not purport to identify unsafe perimeter bonding configurations, so any conclusions that they do purport that or that they provide such data are in conflict with the documents themselves.

There is no basis for concluding that any perimeter bonding scheme EPRI presents in these documents is unsafe, except, of course the case where there is no bonding at all, and there is no disagreement of which I am aware among CMP-17 members that the existence of no perimeter bonding for a permanently installed in-ground pool produces an unsafe situation.

The Dorr IEEE paper produced by EPRI and provided to the CMP makes clear that there are a number of conflicting data, opinions and criteria as to what voltage constitutes a “level of concern” regarding dangerous levels, and the EPRI materials received do not even pretend to develop or identify such a level.

The EPRI documents received do not purport to identify unsafe perimeter bonding configurations,
so any conclusions that the EPRI documents do purport that or that they provide such data are in conflict with the documents themselves.

- Not a single EPRI scenario presented in the materials submitted to CMP-17 provided any data addressing the performance of either the existing allowed #8 AWG copper wire perimeter bonding ring or the amendment’s proposed copper grid product. Neither technology was evaluated by EPRI in the documents provided to the CMP.

- The metallic grid referred to in the EPRI testing is the structural reinforcing steel embedded within a concrete deck, and is covered as the primary means of perimeter bonding under Article 680.26(B)(2)(a), not 680.26(B)(2)(b) which is at issue here. Thus the EPRI grid tested is not the Appellant’s copper wire grid which is being proposed to be buried beneath or incorporated within a deck as an alternate means under 680.26(B)(2)(b). There is no comparison in the EPRI test results presented to the CMP that addressed either the proposed or existing perimeter bonding configurations, and thus any conclusions derived from the EPRI results (1) that the grid tested by EPRI (structural steel) performs better than the existing #8 AWG copper wire ring or (2) that the existing #8 AWG copper wire ring creates an unsafe situation, are an apples-and-oranges comparison.

- The EPRI documents do not correctly characterize the current Code requirements (e.g., incorrectly stating a “requirement” to place the perimeter bonding ring wire “somewhere between 18 and 30 inches from the water’s edge”) and misuse commonly accepted definitions for pool components (e.g., the report consistently misuses the term “forming shell” throughout to mean the pool structure).

- The EPRI work summarized and provided to the CMP deals with a pool with a nonconducting shell, and states that “this particular pool type will always generate greater voltage potentials between the water and the deck as compared to a poured masonite [sic] shell so there is no need to test both types.” This study scope/protocol is probably appropriate insofar as the remedial measures dealt with in the EPRI study are concerned, but by EPRI’s own admission it will overstate any results for a conductive masonry (concrete) pool (by how much it will overstate it is conspicuously not addressed). This may not seem important until one realizes that the great majority of the more than 4.6 million existing inground pools in the U.S. (comparatively almost none of which employ the proposed copper grid product, and only a minuscule percentage of which have been the subject of any “stray voltage complaints) are conductive concrete pools.

- In this light, a conductive concrete pool is built with a bonded structural steel rebar “bond beam” extending about a foot or sometimes more into the perimeter surface, thus leaving only about 2’ of perimeter surface covered under 680.26(B)(2). Therefore there is nothing in the EPRI documents to allow evaluation of either the existing or proposed (copper wire mesh product) alternate means of perimeter surface bonding with respect to the majority of in-ground pools in this country, except the statement that the study’s results are overstated for the most common type of pool construction. It should be of great importance as to whether a differentiation among pool construction types needs to be addressed by the Panel regarding this issue, but unfortunately if this Amending Motion is accepted there will be no opportunity at all to address it.

- All of the data shown in the EPRI study summary document, with the exception of some scenarios in only one of several figures (Figure 12) of the document, resulted in voltages of 15V or less to the water, well within established limits that have existed in the Code for many years. With regard to the
nonconforming scenarios, the worst (and unambiguously dangerous) one in Figure 12 was, not surprisingly, a perimeter surface with no bonding at all. The only other excepted scenarios were a maximum 40 volts and a maximum 25 volts (approx., based on trying to read the rather small printed graph presented in the document), less than some of the several “levels of concern” cited in the EPRI (Dorr IEEE) paper provided to the Panel. So the EPRI work does not provide even a preponderance of scientifically supportable evidence that the current perimeter bonding methodology being challenged is unsafe or has resulted or will result in any injuries or deaths, even if the various and nonuniform “levels of concern” are considered.

- There are no authenticated incidents of injury or death documented at CPSC or in any other known databases that are associated with the proper installation and use of the current perimeter bonding methodologies and technologies.

- The existing #8 AWG copper wire perimeter bonding ring technology has been in use for many years throughout the United States without any documented injuries or deaths.

- The few documented “tingle voltage” consumer complaint incidents associated with perimeter surfaces have occurred in specific local areas, primarily within a few southeastern states, and do not even begin to encompass a nation-wide area.

- The use of the proposed copper wire mesh is not prohibited by the current NEC. It is not the Panel’s recommendation to prohibit such use.

- Under Article 90.4 there is no prohibition against an Authority Having Jurisdiction (AHJ), such as the Appellant states he represents, that experiences localized “tingle voltage” consumer complaints (either real or perceived) to require a bonding scheme other than the #8 AWG copper wire perimeter bonding ring should they choose, just as they do and have done throughout the years regarding other local issues.

In summary, the deficiencies in the information provided to the Panel do not provide a viable, defensible scientific basis for scrapping the current #8 AWG copper wire perimeter bonding ring requirement in favor of the CMI and other similar copper wire mesh products.

As stated in the APSP submission, APSP has opposed and continues to oppose the Certified Amending Motion as being without foundation and unsupportable. As stated by Mr. West in his comments regarding his vote to reject the Amendment, “The purpose of Comment 17-86 is to require a grid arrangement of 8 AWG solid copper conductors, rather than a ring (loop) arrangement of 8 AWG solid copper conductor, as the alternate means to achieve equipotential bonding in the absence of unencapsulated steel rebar as that means. The available test data provided and field experience introduced, available to Code Making Panel 17 (CMPl7) during deliberations of Proposal 17-179 and Comment 17-86, were not sufficient to establish definitively that a ring (loop) of a single 8 AWG solid copper conductor is inadequate to mitigate dangerous voltage gradients around swimming pools.” This comment is representative of the comments of the 70% of the Panel who voted to reject the Amendment, and it is also consistent with the Panel’s votes to reject the original Proposal and Comments. The new information to the CMP during our consideration of the Amendment provides no scientifically viable basis for changing this position.

The new (and incomplete) information made available to the Panel during our consideration of the Amendment has not provided any scientifically defensible data that could lead to a better understanding of
the consequences of not improving the current method of perimeter bonding. It certainly has not provided any viable scientifically-based foundation for concluding that the current #8 AWG copper wire perimeter bonding ring presents a practical safety risk to persons and property.

The prudent approach is to reject the Amendment and allow the Panel to address this issue in a proper and scientific manner via a Task Group as proposed by the majority of the panel who voted to reject. Any local non-dangerous “tingle voltage” nuisance complaints associated with pool or spa deck and other perimeter surfaces can continue to be properly dealt with at the local level by the AHJs.

Thank you for your consideration.

E. P. Hamilton III, Ph. D., P.E.  
Alternate APSP - CMP-17
Submission to Appeals Council on Comment 17-86 (CAM 70-22)

For Council Appeals Hearing August 3 & 4, 2010

Submitter:

Lawrence S. Caniglia, JD, CAE
Northeast Spa & Pool Association (NESPA)
6B South Gold Drive, Hamilton, NJ 08691
609-689-9111

NESPA is the northeast’s premiere trade association for pool and spa professionals. The organization has been continuously protecting, promoting its members, educating them and raising their levels of competency in all phases of their business activity. NESPA also serves as a source of product, technical and safety information for the consumer. NESPA’s Deputy Executive Director, Paulette Pitrak has been a member of the NFPA since 2000 and active in all code activities in our four-state region.

Appeal Description:

Appeal of Comment 17-86 (CAM 70-22)

NEC 680.26(B)(2) Requirement of Copper Grid in Perimeter Pool and Spa Surfaces.

Position of Submitter:

Oppose the appeal.

Argument Against the Appeal:

Proposal 17-179: removes the single wire allowance for meeting the bonding requirement around pool decks.

NESPA is opposing the Proposal 17-179, which this Panel previously rejected. NESPA is asking this Panel today to reaffirm this decision.

- The NEC must always be wary of any proposal from a manufacturer that would result in greater sales of their product. Proposal 17-179 eliminates the #8 single wire method for perimeter bonding and instead requires a full copper wire grid. It just so
happens that when the appellant originally submitted this proposal, he was the only manufacturer of the product they are trying to mandate use of...we understand today there are now two.

- The adequacy of the single wire was established and recognized in the 2008 Code. There is not a single report of injury from stray current since then where a single wire has been used. It appears the appellant is trying to find a problem where none exists, in order to sell more of his product.

- The isolated “problems” in Georgia and Mississippi, do not support a change from the 2008 NEC. First, there are no reports of injury in these states, just a tingling that is less than one would experience walking across a carpet and opening a door. Minimum requirements in the NEC must be based on safety and avoidance of injuries.

- This tingling experience has been VERY isolated, in only two states with two local utility companies, who are dealing with this locally. As it was stated that Georgia Power and Singing River Utility in Mississippi have implemented more stringent rules over the 2008 NEC. That is the correct way to address a localized issue. This does not warrant a change in the minimum standard for a NATIONAL CODE, especially when there have been NO injuries reported and no incidents in any of the other 48 states, including FL, TX, or CA where the vast majority of pools exist, even though, particularly in the State of CA, the single wire has been allowed for YEARS. Further, neither the CPSC, nor anyone we are aware of, has supporting data to confirm the need for the grid at all.

- The appellant references a NEETRAC study that was done on behalf of the grid manufacturer and must be viewed in that light. While it claims that the single wire is unsafe, this is misleading and not scientifically supportable. Here again, the study discusses very low currents, none of which are shown to create potential for injury. You can get a bigger shock from walking across the carpet and touching a doorknob on a dry day then what the NEETRAC report claimed to have measured, without any substantiation.

- The #8 single copper wire is sufficient to reduce the potential for voltage gradients in a pool area – and has the support of building departments and electrical engineers as an alternative to the grid.

- In closing, please reaffirm your previous decision to reject this proposal, as it does not increase safety, but would only increase the cost to consumers where unnecessary – the single wire provides the necessary safety requirements and no evidence exists otherwise.
Statement of Recommended Council Action

This submitter opposes acceptance of the Appeal of Comment 17-86 and recommends that the Council reject it.

Lawrence S. Caniglia, Executive Director
Northeast Spa & Pool Association
June 28, 2010
RE: NEC 2011 Article 690.11: Arc-Fault Circuit Protection (DC)

Dear Sir or Madam,

We are writing to you in regards to the proposed article 690.11 “Arc Fault Circuit Protection (DC)” in the upcoming NEC 2011. We have to apologize for our late comment, but we only learned about this new requirement recently.

Article 690.11 requires a listed arc fault protection device for the DC branch of a PV installation. As with the day of writing we are not aware of such a product being on the marked, nor is there a Standard for the evaluation and listing of such products.

For such a case NEC provides Article 90.4 final paragraph, allowing the authority having jurisdiction to waive new Code requirement until new products meeting the new requirements are available. This requires the awareness of the authority having jurisdiction to this special situation and results in legal uncertainty when first products are available but not in sufficient number as can be expected in PV industries.

To avoid such uncertainty, KACO new energy respectfully requests to remove article 690.11 or to modify it to allow for a future effective-date that awaits the availability of a relevant standard and accounts for a reasonable time frame thereafter for the industry to develop a robust and commercially viable solution.

However besides the general comments to these requirements we would like to submit some technical aspects.

The typical voltage drop on an arc is approximately 15V to 20V, the proposed effective voltage of 80V implies the danger of installations being particularly designed to go below this limit. This would undermine the concept of the article and still bear the danger of an arc fault and resulting fire hazard.

KACO new energy furthermore questions that the requirement of a manual restart meets high enough safety standards. Manual restarts are not the best way to avoid accidental misuse like repeated restarts without a proper investigation of the PV system on the roof. We suggest using an automatic and delayed restart of the system. If the incident repeatedly occurs, the system needs to
be blocked until a trained technician has examined the installation and has done all necessary repair work in order to safely reactivate the PV-system. This would guarantee a high availability of the PV system and raise the acceptance of such a technology.

To conclude, KACO new energy strongly supports all efforts to improve safety of PV installations. Especially fire hazard is becoming an important subject and needs further investigation. However, introducing requirements with no clear specification and no possibility to reliably meet these requirements may cause an uncertainty in the marked that may be counterproductive and may not improve but impair safety.

We thank you for your support in these matters.

Yours sincerely,

Matthias Haag
CTO

Thomas Schaupp
R&D
Report on Proposals – June 2010

4-204 Log #2493 NEC-P04
(690.11) Final Action: Accept in Principle

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the following new section to Article 690.

690.11. DC Arc-fault Circuit Protection. PV systems with dc source and/or output circuits on or penetrating a building operating at a system voltage of 80 volts or greater shall be protected with a listed direct-current, arc-fault circuit interrupter (DCAFCI). PV Type, or other system components listed to provide equivalent protection. The PV Arc-Fault Protection System shall comply with 690.11(A) through 690.11(D).

(A) The system shall detect series arcing faults in the direct current PV source and output circuits.

(B) The system shall interrupt the arc-fault currents.

(C) The system shall disable or disconnect inverters or charge controllers connected to the faulted circuit when a fault is detected. The system shall require that the disabled or disconnected equipment be manually reconnected and restarted.

(D) The system shall have an annunciator that must be manually disabled.

Exception: Complete, listed PV systems with no accessible dc circuits or components.

Substantiation: PV systems are subjected to extreme environmental conditions including wind, rain, snow, ice, UV radiation, and temperature extremes. The systems are installed in dwellings and commercial locations and are not routinely inspected or maintained by qualified people. These systems, as they deteriorate over time, will eventually develop insulation failures or internal PV module conductor faults. Even new modules with manufacturing defects have faulted and caught fire. These failures will result in fault currents and/or series arcing faults. These fault currents and any arcs are direct current (dc) and are far more difficult to deal with since the arcs are not self extinguishing 120 times per second as are alternating current (ac) arcs. These faults may occur anywhere in the dc system. A voltage of 50V was selected since it applies to nearly all PV systems on buildings that could pose hazards. This would exempt 12V and most 24V PV systems and other similar systems at these operating voltages powered by PV modules.

The proposal is written to require that the series arcs be detected and the connected equipment turned off. Audible and visual alarms must manually be turned off to ensure that attention is paid to the faults. It would be premature, at the time this requirement will be enacted, to direct the location of the interruption device or the means of achieving that interruption. It is anticipated that a low cost integrated circuit will be developed that will go into utility-interactive inverters and charge controllers that will sense the series arc fault and turn off the inverter which will interrupt the series arc fault current.

The Exception is included to allow for newly developed and evolving complete systems that use highly integrated circuits imbedded in PV modules or packaged systems. These systems will be listed for safety, hence no requirements are needed in the NEC.

Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action on Proposal 4-205.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1
Explanation of Negative:
YOUNG, J.: See comment on 4-205.
Explanation of Abstention:
OWER, W.: Although I agree that arc faults must be addressed, I am very concerned that this is mandatory language for devices that do not exist and for which there are no set points to address a wide variety of PV system sizes ranging from less than 100 watts to hundreds of kilowatts. Arc fault studies must be completed and device performance verified. I believe the public comment period will provide updates on device availability.
Comment on Affirmative:
IZZANTE, V.: This proposal was accepted in principal and referenced to proposal 4-205 which states that while products are not available presently, the standards for a commercial product would be developed by the ROP in December 2009 and ultimately a commercial product would be available by the time of publication of the 2011 NEC. If this is not the case, then serious consideration should be taken at the ROP to reject this proposal as written because there will be no commercial product readily available at the time of publication.
Submitter: Timothy P. Zgonena, Underwriters Laboratories Inc.
Recommendation: Add new text to read as follows:

690.11 Arc-Fault Circuit Protection (DC). PV systems with dc source and/or output circuits on or penetrating a building operating at a PV system maximum system voltage of 80 volts or greater shall be protected by a listed (DC) arc-fault circuit interrupter, PV type, or other system components listed to provide equivalent protection. The PV arc-fault protection means shall comply with the following requirements:

1. The system shall detect and interrupt arcing faults resulting from a failure in the intended continuity of a conductor, connection, module, or other system component in the direct current PV source and output circuits.

2. The system shall disable or disconnect one of the following:
   a. Inverters or charge controllers connected to the fault circuit when the fault is detected
   b. The system components within the arcing circuit

3. The system shall require that the disabled or disconnected equipment be manually restarted.

4. The system shall have an annunciator that must be manually disabled.

Substantiation: PV systems may be subjected to extreme environmental conditions including wind, rain, snow, ice, dirt, and temperature extremes. The systems are installed on or near dwellings and commercial locations where they may not be routinely inspected or maintained by qualified people. These systems, can deteriorate over time, and eventually develop insulation failures or internal PV module conductor faults. Under rare occasions, new modules with manufacturing defects have faulted and caught fire. These failures will result in fault currents and/or arcing faults. These fault currents, including arcing faults, are direct current (dc) and are far more difficult to interrupt than ac faults because of the non-time varying (non-zero crossing) nature of dc. Series arcing faults resulting from a failure in the intended continuity of a conductor, connection, module, or other system component are most prevalent and may occur anywhere in the dc system. Fault currents to ground will be detected by the ground-fault protection required by Sec. 690.5(A).

Drawing on the success of arc-fault circuit interrupter protection for dwelling unit branch circuits as described in Sec. 210.12, UL has formed a PV AFCI Ad Hoc Working Group. This group, which consists of AFCI manufacturers and PV experts and system manufacturers, is assisting UL with the research and standards development activities related to requirements for arc-fault circuit interrupter protection for PV system applications. The goal of this effort is to have requirements for a PV AFCI developed by 2009 to enable the Listing of PV AFCIs in 2010 prior to the Publication of the 2011 NEC.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1
Explanation of Negative:
YOUNG, J.: There are no dc rated AFCI devices available and there are no requirements developed for such devices. While there may be a need for such a device it is too early to put a requirement in the Code.

Explanation of Abstention:
BOWER, W.: Although I agree that arc faults must be addressed, I am very concerned that this is mandatory language for devices that do not exist and for which there are no set points to address a wide variety of PV system sizes ranging from less than 100 watts to hundreds of kilowatts. Arc fault studies must be completed and device performance verified. I believe the public comment period will provide updates on device availability.
Comment on Affirmative:
STAFFORD, T.: This panel member recognizes the need for DC arc fault detection and encourages the implementation of such devices when available. It is understood by the panel that testing agencies are to have devices in place, for use; by the time the panel meets for the ROC. At that time, technical substantiation and availability will be reviewed as to performance and installation requirements and listing.

ZGONENA, T.: I would like to thank the panel for its support of this proposal. UL has scheduled a three-day PV AFCI Ad Hoc meeting starting on April 7, 2009 to quickly develop safety requirements for PV AFCI products. These published requirements will allow for the Listing of PV AFCI products as well as PV products that include PV AFCI protection. It is expected that these PV AFCI safety requirements will be published and Listed products will be commercially available by the time that the 2011 NEC is published. In the event that this process encounters delays, the proposal should be modified to allow for a future effective date so this crucial safety technology can be implemented.
as soon as the industry is ready.
TCC Action: The Technical Correlating Committee directs that this comment be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative on this comment.

The Technical Correlating Committee notes that Proposal 4-204 remains "Accepted in Principle" and that Proposal 4-205 remains "Accepted" as modified by the action taken on Comment 4-83.

Submitter: Ed Larsen, Square D Company/Schneider Electric
Comment on Proposal No: 4-204
Recommendation: Reject this proposal.
Substantiation: While there seems little doubt that dc arc fault protection should be required in PV systems, this proposal is premature. Using the ac AFCI requirement as a model, were this proposal to have progressed in a similar manner, UL would have begun an investigation into technologies that could mitigate dc arc faults in PV systems in at least 2005, UL would have begun working with prospective manufacturers on a standard in at least 2007 and the proposed effectiveness date of the requirement would be at least 2014. But in this case no product standard exists today, the only meeting UL has held on the subject was on April 7, 2009 and there isn't even agreement on the type of arc fault protection that should be provided and where in the system it should be located. All interested parties are certainly encouraged to move ahead with the work that needs to be done, however, this proposal might better be considered for the 2014 NEC.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 7 Negative: 5
Explanation of Negative:

BOWER, W.: I agree with the comment that the original proposal is premature. Material was presented at the panel meeting that a device to detect arc faults is currently being tested and may be ready in time for the 2011 NEC, but the applicability and range of power levels of a single device in all types of PV systems is not likely! Several panel members expressed confidence that when no commercially available product is available then the mandatory language of the code is not enforced. This is a gamble that could potentially harm the PV industry. Enforcement will be at the discretion of the AHJ and could result in costly delays, multiple appeals and interpretation misunderstandings with each installation.

I agree that all interested parties should move ahead with development of reliable and consistent dc arc fault detection methodologies and devices, but that language proposed for the 2011 NEC would best be delayed until the 2014 edition.

I also believe there should have been a panel statement on this comment to reference the "ACCEPT" on Comment 4-83.

ROGERS, J.: There is no rationale to accept this comment especially in light of the fact that comment 4-80 on the same proposal was rejected. There is definitive forensic evidence of PV ground faults causing fires, although this technology is new the ability to prevent even one fire that cause personal injury or property damage makes its acceptance well worthwhile. The basic premise of the NEC is the protection of persons and property from hazards that may arise from the use of electricity, this technology clearly meets that premise.

STAFFORD, T.: Evidence provides a definitive link to PV ground faults causing fires. This example is enough for this panel member to believe that a technology, while new, is a method that could help mitigate the direct cause of PV ground faults causing fires.

WILLS, R.: I believe that the panel was confused by the double negative involved in this comment which was to Reject Proposal 4-204.

The panel action should have been Reject with the same panel statement as used on Comment 4-80.
I support the requirement for dc arc fault detectors for PV in the 2011 NEC.

While concerned with the lack of available equipment, I believe that the rapid growth of the PV industry and the potential for fire hazard justifies acceptance of this proposal. It will give manufacturers solid reason to continue developing these detectors prior to the release of the 2011 NEC.

ZGONENA, T.: The panel action to accept 4-76 is inconsistent with the action taken on 4-77, and 4-83. The panel action should have been to reject this comment. The ROP panel action on 4-204 was to accept in principal based upon its similarity to 4-205, which was accepted by the panel. The panel actions and statements on 4-80 and 4-81 further collaborate the intent and action to be taken on 690.11.
Submitter: Ed Larsen, Square D Company/Schneider Electric

Comment on Proposal No: 4-205

Recommendation: Reject this proposal.

Substantiation: While there seems little doubt that dc arc fault protection should be required in PV systems, this proposal is premature. Using the ac AFCI requirement as a model, were this proposal to have progressed in a similar manner, UL would have begun an investigation into technologies that could mitigate dc arc faults in PV systems in at least 2005, UL would have begun working with prospective manufacturers on a standard in at least 2007 and the proposed effective date of the requirement would be at least 2014. But in this case no product standard exists today, the only meeting UL has held on the subject was on April 7, 2009 and there isn't even agreement on the type of arc fault protection that should be provided and where in the system it should be located. All interested parties are certainly encouraged to move ahead with the work that needs to be done, however, this proposal might better be considered for the 2014 NEC.

Panel Meeting Action: Reject

Panel Statement: Code-Making Panel 4 affirms that PV AFCI protection is necessary as soon as possible. The safety benefits outweigh the potential challenges associated with an earlier implementation of the 690.11 requirements.

This action will allow us to achieve the earliest possible fire safety improvement, with the best protection available at the time, and to allow for future improvements as technology permits.

The submitter is directed to 90.4 relative to his concerns regarding unavailability of appropriate products.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

BOWER, W.: See My Explanation of Negative on 4-76.

YOUNG, J.: As noted in the substantiation there is not a standard and there are no products available.
Standards Council Supplemental Agenda
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4-78  Log #1731 NEC-P04  Final Action: Reject
(690.11 (New) )

Submitter: John C. Wiles, Southwest Technology Development Institute, New Mexico State University / Rep. PV Industry Forum

Comment on Proposal No:  4-205

Recommendation:  Add the term "(series arc faults)" shown with double underlining in the proposal.

690.11 Arc-Fault Circuit Protection (DC).  PV systems with dc source and/or output circuits on or penetrating a building operating at a PV system maximum system voltage of 80 volts or greater shall be protected by a listed (DC) arc-fault circuit interrupter, PV type, or other system components listed to provide equivalent protection.  The PV arc-fault protection means shall comply with the following requirements:

1. The system output circuits on or penetrating a building operating at a PV system maximum system voltage of 80 volts or greater shall be protected by a listed (DC) arc-fault circuit interrupter, PV type, or other system components listed to provide equivalent protection.  The PV arc-fault protection means shall comply with the following requirements:

   1. The system shall detect and interrupt arc-faults (series arc faults) resulting from a failure in the intended continuity of a conductor, connection, module, or other system component in the direct current PV source and output circuits.

2. The system shall disable or disconnect one of the following:
   a. Inverters or charge controllers connected to the fault circuit when the fault is detected
   b. The system components within the arcing circuit

3. The system shall require that the disabled or disconnected equipment be manually restarted.

4. The system shall have an annunciator that must be manually disabled.

Substantiation:  The words "intended continuity of a conductor, connection, module, or other system component" do not fully convey the intent that this requirement applies only to series types of arc faults.  There are parallel circuit connections in inverters, modules where the continuity of the connection, if broken, would not result in an arc, and parallel arcs of the line-to-line type are not and should not be addressed by this proposal.

Panel Meeting Action:  Reject

Panel Statement:  The submitter has not provided any substantiation for some of the requested changes and introduce new material that has not had public review.

Number Eligible to Vote:  12
Ballot Results:  Affirmative: 11  Negative: 1

Explanation of Negative:

YOUNG, J.:  In the Panel Statement to Comment 4-80 it is noted "Therefore, the panel recognizes "parallel arc detection" as a desirable feature, but not a requirement."  The proposed and accepted wording from Proposal 4-205 makes no mention of series arcing or parallel arcing.  It only reads that the device shall detect and interrupt arcing faults.  This would include all types of arcing.  The CMP may recognize that parallel arc detection is not a requirement but the reader of the Code will not recognize that.  It would be clear if the change were accepted clarifying that only series arcing faults were required to be detected.
4-79 Log #1946 NEC-P04
(600.11 (New))

Final Action: Reject


Comment on Proposal No: 4-205

Recommendation: Revise text to read as follows:

600.11 Arc-Fault Circuit Protection (DC). PV systems with dc source and/or output circuits on or penetrating a building operating at a PV system maximum system voltage of 80 volts or greater shall be protected by a listed (DC) arcfault circuit interrupter, PV type, or other system components listed to provide equivalent protection. The PV arc-fault protection means shall comply with the following requirements:

1. The system shall detect and interrupt arcing faults resulting from a failure in the intended continuity of a conductor, connection, module, or other system component in the direct current PV source and output circuits.

2. The system shall disable or disconnect one of the following:
   a. Inverters or charge controllers connected to the fault circuit when the fault is detected
   b. The system components within the arcing circuit

3. The system shall require that the disabled or disconnected equipment be manually restarted.

4. The system shall have an annunciator that must be manually disabled.

This requirement shall become effective January 1, 2014.

Substantiation: I was in the electrical field when ground fault circuits were introduced into the NEC. Manufacturers were not prepared, circuit breakers were not available, and there were problems with some that were available. Giving the manufacturers this additional time will allow time for engineering, testing to avoid problems, and also allow time to set up production.

Panel Meeting Action: Reject

Panel Statement: The panel does not agree with delaying the effective date beyond the issuance of the code.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanations of Negative:

YOUNG, J.: The proposed effective date of January 1, 2014 would provide time for the standard to be developed and product to be developed. If products become available before that date they can be used but the later date does not introduce the enforcement problem if products are not available. Comments in other panel actions indicate the use is based strictly on availability of the product and not Code inclusion. If that is the case it would be expected these would be used if available even if not included in the Code.
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4-80 Log #2142 NEC-P04
(690.11 (New))

Submitter: Jim Eichner, Xantrex Technology, Inc.

Comment on Proposal No: 4-204

Recommendation: Reject this proposal.

Substantiation: We feel the proposal is incomplete and premature for the following reasons:

1. Basic research into PV arc signatures is lacking or at least incomplete, and will be very difficult. For AC arc-fault detectors there are still problems in this area, and problems were caused due to the code requirement being in force before the technology was ready. PV arc signature research will be even harder in PV systems because, unlike AC appliances, inverters and charge controllers are not subject to conducted emissions requirements on the DC input circuit that the arc-fault detector would be monitoring and because DC arcs do not have the 120Hz signature that AC arcs have.

2. The development of a consensus standard for PV arc fault detectors is not very far along, and will take considerable time since that standard will have to answer all the questions in the remaining points below.

3. The proposal deals only with series arc faults, yet parallel arc faults, both line-to-line and line-to-ground (in grounded PV systems) are at least as significant in terms of the severity and likelihood of the hazard. Line-to-ground faults are a type of parallel fault and carry just as much possibility of arcing, and the number of locations for possible ground faults is very large - everywhere the ungrounded conductors are near or in contact with grounded metal such as conduit. Line-to-line parallel faults are also possible in a large number of locations: the terminal box on the back of each panel, any wire run where + and - are bundled and exposed to mechanical damage or rodents, etc.

4. The proposal seems intent on protection being on the output end of the PV system, where a single device can be used, rather than at the source, as is typically required for protective systems. Putting the protection at the source may be unpopular with panel manufacturers, but it's the right (only) way to provide protection against both series and parallel arc faults. A compromise might be to put protection against both series and parallel faults in the string combiners, which leaves a smaller portion of the system unprotected.

5. What action the protector should take isn't clear. Shorting the array may be the best approach to ensure the arc is extinguished. For a parallel arc fault, opening the circuit would unload the array and drive the voltage up, worsening the arc. It is even possible that opening the circuit could extinguish the series arc but cause a parallel arc to start.

We would like to see this proposal rejected for this code cycle, allowing time for further study of arc signatures and time for industry to come to some consensus on how and where to address parallel faults not just series faults.

Panel Meeting Action: Reject

Panel Statement: There has been an alarming increase in the number of PV arc fault fires occurring worldwide. While PV AFCI technology is relatively new, Code Making Panel 4 concludes it is critical and necessary to address this significant void in PV system protection. Research and development of PV arc fault products and certification requirements is progressing quickly.

These efforts have resulted in a draft standard, and multiple functional prototypes from multiple manufacturers. The experience gathered from the growth and development of the AC AFCI will allow the PV AFCI to avoid similar pitfalls.

The 690.11 requirements provide protection for the most likely type of PV arc faults and allows for its implementation anywhere within a PV system. The requirements in 690.11 are written based upon the protection function and not the implementation method.

While not required by the requirements in 690.11, the PV AFCI certification requirements will include additional requirements for parallel arc fault protection for manufacturers that choose to provide such protection.

Research into arcing faults has been the subject of work by UL, NREL, Sandia, Southwest Research and industry authorities. There is sufficient knowledge to advance PV DC AFCI topics in the code. The remaining technical details listed in the public comments relate to detection methods and are not withstandin the recognized need for the safety improvements.

While series and parallel PV AFCI protection would be preferable, the series protection required by 690.11 provides a substantial increase in the level of protection over a system without PV AFCI protection.

Additionally, parallel PV AFCI protection cannot be added to 690.11 for the 2011 NEC, based upon the already received comments and proposals currently under review. Therefore, the panel recognizes "parallel arc detection" as a desirable feature, but not a requirement.

With regard to the comment on ground faults being parallel faults, most modern listed PV inverters include GFDI protection and will mitigate parallel arcing ground faults.

The future effective date method allows time for new technical developments. New system solutions will be forth
coming to meet the intent of 690.11. This should not be a barrier to achieving the safety improvement that can be accomplished at this time.

The panel affirms that PV AFCI protection is necessary as soon as possible and that the safety benefits outweigh the potential challenges associated with an earlier implementation of the 690.11 requirements. This action will allow us to achieve the earliest possible fire safety improvement with the best protection available at the time and to allow for future improvements as technology permits.

The submitters are directed to 90.4 relative to his concerns regarding unavailability of appropriate products.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

BOWER, W.: I agree with the comment that the proposal is incomplete and premature with possible areas of serious contention. Material was presented at the panel meeting that a device to detect arc faults is being tested and may be ready in time for the 2011 NEC, but the applicability of a single device in all types of PV systems is not likely! I agree with the author of the comment that the proposal appears to be intent on only series arc faults AND protection only at the output end of the PV system. There will likely be better and a multiplicity of ways to detect arc faults nearer to the fault location. Several panel members expressed confidence "out of past experience" that when no commercially available product is available then the mandatory language of the code is not enforced. But what about the scenario where the available device is not applicable to the system? This is huge gamble and could be harmful to the PV industry. Enforcement will be at the discretion of the AHJ and could result in multiple expensive delays, appeals and interpretation misunderstandings with each PV installation.

I agree that all interested parties should move ahead with development of reliable and consistent dc arc fault detection methodologies and devices, but also believe that language in the 2011 NEC would best be delayed until the 2014 edition in order to assure the PV industry that a single method for arc-fault detection not be imposed for all systems.

YOUNG, J.: See comments on 4-79.
4-81 Log #2143 NEC-P04
(690.11 (New))

Final Action: Reject

Submitter: Jim Eichner, Xantrex Technology, Inc.
Comment on Proposal No: 4-205
Recommendation: Reject this proposal.
Substantiation: We feel the proposal is incomplete and premature for the following reasons:
1. Basic research into PV arcing signatures is lacking or at least incomplete, and will be very difficult. For AC arc-fault detectors there are still problems in this area, and problems were caused due to the code requirement being in force before the technology was ready. PV arc signature research will be even harder in PV systems because, unlike AC appliances, inverters and charge controllers are not subject to conducted emissions requirements on the DC input circuit that the arc-fault detector would be monitoring and because DC arcs do not have the 120Hz signature that AC arcs have.
2. The development of a consensus standard for PV arc fault detectors is not very far along, and will take considerable time since that standard will have to answer all the questions in the remaining points below.
3. The proposal deals only with series arc faults, yet parallel arc faults, both line-to-line and line-to-ground (in grounded PV systems) are at least as significant in terms of the severity and likelihood of the hazard. Line-to-ground faults are a type of parallel fault and carry just as much possibility of arcing, and the number of locations for possible ground faults is very large - everywhere the ungrounded conductors are near or in contact with grounded metal such as conduit. Line-to-line parallel faults are also possible in a large number of locations: the terminal box on the back of each panel, any wire run where + and - are bundled and exposed to mechanical damage or rodents, etc.
4. The proposal seems intent on protection being on the output end of the PV system, where a single device can be used, rather than at the source, as is typically required for protective systems. Putting the protection at the source may be unpopular with panel manufacturers, but it's the right (only) way to provide protection against both series and parallel arc faults. A compromise might be to put protection against both series and parallel faults in the string combiners, which leaves a smaller portion of the system unprotected.
5. What action the protector should take isn't clear. Shorting the array may be the best approach to ensure the arc is extinguished. For a parallel arc fault, opening the circuit would unload the array and drive the voltage up, worsening the arc. It is even possible that opening the circuit could extinguish the series arc but cause a parallel arc to start.

We would like to see this proposal rejected for this code cycle, allowing time for further study of arc signatures and time for industry to come to some consensus on how and where to address parallel faults not just series faults.

We would also like to comment that relative to Proposal 4-204, this Proposal 4-205 is preferable in two ways:
a) 4-205 replaces the undefined term “series arcing faults” with a description that does not require defining (“arching faults resulting from a failure in the intended continuity of…”)
and
b) added flexibility in the location of the interrupting means - in 4-204 it is required to disable or disconnect the inverter or charge controller, but in 2-205 an allowance is made to disconnect the faulted component instead, opening the door to arc fault protection located in combiner boxes or upstream.

Panel Meeting Action: Reject
Panel Statement: There has been an alarming increase in the number of PV arc fault fires occurring worldwide. While PV AFCI technology is relatively new, the panel concludes it is critical and necessary to address this significant void in PV system protection. Research and development of PV arc fault products and certification requirements is progressing quickly. These efforts have resulted in a draft standard, and multiple functional prototypes from multiple manufacturers. The experience gathered from the growth and development of the AC AFCI will allow the PV AFCI to avoid similar pitfalls.

The 690.11 requirements provides protection for the most likely type of PV arc faults and allows for its implementation anywhere within a PV system. The requirements in 690.11 are written based upon the protection function and not the implementation method. While not required by the requirements in 690.11, the PV AFCI certification requirements will include additional requirements for parallel arc fault protection for manufacturers that choose to provide such protection.

Research into arcing faults has been the subject of work by UL, NREL, Sandia, Southwest Research and Industry authorities. There is sufficient knowledge to advance PV DC AFCI topics in the code. The remaining technical details listed in the public comments relate to detection methods and are not withstanding to the recognized need for the safety improvements.

While series and parallel PV AFCI protection would be preferable, the series protection required by 690.11 provides a substantial increase in the level of protection over a system without PV AFCI protection.
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Additionally, parallel PV AFCI protection cannot be added to 690.11 for the 2011 NEC, based upon the already received comments and proposals currently under review. Therefore, the panel recognizes “parallel arc detection” as a desirable feature, but not a requirement.

With regard to the comment on ground faults being parallel faults, most modern listed PV inverters include GFDI protection and will mitigate parallel arcing ground faults.

The future effective date method allows time for new technical developments. New system solutions will be forth coming to meet the intent of 690.11. This should not be a barrier to achieving the safety improvement that can be accomplished at this time.

The panel affirms that PV AFCI protection is necessary as soon as possible, and that the safety benefits outweigh the potential challenges associated with an earlier implementation of the 690.11 requirements.

This action will allow us to achieve the earliest possible fire safety improvement with the best protection available at the time and to allow for future improvements as technology permits.

The submitter is directed to 90.4 relative to his concerns regarding unavailability of appropriate products.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
  BOWER, W.: See My Explanation of Negative on 4-80.
  YOUNG, J.: See comments on 4-80.
4-82 Log #2530 NEC-P04 Final Action: Reject
(690.11 (New) )

Submitter: Timothy P. Zgonena, Underwriters Laboratories Inc.
Comment on Proposal No: 4-205
Recommendation: Propose to accept the original proposal with a future effective date to be agreed upon at the ROC meeting.
Substantiation: Affirmative Comment on panel action for Proposal 4-205:
I would like to thank the panel for its support of this proposal. UL with the help of AFCI industry experts and PV industry experts has drafted 1699X, Photovoltaic (PV) DC Arc-Fault Circuit-Interrupters. During this time since the ROP meeting, there have been an increasing number of serious PV related fires. These fires could have been prevented if these systems included PV AFCI protection. With the permission of the CMP-4 chairman, I would appreciate a short period of time to provide a presentation on the PV AFCI status and test results. It is expected that these PV AFCI safety requirements will be published and Listed products will be commercially available by the time that the 2011 NEC is published. In the event that this process encounters delays, the proposal should be modified to allow for a future effective date so this crucial safety technology can be implemented as soon as the industry is ready.

Panel Meeting Action: Reject
Panel Statement: The panel concludes that a delay in the effective date is not required.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ROGERS, J.: The Panel was correct in rejecting this comment and remaining with the language and implementation date that are found in the original proposal. There is documented evidence that PV systems are already beginning to encounter arcing faults and start fires. The technology may be new and there may even unforeseen problems when first using the product but that is the case with many new products that enter the NEC. There is no question from the technical data that has been presented that this product will reduce the likelihood of fires and thus increases the likelihood that it will also reduce injuries or deaths to either firefighters or building occupants. There are multiple hazards involved in fighting PV array fires so preventing the fire in the first place would obviously remove these hazards.
4-83  Log #2672  NEC-P04  
(690.11 (New))  

Submitters: Frederic P. Hartwell, Hartwell Electrical Services, Inc.  
Comment on Proposal No:  4-205  
Recommendation:  Accept the proposal in principle.  

In the first sentence, change “dc source and/or output circuits” to “dc source circuits, dc output circuits, or both”. Revise list item (4) to read: “(4) The system shall have an annunciator that provides a visual indication that the circuit interrupter has operated. This indication shall not reset automatically.”  
Substantiation:  This comment corrects two violations of the NEC Style Manual (“and/or” and “must”) and provides a clearer description of how the annunciator should function.  
Panel Meeting Action:  Accept  
Number Eligible to Vote:  12  
Ballot Results:  Affirmative: 11  Negative: 1  
Explanation of Negative:  
BOWER, W.: I would like to go on record to say that I believe that the detection of dc arc faults is not as simple as with the ac arc faults that are now covered by the code. The fact that it will be difficult to determine whether a dc arc fault is in series with the circuit or is a parallel arc fault is of major concern. The required actions to mitigate series and parallel arc faults are very different. If the wrong action is taken, the arc fault current will likely be worsened. It is likely that several types of arc-fault detectors will be developed out of need because of 690.11, but it is unlikely all will be covered by the requirements being included in the 2011 code.  
I agree that all interested parties should move ahead with development of reliable and consistent dc arc fault detection methodologies and devices, but also believe that language in the 2011 NEC would best be delayed until the 2014 edition in order to assure the PV industry that a single method for arc-fault detection not be imposed for all systems.
June 25, 2010

Secretary Standards Council
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471
proposals_comments@nfpa.org

RE: NEC 2011 Article 690.11: Arc-Fault Circuit Protection (DC)
Member # 2770243 (registered under Bob Schmitt, SMA America)

Dear Sir or Madam,

We are writing to you in regards to the proposed article 690.11 “Arc Fault Circuit Protection (DC)” in the upcoming NEC 2011. The requirement that a PV system shall be protected by a DC Arc Fault Circuit Interrupter (AFCI) is the first of its kind worldwide. Currently, we are not aware of any commercially available DC-AFCI products on the market, any reasonably mature technology, nor have we seen any studies of the effective use of PV-AFCIs in the field.

The original intent by Underwriters Laboratory (UL) was to have PV-AFCI requirements ready and standardized in 2009 to enable the listing of PV-AFCIs in 2010, prior to the publication of the 2011 NEC. As of today, these requirements have not yet been established; therefore, the PV industry has no clear understanding of the requirements and does not have enough information about the necessary tests that have to be successfully passed in order to get a device listed.
Once the corresponding UL standard has been agreed on and published, it will take about two years for the industry to develop a reliable, commercially viable solution, to prepare it for serial production and to conduct sufficient tests on actual products to guarantee maximum safety and dependable performance (e.g. to prevent unwanted or insensitive tripping of the mechanism).

Accordingly, SMA respectfully requests to remove article 690.11 or issue a modification to the original proposal 4-205 (article 690.11) that allows for a future effective-date that awaits the availability of a relevant UL standard and accounts for a reasonable time frame thereafter, for the industry to develop a robust and commercially viable solution. In this context, SMA would like to apprise NEC of IEC’s TC64/TC82 activities, which also cover the risk of arc faults in PV systems. In recent meetings, these technical committees have discussed a much lower limit than the 80V in the NEC article as a potential risk for the formation of an electrical arc. The NEC limit for DC-AFCI of 80V appears too high when considering that the typical voltage drop of an arc is approximately 20V.

SMA furthermore questions that the requirement of a manual restart meets high enough safety standards. Uninhibited manual restarts are not the best way to avoid accidental misuse that can result in critical damage, like repeated restarts of a roof-top PV system without proper examination. We suggest using an automatic and delayed restart of the system. If the incident repeatedly occurs, the system needs to be blocked until a trained technician has assessed the installation and has done all necessary repair work in order to safely reactivate the PV system. This would guarantee both optimal safety and high system availability, raising the acceptance of such a technology.
To conclude, SMA strongly supports all efforts to harmonize national and international safety standards to ensure consistently safe products worldwide. We feel, however, that the prescription of safety measures and use of devices such as DC-AFCIs needs to be backed by applicable standards and allow for thorough and meaningful testing by consumer safety laboratories. Only then will a new guideline truly improve safety and lead to adoption and acceptance of new technologies. The lack of an established standard, absence of proven industrial technology, and missing test procedures to verify effectiveness make it prudent to introduce this requirement into the NEC only when these issues are resolved.

Please feel free to contact us anytime with concerns or questions. We thank you for your support in these important matters.

Respectfully,

Jurgen Krehnke
President & General Manager
SMA Solar Technology America, LLC
Standards Council Supplemental Agenda

August 3-5, 2010

Report on Proposals – June 2010

4-204 Log #2493 NEC-P04
(690.11)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the following new section to Article 690.
690.11. DC Arc-fault Circuit Protection. PV systems with dc source and/or output circuits on or penetrating a building
operating at a system voltage of 80 volts or greater shall be protected with a listed direct-current, arc-fault circuit
interrupter (DCAFCl). PV Type, or other system components listed to provide equivalent protection. The PV Arc-Fault
Protection System shall comply with 690.11 (A) through 690.11(D).
(A). The system shall detect series arcing faults in the direct current PV source and output circuits.
(B). The system shall interrupt the arc-fault currents.
(C). The system shall disable or disconnect inverters or charge controllers connected to the faulted circuit when a fault
is detected. The system shall require that the disabled or disconnected equipment be manually reconnected and
restated.
(D). The system shall have an annunciator that must be manually disabled.

Exception: Complete, listed PV systems with no accessible dc circuits or components,

Substantiation: PV systems are subjected to extreme environmental conditions including wind, rain, snow, ice, UV
radiation, and temperature extremes. The systems are installed in dwellings and commercial locations and are not
routinely inspected or maintained by qualified people. These systems, as they deteriorate over time, will eventually
develop insulation failures or internal PV module conductor faults. Even new modules with manufacturing defects have
failed and caught fire. These failures will result in fault currents and/or series arcing faults. These fault currents and
any arcs are direct current (dc) and are far more difficult to deal with since the arcs are not self extinguishing 120 times
per second as are alternating current (ac) arcs. These faults may occur anywhere in the dc system. A voltage of 50V
was selected since it applies to nearly all PV systems on buildings that could pose hazards. This would exempt 12V
and most 24V PV systems and other similar systems at these operating voltages powered by PV modules.

The proposal is written to require that the series arcs be detected and the connected equipment turned off. Audible
and visual alarms must manually be turned off to ensure that attention is paid to the faults. It would be premature, at the
time this requirement will be enacted, to direct the location of the interruption device or the means of achieving that
interruption. It is anticipated that a low cost integrated circuit will be developed that will go into utility-interactive inverters
and charge controllers that will sense the series arc fault and turn off the inverter which will interrupt the series arc fault
current.

The Exception is included to allow for newly developed and evolving complete systems that use highly integrated
circuits imbedded in PV modules or packaged systems. These systems will be listed for safety, hence no requirements
are needed in the NEC.

Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action on Proposal 4-205.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1
Explanation of Negative:
YOUNG, J.: See comment on 4-205.
Explanation of Abstention:
BOWER, W.: Although I agree that arc faults must be addressed, I am very concerned that this is mandatory language
for devices that do not exist and for which there are no set points to address a wide variety of PV system sizes ranging
from less than 100 watts to hundreds of kilowatts. Arc fault studies must be completed and device performance verified.
I believe the public comment period will provide updates on device availability.
Comment on Affirmative:
ZINNANTE, V.: This proposal was accepted in principal and referenced to proposal 4-205 which states that while
products are not available presently, the standards for a commercial product would be developed by the ROP in
December 2009 and ultimately a commercial product would be available by the time of publication of the 2011 NEC. If
this is not the case, then serious consideration should be taken at the ROP to reject this proposal as written because
there will be no commercial product readily available at the time of publication.
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Report on Proposals – June 2010

NFPA 70

4-205 Log #2748 NEC-P04
(690.11 (New))

Final Action: Accept

Submitter: Timothy P. Zgonena, Underwriters Laboratories Inc.

Recommendation: Add new text to read as follows:

690.11 Arc-Fault Circuit Protection (DC). PV systems with dc source and/or output circuits on or penetrating a building operating at a PV system maximum system voltage of 80 volts or greater shall be protected by a listed (DC) arc-fault circuit interrupter, PV type, or other system components listed to provide equivalent protection. The PV arc-fault protection means shall comply with the following requirements:

1. The system shall detect and interrupt arcing faults resulting from a failure in the intended continuity of a conductor, connection, module, or other system component in the direct current PV source and output circuits.

2. The system shall disable or disconnect one of the following:
   a. Inverters or charge controllers connected to the fault circuit when the fault is detected
   b. The system components within the arcing circuit

3. The system shall require that the disabled or disconnected equipment be manually restarted.

4. The system shall have an annunciator that must be manually disabled.

Substantiation: PV systems may be subjected to extreme environmental conditions including wind, rain, snow, ice, dirt, and temperature extremes. The systems are installed on or near dwellings and commercial locations where they may not be routinely inspected or maintained by qualified people. These systems, can deteriorate over time, and eventually develop insulation failures or internal PV module conductor faults. Under rare occasions, new modules with manufacturing defects have faulted and caught fire. These failures will result in fault currents and/or arcing faults. These fault currents, including arcing faults, are direct current (dc) and are far more difficult to interrupt than ac faults because of the non-time varying (non-zero crossing) nature of dc. Series arcing faults resulting from a failure in the intended continuity of a conductor, connection, module, or other system component are most prevalent and may occur anywhere in the dc system. Fault currents to ground will be detected by the ground-fault protection required by Sec. 690.5(A).

Drawing on the success of arc-fault circuit interrupter protection for dwelling unit branch circuits as described in Sec. 210.12, UL has formed a PV AFCI Ad Hoc Working Group. This group, which consists of AFCI manufacturers and PV experts and system manufacturers, is assisting UL with the research and standards development activities related to requirements for arc-fault circuit interrupter protection for PV system applications. The goal of this effort is to have requirements for a PV AFCI developed by 2009 to enable the Listing of PV AFCIs in 2010 prior to the Publication of the 2011 NEC.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1

Explanation of Negative:

YOUNG, J.: There are no dc rated AFCI devices available and there are no requirements developed for such devices. While there may be a need for such a device it is too early to put a requirement in the Code.

Explanation of Abstention:

BOWER, W.: Although I agree that arc faults must be addressed, I am very concerned that this is mandatory language for devices that do not exist and for which there are no set points to address a wide variety of PV system sizes ranging from less than 100 watts to hundreds of kilowatts. Arc fault studies must be completed and device performance verified. I believe the public comment period will provide updates on device availability.

Comment on Affirmative:

STAFFORD, T.: This panel member recognizes the need for DC arc fault detection and encourages the implementation of such devices when available. It is understood by the panel that testing agencies are to have devices in place, for use; by the time the panel meets for the ROC. At that time, technical substantiation and availability will be reviewed as to performance and installation requirements and listing.

ZGONENA, T.: I would like to thank the panel for its support of this proposal. UL has scheduled a three-day PV AFCI Ad Hoc meeting starting on April 7, 2009 to quickly develop safety requirements for PV AFCI products. These published requirements will allow for the Listing of PV AFCI products as well as PV products that include PV AFCI protection. It is expected that these PV AFCI safety requirements will be published and Listed products will be commercially available by the time that the 2011 NEC is published. In the event that this process encounters delays, the proposal should be modified to allow for a future effective date so this crucial safety technology can be implemented.
as soon as the industry is ready.
TCC Action: The Technical Correlating Committee directs that this comment be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative on this comment.

The Technical Correlating Committee notes that Proposal 4-204 remains "Accepted in Principle" and that Proposal 4-205 remains "Accepted" as modified by the action taken on Comment 4-83.

Submitter: Ed Larsen, Square D Company/Schneider Electric

Comment on Proposal No: 4-204

Recommendation: Reject this proposal.

Substantiation: While there seems little doubt that dc arc fault protection should be required in PV systems, this proposal is premature. Using the ac AFCI requirement as a model, were this proposal to have progressed in a similar manner, UL would have begun an investigation into technologies that could mitigate dc arc faults in PV systems in at least 2005, UL would have begun working with prospective manufacturers on a standard in at least 2007 and the proposed effectiveness date of the requirement would be at least 2014. But in this case no product standard exists today, the only meeting UL has held on the subject was on April 7, 2009 and there isn't even agreement on the type of arc fault protection that should be provided and where in the system it should be located. All interested parties are certainly encouraged to move ahead with the work that needs to be done, however, this proposal might better be considered for the 2014 NEC.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 7 Negative: 5

Explanation of Negative:

BOWER, W.: I agree with the comment that the original proposal is premature. Material was presented at the panel meeting that a device to detect arc faults is currently being tested and may be ready in time for the 2011 NEC, but the applicability and range of power levels of a single device in all types of PV systems is not likely! Several panel members expressed confidence that when no commercially available product is available then the mandatory language of the code is not enforced. This is a gamble that could potentially harm the PV industry. Enforcement will be at the discretion of the AHJ and could result in costly delays, multiple appeals and interpretation misunderstandings with each installation.

I agree that all interested parties should move ahead with development of reliable and consistent dc arc fault detection methodologies and devices, but that language proposed for the 2011 NEC would best be delayed until the 2014 edition.

I also believe there should have been a panel statement on this comment to reference the "ACCEPT" on Comment 4-83.

ROGERS, J.: There is no rationale to accept this comment especially in light of the fact that comment 4-80 on the same proposal was rejected. There is definitive forensic evidence of PV ground faults causing fires, although this technology is new the ability to prevent even one fire that cause personal injury or property damage makes its acceptance well worthwhile. The basic premise of the NEC is the protection of persons and property from hazards that may arise from the use of electricity, this technology clearly meets that premise.

STAFFORD, T.: Evidence provides a definitive link to PV ground faults causing fires. This example is enough for this panel member to believe that a technology, while new, is a method that could help mitigate the direct cause of PV ground faults causing fires.

WILLS, R.: I believe that the panel was confused by the double negative involved in this comment which was to Reject Proposal 4-204.

The panel action should have been Reject with the same panel statement as used on Comment 4-80.

I support the requirement for dc arc fault detectors for PV in the 2011 NEC.

While concerned with the lack of available equipment, I believe that the rapid growth of the PV industry and the potential for fire hazard justifies acceptance of this proposal. It will give manufacturers solid reason to continue developing these detectors prior to the release of the 2011 NEC.

ZGONENA, T.: The panel action to accept 4-76 is inconsistent with the action taken on 4-77, and 4-83. The panel action should have been to reject this comment. The ROP panel action on 4-204 was to accept in principal based upon its similarity to 4-205, which was accepted by the panel. The panel actions and statements on 4-80 and 4-81 further collaborate the intent and action to be taken on 690.11.
4-77  Log #1585 NEC-P04
(690.11)

Submitter: Ed Larsen, Square D Company/Schneider Electric

Comment on Proposal No:  4-205

Recommendation:  Reject this proposal.

Substantiation:  While there seems little doubt that dc arc fault protection should be required in PV systems, this proposal is premature. Using the ac AFCI requirement as a model, were this proposal to have progressed in a similar manner, UL would have begun an investigation into technologies that could mitigate dc arc faults in PV systems in at least 2005, UL would have begun working with prospective manufacturers on a standard in at least 2007 and the proposed effectiveness date of the requirement would be at least 2014. But in this case no product standard exists today, the only meeting UL has held on the subject was on April 7, 2009 and there isn’t even agreement on the type of arc fault protection that should be provided and where in the system it should be located. All interested parties are certainly encouraged to move ahead with the work that needs to be done, however, this proposal might better be considered for the 2014 NEC.

Panel Meeting Action:  Reject

Panel Statement:  Code-Making Panel 4 affirms that PV AFCI protection is necessary as soon as possible. The safety benefits outweigh the potential challenges associated with an earlier implementation of the 690.11 requirements. This action will allow us to achieve the earliest possible fire safety improvement, with the best protection available at the time, and to allow for future improvements as technology permits.

The submittor is directed to 90.4 relative to his concerns regarding unavailability of appropriate products.

Number Eligible to Vote:  12

Ballot Results:  Affirmative: 10  Negative: 2

Explanation of Negative:

BOWER, W.:  See My Explanation of Negative on 4-76.

YOUNG, J.:  As noted in the substantiation there is not a standard and there are no products available.
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Submitter: John C. Wiles, Southwest Technology Development Institute, New Mexico State University / Rep. PV Industry Forum

Comment on Proposal No: 4-205

Recommendation: Add the term "(series arc faults)" shown with double underlining in the proposal.

690.11 Arc-Fault Circuit Protection (DC). PV systems with dc source and/or output circuits on or penetrating a building operating at a PV system maximum system voltage of 80 volts or greater shall be protected by a listed (DC) arc-fault circuit interrupter, PV type, or other system components listed to provide equivalent protection. The PV arc-fault protection means shall comply with the following requirements:

1. The system output circuits on or penetrating a building operating at a PV system maximum system voltage of 80 volts or greater shall be protected by a listed (DC) arc-fault circuit interrupter, PV type, or other system components listed to provide equivalent protection. The PV arc-fault protection means shall comply with the following requirements:
   1. The system shall detect and interrupt arcing faults (series arc faults) resulting from a failure in the intended continuity of a conductor, connection, module, or other system component in the direct current PV source and output circuits.
   2. The system shall disable or disconnect one of the following:
      a. Inverters or charge controllers connected to the fault circuit when the fault is detected
      b. The system components within the arcing circuit
   3. The system shall require that the disabled or disconnected equipment be manually restarted.
   4. The system shall have an annunciator that must be manually disabled.

Substantiation: The words "intended continuity of a conductor, connection, module, or other system component" do not fully convey the intent that this requirement applies only to series types of arc faults. There are parallel circuit connections in inverters, modules where the continuity of the connection, if broken, would not result in an arc, and parallel arcs of the line-to-line type are not and should not be addressed by this proposal.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided any substantiation for some of the requested changes and introduce new material that has not had public review.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

YOUNG, J.: In the Panel Statement to Comment 4-80 it is noted "Therefore, the panel recognizes "parallel arc detection" as a desirable feature, but not a requirement." The proposed and accepted wording from Proposal 4-205 makes no mention of series arcing or parallel arcing. It only reads that the device shall detect and interrupt arcing faults. This would include all types of arcing. The CMP may recognize that parallel arc detection is not a requirement but the reader of the Code will not recognize that. It would be clear if the change were accepted clarifying that only series arcing faults were required to be detected.
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4-79 Log #1946 NEC-P04
(600.11 (New))

Final Action: Reject

Comment on Proposal No: 4-205

Recommendation: Revise text to read as follows:

690.11 Arc-Fault Circuit Protection (DC). PV systems with dc source and/or output circuits on or penetrating a building operating at a PV system maximum system voltage of 80 volts or greater shall be protected by a listed (DC) arc fault circuit interrupter, PV type, or other system components listed to provide equivalent protection. The PV arc-fault protection means shall comply with the following requirements:

1. The system shall detect and interrupt arcing faults resulting from a failure in the intended continuity of a conductor, connection, module, or other system component in the direct current PV source and output circuits.

2. The system shall disable or disconnect one of the following:
   a. Inverters or charge controllers connected to the fault circuit when the fault is detected
   b. The system components within the arcing circuit

3. The system shall require that the disabled or disconnected equipment be manually restarted.

4. The system shall have an annunciator that must be manually disabled.

This requirement shall become effective January 1, 2014.

Substantiation: I was in the electrical field when ground fault circuits were introduced into the NEC. Manufacturers were not prepared, circuit breakers were not available, and there were problems with some that were available.

Giving the manufacturers this additional time will allow time for engineering, testing to avoid problems, and also allow time to set up production.

Panel Meeting Action: Reject

Panel Statement: The panel does not agree with delaying the effective date beyond the issuance of the code.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

YOUNG, J.: The proposed effective date of January 1, 2014 would provide time for the standard to be developed and product to be developed. If products become available before that date they can be used but the later date does not introduce the enforcement problem if products are not available. Comments in other panel actions indicate the use is based strictly on availability of the product and not Code inclusion. If that is the case it would be expected these would be used if available even if not included in the Code.
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<th>Final Action: Reject</th>
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<tr>
<td>Submitter: Jim Eichner, Xantrex Technology, Inc.</td>
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<tr>
<td>Comment on Proposal No:  4-204</td>
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<tr>
<td>Recommendation:  Reject this proposal.</td>
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<tr>
<td>Substantiation: We feel the proposal is incomplete and premature for the following reasons:</td>
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<td>1. Basic research into PV arcing signatures is lacking or at least incomplete, and will be very difficult. For AC arc-fault detectors there are still problems in this area, and problems were caused due to the code requirement being in force before the technology was ready. PV arc signature research will be even harder in PV systems because, unlike AC appliances, inverters and charge controllers are not subject to conducted emissions requirements on the DC input circuit that the arc-fault detector would be monitoring and because DC arcs do not have the 120Hz signature that AC arcs have.</td>
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<tr>
<td>2. The development of a consensus standard for PV arc fault detectors is not very far along, and will take considerable time since that standard will have to answer all the questions in the remaining points below.</td>
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<tr>
<td>3. The proposal deals only with series arc faults, yet parallel arc faults, both line-to-line and line-to-ground (in grounded PV systems) are at least as significant in terms of the severity and likelihood of the hazard. Line-to-ground faults are a type of parallel fault and carry just as much possibility of arcing, and the number of locations for possible ground faults is very large - everywhere the ungrounded conductors are near or in contact with grounded metal such as conduit. Line-to-line parallel faults are also possible in a large number of locations: the terminal box on the back of each panel, any wire run where + and - are bundled and exposed to mechanical damage or rodents, etc.</td>
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<td>4. The proposal seems intent on protection being on the output end of the PV system, where a single device can be used, rather than at the source, as is typically required for protective systems. Putting the protection at the source may be unpopular with panel manufacturers, but it's the right (only) way to provide protection against both series and parallel arc faults. A compromise might be to put protection against both series and parallel faults in the string combiners, which leaves a smaller portion of the system unprotected.</td>
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<tr>
<td>5. What action the protector should take isn't clear. Shorting the array may be the best approach to ensure the arc is extinguished. For a parallel arc fault, opening the circuit would unload the array and drive the voltage up, worsening the arc. It is even possible that opening the circuit could extinguish the series arc but cause a parallel arc to start.</td>
</tr>
<tr>
<td>The proposal seems intent on protection being on the output end of the PV system, where a single device can be used, rather than at the source, as is typically required for protective systems. Putting the protection at the source may be unpopular with panel manufacturers, but it's the right (only) way to provide protection against both series and parallel arc faults. A compromise might be to put protection against both series and parallel faults in the string combiners, which leaves a smaller portion of the system unprotected.</td>
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Panel Meeting Action: Reject

Panel Statement: There has been an alarming increase in the number of PV arc fault fires occurring worldwide. While PV AFCI technology is relatively new, Code-Making Panel 4 concludes it is critical and necessary to address this significant void in PV system protection. Research and development of PV arc fault products and certification requirements is progressing quickly. These efforts have resulted in a draft standard, and multiple functional prototypes from multiple manufacturers. The experience gathered from the growth and development of the AC AFCI will allow the PV AFCI to avoid similar pitfalls. The 690.11 requirements provide protection for the most likely type of PV arc faults and allows for its implementation anywhere within a PV system. The requirements in 690.11 are written based upon the protection function and not the implementation method. While not required by the requirements in 690.11, the PV AFCI certification requirements will include additional requirements for parallel arc fault protection for manufacturers that choose to provide such protection. Research into arcing faults has been the subject of work by UL, NREL, Sandia, Southwest Research and industry authorities. There is sufficient knowledge to advance PV DC AFCI topics in the code. The remaining technical details listed in the public comments relate to detection methods and are not withstanding to the recognized need for the safety improvements. While series and parallel PV AFCI protection would be preferable, the series protection required by 690.11 provides a substantial increase in the level of protection over a system without PV AFCI protection. Additionally, parallel PV AFCI protection cannot be added to 690.11 for the 2011 NEC, based upon the already received comments and proposals currently under review. Therefore, the panel recognizes "parallel arc detection" as a desirable feature, but not a requirement.

With regard to the comments on ground faults being parallel faults, most modern listed PV inverters include GFDI protection and will mitigate parallel arcing ground faults. The future effective date method allows time for new technical developments. New system solutions will be forth.
coming to meet the intent of 690.11. This should not be a barrier to achieving the safety improvement that can be accomplished at this time.

The panel affirms that PV AFCI protection is necessary as soon as possible and that the safety benefits outweigh the potential challenges associated with an earlier implementation of the 690.11 requirements. This action will allow us to achieve the earliest possible fire safety improvement with the best protection available at the time and to allow for future improvements as technology permits.

The submitter is directed to 90.4 relative to his concerns regarding unavailability of appropriate products.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

BOWER, W.: I agree with the comment that the proposal is incomplete and premature with possible areas of serious contention. Material was presented at the panel meeting that a device to detect arc faults is being tested and may be ready in time for the 2011 NEC, but the applicability of a single device in all types of PV systems is not likely! I agree with the author of the comment that the proposal appears to be intent on only series arc faults AND protection only at the output end of the PV system. There will likely be better and a multiplicity of ways to detect arc faults nearer to the fault location. Several panel members expressed confidence "out of past experience" that when no commercially available product is available then the mandatory language of the code is not enforced. But what about the scenario where the available device is not applicable to the system? This is huge gamble and could be harmful to the PV industry. Enforcement will be at the discretion of the AHJ and could result in multiple expensive delays, appeals and interpretation misunderstandings with each PV installation.

I agree that all interested parties should move ahead with development of reliable and consistent dc arc fault detection methodologies and devices, but also believe that language in the 2011 NEC would best be delayed until the 2014 edition in order to assure the PV industry that a single method for arc-fault detection not be imposed for all systems.

YOUNG, J.: See comments on 4-79.
4-81 Log #2143 NEC-P04 (690.11 (New))

Final Action: Reject

Submitter: Jim Eichner, Xantrex Technology, Inc.

Comment on Proposal No: 4-205
Recommendation: Reject this proposal.
Substantiation: We feel the proposal is incomplete and premature for the following reasons:
1. Basic research into PV arcing signatures is lacking or at least incomplete, and will be very difficult. For AC arc-fault detectors there are still problems in this area, and problems were caused due to the code requirement being in force before the technology was ready. PV arc signature research will be even harder in PV systems because, unlike AC appliances, inverters and charge controllers are not subject to conducted emissions requirements on the DC input circuit that the arc-fault detector would be monitoring and because DC arcs do not have the 120Hz signature that AC arcs have.
2. The development of a consensus standard for PV arc fault detectors is not very far along, and will take considerable time since that standard will have to answer all the questions in the remaining points below.
3. The proposal deals only with series arc faults, yet parallel arc faults, both line-to-line and line-to-ground (in grounded PV systems) are at least as significant in terms of the severity and likelihood of the hazard. Line-to-ground faults are a type of parallel fault and carry just as much possibility of arcing, and the number of locations for possible ground faults is very large - everywhere the ungrounded conductors are near or in contact with grounded metal such as conduit. Line-to-line parallel faults are also possible in a large number of locations: the terminal box on the back of each panel, any wire run where + and - are bundled and exposed to mechanical damage or rodents, etc.
4. The proposal seems intent on protection being on the output end of the PV system, where a single device can be used, rather than at the source, as is typically required for protective systems. Putting the protection at the source may be unpopular with panel manufacturers, but it’s the right (only) way to provide protection against both series and parallel arc faults. A compromise might be to put protection against both series and parallel faults in the string combiners, which leaves a smaller portion of the system unprotected.
5. What action the protector should take isn’t clear. Shorting the array may be the best approach to ensure the arc is extinguished. For a parallel arc fault, opening the circuit would unload the array and drive the voltage up, worsening the arc. It is even possible that opening the circuit could extinguish the series arc but cause a parallel arc to start.

We would like to see this proposal rejected for this code cycle, allowing time for further study of arc signatures and time for industry to come to some consensus on how and where to address parallel faults not just series faults.
We would also like to comment that relative to Proposal 4-204, this Proposal 4-205 is preferable in two ways:
a) 4-205 replaces the undefined term “series arcing faults” with a description that does not require defining (“arching faults resulting from a failure in the intended continuity of…”)
and
b) added flexibility in the location of the interrupting means - in 4-204 it is required to disable or disconnect the inverter or charge controller, but in 2-205 an allowance is made to disconnect the faulted component instead, opening the door to arc fault protection located in combiner boxes or upstream.

Panel Meeting Action: Reject

Panel Statement: There has been an alarming increase in the number of PV arc fault fires occurring worldwide. While PV AFCI technology is relatively new, the panel concludes it is critical and necessary to address this significant void in PV system protection. Research and development of PV arc fault products and certification requirements is progressing quickly. These efforts have resulted in a draft standard, and multiple functional prototypes from multiple manufacturers. The experience gathered from the growth and development of the AC AFCI will allow the PV AFCI to avoid similar pitfalls.

The 690.11 requirements provides protection for the most likely type of PV arc faults and allows for its implementation anywhere within a PV system. The requirements in 690.11 are written based upon the protection function and not the implementation method. While not required by the requirements in 690.11, the PV AFCI certification requirements will include additional requirements for parallel arc fault protection for manufacturers that choose to provide such protection. Research into arcing faults has been the subject of work by UL, NREL, Sandia, Southwest Research and industry authorities. There is sufficient knowledge to advance PV DC AFCI topics in the code. The remaining technical details listed in the public comments relate to detection methods and are not withstanding to the recognized need for the safety improvements.

While series and parallel PV AFCI protection would be preferable, the series protection required by 690.11 provides a substantial increase in the level of protection over a system without PV AFCI protection.
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Additionally, parallel PV AFCI protection cannot be added to 690.11 for the 2011 NEC, based upon the already received comments and proposals currently under review. Therefore, the panel recognizes “parallel arc detection” as a desirable feature, but not a requirement.

With regard to the comment on ground faults being parallel faults, most modern listed PV inverters include GFDI protection and will mitigate parallel arcing ground faults.

The future effective date method allows time for new technical developments. New system solutions will be forth coming to meet the intent of 690.11. This should not be a barrier to achieving the safety improvement that can be accomplished at this time.

The panel affirms that PV AFCI protection is necessary as soon as possible, and that the safety benefits outweigh the potential challenges associated with an earlier implementation of the 690.11 requirements.

This action will allow us to achieve the earliest possible fire safety improvement with the best protection available at the time and to allow future improvements as technology permits.

The submitter is directed to 90.4 relative to his concerns regarding unavailability of appropriate products.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:

BOWER, W.: See My Explanation of Negative on 4-80.
YOUNG, J.: See comments on 4-80.
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4-82  Log #2530  NEC-P04  Final Action: Reject
(690.11 (New))

Submitter: Timothy P. Zgonena, Underwriters Laboratories Inc.
Comment on Proposal No: 4-205
Recommendation: Propose to accept the original proposal with a future effective date to be agreed upon at the ROC meeting.
Substantiation: Affirmative Comment on panel action for Proposal 4-205:
I would like to thank the panel for its support of this proposal. UL with the help of AFCI industry experts and PV industry experts has drafted 1699X, Photovoltaic (PV) DC Arc-Fault Circuit-Interrupters. During this time since the ROP meeting, there have been an increasing number of serious PV related fires. These fires could have been prevented if these systems included PV AFCI protection. With the permission of the CMP-4 chairman, I would appreciate a short period of time to provide a presentation on the PV AFCI status and test results. It is expected that these PV AFCI safety requirements will be published and Listed products will be commercially available by the time that the 2011 NEC is published. In the event that this process encounters delays, the proposal should be modified to allow for a future effective date so this crucial safety technology can be implemented as soon as the industry is ready.

Panel Meeting Action: Reject
Panel Statement: The panel concludes that a delay in the effective date is not required.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ROGERS, J.: The Panel was correct in rejecting this comment and remaining with the language and implementation date that are found in the original proposal. There is documented evidence that PV systems are already beginning to encounter arcing faults and start fires. The technology may be new and there may even unforeseen problems when first using the product but that is the case with many new products that enter the NEC. There is no question from the technical data that has been presented that this product will reduce the likelihood of fires and thus increases the likelihood that it will also reduce injuries or deaths to either firefighters or building occupants. There are multiple hazards involved in fighting PV array fires so preventing the fire in the first place would obviously remove these hazards.
4-83 Log #2672 NEC-P04 Final Action: Accept
(690.11 (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Comment on Proposal No: 4-205

Recommendation: Accept the proposal in principle.

In the first sentence, change "dc source and/or output circuits" to "dc source circuits, dc output circuits, or both". Revise list item (4) to read: "(4) The system shall have an annunciator that provides a visual indication that the circuit interrupter has operated. This indication shall not reset automatically."

Substantiation: This comment corrects two violations of the NEC Style Manual ("and/or" and "must") and provides a clearer description of how the annunciator should function.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

BOWER, W.: I would like to go on record to say that I believe that the detection of dc arc faults is not as simple as with the ac arc faults that are now covered by the code. The fact that it will be difficult to determine whether a dc arc fault is in series with the circuit or is a parallel arc fault is of major concern. The required actions to mitigate series and parallel arc faults are very different. If the wrong action is taken, the arc fault current will likely be worsened. It is likely that several types of arc-fault detectors will be developed out of need because of 690.11, but it is unlikely all will be covered by the requirements being included in the 2011 code.

I agree that all interested parties should move ahead with development of reliable and consistent dc arc fault detection methodologies and devices, but also believe that language in the 2011 NEC would best be delayed until the 2014 edition in order to assure the PV industry that a single method for arc-fault detection not be imposed for all systems.
Mary,

Although I will not be able to attend the hearings on the appeals to 2011 NEC Article 690.11, I would like to comment as follows on those appeals:

In the proposal phase of the 2011 NEC, two proposals (4-204 and 4-205) were submitted requiring the use of dc AFCI's on PV systems. These proposals were discussed at length in the panel session. Public comments (4-76 through 4-83) were subsequently received in the comment phase and again, lengthy discussions were held in the panel sessions. These comments were not treated lightly, as can be seen in the panel comments in the ROC. The panel clearly intends for the requirements expressed in Article 690.11 to be a part of the 2011 NEC.

The SMA appeal notes that this is the first requirement anywhere for such devices. Wide application of PV technology for residential use (typically untrained consumers) is relatively new, and "somebody" has to be "first". Being "first" in this case indicates that others have not yet responded to the need as expressed in the substantiation in the public proposals and comments.

Both the SMA and KACO appear to recognize the dc arcing fault hazard and agree with the need for the dc AFCI technology, but not the timing. However, the rush to get PV applications to market (without the dc AFCI) does not justify the risk to people and property that can be mitigated with the dc AFCI. PV systems should be installed only when the system, as a whole, does not present a significant hazard to the user. Both appeals imply that this obvious situation does not yet exist. Forcing PV system suppliers to hold off on marketing and installing systems until the dc arcing fault issue is addressed protects people and property, which is the reason we have the NEC.

The appeals also mentioned issues of manual reset and the minimum voltage for dc arcing faults. Will appropriate substantiation, these could be the basis for proposals the 2014 NEC, and I encourage SMA and KACO to share their knowledge and advocate for their positions in that arena.

Regards,
Robert J. Deaton, P.E.
CMP 4 Principal (IEEE)
Item 10-8-2
Michael Greiner
President

June 29, 2010

Amy Beasley Cronin, Secretary of the NFPA Standards Council
National Fire Protection Association
Battery March Park
PO Box 9101
Quincy, MA 02269-9101

Subject: Notice of NFPA Standards Council Appeal
Reference: Failed Certified Amending Motion 18-1

Dear Ms. Cronin:

In accordance with NFPA Regulations Governing Committee Projects; Section 1.6, Appeals to Council please consider this letter as my official notice to the NFPA Standards Council to appeal failed Certified Amending Motion 18-1

Pursuant to NFPA Regulations Governing Committee Projects; Section 1.6.2, Time for Filling an Appeal, I am hereby submitting this notice to appeal on June 29, 2010 no later than 20 day after the June 10, 2010 date in which the Association Technical Meeting was held and took action on the failed Certified Amending Motion, 18-1 which I am hereby appealing.

Pursuant to NFPA Regulations Governing Committee Projects; Section 1.6.2 (b) Association Technical Meeting Failed Amendments:

a) “Party may advocate their position either in writing or in person before the Standards Council” - Due to the complexity of the issue which has lead to this appeal, I am hereby requesting placement on the NFPA Standards Council Meeting Agenda, scheduled for August 3-5, 2010 in Quincy, MA so I may advocate my position in person before the Standards Council.

b) “Parties wishing to appear in person before the Council shall notify the Council Secretary no later than 48 hours prior to the Council Meeting” – Please accept this letter as my notice to the Council Secretary that I wish to appear in person.
c) "Although not required, parties wishing to advocate a position (in person) are encouraged, to the extent practicable, to file a written submission in general conformance with 1.6.3 and 1.6.4 in advance of the meeting at which action will be considered" – Upon receipt of notice from the Council Secretary that this appeal notice to the Standards Council is accepted and I am scheduled to appear before the Standards Council at the April 3-5, 2010 Meeting, I will respectfully submit a written overview of my appeal in accordance with Section 1.6.3, Filing and Contents of an Appeal.

I look forward to your notification that this Notice of Appeal to the NFPA Standards Council has been accepted

Sincerely,

Michael Greiner, President
NFPA Member #: 212269
4.5.2 The mammalian and fish toxicity and biodegradability performance limits determined in 4.5.1 shall meet the requirements shown below. be approved by the authority having jurisdiction:

4.5.2.1 The mammalian toxicity of the wetting agent and wetting agent solution shall meet the requirements shown in table 4.5.2.1. Current Table 5.2.7.2. in NFPA 18 (2006)

4.5.2.2. The fish toxicity of the wetting agent shall not be less than 10 mg/L when tested in accordance with 4.5.2.2.1. Rainbow trout (Oncorhynchus mykiss) at 60 ± 7 days post hatch, shall be exposed to the wetting agent in accordance with OPPTS 850.1075 and ASTM E729.

4.5.2.2.2. Status conditions in ASTM soft water as described in ASTM E729 at 54 ± 2°F (12 ± 1°C) shall be maintained throughout the 96-hour test period.

4.5.2.3 The wetting agent shall be biodegradable or readily biodegradable as determined by OPPTS 835, Section M.

Substantiation: Mammalian toxicity, fish toxicity, and biodegradability tests can help determine the human and environmental impact of a product or treatment on the environment. A treatment that works to extinguish fires, but has a serious impact on either the people or the environment is a poor choice. The AHJ needs the information to make that choice and needs it in a way that comparison is as straightforward as possible. In many cases the AHJ does not have the expertise needed to determine what is hazardous. This information provided in a consistent manner on a technical data sheet can be compared to available guidance to make a reasoned judgement. The EPA and OSHA have provided some level of guidance in their requirements for labeling, MSDS content, and environmental criteria and guidelines. For a technical committee with expertise in a subject to leave the AHJ uninformed is a misuse of that expertise and our assignment of revising the document. We need to make it better, more useful to the AHJ. There should be a lot more to a standard than a fire test.

Committee Meeting Action: Accept

Number Eligible to Vote: 11
Ballot Results: Affirmative: 6 Negative: 1
Ballot Not Returned: 4 Caron, P., Greiner, M., Hubert, M., Tinsley, Jr., R.

SHUGARMAN, B.: The health effects, ecological effects, and biodegradability of wetting agent concentrate(s) and/or wetting agent solution(s) are to be evaluated to and comply with any specified requirements of the US EPA Office of Prevention, Pesticides and Toxic Substances Guidelines, or the equivalent. The Technical Committee on Water Additives for Fire Control and Vapor Mitigation is not charged with determining acceptable health effects limits, ecological effects limits, or biodegradability criteria.
Note: This proposal is reported as a "Reject" as it did not receive the simple majority affirmative vote.

Submitter: Technical Committee on Water Additives for Fire Control and Vapor Mitigation,

Recommendation: Proposal: Add new and delete text as indicated

4.5 Health, Safety, and Environmental Considerations.

4.5.1 The toxicity and biodegradability of wetting agent concentrate(s) and wetting agent solution(s) shall be evaluated in a manner equivalent to the guidelines used by the U.S. Environmental Protection Agency’s (EPA).

The following EPA OPPTS tests or their equivalent:
(1) Health Effects Test Guidelines, OPPTS 870.1100, Acute Oral Toxicity
(2) Health Effects Test Guidelines, OPPTS 870.1200, Acute Dermal Toxicity
(3) Health Effects Test Guidelines, OPPTS 870.2400, Acute Eye Irritation
(4) Health Effects Test Guidelines, OPPTS 870.2500, Acute Dermal Irritation
(5) Ecological Effects Test Guidelines, OPPTS 850.1075, Fish Acute Toxicity Test, Freshwater and Marine
(6) Fate, Transport, and Transformation Test Guidelines, OPPTS 835.3110, Ready Biodegradability

4.5.2 The toxicity and biodegradability limits determined in 4.5.1 shall be approved by the authority having jurisdiction

5.2.7 Toxicity:

5.2.7.1 Wetting agents shall comply with the following EPA OPPTS tests or their equivalent:
(1) 870.1100 Acute Oral Toxicity
(2) 870.1200 Acute Dermal Toxicity
(3) 870.2400 Acute Eye Irritation
(4) 870.2500 Acute Dermal Irritation

5.2.7.2 The wetting agent and the maximum use solution shall not exceed the toxicity limits established in Table 5.2.7.2 when tested in accordance with 5.2.7.1:

Table 5.2.7.2 Toxicity Limits for Wetting Agents and Wetting Agent Solutions

(Also delete table content)

A.4.5 The handling, mixing, and application of wetting agent concentrate should follow specific operational procedures to protect the water source and to provide safety in the workplace. Secondary containment devices such as berms should be used to isolate potential spills from the aquatic environment.

The following procedures should be used where wetting agent solutions are mixed and applied:
(1) Fire apparatus tanks should not leak, and operators should use appropriate methods and equipment to avoid overflow spills and discharge hose spills when filling the tanks.
(2) Portable tanks or sumps that are used to premix solution or to fill application vehicles should be located at least 30 m (100 ft) from bodies of water. Mixing operations should be conducted in such a manner as to avoid spilling wetting agent concentrate or solution. Spillage should not enter drainage systems that empty into fish habitats or waterways that flow into fish-inhabited water.

A.4.5.1 (A.5.2.7.1) There are other organizations, such as the Organization for Economic Cooperation and Development (OECD), having similar test guidelines that can be substituted with the approval of the authority having jurisdiction.

Substantiation: This removes the toxicity requirements from the Standard and allows the toxicity of materials to be evaluated by the EPA, or equivalent experts.

Committee Meeting Action: Accept

Committee Statement: Separate Ballot to whole committee.

Number Eligible to Vote: 13

Ballot Results: Affirmative: 6 Negative: 3

Ballot Not Returned: 4 Caron, P., Hanauska, C., Tinsley, Jr., R., Wright, J.

Explanation of Negative:

GEORGE, C.: See my Explanation of Negative on 18-4 (Log #CP22).

JOHNSON, C.: See my Explanation of Negative on 18-4 (Log #CP22). The committee is responsible for preparing a useful and meaningful document. Removing the performance criteria is an abdication of this responsibility. We need to take advantage of the technical expertise of committee members to include requirements that will assist the AHJ in decision making. Toxicity testing, and the associated performance limits, is one of those areas where it is unlikely that the AHJ will have the knowledge to establish meaningful toxicity limits.

VANDERSALL, H.: See my Comment 1. This proposal removes the responsibility of placing product toxicity limits
from the Technical Committee and assigns it to the AHJ. It is unlikely that the user or the AHJ would have the capability or the technical expertise necessary to establish toxicity limits.
Committee Report and behind me on the screen. We will proceed in the order of the motion sequence number presented. Mr. Brandeau.

MR. BRANDEAU: Thank you. Mr. Chairman, ladies and gentlemen, the Report of the Technical Committee on Water Additives for Fire Control and Vapor Mitigation is presented for adoption and can be found in the Report on Proposals and Report on Comments for the 2009 Fall Meeting Revision Cycle.

The Technical Committee has published a report consisting of a partial revision of NFPA 18, Standard on Wetting Agents. The presiding officer will now proceed with the certified amending motions.

MR. JARD: Thank you, Mr. Brandeau. Let's now proceed with the discussion on the certified amending motion on NFPA 18. Microphone 1, please.

MR. GRINER: My name is Mike Griner. And I represent Hazard Control Technologies. The motion here is a grouped motion where if you are voting in favor of this motion, you are voting to reject Section 4.5.2.2 and also accept Comment 18-7. And Comment 18-7 would read --

MR. JARD: So your motion is to accept Comment 18-7 and reject an identifiable part of Comment 18-4?
MR. GRINER: Yes, sir.

MR. JARD: I'm sorry, 18.17. Is it 7 or 17?

MR. GRINER: It's to reject Comment 18-4 and to accept 18-17.

MR. JARD: Okay. Thank you. That is the certified motions. Is there a second? There is a second. Please proceed.

MR. GRINER: Thank you. The issue here -- again let me state I'm Mike Griner, President of Hazard Control Technologies. I'm a secretary of the NPA 18 Technical Committee. Our company manufactures Class-A foams, Class-B foams, and products that are covered by this standard.

This has been a very debated argument within the Technical Committee. Our Technical Committee is very small. It consists of 11 people. Four of them are relatively inactive. And the other seven are pretty much divided right down the middle on this issue.

The issue is not whether we should perform aquatic toxicity testing. We all unanimously agree that aquatic toxicity testing and reporting to the authorities having jurisdiction is a good thing. The issue that the manufacturers have with Comment 18-4 is the assigning of an arbitrary 10 milligram per
liter pass/fail criteria, which has no correlation with the concentration levels the products are applied in the field.

Therefore, having aquatic toxicity results by voting in favor of this rather than having an arbitrary 10 milligram per liter value, the aquatic toxicity values would be reported on the manufacturer's product data sheets.

The scope of the NFPA is the education, prevention, suppression and protection from fire. While I myself, along with the NFPA Technical Committee members, are concerned on the environment, we are not environmental experts. And the Technical Committee should not be basically coming up with pass/fail environmental test limits. It could be in conflict with EPA requirements. But rather leave the use and limits to the federal, state, local, EPA's, and the authority having jurisdiction. So by voting in favor of this amendment, that's essentially what would be accomplished.

The issue, as I mentioned, is a ten milligram per liter value as an arbitrary value. So let me relate it to the products applied in the field. Every fire suppression agent under this standard will be UL listed for Class A and Class B...
fires. Under those listings these agents are listed at a proportioning rate of 1 percent to 3 percent. So if you're applying the agent in the field at a 1 percent solution, you are applying the agent at 10,000 milligrams per liter. So the concentration of the agent in the water solution is 10,000 milligrams per liter.

So in this situation, what you can have is a product that passes this aquatic toxicity test. Let's say their limit is 25 milliliters per liter, which means at that rate it kills 50 percent of (indiscernible). In the field it's going to be applied at 10,000 milligrams per liter. So you will have products that pass this requirement, giving a false sense of security to the firefighters and the authorities having jurisdiction that it's echo friendly when, in fact, if it's allowed to go into the water stream, it will kill fish. Thank you.

MR. JARD: Thank you. Mr. Brandeau, would you like to offer the Committee's position?

MR. BRANDEAU: Yes. As Mr. Griner stated, this has been a contentious issue in the Committee. The intent of the Committee in setting this requirement was to provide some guidance to authorities having jurisdiction who might not be able
to interpret the results reported for this testing without some guidance.

There were attempts made to compromise, including moving this material to annex so it would be advisory rather than mandatory. But that compromise was rejected, and the Committee majority view was to maintain it in the body of the standard.

I would like to defer to Committee Member Cecilia Johnson, who can speak further to the Committee's intent.

MR. JARD: All right. Thank you, Mr. Brandeau. With that we will open up debate on the motion. And please remember to provide your name and affiliation and whether you're speaking for or against the motion. Microphone 8, please.

MS. JOHNSON: My name is Cecilia Johnson, usually referred to as Ceci. I work for the U.S. Forest Service. I worked since 1970 in the forest service program that evaluates fire chemicals for use by the Forest Service and other federal agencies. I am a member of NFPA. I'm a member of the Technical Committee on Water Additives and also on Forest and Rural. I am speaking against the motion.

I have several points I'd like to make, one of which, as Mike has already stated, the toxicity
and environmental issues are very complex. This is especially a problem for very small, underfunded professional or volunteer organizations who need help. They need to have somebody tell them what's a reasonable thing to do on these very technical issues.

We also need to update and improve our documents in response to experience, changing uses, changing regulations, and public opinion. These products can and will get in the waterways regardless of where they are used, either in warehouses, structures, through spills, runoff storm sewers, or worst-case a transportation accident getting supplies to an incident or to a facility. We're going to have a problem with it.

I want to comment on a couple of things, just highlight some of the things that Mike covered. We're dealing with aquatic toxicity here. So we want to deal with LC-50's, the concentration in the environment in which the organism lives. And in this case, the bigger the better. The bigger that LC-50, the less toxic is the situation.

As for these being totally arbitrary numbers, that's not true. The EPA has set protocols, which we are requiring to be used. They have also
set, not by regulation but by guidance, a series of standard categories. Slightly toxic, which is between 10 and 100 parts per million as an LC-50, we feel is a good compromise between effectiveness and providing some safety measure for aquatic organisms.

That doesn't say that it's going to be safe in all conditions. A tanker truck going over into a small waterway will kill the organisms. However, small amounts of runoff from use, as they go into the waterway, they are going to be diluted further, meaning less toxicity.

I think that's what I wanted to say. Thank you very much.

MR. JARD: Microphone 1.

MR. GRINER: I would like to address some of those comments.

MR. JARD: Please remember to state your name, affiliation, and whether you're for or against the motion.

MR. GRINER: Mike Griner, Hazard Control Technologies. And I'm for the motion. Ceci points out some very good things.

One of the issues that was trying to be addressed, which has failed to be addressed by adopting 10 milligrams per liter, is that the smaller
fire departments don't have the resources. The issue is this does not solve the problem. The issue is one of the more environmentally aquatically toxic-friendly foams on the market that are listed under this standard has a value of 2350 milligrams per liter. When it is applied, since it's UL listed at 1 percent, it will be applied at 10,000 milligrams per liter. So, therefore, even though it passes this requirement, if it's allowed to run into the waterways, it will kill fish. So by setting the value doesn't solve the problem. The only way to solve the issue is make the aquatic toxicity values known to the authorities having jurisdictions and to put in standards that these materials should be kept out of the waterway. That's the only way to solve the problem.

Well, I should say the second way to solve the problem would be setting an aquatic toxicity level that's up around 120,000 milligrams per liter because products aren't applied at that rate. But then there will be no products that would meet or that could be used as a fire suppressant agent.

The second issue she mentioned was a tractor-trailer truck going into the water. That's
1 really a moot issue here because if it goes in the
2 water, it's the hydrocarbons killing the fish and has
3 nothing to do with the aquatic toxicity of a fire
4 suppressing agent.
5
6 Also, this does not take into consideration
7 the performance between different agents. For
8 example, if you had a structure fire and you are able
9 to put that fire out in two minutes, you have very
10 little fire runoff and fire debris runoff.
11
12 On the other hand, if it took you 30
13 minutes, you would have a lot more fire debris runoff
14 and a greater chance for that product to get into the
15 stream.
16
17 So, again, the only way to resolve this
18 issue is to address not getting these agents in the
19 stream, not setting a value that is 1,000 times less
20 stringent than what the products are actually applied
21 in the field. Thank you.
22
23 MR. JARD: Microphone 8.
24
25 MS. JOHNSON: Thank you. This is Ceci
26 Johnson again with the Forest Service speaking
27 against the motion.
28
29 I believe that Mike has just illustrated one
30 of the issues with trying to have all the
31 jurisdictions set their own limits. And I want to do
If you start out with a product that its concentrate has an LC-50 of 2000 milligrams per liter, when you use it at 1 percent, you are talking about 200,000 parts per milliliter in the solution. As soon as you have it in any kind of waterway, it becomes even more diluted. So if it had an initial LC-50 of 2000, that is 200 times the limit or 200 times better than we are requiring.

We are simply trying to resolve some of the extremely toxic things. If I can put it in food type of things and ingestibles, we are going to try to screen out the strychnine and let you have your coffee. Thank you.

MR. JARD: Is there any other further discussion from the floor on Motion 18.1?

MR. GRINER: Mike Griner, Hazard Control Technologies, for the motion.

I think there's some number ease that was used there that's not really appropriate. Making mention that 2000 is ten times better than what we're requiring, that's kind of sideling the issue. The issue is even if that agent goes in the water, it will kill the fish.

So if we're really trying to prevent from
aquatic events happening, setting this limit doesn't succeed in doing that. The only way to do that is to publish what the aquatic toxicity numbers are for the individual agents either on their material safety data sheet and/or on a product data sheet so that the authorities having jurisdiction know what they are because a product could have an aquatic toxicity of 11 parts per milliliter or 11 milligrams per liter and pass this test and still be toxic when it's applied at 1 percent.

So my recommendation is to vote in favor of this so that the aquatic toxicity numbers show up on a product data sheet so that the authorities having jurisdiction can better understand they need to keep these fire suppression agents out of the waterways.

Thank you.

MR. JARD: Mr. Brandeau, do you have any other commentary?

MR. BRANDEAU: I believe the viewpoints of the two opposing factions have been well articulated.

MR. JARD: Okay. Thank you. Microphone Number 3.

UNIDENTIFIED SPEAKER: Call the question, please.

MR. JARD: Okay. There's been a motion to
end debate. We'll vote on that motion now.

All in favor of ending debate on this motion, please raise your hand. All opposed. The motion carries, and we'll go to a vote on that motion.

Before we vote, just let me restate the motion on the floor is to reject an identifiable part on Comment 18-4.

All in favor of the motion, please indicate by raising your hand. All opposed to the motion, please raise your hand. The motion fails. Thank you, Mr. Brandeau.

The next report under consideration this morning is that of the Technical Committee on the Liquified Petroleum Gas Code. Here to present the Committee report is Committee Chair Frank Mortimer of EMC Insurance Company, Des Moines, Iowa.

The Committee report can be found in the blue 2010 Annual Revision Cycles ROP and ROC. The certified amending motions are contained in the Motions Committee Report and behind me on the screen. And again we will proceed in the order of the motion numbers presented. Mr. Mortimer.

MR. MORTIMER: Mr. Chair, ladies and gentlemen, the Report of the Technical Committee on
July 16, 2010

Ms. Mary J. Maynard  
Codes & Standards Administration  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169

Subject: Request for Standards Council Appeal  
Reference: Hazard Control Technologies, Inc, NFPA-18, Denied Motion to Amend

Dear Ms. Maynard:

I have been responsible for research and the development of fire retardant additives and, particularly, fire suppressants and retardants used by municipal, wildland and wildland/urban intermix Departments for more than thirty years. I retired from Monsanto Company in 1985 and formed my own fire suppression and retardant technology consulting business. During all of these fifty five years, many fire retardants and suppressant products were formulated, developed and commercialized by me and those that worked with me. Many of these are currently considered state-of-the-art products and are being used throughout the world for wildland and wildland/urban intermix fire management and control.

I have been a member of the National Fire Protection Association and a contributing member of the Forest & Rural Technical Committee for more than twenty years. I have, also, been a member of the NFPA-11 Foam Technical Committee for many years and the NFPA-18/18A Water Additives Technical Committee since its inception. I am recognized as a Special Expert by all three Committees.

I have observed new products being introduced with only the claims of the vendor as evidence of their advantages. Often the performance advantages are not realized during actual fire use or, alternatively, their disadvantages outweigh their fire ground performance. Specification and Standards writing organizations such as NFPA play a vital role in assisting the user in the identification of products that will provide benefits, describe how best to obtain those benefits while also identifying any risks that their use might pose. Many Departments are small and have limited resources and, consequently, they depend upon organizations such as NFPA to provide them with information that will assist them in accomplishing their goals with, at least, a minimum of toxicological and environmental impact. I think we can all agree that concerns in

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these two areas continue to increase and it would be unthinking if risks were not considered along with effectiveness during the preparation of NFPA Standards. In view of this, both the Forest and Rural and the Water Additives Technical Committees have incorporated toxicological and environmental safeguard requirements in the Standards that they prepare for consideration by the AHJ.

We now have a manufacturing representative of Hazard Control Technologies, Inc. who is also a member of the Water Additives for Fire Control and Vapor Inhibition Technical Committee, appealing the decision of both his Technical Committee and the voting membership to include a aquatic toxicity requirement in the next edition of NFPA-18, Standard for Wetting Agents. It should be recognized that the Committee membership believes that this requirement should be included in the Standard because these retardant and suppressant products do not require containment and, consequently, will often find their way into bodies or water and into municipal water intakes. The Technical Committee membership includes several that are well acquainted with Environmental Protection Agency issues and requirements and other Federal and State Agency toxicology and environmental decisions and have for many years been responsible for identifying and requiring the use of safe and effective products.

The aquatic toxicity requirement in NFPA-18 is, in fact, quite lenient requiring the product to be only “no more than slightly toxic” as indicated by an LC50 concentration of no more than 10 ppm while other similar product are an order of magnitude less toxic. I encourage the Standards Council to reject Hazard Technologies appeal and actually encourage the inclusion of appropriate toxicological and environmental safeguards within appropriate NFPA Standards.

Thank you for hearing my opinion in this matter.

Sincerely

H. L. Vandersall
H. L. Vandersall
President.

Lawdon - for all your burning needs!
Dear Sirs:

My name is Cecilia Johnson.

- I have worked for US Forest Service since 1970, first for Research and currently for the Wildland Fire Chemicals Program located at the Technology and Development Center in Missoula, Montana.
  - During this time my responsibilities have focused on the development of agency specifications for wildland fire chemicals (long-term fire retardants, class A foams, and water enhancers) and the selection and modification of standard test methods from other sources to meet our specific needs.
  - We also develop the performance requirements for these products, including those for environmental protection, and maintain the Qualified Products List (QPL) used by the Forest Service and other federal and state wildland fire agencies: Bureau of Land Management (BLM), National Park Service (NPS), and Bureau of Indian Affairs (BIA) as well as state and international agencies such as California’s CalFire and the Canadian Interagency Forest Fire Center.
- I am a member of NFPA and the Technical Committees on Water Additives (responsible for 18 and 18A) and Forest and Rural Technical Committee since 2002 after serving as SEM for the Class A Foam Standard 1150 (formerly 298) since the first or second edition.

I am writing in support of the committee action to put a performance in place for aquatic toxicity.

I would to share my thoughts related to the toxicity issues, especially aquatic, as reflected in the standards.

One of our goals as a committee is to provide direction and guidance to AHJs on specialized technical aspects that the AHJ may be unfamiliar with such as aquatic toxicity. We need to be especially aware of the needs of the many professional and volunteer organizations that do not have the resources to develop their own plans or hire specialists to assist them.

We need to work to update and improve our documents in response to experience, changing uses, and regulation.

- We must work to protect our natural resources such as fresh water and minimize actions and use of products that may harm the species in the water.
Although use of these products may occur in buildings and industrial areas, they are also used in outside incidents. Products will get into the water ways. Run-off, spills, storm sewer, other drains, and clean up activities are just a few of the ways in which products get into the waterways. Transportation accidents are particularly problematic as they typically involve spilling concentrates, often in large quantities.

**All products may be toxic under the right circumstances and quantities.** Our goal should be to minimize the hazards inherent in predictable events. However exposure to very small amounts of some products is lethal while exposure to much larger amounts of other products may cause minor and temporary distress.

Toxicity to aquatic organisms (represented by rainbow trout, fathead minnows, and other “lab rat” species) is generally assessed by monitoring the effects of immersion in solutions of different concentration which are then absorbed through gills

- Because we are talking about aquatic toxicity we need to deal with LC$_{50}$ values, i.e. LC$_{50}$. The concentration of product in water, usually expressed as milligrams of product in a liter of solution that results
- When dealing with LC$_{50}$ (and LD$_{50}$) bigger is better. Smaller numbers indicate greater toxicity.
- As the concentration is decreased, fewer numbers of organisms die.

Concentration is a major consideration in determining toxicity
- We test the concentrate as likely the most toxic and dilutions will normally be less toxic
- The amount of concentrate in relation to the volume of water determines the extent of dilution and thus toxicity
- Proximity of aquatic organisms to point of entry of product into waterway will also have a big impact on the toxic effect, i.e. how much and how fast is dilution occurring.
- The concentration of a wetting agent in the water that the fish live in will determine the effect on the fish. There, spilling 5 gallons of concentrate would be expected to have a more serious effect than spilling 5 gallons of the mixed product, typically less than 0.25%.

More highly concentrated products may show higher toxicity with the concentrate but may be effective at a greater dilution resulting in lower toxicity of the effective diluted material. Conversely a highly concentrated product may show lower toxicity but may not be effective at the lower concentrations.

Wetting agents or surfactants can interfere with the ability of the gills to absorb oxygen from the water that the fish are in.

Wetting agents are not generally fluorines, not AFFF, not PBDE (home furnishings, electronics insulation, or PCB

**The toxicity test and limits included in NFPA 18 are well established.**

Environmental Protection Agency (EPA) test protocols are used to determine the toxicity of the concentrate (OPPTS 850.1075). These test protocols are very similar to those in ASTM E-729.
The concentration selected as the pass/fail limit is based on EPA Ecological Risk Guidelines (April 1998, Guidelines for Ecological Risk Assessment; USEPA EPA/630/R095/002F). The table below, from the guidelines shows the level of toxicity that was selected as the pass/fail point.

The goal in selecting “Slightly Toxic” was to offer a balance between environmental safety when concentrate is spilled and effectiveness of the mixed product.

<table>
<thead>
<tr>
<th>Lethal Concentration (ppm)</th>
<th>Toxicity Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.1</td>
<td>Very Highly Toxic</td>
</tr>
<tr>
<td>0.1 – 1</td>
<td>Highly Toxic</td>
</tr>
<tr>
<td>&gt; 1 - 10</td>
<td>Moderately Toxic</td>
</tr>
<tr>
<td>&gt; 10 - 100</td>
<td>Slightly Toxic</td>
</tr>
<tr>
<td>&gt; 100</td>
<td>Practically Non-Toxic</td>
</tr>
</tbody>
</table>

96-hr exposures of the fish to the test product in water

From EPA Ecological Risk Guidelines.

Biodegradability, how fast does the product break down in the presence of naturally occurring bacteria (OPPTS 835), is another factor in determining hazard to the environment.

- Biodegradability testing and performance limits are also part of this standard.
- Toxic products may have less impact on the environment depending on how fast they degrade and the nature of the degradation products.
- Most wetting agents and Class A foams are considered to be “readily biodegradable” according to EPA criteria.

The EPA provides direction and guidance on a number of environmental issues, but promulgates rules in a fairly narrow arena.

The Toxic Substances Control Act (TSCA) addresses the hazard associated with individual ingredients. Mixtures of chemical are not included unless there is a reaction to make a new molecule.

Thank you for listening. I appreciate your consideration in this matter.

If you have any questions, please contact me at the address shown above, by phone at 406-329-4819, or email at cjohnson12@fs.fed.us.

Sincerely,

Cecilia Johnson

CECILIA W. JOHNSON
Technical Specialist
Wildland Fire Chemical Systems
Maynard, Mary

Subject: FW: Appeal to NFPA re CAM 18-1 (Comment 18-4)

From: Charles W George [mailto: cwgeorge@hughes.net]
Sent: Friday, July 16, 2010 4:17 PM
To: Maynard, Mary
Subject: RE: Appeal to NFPA re CAM 18-1 (Comment 18-4)

Mary

Thanks for the opportunity to comment. I’m sorry that I have been out of town and unavailable to respond to your note prior to the end of the day. I want to comment, however, that I have read the comments of C.Johnson and concur with her comments and note regarding CAM 18-1. I have discussed the response she is making and understand that this may not constitute a formal comment, but I want to go on record of supporting the position she has taken.

Thanks,
Charles W George
Item 10-8-3
ASSOCIATION AMENDMENT
BALLOT RESULTS

DATE: July 7, 2010

AMENDMENT

Document: NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

Motion: To Accept Comment 25-41

TC PRELIMINARY Ballot Results (Final Ballot due 7/13/10)

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment IS NOT achieving the necessary 2/3 majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the report to be published is 21.

\[\text{21} = \frac{32 \text{ (eligible to vote)}}{2} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 31 \times 0.66 = 20.46\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[\text{32 eligible} \div 2 = 16 + 1 = 17 \text{ (this is the simple majority)}\]

32 Eligible to Vote
1 Not Returned (Drysdale)
20 Agree
11 Do Not Agree (Adams, Andress, Bouchard, Elvove, Fantauzzi, Larrimer, Leavitt, Muno, Saidi, Sheppard, Underwood)
0 Abstentions

Preliminary Action: FAILING
Standards Council Supplemental Agenda

NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

**Amendment:** Accept Comment 25-41

☐ Agree

If you agree with this amendment, the result will be to add text to read as follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible. When observed missing, the owner shall investigate and replace the nameplate.

☐ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to the previous edition text, if any. If there was no previous edition text, the text is deleted. In this case, the text would read as follows:

5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Pipe Schedule Systems do not require the nameplate. The new wording would require the owner to replace the nameplate which was not originally required which is beyond the scope of the standard.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature:

Name - Please Print: GLENN V. ADAMS

Date: 7/1/10

June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

If you agree with this amendment, the result will be to add text to read as follows:
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☒ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to the previous edition text, if any. If there was no previous edition text, the text is deleted. In this case, the text would read as follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:
I agree with the original committee action

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: ___________________________
Name - Please Print: Gary Andress
Date: 7/2/2010

June 2010
NPPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree
If you agree with this amendment, the result will be to add text to read as follows:

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☒ Do Not Agree*
If you do not agree with this amendment, the recommendation is to return to the previous edition text, if any. If there was no previous edition text, the text is deleted. In this case, the text would read as follows:

5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

I do not agree with this amendment. The committee was quite clear in the ballot results (ROP – Reject – Unanimous (Including the submitter, although with negative comment); RQC – Reject – 27 to 2) that it felt the existing paragraph was clear, and that adequate information was included in the appendix material for guidance.

My main concern is the enforcement of the statement, and feel that “requiring” this action should be left to the authority having jurisdiction, as the entire picture, including the hazard of the occupancy, can be considered.

I believe this is what the committee has been indicating... the inspection provides the information that is necessary for the authority having jurisdiction to consider, and the appendix provides guidance and explanation to the authority as well as the owner.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169

FAX: 617-984-7110

Signature: [Signature]
Name - Please Print: JOHN BOUCHARD
Date: 7/1/10
Standards Council Supplemental Agenda
August 3-5, 2010
Page 578 of 1603

NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

☐ Do Not Agree*

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Existing text requires the sign to be inspected quarterly to verify it's attached to the riser and is legible. Moreover, there's not even a requirement to ensure the information contained on the sign is actually accurate - only that it be "legible." Besides, if an "inspector" doesn't see the sign, he will note this in his report; it should be obvious what to do next. Finally, owner's requirements don't belong in Chapter 5. The committee has seen this item twice and voted overwhelmingly both times to not include this language in Chapter 5.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617- 984-7110

Signature: /s/ JWE
Name - Please Print: Joshua W. Elvove
Date: 6/30/2010

June 2010

Standards Council Supplemental Agenda August 3-5, 2010 Page 578 of 1603

Revised Page Number 581 of 813
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

If you agree with this amendment, the result will be to add text to read as follows:
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5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Please find attached Comment.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name: Please Print: [Name]

Date: 7-1-10

June 2010
To: NFPA 25 Committee c/o Jeanne Moreau-Correia  
Re: 25-41 (A2010)  
Log #: #8  
Section: Chapter 5  
Action: Reject  

Comment:

I find no reason to change the committee’s ROP decision which was 27 to 2 to reject and the committee’s statement should stand.

James M. Fantauzzi
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

☐ Do Not Agree* If you do not agree with this amendment, the recommendation is to return to the previous edition text, if any. If there was no previous edition text, the text is deleted. In this case, the text would read as follows:

5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible. When observed missing, the owner shall investigate and replace the nameplate.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

The information accepted in Fig 25-88 in A.5.2.7 is adequate.

In addition, the requirements in chapter 5 are to be performed by the Inspector and this new requirement would be an owner requirement, which are presently covered in Chapter 4.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7116

Signature:

Name - Please Print: PETER A. LARRIMORE

Date: 7-1-10

June 2010
NFPA 25

TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

If you agree with this amendment, the result will be to add text to read as follows:
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☒ Do Not Agree*

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5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

I still agree with the original TC action to "REJECT" and the substantiation that the issue is adequately covered in the Annex.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7130

Signature: [Signature]
Name - Please Print: Russell Leavitt
Date: 6/30/10

June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

☐ Do Not Agree*

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

THE STANDARD SHOULD ALLOW THE OWNER TO

CONTRACT THIS SERVICE.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7170

Signature: 

Name - Please Print: JOHNN MUNRO

Date: 7-2-10

June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

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☒ Do Not Agree*

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☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:
The previous edition text is adequate. If nameplate was observed missing, the course of action would be self-evident to owners.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-999-7110

Signature:

Name - Please Print: John F. Sami
Date: 6/30/10

June 2010
Standards Council Supplemental Agenda

Moreau-Correia, Jeanne

From: Bill Sheppard [jw_sheppard@yahoo.com]
Sent: Friday, June 25, 2010 8:13 AM
To: Moreau-Correia, Jeanne
Subject: Re: NFPA 25 Amendments

Jeanne:

My ballot is as follows:

25-41: Do not agree. Explanation: Existing wording in current document and annex will be sufficient.


thanks.

Bill Sheppard

From: "Moreau-Correia, Jeanne" <jmoreau@NFPA.org>
To: "Walker, Nancy" <nwalker@NFPA.org>; "Moreau-Correia, Jeanne" <jmoreau@NFPA.org>
Sent: Thu, June 24, 2010 2:09:28 PM
Subject: NFPA 25 Amendments

TO: The Technical Committee on Inspection, Testing, and Maintenance of Water-Based Systems

Dear Committee Members:

Attached are the ballot materials for NFPA 25 Amendments. The due date for return of the ballot is Friday, July 2, 2010. Please fax your ballot to 617-984-7110 or email to jmoreaucorreia@nfpa.org (Please note there are two (2) ballots to be returned).

This information has also been posted on your ECommittee Page under the “Ballot Information Heading” and within the “Other Ballots” folder.

If you have any questions, please don’t hesitate to contact me.

Thank you.

Jeanne Moreau
Technical Projects Supervisor
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
Ph: 617-984-7586
Fx: 617-984-7110
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

If you agree with this amendment, the result will be to add text to read as follows:
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☒ Do Not Agree*

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5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

We are telling an Owner what to do in the wrong section - should be in Chapter 4

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Joanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [signature]

Name - Please Print: [signature]

Date: 6-28-10

June 2010
Recommendation:

of private hydrants to properly test the system, this proposal will provide the
ability to the complete satisfaction of the authority having jurisdiction to ensure that
the fire service main is serving. Any flow test results that
be recorded and compared to previous test results and compared to the required
5.3.5.2 For fire sprinkler systems served by a public water main the test shall
be performed every 5 years, then add such a requirement to the owner's section
if the committee feels that an engineering review of the system should be
obtained. Having a single water supply test performed in many parts of the
system demand may not be available. Requiring this comparison
cannot be performed without the latest gradient information and perhaps an
engineering review.

The NFPA 25 technical committee has been careful not to requiring
the systems are sound.

In place of the proposal, I would recommend instead, that the text of 11.2.5
should be adopted: “The dependability of the water supply shall be ensured by
requirements that the fire pump or system maintenance personnel is notified by a municipal source,
on-site storage tanks, a fire pump, or private underground piping systems.”

The NFPA 25 committee has regularly been trying to rewrite the scope. Specifically, the
person/company doing the inspection testing and maintenance should not be
held responsible for ensuring system performance when the original design
parameters are not known or have not been recorded. If the person/company is
required to compare the water supply tests to the system demands, then he will
be responsible for knowing the designs of the systems.

The committee has been attempting to write code requirements that will
ensure that the maintenance person/company is not held responsible for
knowing the original design parameters of the system. The requirements of this
standard, as I understand them, are for testing components. After the testing
per this standard is completed, the company/person can leave the site without
noting any deficiencies, and there is still no implied assurance that the system
will perform as intended (originally designed). See my negative comment on
Proposal 25-8 (Log #105).

The standard should be written to ensure that the system will work as
originally intended and at the same time provide relief for contractors so that
they are not held responsible for information that is not available.

Proposals 25-105 (Log 147) and 25-143 (Log 150)
Backup for Comment Substantiation

1 Hoover, S.

Ballot Results: Affirmative: 24 Negative: 5
Ballot Not Returned: 1

Report Summary:

2. The proposal has the potential for significant cost to the owner with no
benefit. It requires an engineering review.

1. No guidance for what constitutes a “deterioration of available waterflow.”

2. The proposal has the potential for significant cost to the owner with no
benefit. It requires an engineering review.

Comment on Affirmative:

ELBOVE, J.: I concur in concept with this change, however, the proponent
needs to delete the mandatory reference in 5.3.5.2 to NFPA 291, since NFPA
291 is a recommended practice. The proponent should refer to similar action
taken by the committee on 25-124, (Log #148) on how to properly reference
NFPA 291.

LARRIMER, P.: Accepting this proposal requires that all sprinkler system
designs fed by a water supply need to be known so that the results of the water
supply testing can be compared to the demand of the systems. While I agree
that this is a good thing to do and should be done, it appears to go against what
the committee has been trying to do in rewriting the scope. Specifically, the
person/company doing the inspection testing and maintenance should not be
held responsible for ensuring system performance when the original design
parameters are not known or have not been recorded. If the person/company is
required to compare the water supply tests to the system demands, then he will
be responsible for knowing the designs of the systems.

The committee has been attempting to write code requirements that will
ensure that the maintenance person/company is not held responsible for
knowing the original design parameters of the system. The requirements of this
standard, as I understand them, are for testing components. After the testing
per this standard is completed, the company/person can leave the site without
noting any deficiencies, and there is still no implied assurance that the system
will perform as intended (originally designed). See my negative comment on
Proposal 25-8 (Log #105).

The standard should be written to ensure that the system will work as
originally intended and at the same time provide relief for contractors so that
they are not held responsible for information that is not available.
Recommendation:

The pump performance shall be evaluated using the unadjusted flow rates and pressures to ensure the pump can supply the system demand.

Substantiation:
The performance of the pump in relation to the system demand can only be properly determined using the unadjusted flow rates and pressures. Using the affinity laws will only compare the current pump performance to the original shop test curve, not the actual pump performance at the time of the test.

Committee Meeting Action: Accept
Number Eligible to Vote: 30
Ballot Results: Affirmative: 28 Negative: 1
Ballot Not Returned: 1 Hoover, S.

Explanation of Negative:

VICTOR, T.: The NFPA 25 technical committee has been careful not to requiring comparing fire pump test results to the actual system demand because the system demand may not be available. Requiring this comparison will put an unreasonable burden on the person performing the flow test to obtain the system demand information. Again an engineering review may be required to perform this comparison.

If the committee feels that an engineering review of the system should be performed every five years, then add such a requirement to the owner’s section in chapter 4, and move this flow test requirement to that section.

Comment on Affirmative:

LARRIMER, P.: See my comment on Proposal 25-105 (Log #147).
UNDERWOOD, D.: The pump performance shall be evaluated by plotting the pump curve.

Committee Statement:
The annex material provides sufficient information and the sentence proposed for the main paragraph is not necessary.

Number Eligible to Vote: 30
Ballot Results: Affirmative: 29
Ballot Not Returned: 1 Hoover, S.

Comment on Affirmative:

RAY, R.: This proposal should be accepted as submitted. The proposed language “When observed missing, the owner shall investigate and replace if necessary,” should not be struck and the proposal should be accepted as submitted. What is the purpose of accepting 25-143 (Log #150) which requires the fire pump test results be verified to be able to “supply the system demand” if the simplest method of determining the system demand (the hydraulic nameplate) is missing and not required to be replaced? Also, what is the purpose of accepting 25-105 (Log #147) which requires that the results of water supply tests conducted every 5 years be “compared to the required system demand” for the same reason as above? Accepting this proposal “in part” will make the new language that is being accepted in 25-143 (Log #150) & 25-105 (Log #147) unenforceable in many instances. The lack of a hydraulic nameplate will cause economic hardships on property owners as the information provided on the hydraulic nameplate is critical in performing evaluations of a system’s capability when dealing with occupancy changes. When a hydraulic nameplate is missing, determining a system’s capability usually requires field survey work of the system and its components, and the performance of hydraulic calculations – thus forcing a property owner to be burdened with costs to perform an analysis that would be much simpler and less expensive to perform if the hydraulic nameplate were required to be in place and/or replaced if missing.
ASSOCIATION AMENDMENT
BALLOT RESULTS

DATE: July 13, 2010

AMENDMENT

Document: NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

Motion: To Accept Comment 25-41

TC FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment HAS NOT achieved the necessary $\frac{2}{3}$ majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the report to be published is 21.

$[32 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 31 \times 0.66 = 20.46]$

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

$[32 \text{ eligible} \div 2 = 16 + 1 = 17 \text{ (this is the simple majority)}]$

32 Eligible to Vote
1 Not Returned (Drysdale)

20 Agree
11 Do Not Agree (Adams, Andress, Bouchard, Elvove, Fantauzzi, Larrimer, Leavitt, Muno, Saidi, Sheppard, Underwood)
0 Abstentions

Final Action: FAIL
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

If you agree with this amendment, the result will be to add text to read as follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible. When observed missing, the owner shall investigate and replace the nameplate.

☐ Do Not Agree*

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5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Pipe Schedule Systems do not require the nameplate. The new wording would require the owner to replace the nameplate, which was not originally required which is beyond the scope of the standard.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7410

Signature: __________________________

Date: ____/____/2010

Name - Please Print: __________________________

June 2010
Amendment: Accept Comment 25-41

☐ Agree

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☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

I agree with the original committee action

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: __________________________
Name - Please Print: Gary Andress
Date: 7/2/2010

June 2010
NPPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

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☒ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to the previous edition text, if any. If there was no previous edition text, the text is deleted. In this case, the text would read as follows:

5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

I do not agree with this amendment. The committee was quite clear in the ballot results (ROP – Reject – Unanimous (Including the submitter, although with negative comment); ROQ – Reject – 27 to 2) that it felt the existing paragraph was clear, and that adequate information was included in the appendix material for guidance.

My main concern is the enforcement of the statement, and feel that “requiring” this action should be left to the authority having jurisdiction, as the entire picture, including the hazard of the occupancy, can be considered.

I believe this is what the committee has been indicating… the inspection provides the information that is necessary for the authority having jurisdiction to consider, and the appendix provides guidance and explanation to the authority as well as the owner.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169

FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: JOHN BOUCHARD

Date: 7/1/10
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

☑ Do Not Agree*

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Existing text requires the sign to be inspected quarterly to verify it’s attached to the riser and is legible. Moreover, there’s not even a requirement to ensure the information contained on the sign is actually accurate - only that it be "legible." Besides, if an "inspector" doesn’t see the sign, he will note this in his report; it should be obvious what to do next. Finally, owner’s requirements don’t belong in Chapter 5. The committee has seen this item twice and voted overwhelmingly both times to not include this language in Chapter 5.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: /s/ JWE

Name - Please Print: Joshua W. Elvove

Date: 6/30/2010

June 2010
Supplemental Attachment 10-8-3-a
Page 6 of 15

NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

If you agree with this amendment, the result will be to add text to read as follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be
inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible. When
observed missing, the owner shall investigate and replace the nameplate.

X Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to the previous edition text, if
any. If there was no previous edition text, the text is deleted. In this case, the text would read as
follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be
inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

Please find attached comment.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature

Name, Please Print: James M. Fantauzzi

Date: 7-1-10

June 2010

Standards Council Supplemental Agenda
August 3-5, 2010
Page 594 of 1603
Revised Page Number 597 of 813
To:  NFPA 25 Committee c/o Jeanne Moreau-Correia  
Re:  25-41 (A2010) 
Log #  #8 
Section  Chapter 5 
Action:  Reject 

Comment: 

I find no reason to change the committee’s ROP decision which was 27 to 2 to reject and the committee’s statement should stand. 

James M. Fantauzzi
Standards Council Supplemental Agenda  

NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

If you agree with this amendment, the result will be to add text to read as follows:

5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible. When observed missing, the owner shall investigate and replace the nameplate.

☒ Do Not Agree*  

If you do not agree with this amendment, the recommendation is to return to the previous edition text, if any. If there was no previous edition text, the text is deleted. In this case, the text would read as follows:

5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

The information accepted in RCP 25-88 in A.5.2.7 is adequate.

In addition, the requirements in chapter 5 are to be performed by the Inspector and this new requirement would be an owner requirement, which are presently covered in chapter 4.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeannine Moreau  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-984-7110

Signature: [Signature]
Name – Please Print: Peter A. Larrime
Date: 7/1/10

June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

If you agree with this amendment, the result will be to add text to read as follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible. When observed missing, the owner shall investigate and replace the nameplate.

☒ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to the previous edition text, if any. If there was no previous edition text, the text is deleted. In this case, the text would read as follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

I STILL AGREE WITH THE ORIGINAL TC ACTION TO “REJECT” AND THE SUBSTANTIATION THAT THE ISSUE IS ADEQUATELY COVERED IN THE ANNEX.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Morneau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [signature]

Name - Please Print: RUSSELL LEAVITT

Date: 6/30/10

June 2010
Amendment: Accept Comment 25-41

☐ Agree  
If you agree with this amendment, the result will be to add text to read as follows:

5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be
inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible. When
observed missing, the owner shall investigate and replace the nameplate.

☒ Do Not Agree*  
If you do not agree with this amendment, the recommendation is to return to the previous edition text, if
any. If there was no previous edition text, the text is deleted. In this case, the text would read as
follows:

5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be
inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

_______________________________
The standard should allow the owner to contract this service.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanine Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7170

Signature: _______________________

Name - Please Print: _______________________

Date: ________________

June 2010
Supplemental Attachment 10-8-3-a
Page 11 of 15

NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

If you agree with this amendment, the result will be to add text to read as follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible. When observed missing, the owner shall investigate and replace the nameplate.

☒ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to the previous edition text, if any. If there was no previous edition text, the text is deleted. In this case, the text would read as follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:
The previous edition text is adequate. If nameplate was observed missing, the course of action would be self-evident to owners.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-994-7110

Signature: [Signature]
Name - Please Print: [Name]
Date: 6/30/10

June 2010
Moreau-Correia, Jeanne

From: Bill Sheppard [jw_sheppard@yahoo.com]
Sent: Friday, June 25, 2010 8:13 AM
To: Moreau-Correia, Jeanne
Subject: Re: NFPA 25 Amendments

Jeanne:

My ballot is as follows:

25-41: Do not agree. Explanation: Existing wording in current document and annex will be sufficient.


thanks.

Bill Sheppard

From: "Moreau-Correia, Jeanne" <jmoreau@NFPA.org>
To: "Walker, Nancy" <nwalker@NFPA.org>; "Moreau-Correia, Jeanne" <jmoreau@NFPA.org>
Sent: Thu, June 24, 2010 2:09:28 PM
Subject: NFPA 25 Amendments

TO: The Technical Committee on Inspection, Testing, and Maintenance of Water-Based Systems

Dear Committee Members:

Attached are the ballot materials for NFPA 25 Amendments. The due date for return of the ballot is Friday, July 2, 2010. Please fax your ballot to 617-984-7110 or email to jmoreau correia@nfpa.org (Please note there are two (2) ballots to be returned).

This information has also been posted on your ECommittee Page under the "Ballot Information Heading" and within the "Other Ballots" folder.

If you have any questions, please don't hesitate to contact me.

Thank you.

Jeanne Moreau
Technical Projects Supervisor
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
Ph: 617-984-7586
Fx: 617-984-7110
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-41)

Amendment: Accept Comment 25-41

☐ Agree

If you agree with this amendment, the result will be to add text to read as follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be
inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible. When
observed missing, the owner shall investigate and replace the nameplate.

☒ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to the previous edition text, if
any. If there was no previous edition text, the text is deleted. In this case, the text would read as
follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be
inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

We are telling an Owner what to do in the wrong section - should be in
Chapter 4.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Joanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature:

Name - Please Print: DARRELL W. UNDERWOOD

Date: 6-28-10

June 2010
Proposals 25-105 (Log 147) and 25-143 (Log 150) Backup for Comment Substantiation

25-105 Log #147

Final Action: Accept

(5.3.5, 5.3.5.1, 5.3.5.2 (New))

Submitter: James M. Feld, Feld Engineering

Recommendation: Add new text to read as follows:

5.3.5 Water Supply Test. A water supply test shall be conducted for fire sprinkler systems at a frequency not to exceed 5 years.

Statement:

Statement:

Substantiation: Chapter 7 deals with private fire service mains. Since many fire sprinkler systems are supplied by public water mains without the benefit of private hydrants to properly test the system, this proposal will provide the guidance of how to test the water supply.

Committee Meeting Action: Accept

Number Eligible to Vote: 30
Submitter: James M. Feld, Feld Engineering
Recommendation: Add new text to read as follows:
8.3.5.7 The pump performance shall be evaluated using the unadjusted flow rates and pressures to ensure the pump can supply the system demand.
Substantiation: The performance of the pump in relation to the system demand can only be properly determined using the unadjusted flow rates and pressures. Using the affinity laws will only compare the current pump performance to the original shop test curve, not the actual pump performance at the time of the test.
Committee Meeting Action: Accept
Number Eligible to Vote: 30
Ballot Results: Affirmative: 28 Negative: 1
Ballot Not Returned: 1 Hoover, S.
Explanation of Negative:
VICTOR, T.: The NFPA 25 technical committee has been careful not to requiring comparing fire pump test results to the actual system demand because the system demand may not be available. Requiring this comparison will put an unreasonable burden on the person performing the flow test to obtain the system demand information. Again an engineering review may be required to perform this comparison.
If the committee feels that an engineering review of the system should be performed every five years, then add such a requirement to the owner’s section in chapter 4, and move this flow test requirement to that section.
Comment on Affirmative:
LARRIMER, P.: See my comment on Proposal 25-105 (Log #147).
UNDERWOOD, D.: The pump performance shall be evaluated by plotting the pump curve.

Recommendation:
Submitted: Kenneth E. Isman, National Fire Sprinkler Association, Inc.
Recommendation: Insert a new sentence at the end of 5.2.7 and to the end of the annex as follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible. When observed missing, the owner shall investigate and replace if necessary.
A.5.2.7 The hydraulic nameplate should be secured to the riser with durable wire, chain, or equivalent. The hydraulic nameplate can provide useful information to the owner. If the nameplate is missing, the owner should contact a design professional to determine the demand for the system which can be written on a new nameplate. (See Figure A.5.2.7)
Substantiation: Guidance is needed for owners who do not have nameplates attached.
Committee Meeting Action: Accept in Part
Revise text to read as follows:
5.2.7* Hydraulic Nameplate. The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible. When observed missing, the owner shall investigate and replace if necessary.
A.5.2.7 The hydraulic nameplate should be secured to the riser with durable wire, chain, or equivalent. The hydraulic nameplate can provide useful information to the owner. If the nameplate is missing, the owner should contact a design professional to determine the demand for the system which can be written on a new nameplate. (See Figure A.5.2.7)
Committee Statement: The annex material provides sufficient information and the sentence proposed for the main paragraph is not necessary.
Number Eligible to Vote: 30
Ballot Results: Affirmative: 29
Ballot Not Returned: 1 Hoover, S.
Comment on Affirmative:
RAY, R.: This proposal should be accepted as submitted. The proposed language “When observed missing, the owner shall investigate and replace if necessary” should not be struck and the proposal should be accepted as submitted. What is the purpose of accepting 25-143 (Log #150) which requires the fire pump test results be verified to be able to “supply the system demand” if the simplest method of determining the system demand (the hydraulic nameplate) is missing and not required to be replaced? Also, what is the purpose of accepting 25-105 (Log #147) which requires that the results of water supply tests conducted every 5 years be “compared to the required system demand” for the same reason as above? Accepting this proposal “in part” will make the new language that is being accepted in 25-143 (Log #150) & 25-105 (Log #147) unenforceable in many instances. The lack of a hydraulic nameplate will cause economic hardships on property owners as the information provided on the hydraulic nameplate is critical in performing evaluations of a system’s capability when dealing with occupancy changes. When a hydraulic nameplate is missing, determining a system’s capability usually requires field survey work of the system and its components, and the performance of hydraulic calculations – thus forcing a property owner to be burdened with costs to perform an analysis that would be much simpler and less expensive to perform if the hydraulic nameplate were required to be in place and/or replaced if missing.
Dear Ms. Fuller,  
Pursuant to your request, below please find the reasons that I feel that Comment 25-41 should be accepted.  
Thx,  
Richard M. Ray  

1) The hydraulic nameplate identifies the design criteria of the system, the calculated hydraulic demand as well as a description of the occupancy that the system was designed to protect. This is valuable information for the owner.  

2) My motion in Las Vegas was to add the requirement to replace the hydraulic nameplate if found missing in to the text since the tables are inconsistent (as I pointed out in Las Vegas at the Association Technical Meeting, I had two different printed versions of NFPA 25 with me in Vegas: in one, table 5.5.1 includes requirements for "informational components" like hydraulic nameplates; in the other copy of 25 I had, there is no such information in table 5.5.1). I was told that they are different printings of the book, but what happens if people only bought ONE and it was the wrong one. Also, my NFPA official subscription service copy is includes the incorrect version of table 5.5.1, and I have never received an errata or addendum.  

3) At the ROP meeting, the Committee removed the requirement that “when observed missing the owner shall investigate and replace the nameplate” from a proposal, BUT the committee accepted new requirements such as Proposal 25-143 & subsequently Comment 25-76 which requires “the fire pump performance to be evaluated to ensure the pump can supply the system demand as supplied by the owner”. How can the owner supply this information if the nameplate is missing and is not required to be replaced? This is an unnecessary burden on the owner and requires him or her to do something that they may be incapable of doing.  

4) At the ROC meeting the committee substantiation to not accept my comment was that “the appendix makes the requirement to replace the nameplate clear”. BUT THE APPENDIX IS NOT ENFORCEABLE. The intent of 25 is clear but not being communicated clearly (INCONSISTENT TABLES).  

5) Also, the nameplate is extremely valuable in helping owners evaluate systems following occupancy changes.  
Richard M. Ray
Fire Protection Company, and I make it a motion to accept Comment 25-41.

RALPH GERDES: Is there a second?

(Second.)

RALPH GERDES: Okay. Proceed.

RICH RAY: What this comment and this issue is about is about hydraulic nameplates. For some people in the room you might know them as -- they used to be called hydraulic placards, okay, so that's what this proposal is about.

And for some people who may not be familiar with what even a hydraulic placard or hydraulic nameplate is, the hydraulic nameplate identifies the design criteria of the fire sprinkler system. It identifies the calculated hydraulic demand of the system as well as a description of the occupancy that the system was designed to protect.

My motion is simply to add the requirement to replace the hydraulic nameplate that's found missing in the text. That's all I want to do, and I'm going to show you something. I'm not supposed to have props, but they're NFPA books that I thought that would be our...

Copies of NFPA 25 here. I brought them out. John knows what I'm going to do. I had these at the ROC meeting.

I got two copies. They're both valid copies.
They're not copies like, you know, Xerox. They're the same edition, the 2008 edition. Now, this one, if you go to page 16 in the table, there's a table, it says -- it's under "Informational components." Hydraulic placards, you have to replace them if they're missing.

Now I go to this -- this copy and I go to the same page and somehow it's a different table. This table ends with inspectors test connection. It doesn't even talk about the placards. So it got printed wrong. I have no idea. I'm not a printer. I'm not an MPI. I have no idea how that happened.

All I want to do is add the words in the text. The text, sorry, currently says, "The hydraulic nameplate for hydraulic (indiscernible) systems shall be inspected quarterly to verify that it's attached securely to the riser and is legible," and I just want to add the words "and shall be replaced if found missing."

The tables are no good. I have two versions of the book that are different. The committee says well, let's put it in the appendix. We'll, you've heard a lot of discussion tonight. The appendix isn't enforceable, and hydraulic placards are very useful to owners like Josh and some of the owners in here who have spoken.

When an occupancy change occurs in a building,
if they're going to move a different process into this facility or change the way that they store their products, they need to know how that affects the fire sprinkler system. We just got done discussing that. We just got done discussing it's the owner's responsibility.

If the placard is there, it makes my job as a fire protection engineer very simple. I can tell what the system is designed for. I go look and see what the new proposed occupancy is going to be. If the two match, we're in good shape.

The problem is if it's not there. If it's not there, then I got to tell the owners in the room well, guys, guess what? Now I got to get a lift out here, I got to get up at the deck, I got to check the orifices of the head, I got to verify the temperature of the head, I got to make sure those are 2-inch branch lines and not two and a half inch branch lines that are 30 feet in the air.

A lot of cost, a lot of headaches for owners. That's all I want to do is add the words into the text of the standard which is a comment that we rejected. Thank you.

RALPH GERDES: Thank you.

Mr. Bouchard.
JOHN BOUCHARD: I know that Ray is passionate and has raised the issue of the different tables. As a matter of fact, I'm not sure if we ever found out an answer to that, but it was an anomaly and it was interesting to discover that way back when.

However, I will indicate that Ray actually reiterated the committee statement in the rejection statement for this -- his comment and basically indicated that it is covered in the annex. And in addition, the comment was rejected overwhelmingly.

RALPH GERDES: Thank you.

I'll go to Mic 5.

RICH RAY: I'll reiterate again. I think it's very important putting it in the appendix. To me it's no good.

RALPH GERDES: You are speaking for the motion?

RICH RAY: Yes, sir. I'm sorry. The appendix is not enforceable. It's a big help to me as a designer and big help to owners when it comes to occupancy changes. We just got done talking for a half an hour that if an occupancy changes in a building, the owner has to do something. I'm trying to make that something easier for him. That's all. That's all.

RALPH GERDES: Thank you.

Mic 4.
JOSH ELVOVE: Josh Elvove with the U.S. General Service Administration speaking against a motion for a change.

"Owner shall" -- this is Chapter 5, "Owner shall" -- I thought we talked about the "owner shall" is supposed to be in Chapter 4. I'm not going to debate the importance of the sign, even though if the sign's there, it has Mickey Mouse on it, that's probably -- it's okay. I mean, there's no validation of the actual data on the nameplate. It's basically it's there.

I mean, I think we need to get our priorities straight here. We're talking about having a sign, we're talking about having sprinklers. You obviously reject to having sprinklers, but that's not that important or it's not in the scope. But here we're going to go for a sign.

So I'm speaking against this on a principle. It doesn't belong in Chapter 5, it belongs anywhere, and although I thank Mr. Ray for the consideration, I don't think it belongs here. I urge you to reject this.

RALPH GERDES: Thank you.

Mic 5.

RICH RAY: You can't compare it to, you know, not wanting to identify where sprinklers are. That's a design issue. We've been through that for the last two
1 and a half hours.

RALPH GERDES: You're speaking for or against the motion?

RICH RAY: I'm sorry. I'm speaking for my motion. NFPA 13 requires the sign. It can't have a picture of Mickey Mouse on it, Josh, or you can't get a certificate of occupancy, okay? It's not going to have a picture of Mickey Mouse.

If you use the right table with the right book, you see that it's required. If you happen to have a deviations with the wrong table, it's not required. Oh, but it's in the appendix. That isn't enforceable. Well, Josh wants me to verify the design of the system. Hey, Josh, I got to rent a lift. That $50 job just went up five, ten times. I don't know what else to say.

RALPH GERDES: Thank you.

Mic 1.

JIM FELD: Jim Feld, University of California, speaking in favor. I don't think anybody here can minimize the importance of the hydraulic nameplate. And in the new edition of 13, we're going to hydraulic information signs that provide even more information.

This information is critical to having this -- having any system perform as we want it to do for the longevity of the system.
Now, bear in mind that in Chapter 13, Section 3.3.1, we're required to put a sign on every control valve to say that it is a control valve. We're going to make sure that's done, but if the hydraulic nameplate's missing, well, maybe we don't really need it. It just doesn't make sense.

So if we're going to put control valve signs on control valves that are obviously control valves, then why not have the hydraulic information signs because that's going to solve a lot of problems later on when there's changes in occupancy, changes in water supply, changes in processing, all the other things that 415 and 416 require the owner to do.

And that the owner's required to do it. And this is stuck in Chapter 5, is still legitimate because the first line of defense in this is that the contractor identifies that the nameplate is missing, then the owner steps in.

So it's not strictly just an owner responsibility that should be in Chapter 4. It's appropriately in Chapter 5. Thank you.

RALPH GERDES: Thank you.

RICH RAY: Let everyone know, the nice lady who's in charge of making these books --
RALPH GERDES: Name, affiliation --

RICH RAY: Rich Ray, Cyborg Fire Protection, speaking in favor of the motion. This nice lady from NFPA just explained to me how to figure out what printing of the book it is.

The first printing is the one that doesn't say it has to be replaced. The subsequent -- the other book is a subsequent printing. So somebody found this mistake before I did. To me that shows the importance of this. It was important for NFPA to then change the book and print it correctly.

So all I want to do is add those simple words to the text, and when it is missing, the owner shall replace it. Just the chart says in the correct version.

Thank you.

RALPH GERDES: Thank you.

Mr. Bouchard, any final comments?

JOHN BOUCHARD: No. I was hoping a couple of other committee members might -- might get up and say something, but I feel that this could go either way and personally I don't worry about it. I support the committee, however, which again overwhelmingly defeated it after much discussion. It was not done surreptitiously.

RALPH GERDES: Thank you.
We're going to move to the motion. The motion is to accept Comment 25-41. All those in favor, please raise your hand.

(Raising Hands.)

RALPH GERDES: Thank you.

All those opposed?

(Raising Hands.)

RALPH GERDES: I think I'm going to have to go to a standing count.

All those in favor of the motion to accept Comment 25-41, please stand.

(Standing.)

RALPH GERDES: Thank you. You can be seated.

All those opposed to the motion, please stand.

(Standing.)

RALPH GERDES: Thank you. You can be seated.

That motion passes. The vote was 52 to 35.

We're going to move on to motion sequence 25-12.

Microphone 5.

KENNETH ISMAN: Thank you. Kenneth Isman for the National Fire Sprinkler Association and I move my comment -- I move to accept my comment, 25-65.

RALPH GERDES: Is there a second?

(Second.)

RALPH GERDES: I heard a second. You can
ASSOCIATION AMENDMENT
BALLOT RESULTS

DATE: July 7, 2010

AMENDMENT


Motion: To Accept Comment 25-104 and 25-101

TC PRELIMINARY Ballot Results (Final Ballot due 7/13/10)

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment **IS NOT** achieving the necessary 2/3 majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the report to be published is **19**.

\[32 \text{ (eligible to vote)} - 2 \text{ (not returned)} - 2 \text{ (abstentions)} = 28 \times 0.66 = 18.48\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[32 \text{ eligible} \div 2 = 16 + 1 = 17 \text{ (this is the simple majority)}\]

<table>
<thead>
<tr>
<th>32 Eligible to Vote</th>
<th>2 Not Returned (Drysdale and Whitney)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Option 1</strong></td>
<td>2 Agree to Reject Both Comments</td>
</tr>
<tr>
<td></td>
<td>(Fantauzzi, Leavitt)</td>
</tr>
<tr>
<td></td>
<td>8 Agree to Accept Comment 25-101</td>
</tr>
<tr>
<td></td>
<td>(Adams, Elvove, Lake, Larrimer, Muno, Saidi, Underwood w/comment)</td>
</tr>
<tr>
<td><strong>Option 2</strong></td>
<td>18 Agree to Accept Comment 25-104</td>
</tr>
<tr>
<td></td>
<td>(Andress, Feld, Fleming, Fuller, Keeping, Linder, Ray w/comment)</td>
</tr>
<tr>
<td><strong>Option 3</strong></td>
<td>2 Abstentions</td>
</tr>
<tr>
<td></td>
<td>(Bouchard, Stein)</td>
</tr>
</tbody>
</table>

Preliminary Action: Failing
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:  Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

☐ Option 1: REJECT BOTH COMMENTS
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

☐ Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

SEE ATTACHED.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Mreassy
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature:

Name - Please Print:   RUSSELL LEAVITT

Date: (06/30/10)
June 2010
Comment on Voting for Option 1
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 Association Amendment

Although I originally voted to accept comment 104 with the TC, after carefully reviewing the comments given with the negative votes and the obvious "confusion" that resulted in the general membership voting to accept both comments 104 and 101 it is clear to me that there is still much work to do before any revisions are acceptable. Therefore, I believe that we should leave the wording as is currently in the 2008 edition and work to resolve the many outstanding issues during the next revision cycle.
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:  Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

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If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

Please find attached comments.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-794-7110

Signature: ________________________________

Name: Please Print: ____________________________

Date: ________. _______ 2010

June 2010
To: NFPA 25 Committee c/o Jeanne Moreau-Correia  
Re: 25-104  
Log # CC5  
Section Chapter 14  
Action: Reject both comments and return to previous edition text  

Comment:  
I have some reservation on how 25-104 reads which may increase cost and place an undo burden upon the end user of the 25 Document.  
Secondly, I have reviewed NFPA-13, IBC and NYS Building Code and cannot find a clean clear-cut definition of what is a system. The implication of A.14.2.3 may automatically define what is considered a zone, sectional, and a sub-system or isolation valve, as a system. Log # CC5 appears to define what a system is which has far reaching ramification in relationship to other inspection and testing function and may be used by other codes and standards as a definition. I feel that it is NFPA-13 committee's position and responsibility to determine the definition of what a system is and not that of the NFPA-25 committee.  

Re: Comment 25-101  
Log #98  
Section Chapter 14  
Action: Reject both comments and return to previous edition text  

Comment:  
Comment 25-101 is somewhat convoluted, weakens the current chapter 14 and leaves the user confused on what should be done and when to do it.

James M. Fantauzzi
**NFPA 25**

**TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems**

**June 2010 ASSOCIATION AMENDMENT**

(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

☐ Option 1: REJECT BOTH COMMENTS
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

☒ Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

☒ Accept Comment 25-101 (see Attachment A to see the resulting text)
☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

**BALLOT COMMENTS.** Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot.)

Current requirements need clarification which is done in Comment 25-101. Comment 25-104 removed the internal inspection requirement which is needed and relies solely on external factors.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: [Name]

Date: 7/1/10

June 2010
NFPA 25  
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems  
June 2010 ASSOCIATION AMENDMENT  
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:  Accept Comment 25-101 (see Attachment A to see the resulting text)  
Accept Comment 25-104 (see Attachment B to see the resulting text)  

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If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

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☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

Despite the fact that 25-101 removes the mandatory 5 year internal inspection requirement, it appears to be the less radical change to chapter 14 than 25-104. 25-101 makes 5 additional changes but they truly are formatting changes that set up the flow of chapter 14 to establish that purpose of obstruction investigations is to “ensure that piping remains clear of all obstructive foreign matter”; that internal inspections are triggered as a result of any one of the 14 established conditions; and that flushing is required when there is sufficient material noted that obstructs any portion of the sprinkler system. 25-104 tries to do too much and actually adds 11 new line items to the chapter (many of which were newly created during ROC) that have their own shortcomings (e.g., exempting non-metallic pipe from internal inspections, requiring the most remote branch on dry pipe systems to be internally inspected, exempting inaccessible pipe from internal inspections, permitting "systems" – which are not clearly defined – to be internally inspected every other 5 years, adds new contradictory annex material regarding what is sufficient to permit this alternative inspection frequency). Because of these issues, I cannot support 25-104.

I Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature:  [s/ JWE ]

Name - Please Print: Joshua W. Elvove

Date:  6/25/2010

June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:
- Accept Comment 25-101 (see Attachment A to see the resulting text)
- Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

[ ] Option 1: REJECT BOTH COMMENTS
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Accordingly, you are recommending returning Chapter 14 to previous edition text.

[ ] Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

[ ] Accept Comment 25-101 (see Attachment A to see the resulting text)

[ ] Accept Comment 25-104 (see Attachment B to see the resulting text)

[ ] Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

I still don't agree that CPVC or Non-metallic pipe should be exempted. Obstructions can still occur due to other factors, such as rocks, glue, pieces of pipe and other debris.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanna Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: [Janualice]

Date: 6/24/2010

June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
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☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

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BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

Based on the data from the NFPA report dated February 2010 by John A. Hall, Jr., titled "US Experience with Sprinkler and Other Automatic Fire Extinguishing Equipment now available, it is clear the mandatory 5 year requirement to inspect sprinkler systems was not warranted. Inspections will only be required when there is due cause.

Please return as soon as possible, but no later than Vriday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: Peter A. Larrimee

Date: 7-1-10
June 2010

The problems identified in the negative votes on 25-104 show some of the problems that could be included in the document if comment 25-104 was to be accepted.
Revised Page Number 626 of 813
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:  Accept Comment 25-101 (see Attachment A to see the resulting text)
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☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

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BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

There is consensus of the need for internal inspection of the piping to “ensure that piping remains clear of all obstructive foreign matter” when there are triggers as established in Chapter 14 indicating due cause but should be not mandated as universal requirement regardless of system conditions and history. Comment 25-101 accomplishes this objective and appears to be a more rational and the less radical change to the chapter.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-944-7110

Signature: [Signature]
Name - Please Print: [John P. Sandi]
Date: 6/20/10
June 2010
Standards Council Supplemental Agenda

August 3-5, 2010

NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:
Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

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☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

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BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

I still need a reason to show me there is a problem before taking systems apart.

______________________________________________________________

______________________________________________________________

______________________________________________________________

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Joanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: [Signature]

Date: June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:  Accept Comment 25-101 (see Attachment A to see the resulting text)
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☒ Accept Comment 25-104 (see Attachment B to see the resulting text)

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I agree with comment 25-101 (CC5) and agree with the committee action.

I disagree with comment 25-104 and support the committee action that supports the 5 year internal inspection frequency.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: __________________________

Name – Please Print: Gary Andress
Date: 7/2/2010
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
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Accordingly, you are recommending returning Chapter 14 to previous edition text.

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Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually
inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☒ Accept Comment 25-104 (see Attachment B to see the resulting text)

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BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why
you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are
optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional
sheets may be attached to this ballot).

Comment: I believe the 5 year frequency is necessary. We have found pipe heavily corroded and
obstructed as well as valves.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02199
FAX 617-984-7110

Signature: [Signature]

Name: Please Print: [Name]

Date: 7/1/10

June 2010
Standards Council Supplemental Agenda

August 3-5, 2010
Page 628 of 1603

NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

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☒ Accept Comment 25-104 (see Attachment B to see the resulting text)

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COMMENT 25-104 WAS A COMMITTEE COMMENT INTENDED TO HELP IMPROVE UNDERSTANDING AND ENFORCEMENT OF THE 5-YEAR RANDOM INTERNAL INSPECTION THAT WAS ADDED IN THE 2002 EDITION. IT FAILED BALLOT BY A SINGLE VOTE, WITH SOME MEMBERS CLAIMING IT WAS TOO SEVERE AND OTHERS TOO LAX. COMMENT 25-104 WOULD ELIMINATE THE INSPECTION ALTOGETHER AND WOULD BE A STEP BACKWARD. I'M CONCERNED THAT THE BALLOT PACKAGE DOES NOT MAKE THIS ELIMINATION CLEAR THROUGH THE USE OF LEGISLATIVE TEXT.

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: R. Fleming

Date: 7/1/10

June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems

June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
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Accordingly, you are recommending returning Chapter 14 to previous edition text.

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☐ Accept Comment 25-101 (see Attachment A to see the resulting text)

☒ Accept Comment 25-104 (see Attachment B to see the resulting text)

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BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why
you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are
optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional
sheets may be attached to this ballot).

My understanding is that if neither of these amendments pass ballot,
the text will return to the flawed text of the previous edition. Therefore
I am supporting 25-104.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
I Battery Row Park
Quincy, MA 02169
FAX: 617-984-7110

[Signature]

Name - Please Print: David B. Fuller
Date: July 1, 2010
June 2010
NFPA 25  
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems  
June 2010 ASSOCIATION AMENDMENT  
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:  Accept Comment 25-101 (see Attachment A to see the resulting text)  
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

☐ Option 1: REJECT BOTH COMMENTS  
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending retaining Chapter 14 to previous edition text.

☐ Option 2: ACCEPT ONE COMMENT  
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)

☑ Accept Comment 25-104 (see Attachment B to see the resulting text)

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SEE ATTACHED SHEET

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moser  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: [Name]

Date: [Date]

June 2010
NFPA 25
TC Ballot for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 Association Amendment
(To accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Regarding this issue, I opt for Option 2, to Accept One Comment.

The Comment that I vote to Accept is Comment 25-104.

I do agree with the need to internally inspect the piping every 5 years, in an effort to proactively look for potential problems, before they can impact on system performance in the event of a fire.

During the ROC balloting I actually voted against this comment, because I feel it has some inconsistencies, which I spoke to in my ballot statement. However, I was in general agreement with the attempt to differentiate between an internal inspection and an obstruction investigation and provide some guidance as to what should be done following an inspection.

Now, faced with the choices of accepting Comment 25-104, despite its flaws, or of accepting Comment 25-101, and doing away with the 5 year inspections, or of returning to the text of the 2008 edition, I choose to Accept Comment 25-104, as the best choice that is available.

I cannot vote in favour of Comment 25-101, because despite our best efforts, foreign material does get into our systems, and without looking inside on occasion, there is no way to find it, until it may be too late.

L. Keeping
Larry Keeping, P.Eng
Vipond Fire Protection
Moreau-Correia, Jeanne

From: Kenneth.Linder@swissre.com
Sent: Thursday, July 01, 2010 4:23 PM
To: Moreau-Correia, Jeanne
Subject: Re: NFPA 25 Amendments

Jeanne,

Please record me as voting as follows:

Accept Comment 25-41. -- I vote affirmative.

Accept Comment 25-101 and 104. I vote for Option 2 and to accept Comment 104. While it is not perfect and I have some concerns on the wording, I feel it best represents the intent of the committee and is better than reverting to the existing language if we reject both.

Let me know if you need anything else,

Regards,
Ken

Kenneth Linder | Vice President | Property & Specialty
Swiss Re/Industrial Risk Insurers | 2 Waterfront Crossing, Suite 200, Windsor, CT 06095, USA
Direct: +1 860 902 7337 Mobile: +1 860 573 7722 E-mail: Kenneth.Linder@swissre.com

http://www.swissre.com

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From: "Moreau-Correia, Jeanne" <jmoreau@NFPA.org>
To: "Walker, Nancy" <nwalker@NFPA.org>, "Moreau-Correia, Jeanne" <jmoreau@NFPA.org>
Date: 08/24/2010 02:06 PM
Subject: NFPA 25 Amendments

TO: The Technical Committee on Inspection, Testing, and Maintenance of Water-Based Systems

Dear Committee Members:

Attached are the ballot materials for NFPA 25 Amendments. The due date for return of the ballot is Friday, July 2, 2010. Please fax your ballot to 617-984-7110 or email to jmoreaucorreia@nfpa.org (Please note there are two (2) ballots to be returned).

This information has also been posted on your ECommittee Page under the “Ballot Information Heading” and within the “Other Ballots” folder.

If you have any questions, please don’t hesitate to contact me.

1
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text).

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be
to return to previous edition text.

☐ Option 1: REJECT BOTH COMMENTS
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104.
Accordingly, you are recommending returning Chapter 14 to previous edition text.

☒ Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually
inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☒ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why
you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are
optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional
sheets may be attached to this ballot).

Comment 25-101 would eliminate the random internal inspections of
fire sprinkler piping. These inspections have proven very worthwhile
in ensuring that fire sprinkler systems stand ready to protect life
and property.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: Richard M. Kay

Date: 07/02/10
June 2010

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Standards Council Supplemental Agenda
August 3-5, 2010

NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
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☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

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I agree with nearly all that Comment #104 accomplishes, and I believe that most of the committee is in agreement on that fact, also. However, I do not agree with the mandatory nature of the 5 year requirement for internal investigation or inspection of piping, unless one of the indicators listed in the document triggers such an investigation.

Technical justification has not been provide[d] to the committee for either the requirement or the 5 year interval, without which I feel this becomes an unnecessary and costly requirement that would be placed squarely on the shoulders of all owners of automatic sprinkler systems.

(PLEASE SEE CONTINUATION OF THIS SUBSTANTIATION FOR ABSTENTION ON THE NEXT PAGE)

Signature: [Signature]
Name - Please Print: JOHN BOUCHARD
Date: 7/1/10
CONTINUATION OF SUBSTANTIATION FOR ABSTENTION:

Until such time that documentation or records can show that the viability of many systems is in jeopardy, I do not believe that this action is necessary.

I have abstained from voting on this issue at this time, as I don't feel that Comment #101 accomplishes as much as the committee would like, although I do agree with the removal of a mandatory internal inspection based on a 5 year interval. I am not convinced that Comment #101 creates an improved version over previous text, and prefer to review the circulation of the committee member results and comments prior to making a decision on this issue.

Signature: [Signature]
Name - Please Print: JOHN BOUCHARD
Date: 7/1/10
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

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☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

☒ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moran
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-994-7110

Signature

Name - Please Print: ox Stein
Date: 6-28-10
June 2010

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Moreau-Correia, Jeanne

From: Chip Stein [stein@tankindustry.com]
Sent: Thursday, July 01, 2010 2:05 PM
To: Moreau-Correia, Jeanne
Subject: Re: NFPA 25 Amendment 101 and 104

I don't have a significant amount of expertise or opinion on that matter.

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From: Moreau-Correia, Jeanne
To: Chip Stein
Sent: Thu Jul 01 13:59:22 2010
Subject: NFPA 25 Amendment 101 and 104

Greg,

I have received your ballot and have you down as abstaining. However, the reason for your abstention is missing.

Please advise.

Best Regards,
Jeanne

Jeanne Moreau
Technical Projects Supervisor
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
Ph: 617-984-7586
Fx: 617-984-7110
COMMENT 25-101 (A2010) Accept Comment

25-101 Log 998
(Chapter 14)

Submitter: Peter A. Larrimer, US Department of Veterans Affairs

Comment on Proposal No: 25-185

Recommendation: Revise text to read as follows:

Accept the original proposal.

Substantiation: The committee did not address the substantiation provided by the proponent. The committee has never justified why it is a good idea for an owner to pay someone look inside of the pipe every 5 years as identified in the committee statement. (See Negative Explanations.)

It would be valuable to the owner if the committee established why those 5 year intervals are necessary. More than one committee members are interested in supporting the submitter.

Committee Meeting Action: Reject

PROPOSAL 25-185 (A2010) Backup

25-185 Log 693
(Chapter 14)

Submitter: Joshua Elvove, U.S. General Services Administration

Recommendation: Revise Chapter 14 as follows:

14.1 General

This chapter shall provide the minimum requirements for conducting investigations of fire protection system piping for possible sources of materials that could cause pipe blockage.

14.2 Obstruction Investigation and Prevention

14.2.1 To ensure that piping remains clear of all obstructive foreign matter, an obstruction investigation shall be conducted for system or yard main piping wherever any of the following conditions exist:

(1) Defective intake for fire pumps taking suction from open bodies of water
(2) The discharge of obstricable material during routine water tests
(3) Foreign materials in fire pumps, in dry pipe valves, or in check valves
(4) Foreign material in water during drain tests or plugging of inspector’s test connection(s)
(5) Plugged sprinklers

(6) Plugged piping in sprinkler systems dismantled during building alterations
(7) Failure to flush yard piping or surrounding public mains following new installations or repairs
(8) A record of broken public mains in the vicinity
(9) Abnormally frequent false tripping of a dry pipe valve(s)
(10) A system that is returned to service after an extended shutdown (greater than 1 year)
(11) There is reason to believe that the sprinkler system contains sodium silicate or highly corrosive fluxes in copper systems
(12) A system has been supplied with raw water via the fire department connection
(13) Pinhole leaks
(14) A 50 percent increase in the time it takes water to travel to the inspector’s test connection from the time the valve trip occurs during a full flow trip test of a dry pipe sprinkler system when compared to the original system acceptance test

14.2.2 Where an obstruction investigation is warranted in accordance with Section 14.2.1, the following shall be required:

14.2.2.1 An inspection of piping and branch line conditions shall be conducted every 5 years by opening a flushing connection at the main and by removing a sprinkler toward the end of one branch line for the purpose of inspecting for the presence of foreign organic and inorganic material.

14.2.2.2 Alternative nondestructive examination methods shall be permitted.

14.2.2.3 Tubercules or slime, if found, shall be tested for indication of microbiologically influenced corrosion (MIC).

14.2.2.4 If the obstruction investigation carried out in accordance with 14.2.1 indicates the presence of sufficient material to obstruct sprinklers, an A complete flushing program shall be conducted by qualified personnel if the obstruction investigation indicates the presence of sufficient material to obstruct any portion of the sprinkler system.

14.2.3 System shall be examined for internal obstructions where conditions exist that could cause obstructed piping.

14.3 Ice Obstruction

Dry pipe or preaction sprinkler system piping that protects or passes through freezers or cold storage rooms shall be inspected internally on an annual basis for ice obstructions at the point where the piping enters the refrigerated area.

14.3.1 Alternative nondestructive examinations shall be permitted.

14.3.2 All penetrations into the cold storage areas shall be inspected and, if an ice obstruction is found, additional pipe shall be examined to ensure no ice blockage exists.

A.14.2 For obstruction investigation and prevention, see Annex D.

A.14.2.2 A.14.2.1 For obstruction investigation procedures, see Section D.3.

The type of obstruction investigation should be appropriately selected based on the observed condition. For instance, ordering an internal obstruction investigation would be inappropriate where the observed condition is broken pipe blockage in the vicinity. On the other hand, such an investigation would be appropriate where foreign materials are observed in the dry pipe valve.

A.14.2.3 For obstruction investigation flushing procedures, see Section D.5.

A.14.2.3.1 For obstruction prevention program recommendations, see Section D.4.

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Committee Meeting Action: Reject
Committee Statement: It is important to look inside the pipe every five years. 25-187 (Log #27) addresses the structure of this section.

Number Eligible to Vote: 30
Ballot Results: Affirmative: 26 Negative: 3
Ballot Not Returned: 1 Hoover, S.

Explanation of Negative:
ELVOVE, J.: This proposal should be accepted for the reasons stated in the substantiation. However, it’s clear there’s no way this committee will budge on this issue. The 5-year obstruction investigation was never technically substantiated when it was approved by the committee two cycles ago and is required whether or not there is any evidence of MIC. As typical with many ITM frequencies, once in the standard, it’s difficult if not impossible to revise or remove. As such, every property owner is now and forever saddled with this potentially unnecessary effort and expense. NFPA 25 is supposed to be a minimum standard and here is another example of where it clearly has gone beyond being a minimum standard. Of note: a proposal (25-189, Log 101) to eliminate CPVC pipe from obstruction inspection requirements barely passed committee vote during the ROP which shows that there’s even a lot of resistance to removing this requirement from a pipe that’s not subject to MIC.

LARRIMER, P.: There has been no substantiation for this requirement to open up a sprinkler system and inspect the inside of the piping every five years. It is expensive and onerous to the owners of the systems. The code requirement was added to the document in 2002 without the substantiation required by the NFPA Regulations Governing Committee Projects. Subsequent attempts to eliminate it have been rejected by the committee who has still not provided or required substantiated the requirement.

Now the committee retains the requirement with the following committee statement:

“It is important to look inside the pipe every five years.”

How can an argument be made against the justification for putting this requirement in the standard when there was no justification in the first place. Here is a summary of the original proposal substantiation in 2002 and subsequent committee statements from 2002/2006 ROPs and ROCs respectively. Never has the requirement been justified.

2002 ROP

SUBSTANTIATION: There is a need to check for the possibility of clogged mains and lines other than routine inspector’s test flows.

This proposal was developed by the UL/FM/NFSA Standards Review Committee.

2002 ROC

COMMITTEE STATEMENT: The committee stands by the original justification. This requirement more appropriately belongs in Chapter 10.

2006 ROP

Committee Statement: It is the intent of the committee to retain the 5 year requirement.

2006 ROC

Committee Statement: See committee action and statement on Comment 25-63 (Log #7).


25-46 Committee Meeting Action: Accept

25-48 Committee Statement: It is the intent of the committee to segregate the requirements of obstruction inspection and investigation for clarification.

SAIDI, J.: (Chapter 14)

This and other proposals on this section highlight the need for a comprehensive review and re-write of this section on obstruction investigation and prevention. Changes proposed in 25-187 (Log #27) do not fully address the issues in this chapter.
COMMENT 25-104 (A2010) Accept Comment

25-104 Log #CC5 Final Action: Reject
(Chapter 14)

This proposal is reported as “Reject” as it did not receive the 2/3 affirmative vote.

Submitter: Technical Committee on Inspection, Testing, and Maintenance of Water-Based Systems,


Recommendation: Further revise Chapter 14 as follows:

14.2 General. This chapter shall provide the minimum requirements for conducting investigations of fire protection system piping for possible sources of materials that could cause pipe blockage.

A.14.2.1 For obstruction investigation and prevention, see Annex D.

A.14.2.2 Obstruction Investigation and Prevention Internal Inspection of Piping [from ROP 25-187]

14.2.1 Except as discussed in 14.2.1.1 and 14.2.1.3, an inspection of piping and branch line conditions shall be conducted every 5 years by opening a flushing connection at the end of one main and by removing a sprinkler toward the end of one branch line for the purpose of inspecting for the presence of foreign organic and inorganic material. [from ROP 25-189]

14.2.1.1 Alternative nondestructive examination methods shall be permitted.\(1\)

14.2.1.2 Tubercules or slime, if found, shall be tested for indications of microbiologically influenced corrosion (MIC).

14.2.1.3* If the presence of sufficient foreign organic and/or inorganic material is found to obstruct sprinklers, an obstruction investigation shall be conducted as described in 14.3.

A.14.2.1.3* Most piping systems may contain some foreign material or other evidence of corrosion but not sufficient to trigger an obstruction investigation. Furthermore, an internal inspection is primarily an inspection for determining corrosion of the pipe but it may result in finding the presence of material that would be an obstruction to piping or sprinklers. If such is found an obstruction investigation in 14.3 would be required.

[ROP 25-187] 14.2.2.1-14.3.4* If an obstruction investigation carried out in accordance with 14.2.1, indicates the presence of sufficient material to obstruct sprinklers, a complete flushing program shall be conducted by qualified personnel.

A.14.2.3.4* For obstruction investigation flushing procedures, see Section D.5.

A.14.2.3.4* CPVC Non-metallic pipe shall not be required to be inspected internally. \[from ROP 25-189\]

14.2.3.5 In dry pipe systems and pre-action systems, the sprinkler removed for inspection shall be from the most remote branch line from the source of water that is not equipped with the inspectors test valve. \[from ROP 25-190\]

14.2.1.6* Inspection of a cross main is not required where-\(1\)\(2\)system piping is not accessible

(b) the system does not have a visible means of inspection such as grooved couplings or flushing connections. \[from ROP 25-191\]

14.2.3* In buildings having multiple wet piping systems, every other system shall have an internal inspection of piping every 5 years as described in 14.2.1.

A.14.2.3* In large warehouses, high rise buildings, and other buildings having multiple systems, in addition to the internal inspection on half of the water systems, and conclude that these are representative of all systems in the building. The systems in the building not inspected during one inspection cycle should be inspected during the next one. As long as there is no evidence of any foreign organic and/or inorganic material found in any of the systems being inspected, every other system would be inspected once every 10 years.

However, if foreign organic and/or inorganic material is found in any system, in the building during the 5 year inspection cycle, all systems must then be inspected during that inspection cycle.

14.2.3.1 During the next inspection frequency required by 14.2.1, the alternate systems not inspected during the previous inspection shall have an internal inspection of piping as described in 14.2.1.

14.2.3.2 If the presence of foreign organic and/or inorganic material is found in any system in a building during the 5 year internal inspection of piping, all systems shall have an internal inspection.

14.3 Obstruction Investigation and Prevention [from ROP 25-187]

14.3.1 An obstruction investigation shall be conducted for system or yard main piping wherever any of the following conditions exist:

(1) Defective intake for fire pumps taking suction from open bodies of water

(2) The discharge of obstructive material during routine water tests

(3) Foreign materials in fire pumps, in dry pipe valves, or in check valves

(4) Foreign material in water during drain tests or plugging of inspector’s test connection(6)

(5) Plugged sprinklers

(6) Plugged piping in sprinkler systems dismantled during building alterations

(7) Failure to flush yard piping or surrounding public mains following new installations or repairs

(8) A record of broken public mains in the vicinity

(9) Abnormally frequent false tripping of a dry pipe valve(s)

(10) A system that is returned to service after an extended shutdown (greater than 1 year).

(11) There is reason to believe that the sprinkler system contains sodium silicate or highly corrosive fluxes in copper systems

(12) A system has been supplied with raw water via the fire department connection

(13) Pinhole leaks

(14) A 50 percent increase in the time it takes water to travel to the inspector’s test connection from the time the valve trips during a full flow trip test of a dry pipe sprinkler system when compared to the original system acceptance test.

A.14.3.1.1 For obstruction investigation procedures, see Section D.3. The type of obstruction investigation should be appropriately selected based on the observed condition. For instance, ordering an internal obstruction investigation would be inappropriate where the observed condition was broken public mains in the vicinity. On the other hand, such an investigation would be appropriate where foreign materials are observed in the dry pipe valve.

A.14.3.1(4) If unknown materials are heard in the system piping during draining, refilling or otherwise flowing water through the system.

14.3.2* 3.2* Systems shall be examined for internal obstructions where conditions exist that could cause obstructed piping.

A.14.3.2 For obstruction prevention program recommendations, see Section D.4.

A.14.3.2.1 If the condition has not been corrected or the condition is one that could result in obstruction of the piping despite any previous flushing procedures that have been performed, the system shall be examined for internal obstructions every 5 years.

A.14.3.2.2 Internal inspections shall be accomplished by examining the interior of [from ROP 25-187] examination shall be performed at the following four points:

(1) System valve

(2) Riser

(3) Cross main

(4) Branch line

14.3.3* For obstruction investigation flushing procedures, see Section D.5.

14.3.3.1 Obstruction Investigation flushing procedures, see Section D.5.

14.3.3.1 Ice Obstruction. Dry pipe or preaction sprinkler system piping that protects or passes through freezers or cold storage rooms shall be inspected internally on an annual basis for ice obstructions at the point where the piping enters the refrigerated area. [from ROP 25-187]

14.3.3.1 Alternative nondestructive examination methods shall be permitted.

14.3.3.1 If an obstruction investigation indicates the presence of sufficient material to obstruct pipe or sprinklers, a complete flushing program shall be conducted by qualified personnel.

A.14.3.3 For obstruction investigation flushing procedures, see Section D.5.

A.14.3.3 for obstruction investigation flushing procedures, see Section D.5.

14.3.4 Ice Obstruction. Dry pipe or preaction sprinkler system piping that protects or passes through freezers or cold storage rooms shall be insulated internally on an annual basis for ice obstructions at the point where the piping enters the refrigerated area. [from ROP 25-187]

14.3.4.1 Alternative nondestructive examinations shall be permitted.

14.3.4.2 All penetrations into the cold storage areas shall be insulated and, if an ice obstruction is found, additional piping shall be examined to ensure no ice blockage exists.

Substantiation: New A.14.4.1 is moved from A.14.2.2 for a more inclusive reference.

New 14.2.1.3 and A.14.2.1.3 is added because in the current language the standard does not advise what to do if something is found during the internal inspection. Finding something in the system piping should trigger an obstruction investigation.

Paragraph 14.2.1.4 deletes CPVC for a more inclusive reference to other plastic piping systems and these would not require an internal inspection either.

Paragraph 14.2.1.6 is further revised from the ROP because whether a pipe is accessible or not is subjective. This change is intended to clarify that if a lift is required, or if it’s above a lay-in tile ceiling, it’s not accessible. This change should cover both situations described in the annex note.

New 14.2.3 is added in an effort to relax the requirement that all systems in a building must be inspected every 5 years, it is reasonable to inspect half this cycle and the other half the next cycle. However, if tubercules or slime or obstructing material is found in any system, all systems should undergo an obstruction investigation.

New A.14.3.1(4) Clarifies that it is not uncommon to actually hear rocks, stones, and other materials rattle through the piping when water is moving. These sounds should trigger an obstruction investigation.

New 14.3.3 adds the same language here as in new 14.2.1.3.1 because this should apply to both sections 14.2 & 14.3.

Committee Meeting Action: Accept

Number Eligible to Vote: 30

Ballot Results: Affirmative: 17 Negative: 9
Ballot Not Returned: 4 Drysdale, M., Garber, G., Stein, G., Whitney, J.
Explanation of Negative:

ELVOVE, J.: This is one of eight comments (ROC 25-103, 104, 105, 106, 107, 110, 111 and 133) pertaining to three public proposals (ROP 25-187, 25-189 and 25-191) on Chapter 14. This particular comment was generated by the committee in order to consolidate actions on all three public proposals and all seven subsequent public comments and attempts to incorporate those actions into a single committee comment. Unfortunately, the committee statement herein doesn’t clearly delineate how all this transpired. Therefore, I am very uncomfortable presenting this comment to the membership and the public when it comes up for a vote at the annual meeting in June. In addition, there are erroneous committee statements in related comments ROC 25-103, 25-105, 25-107, 25-110 and 25-133 which directly relate to this comment. Those committee statements refer to ROC 25-76 for all actions taken, but that ROC 25-76 has nothing to do with Chapter 14 (it references 8.3.5.7). As a result, the public may not understand how to interpret individual committee member “explanation of negative” and “affirmative with comment” statements made on all those comments as they relate to this comment. Next, there is no section 14.2.2. Is this an editorial mistake, or did the committee miss some key text when rearranging this section to address this comment as well as all the other related comments (and earlier proposals) on Chapter 14? Finally, all the text in section 14.2.3 is new material which has not been reviewed by the public. For all these reasons, this committee comment should be rejected.

FANTAUZZI, J.: I have some reservation on how chapter 14 reads which may increase cost and undo burden upon the end user of the 25 Document. I feel that we are losing our goals for a reasonable application and cost effectiveness of this standard.

I have reviewed the ROP and it appears that this may be new material and has not been reviewed by anybody other than the committee itself.

Secondly, I have reviewed NFPA 13, IBC and NYS Building Code and can not find a clean clear-cut definition of what is a system. The implication of A.14.2.3 may automatically define what is considered a zone, sectional, and a subsystem or isolation valve as a system. Log #CC5 appears to define what a system is which has far reaching ramifications in relationship to other inspection and testing function and may be used by other codes and standards as a definition. I feel that it is NFPA 13 committee’s position and responsibility to determine the definition of what a system is and not that of the NFPA 25 committee.

KEEPING, L.: While I definitely I agree with the intent of this offering to provide advice for what to do if something is found during an internal inspection, I take issue with some of the directions within the text.

1. I do not believe that non-metallic pipe (CPVC) should be excluded from the inspection requirements as stated in the new text for 14.2.1.4. This material may be resistant to corrosion, but it is every bit as susceptible to collecting foreign materials (sand, mud or stones, cigarette butts, paper, rags, etc.) as any other type of system. Since as per 14.1.1 a key reason for an internal inspection is to look for materials that could cause a blockage, to exempt this pipe type from the same scrutiny that metallic pipe must be subjected is a wrong step.

2. I disagree with the premise of always looking at the one branch line, that is adjacent to the trip test connection as stated in the new text for 14.2.1.5. I believe that for each inspection a different part of the system should be investigated. To always look in one place is ignoring the possibility that foreign material or products of corrosion could be located elsewhere in the system.

3. I do not agree that the new text of 14.2.1.6 adequately explains when a cross main is exempted from inspection, because it does not properly address the issues of accessibility. Despite the implication in the substantiation, the new text on offer is actually silent on both the questions of the height of a system (which is not discussed in the ROP text either) and of the types of ceiling. Therefore I believe more thought needs to go into the subject. For example at what height should we consider the cut-off point or what type of ceilings should be exempt?

Also, on the subject of accessibility, the revised text for 14.2.4 does not actually let a contractor off the hook for the rental of a lift due to the height of a cross main, because the cost of renting a lift must still be borne to allow the inspection of the branch line piping.

4. I believe that the new text for A.14.2.1.3 is in conflict with the new text for 14.2.3.2.

The verbiage of A.14.2.1.3 is to clarify that some minor amounts of stuff found in a system is kind of typical and should not trigger an internal examination. However, 14.2.3.2 contains a contrasting statement: “if the presence of foreign and/or organic material is found in any system... all systems shall have an internal inspection”, which basically says that even an insignificant amount of stuff in one system would trigger an internal inspection - not only for that one system, but for all of the other systems in a building.

KETNER, C.: Corrosion is not the only concern for obstruction to non-metallic pipe or even metallic pipe. Another concern is that it is still subject to possible obstructions from foreign materials entering into the system the same as metallic piping. We cannot give non-metallic pipe this exemption.

KEKE, J.: I do not believe that non-metallic pipe should be exempted. The possibilities and probabilities for obstructions occur each time the system is modified, repaired or extended (chunks of glue, pieces of pipe) or any time the system or its supply gets opened. MIC is not the only reason for obstructions.

LARRIMER, P.: There has never been technical justification provided in this minimum standard to justify a mandatory five year inspection of the internal piping of a wet pipe sprinkler system. The operational record for wet pipe sprinkler systems has been exceptional over the years. There has never been any data submitted, not even any anecdotal data, showing an internal piping problem that this onerous inspection will solve.

The new language added in 14.2.3 does just the opposite of what is stated in the committee substantiation. Requiring internal inspection of every other system in a building will significantly increase the burden on building owners. The requirement of 14.2.3 will require a typical high rise hospital building that might have three sprinkler systems or more per floor (often segregated by the smoke zones in the building to meet the fire alarm code) to have an internal inspection of the sprinkler piping for every other system.

The requirement in 14.2.1.3 to determine if “the presence of sufficient foreign organic or inorganic matter is found to obstruct pipe or sprinklers” is not enforceable. The personnel qualification requirements for those performing routine the routine inspection and testing required by this standard does not qualify them to make that judgment call.

The proposals (25-185 and/or 25-186) to delete the five year mandatory requirement unless there is cause for an investigation should have been accepted for this minimum standard.

LINDER, K.: While the committee tried to clean this up and make it more reasonable, the more I read this the more inconsistencies I see. For example, 14.2.1.3 refers to “sufficient foreign organic or inorganic material” while other sections state “any foreign organic and/or inorganic material.” Also section 14.2.5 which allows every other wet system to be tested is confusing, unless you do all the testing at the same time. If to spread the costs you do a portion each year, so that over 5 years you do 1/2, what happens if you find material that triggers the “test all systems” requirement of section 14.2.3.2? Do you re-inspect the systems you inspected last year? The appendix to that section does not clarify the issue. I also think that to test all or even 50% of the wet pipe systems is too much, especially for large facilities. In areas where there is no history of problems and you open 5 or 10 systems and find no problems I do not believe it is necessary to open 20, 30 or more just to get 50%.

SAID, J.: Per my previously balloted comment, I continue to disagree with the committee action on 25-104 for several reasons.

For start, I see this comment related to other ROC’s 25-103, 25-105 and 25-133, yet committee actions on these ROC’s are inconsistent, disconnected and confusing. Committee action is too segmented and has failed to properly address the proposals and comments. What is at stake here may also be the credibility with end users and the public at large. Therefore in my view, this committee comment should be rejected and all 4 ROC’s and perhaps the entire Chapter 14 should be re-visited and re-worked.

SHEPPARD, J.: With respect to this submittal, I continue to vote negative and stand by my comment on the previous ballot.

Comment on Affirmative:

FELD, J.: Although this work is better than what appears in the 2008 Edition, there is more work to be done.

RAY, R.: I agree with the committee vote yet I think there is a mistake in the substantiation for paragraph 14.2.1.6; the change is intended to clarify that if a lift is required to access a pipe or if the pipe is above a lay-in ceiling, the pipe is STILL accessible (and thus not exempt from inspection).

UNDERWOOD, D.: See my comment on Comment 25-101 it still is not right.
PROPOSAL 25-187 (A2010) Backup

25-187 Log #27 Final Action: Accept (14.2.)

Submitter: Roland J. Huggins, American Fire Sprinkler Association, Inc.
Recommendation: Revise text to read as follows:
14.2 Obstruction Investigation and Prevention Internal Inspection of Piping
14.2.4 14.2.1.3 If an obstruction investigation carried out in accordance with 14.2.1 indicates the presence of there is sufficient material to obstruct sprinklers, a complete flushing program shall be conducted by qualified personnel.

14.2 Obstruction Investigation and Prevention

14.2.3 An obstruction investigation shall be accomplished by examining the interior of examination shall be performed at the following four points:

Substantiation: Editorial changes are needed to better differentiate between an inspection and an obstruction evaluation.

Committee Meeting Action: Accept

Number Eligible to Vote: 30
Ballot Results: Affirmative: 27 Negative: 2
Ballot Not Returned: 1 Hoover, S.

Explanation of Negative:

ELVOVE, J.: This is not an editorial change. See Mr. Larrimer’s negative ballot comment.
LARRIMER, P.: Section 14.2.4 as written in the standard, was to be used after the system internals (system valve, riser, cross main, and branch line) were properly inspected; and the proper inspection was only to be done after there was SUFFICIENT cause to do so. The SUFFICIENT causes that “triggered” a proper inspection are listed in section 14.2.2. This “editorial” change (relocating 4.2.4 to 14.2.1.3) now requires every five years a contractor who has been asked to perform ITM per NFPA 25 to remove a sprinkler from a branch line and look into a flushing connection and into a ½ inch hole (inspect), and then require a complete flushing program to be done because he thinks there is sufficient material to obstruct sprinklers.

This contractor (who the committee says should not be asked to determine when the sprinkler spacing meets code because he may not be qualified) is supposed to determine when “sufficient material” to obstruct sprinklers in present to require a complete flushing program.

The term sufficient is unenforceable according to the Manual of Style.

The terms inspection, evaluation, and investigation were not a problem until the mandatory five year “inspection” was added without cause and without much thought concerning the actual verbiage. It used to be that an obstruction investigation would be initiated, only after a trigger (in 14.2.2), and that obstruction investigation would include inspections and evaluations as appropriate.

See also my negative comment on 25-185 (Log #93).

Comment on Affirmative:

FANTAUZZI, I.: The title still shows deletion of all the text whereas the last portion should be underlined showing it as new text as shown below:

14.2 Obstruction Investigation and Prevention Internal Inspection of Piping

PROPOSAL 25-191 (A2010) Backup

25-191 Log #CP52 Final Action: Accept (14.2.1.3 (New))

Submitter: Technical Committee on Inspection, Testing, and Maintenance of Water-Based Systems,
Recommendation: Add new text to read as follows:
14.2.1.3* Inspection of a cross main is not required where:
(a) system piping is not accessible
(b) system does not have a means of inspection such as grooved couplings or flushing connections
A.14.2.1.3 The inspection of piping is not required where the pipe is not readily accessible such as above gypsum ceilings. Additionally, not all systems, such as those installed in accordance with NFPA 13R, have flushing connections.

Substantiation: The intent is to not impose undue cost on performing this inspection.

Committee Meeting Action: Accept

Number Eligible to Vote: 30
Ballot Results: Affirmative: 29 Negative: 2
Ballot Not Returned: 1 Hoover, S.

Comment on Affirmative:

RAY, R.: This proposal should be accepted in part: the wording “(a) system piping is not accessible” should be struck. The potential for loss due to obstructed piping is too great to allow the mere concealment of piping to preclude the need for obstruction investigation. The simple addition of an access panel in the case of gypsum ceilings will alleviate future ceiling modifications to allow access to the piping.
The following represents the recommended language for Chapter 14 if Comment 25-101 is accepted by the committee.

14.1 General.
This chapter shall provide the minimum requirements for conducting investigations of fire protection system piping for possible sources of materials that could cause pipe blockage.

14.2* Obstruction Investigation and Prevention.
A.14.2 For obstruction investigation and prevention, see Annex D.
14.2.1* To ensure that piping remains clear of all obstructive foreign matter, an obstruction investigation shall be conducted for system or yard main piping wherever any of the following conditions exist:

(1) Defective intake for fire pumps taking suction from open bodies of water
(2) The discharge of obstructive material during routine water tests
(3) Foreign materials in fire pumps, in dry pipe valves, or in check valves
(4) Foreign material in water during drain tests or plugging of inspector’s test connection(s)
(5) Plugged sprinklers
(6) Plugged piping in sprinkler systems dismantled during building alterations
(7) Failure to flush yard piping or surrounding public mains following new installations or repairs
(8) A record of broken public mains in the vicinity
(9) Abnormally frequent false tripping of a dry pipe valve(s)
(10) A system that is returned to service after an extended shutdown (greater than 1 year)
(11) There is reason to believe that the sprinkler system contains sodium silicate or highly corrosive fluxes in copper systems
(12) A system has been supplied with raw water via the fire department connection
(13) Pinhole leaks
(14) A 50 percent increase in the time it takes water to travel to the inspector’s test connection from the time the valve trips during a full flow trip test of a dry pipe sprinkler system when compared to the original system acceptance test

A.14.2.1 For obstruction investigation procedures, see Section D.3. The type of obstruction investigation should be appropriately selected based on the observed condition. For instance, ordering an internal obstruction investigation would be inappropriate where the observed condition was broken public mains in the vicinity. On the other hand, such an investigation would be appropriate where foreign materials are observed in the dry pipe valve.

14.2.2 Where an obstruction investigation is warranted in accordance with Section 14.2.1, the following shall be required:
14.2.2.1 An inspection of piping and branch line conditions shall be conducted by opening a flushing connection at the end of one main and by removing a sprinkler toward the end of one branch line for the purpose of inspecting for the presence of foreign organic and inorganic material.

14.2.2.1.1 Alternative nondestructive examination methods shall be permitted.

14.2.2.2 Tubercules or slime, if found, shall be tested for indications of microbiologically influenced corrosion (MIC).

14.2.2.3* A complete flushing program shall be conducted by qualified personnel if the obstruction investigation indicates the presence of sufficient material to obstruct any portion of the sprinkler system.

A.14.2.2.3 For obstruction investigation flushing procedures, see Section D.5

14.2.3* If the condition noted in Section 14.2.1 has not been corrected or the condition is one that could result in obstruction of the piping despite any previous flushing procedures that have been performed, the system shall be flushed in accordance with Section 14.2.2.3 and inspected for internal obstructions every 5 years.

A.14.2.3 For obstruction prevention program recommendations, see Section D.4.

14.2.3.1 Internal inspections shall be accomplished by examining the interior of the following four points:

(1) System valve
(2) Riser
(3) Cross main
(4) Branch line

14.2.3.1.1 Alternative nondestructive examination methods shall be permitted.
14.3 Ice Obstruction.

Dry pipe or preaction sprinkler system piping that protects or passes through freezers or cold storage rooms shall be inspected internally on an annual basis for ice obstructions at the point where the piping enters the refrigerated area.

14.3.1 Alternative nondestructive examinations shall be permitted.

14.3.2 All penetrations into the cold storage areas shall be inspected and, if an ice obstruction is found, additional pipe shall be examined to ensure no ice blockage exists.
The following represents the recommended language for Chapter 14 if Comment 25-104 is accepted by the committee.

14.1* General.
This chapter shall provide the minimum requirements for conducting investigations of fire protection system piping for possible sources of materials that could cause pipe blockage.
A.14.1 For obstruction investigation and prevention, see Annex D.

14.2* Internal Inspection of Piping

14.2.1 Except as discussed in 14.2.1.1 and 14.2.1.3 an inspection of piping and branch line conditions shall be conducted every 5 years by opening a flushing connection at the end of one main and by removing a sprinkler toward the end of one branch line for the purpose of inspecting for the presence of foreign organic and inorganic material.

14.2.1.1 Alternative nondestructive examination methods shall be permitted.

14.2.1.2 Tubercules or slime, if found, shall be tested for indications of microbiologically influenced corrosion (MIC).

14.2.1.3* If the presence of sufficient foreign organic or inorganic material is found to obstruct pipe or sprinklers, an obstruction investigation shall be conducted as described in 14.3.

A.14.2.1.3 Most piping systems may contain some foreign material or other evidence of corrosion but not sufficient to trigger an obstruction investigation. Furthermore, an internal inspection is primarily an inspection for determining corrosion of the pipe but it may result in finding the presence of material that would be an obstruction to piping or sprinklers. If such is found an obstruction investigation in 14.3 would be required.

14.2.1.4 Non-metallic pipe shall not be required to be inspected internally.

14.2.1.5 In dry pipe systems and pre-action systems, the sprinkler removed for inspection shall be from the most remote branch line from the source of water that is not equipped with the inspector’s test valve.

14.2.1.6* Inspection of a cross main is not required where the system does not have a means of inspection

A.14.2.1.6 The inspection of piping is not required where the pipe is not readily-accessible such as above gypsum ceilings. Additionally, not all systems, such as those installed in accordance with NFPA 13R, have grooved couplings or flushing connections.

14.2.2* In buildings having multiple wet pipe systems, every other system shall have an internal inspection of piping every 5 years as described in 14.2.1.

A.14.2.2 In large warehouses, high rise buildings, and other buildings having multiple systems, it is reasonable to perform the internal inspection on half of the systems, and conclude that these are representative of all systems in the building. The systems in the building not inspected during one inspection cycle should be inspected during the next one. As long as there is no evidence of any foreign organic and/or inorganic material found in any of the systems being inspected, every other system would be inspected once every 10 years. However, if foreign organic and/or inorganic material is found in any system in the building during the 5 year inspection cycle, all systems must then be inspected during that inspection cycle.

14.2.2.1 During the next inspection frequency required by 14.2.1, the alternate systems not inspected during the previous inspection shall have an internal inspection of piping as described in 14.2.1.

14.2.2.2 If the presence of foreign organic and/or inorganic material is found in any system in a building during the 5 year internal inspection of piping, all systems shall have an internal inspection.

14.3 Obstruction Investigation and Prevention

14.3.1* An obstruction investigation shall be conducted for system or yard main piping wherever any of the following conditions exist:

(1) Defective intake for fire pumps taking suction from open bodies of water
(2) The discharge of obstructive material during routine water tests
(3) Foreign materials in fire pumps, in dry pipe valves, or in check valves
(4)* Foreign material in water during drain tests or plugging of inspector’s test connection(s)
(5) Plugged sprinklers
(6) Plugged piping in sprinkler systems dismantled during building alterations
(7) Failure to flush yard piping or surrounding public mains following new installations or repairs
(8) A record of broken public mains in the vicinity
(9) Abnormally frequent false tripping of a dry pipe valve(s)
(10) A system that is returned to service after an extended shutdown (greater than 1 year)
(11) There is reason to believe that the sprinkler system contains sodium silicate or highly corrosive fluxes in copper systems
A system has been supplied with raw water via the fire department connection
Pinhole leaks
A 50 percent increase in the time it takes water to travel to the inspector’s test connection from the time the valve trips during a full flow trip test of a dry pipe sprinkler system when compared to the original system acceptance test.

A.14.3.1 For obstruction investigation procedures, see Section D.3. The type of obstruction investigation should be appropriately selected based on the observed condition. For instance, ordering an internal obstruction investigation would be inappropriate where the observed condition was broken public mains in the vicinity. On the other hand, such an investigation would be appropriate where foreign materials are observed in the dry pipe valve.

A.14.3.1(4) If unknown materials are heard in the system piping during draining, refilling or otherwise flowing water through the system.

14.3.2 Systems shall be examined for internal obstructions where conditions exist that could cause obstructed piping.
A.14.3.2 For obstruction prevention program recommendations, see Section D.4.

14.3.2.1 If the condition has not been corrected or the condition is one that could result in obstruction of the piping despite any previous flushing procedures that have been performed, the system shall be examined for internal obstructions every 5 years.

14.3.2.2 Internal examination shall be performed at the following four points:
(1) System valve
(2) Riser
(3) Cross main
(4) Branch line

A.14.3.2.3 Alternative nondestructive examination methods shall be permitted.

14.3.3 If an obstruction investigation indicates the presence of sufficient material to obstruct pipe or sprinklers, a complete flushing program shall be conducted by qualified personnel.
A.14.3.3 For obstruction investigation flushing procedures, see Section D.5.

14.4 Ice Obstruction. Dry pipe or preaction sprinkler system piping that protects or passes through freezers or cold storage rooms shall be inspected internally on an annual basis for ice obstructions at the point where the piping enters the refrigerated area.

14.4.1 Alternative nondestructive examinations shall be permitted.

14.4.2 All penetrations into the cold storage areas shall be inspected and, if an ice obstruction is found, additional pipe shall be examined to ensure no ice blockage exists.
Linda:

I received a letter asking about my intentions relative to a possible appeal in follow-up to the floor action and balloting. Yes, please schedule me in, I plan to come to Quincy for the item. I’m on vacation this week so I hope this e-mail will work in place of a more formal letter. Let me know.

Best regards,

Russ Fleming
RALPH GERDES: I'm going to do a standing count.

All those in favor of accepting Comment 25-75, please stand.

(Standing.)

RALPH GERDES: Thank you. You can be seated.

All those opposed to the motion, please stand.

(Standing.)

RALPH GERDES: We have a tie vote, 40 to 40.

By convention rules, the motion fails.

(A short recess was taken.)

RALPH GERDES: Motion sequence 25-15, and I am going to go to Mic 5.

GEORGE STANLEY: Thank you, Mr. Chairman. My name is Russ Fleming with the National Fire Sprinkler Association. I fooled you, didn't I?

RALPH GERDES: Please state your correct name.

GEORGE STANLEY: We look so much alike.

My name is George Stanley with Wiginton Fire Sprinklers -- or Wiginton Fire Systems rather, and I'm speaking on behalf of Russ Fleming who had to catch a plane. The certified amending motion is to accept Comment 25-104.

(Second.)

RALPH GERDES: Okay. You are a designated
representative for Mr. Fleming, and I have a second, so
you can proceed.

GEORGE STANLEY: Thank you, Mr. Chairman.
Annex D.1 describes how important it is that pipe is
free of obstruction and anything that might affect the
proper flow of a sprinkler head. Accepting Comment
25-104 clarifies what needs to be done, how to do it,
and when it needs to be done for both the inspector and
the owner alike.

The proposed knew language of 14.2.1 clearly
states that it all starts with a five-year internal
inspection and how it needs to be done. Proposed new
language of 14.2.1.3 clearly states that if anything is
found that might obstruct the pipe or sprinkler, an
obstruction investigation shall be conducted.

Proposed new language of 14.2.3 clearly states
that buildings having multiple wet pipe systems either
have or either other -- every other system shall be --
shall have internal inspection every five years.
Proposed new language 14.2.3.1 clearly states that you
would alternate between systems every five years.

Proposed new language 14.2.3.2 clearly states
that if something is found during that internal
inspection, that all systems will need to have to be
internally inspected. Proposed new language 14.3.3
1 Clearly states that if there are obstructions that could
2 obstruct the pipe or sprinkler, a complete flushing
3 program shall be conducted by qualified personnel.
4 Again, I can't state it enough that it really
5 cleans up Chapter 14: What needs to be done, when it
6 needs to be done, and how it needs to be done. Thank
7 you.
8 RALPH GERDES: Thank you. Mr. Bouchard.
9 JOHN BOUCHARD: I'm sure there's going to be a
10 lot of discussion just after I say what I'm going to
11 say, but it's mostly in terms of an explanation.
12 Understand that the committee discussed the
13 obstruction issue, the investigation issue, the internal
14 pipe condition at length, and this even precedes the ROP
15 and ROC meeting for this cycle.
16 And at those meetings there were very many cite
17 issues, maybe that's the wrong word to use, but
18 different components of what people were for and what
19 some folks were against. It created some close voting,
20 very close within the committee to move some of these
21 things forward.
22 At the comment stage, the committee established
23 a subcommittee to address this multitude of issues to
24 try to combine them and come up with a Chapter 14 that
25 was clear and acceptable to each and every committee
member who had a particular issue or component that was their particular concern.

When the committee considered this comment, and you'll note that it is a committee comment and it's 25-104, unfortunately some of the issues that individuals were in favor of were now turned a little bit the other way and taken as a whole, resulted in the committee comment not passing ballot.

So this series of NITMAMs that you will hear in the next few minutes, or maybe several minutes, basically is trying to plug most of those holes so that the section which the committee has put a great deal of effort into already can move forward. With that, I'll turn it over to the floor.

RALPH GERDES: Thank you.

With that, we'll proceed to the floor discussion.

I'm going to go to Mic 5.

TERRY VICTOR: Thank you, Mr. Chairman. Terry Victor with Play Co/Simplex Grinnell. I'm speaking in favor of the motion as a committee member to NFPA 25 and as a member of the task group that came to the committee during the comment stage and submitted this committee comment.

Chapter 14 is in need of reorganization.
1 There's a lot of confusion about Chapter 14, and this
2 committee comment was intended to help with that
3 reorganization and make it very clear what the
4 requirements are and the differences between an internal
5 pipe inspection that's required every five years, an
6 obstruction investigation which is only required when
7 certain things happen during the course providing normal
8 inspection, testing, and maintenance.
9
10 The internal piping inspection is required
11 every five years to check for evidence of internal
12 corrosion, evidence of microbiologically influenced
13 corrosion, and any other obstructing material that may
14 be in the system. The obstruction investigation and
15 prevention is only required on an as need basis.
16
17 The reorganization of Chapter 14 also includes
18 the lessening of some of the internal inspection of
19 piping requirements for buildings with multiple systems
20 and for systems with nonmetallic pipe and for systems
21 that do not have a means of performing this inspection.
22 The reorganization is necessary as the current text has
23 led to confusion, misinterpretation, and misapplication
24 of the requirements.
25
26 There's even a frequently asked question posted
27 on the NFPA website concerning this chapter and whether
28 an internal -- or rather an obstruction investigation is
required every five years, and the answer on the website is no, the obstruction investigation is only required when certain -- the 14 items that are on the list occur during the inspection and testing and maintenance processes. However, every five years you do have to do the internal pipe inspection on every system.

So I move -- or I propose to support this motion. I ask for your support on it just so we can have all this clarification that the committee did submit, and as John stated, it -- it was a slim margin of approval at the committee meeting for the ROC. It didn't pass the two-thirds ballot, so we're trying to get this thing back on track and make it as a comment that represents what the desire of committee is. Thank you.

RALPH GERDES: Thank you. Mic 1.

RICH RAY: Rich Ray, Cybor Fire Protection, committee member, speaking in favor of the motion. I think we did a great job with this, and Terry's right and George is right. We -- this section really needed a lot of clearing up.

First, we call it an obstruction investigation, two sentences later it's called an inspection of piping, then it's called an obstruction investigation again.

Now, then, down here it's called an internal inspection.
They did a good job of cleaning it up nicely, making a distinction between internal inspection being required every five years, and then when certain things happen, like you hear rocks in your pipe or when you open up an ITV, it plugs up with junk, then it's an obstruction investigation. We did a great job and we'd like your support. Thank you.

(Court reporters switched at 9:13 p.m.)
REPORTER'S CERTIFICATE

STATE OF NEVADA )
 ) ss:
COUNTY OF CLARK )
I, Blanca I. Cano, CCR No. 861, RPR, do hereby declare:
That I reported the taking of the NFPA proceedings commencing on Wednesday, June 9, 2010.
That I thereafter transcribed my said shorthand notes into typewriting and that the typewritten transcript is a complete, true, and accurate transcription of my said shorthand notes.
I further certify that I am not a relative or employee of any of the parties, nor a relative or employee of the parties involved, nor a person financially interested in the action.

IN WITNESS WHEREOF, I have set my hand in my office in the County of Clark, State of Nevada, this 24th day of June, 2010.

________________________________
Blanca I. Cano, CCR No. 861, RPR
The following is the continuation of the Hearing on NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*

Start time: 9:12 PM
REPORTER'S TRANSCRIPT OF

NFPA ASSOCIATION TECHNICAL MEETING

Taken at Mandalay Bay Convention Center
3950 South Las Vegas Boulevard
Las Vegas, Nevada

On Wednesday, June 9, 2010
9:12 p.m. to 9:45 p.m.

Reported by: Jane V. Efaw, CCR #601, RPR
MR. KEATING: Good afternoon. My name is Larry Keating. I'm with Lifeline Fire Protection. I represent the Canadian Independent Sprinkler Association. And I'm a committee member. And I can't agree that we did a great job.

THE CHAIR: Speaking for or against the motion?

MR. KEATING: I'm speaking against the motion. I'm totally in favor of what we tried to do, but unfortunately I don't think we quite hit the mark. That's why I had a negative ballot. I was one of those people that didn't help with the two-thirds to get it passed because I had to vote against it.

There were some issues. And I'm getting tired, so please bear with me. There is the issue of not having to check CBDC pipe just because CBDC doesn't corrode. But it is susceptible to getting debris and things that can plug a sprinkler in it. And I can't agree that we can accept paragraphs like that.

There was the premise of always checking the
one branch line besides the inspector's test connection. I disagree with that. You have to look at different places each time. If you always go and look at the safe thing, you always get the same result.

But that isn't the reason for the internal inspection. The internal inspection is to arbitrarily look at places to see if there's a problem in the system, just not one place in the system.

They tried to discuss the subject of when you have to inspect the internal end of a cross fan. I'm afraid they missed the boat there. They actually forgot to mention that. There were discussions about not having to rent a man-lift to get in there and inspect the internals of the cross-connection. They didn't do anything about having to check the branch line.

So as I said, I'm afraid we just didn't get there, and I can't support this motion.

THE CHAIR: Thank you. Mike 5.

MR. BILBO: Cecil Bilbo from the Academy of Fire Sprinkler Technology, and I speak in favor of the motion.

Over the last few years, we spent three days
1 with probably 2,000 or 3,000 inspectors and ASJ's
2 teaching them about water-based fire protection
3 systems. This is a subject that comes up in each and
4 every class, and it's a question that needs to be
5 answered in each and every class. While this
6 language that Mr. Keating states may not be
7 pertinent, along with other things that's happened
8 here tonight, this is moving in the right direction.
9 And I would ask that everyone accepts this motion.
10
11 MR. ELVOVE: Josh Elvove with the U.S.
12 General Services Administration speaking against the
13 motion.
14
15 First of all, I have a point of order.
16 There are at least four subsequent motions that are
17 basically going to address this particular comment.
18 And I was wondering how those are going to affect it.
19 If this were to pass, we're going to be picking and
20 choosing pieces of it.
21
22 THE CHAIR: If all these subsequent motions
23 are successful, the Committee will be balloted. And
24 that information is going to be passed onto the
25 Standards Council. And there may be appeals. But
26 the Council will ultimately make the decision.
27
28 MR. ELVOVE: Thank you. I just want to make
sure that the assembly here was aware that there are
multiple motions that would actually amend this again
should you choose to accept this, which I ask you not
to for what Larry has said.

And to counter what Mr. Bilbo has said, it's
not even close to being perfect. Look at all the
reasons used for rejecting this during the ROC
ballot. And forget about the fact that the
references were incorrect. There's no Section 14.22.
Was that an editorial mistake or an omission of the
text? Can someone say for sure given the confusion
out of a committee member how this was very, very
confusing.

We did our best to come up with the
consensus language, but we obviously failed. A lot
of motions are tied to this motion. And I don't
think a lot of people can look at the ROP and ROC and
really understand how this came to be. And let me
continue.

This section also introduces new material
that the public hasn't seen. I'm not sure if that's
a fact or I asked that before. And apparently that
wasn't an issue. But look at the committee's
substantiation. At least four of the six listed
changes are brand-new. But, regardless, some of the
proposed changes are confused or flawed.

For example, new 14.232 requires an internal inspection for all systems if foreign organic or inorganic material is found during the five-year inspection. Yet in A14.213 it says the presence of some foreign material may not be sufficient to trigger an obstruction investigation. We're sending mixed signals there.

In addition, the new 14.232 seems to relax the five-year internal inspection requirement. But does it? The annex note requires that no evidence of any foreign or organic or inorganic material be found before this kicks in. So I look at that as an illusion.

And there's also an editorial mistake. The new A14.314, which I have no issue with, does not even accept it. So this was not really done very well. And I would urge the assembly here to really look at this before you accept this. It doesn't flow well. If it doesn't flow well, we might as well stick with what we have and go fix it later. I urge you to reject this comment.

THE CHAIR: Thank you. We'll go to mike 4.

MR. LARRIMER: My name is Pete Larrimer. I'm with the Department of Veteran Affairs. And I
1 speak opposed to the motion. I just want to point
2 out a couple brief items.
3
4 You can see by the committee members, of
5 which I am one also, that most of the committee
6 members are confused as to what the requirements are.
7 Mr. Keating in his negative comment is still looking
8 for obstructions in plastic pipe.
9 Back when we were in Phoenix years ago when
10 this was originally put in, I believe it was
11 originally put in because of the MIC issue, and they
12 were just looking inside for the presence of MIC.
13 And it got turned around. But now we're looking for
14 debris in this obstruction, and one little sprinkler
15 location remained in a building like this. It's
16 ridiculous. There's so many confusing things in this
17 document. 104 will not clarify anything. If
18 anything, it makes it more confusing. I speak in
19 opposition to this motion. Thank you.
20
21 THE CHAIR: Thank you. Mike 5.
22
23 MR. VICTOR: Terry Victor with Tyco Simplex
24 Grinnell. I can't let it go without saying again
25 that the text the way it is now, if we don't pass
26 this committee comment --
27
28 THE CHAIR: You're speaking for or against?
29
30 MR. VICTOR: I'm speaking in favor of the
1 motion. If we don't pass this committee comment
2 here, then we're going to revert back to basically
3 the text that was in the previous edition, which is
4 very confusing and is causing a lot of undue
5 inspections and obstruction investigations.

6 And, again, as we spoke earlier, there's a
7 confusion of terms even within the current document
8 in Chapter 14. The question was whether subsequent
9 comments and motions are going to be made following
10 this one. Mine is up next. If this motion succeeds,
11 I intend to withdraw my next motion, and we can speed
12 up the process.

13 However, if this fails, I'm going to go
14 forward with my motion, and we will address some of
15 the issues that Mr. Keating has with the plastic
16 pipe. And I think there were others that intend to
17 withdraw motions if, in fact, this motion should
18 pass.

19 So we want to clean it up. We want to make
20 it user friendly. We want to keep the requirements
21 in there that we know are working.

22 We have, in fact, recognized that there is
23 material in these pipes that we didn't realize were
24 there years ago. This requirement for the internal
25 inspection was put in two cycles ago into the
document. And since then we've been opening up these systems and finding all kinds of problems.

So we need to continue with this type of an internal inspection. We need to clarify the difference between the internal inspection and the obstruction investigation. And this committee comment and this motion will do that. Thank you.

THE CHAIR: Thank you. Seeing no further discussion on the floor, Mr. Brushard?

MR. BRUSHARD: I would only comment that what Terry has just indicated and what I was going to say is that there's been discussion. And if this particular amendment should be passed, then there are a few of the following motions that would not be opposed, but they would be withdrawn at that point.

Again, relative to the overall effort, I believe that NFPA 25 is attempting to move forward. They are trying to address a lot of complex issues that are brought up between our enforcement officials, the users, our contractors, and also our insurance representatives.

And it is a major effort to try to not appease everyone but at least to address everyone's major concerns. And that's what the subcommittee attempted to do originally. And, yes, they missed
1 the mark.
2
3 The current proposal on the floor, in my opinion, is a good attempt to bring quite a few of those minor or sub items into focus so that we can move forward with it. If this one does not pass, then there will be three or four more. And, unfortunately, I have to indicate that I think you will hear a lot of the same arguments.

4 THE CHAIR: Thank you. I'm going to go to mike 4.

5 MR. ELVOVE: Josh Elvove with the U.S. General Services Administration speaking against the motion. With no disrespect to the Chair, I don't think it's fair to speculate what will be happening next. There's a lot of motions coming up, and we don't know what's going to happen. So I would say disregard that.

6 I would just remind the assembly one more time that this one was not a consensus. You looked at the ballot. You saw this is the most contentious issue that the committee had to deal with. If that's the care, I'm reluctant and hesitant to want to pass it here on the floor. Thank you.

7 THE CHAIR: Thank you. I'll go to mike 5.

8 UNIDENTIFIED SPEAKER: I'm speaking in favor
of the motion. Josh is right. You never know what's going to happen. But I'll tell you, if we get this one passed, I've got two coming up, and I'll pull them.

THE CHAIR: Okay. Thank you. We're going to close discussion on this issue and go to the vote. The motion is to accept Comment 25.104. All those in favor please raise your hand. Thank you. Those opposed. Thank you. That motion carries. As previously stated in the last discussion, we're now going to see some motions that may be modifying what we just did. I just want to make the body aware of that. With that, we're going to proceed with Motion Sequence 25-16. Mike 5.

MR. VICTOR: My name is Terry Victor with Simplex Grinnell. And I move to withdraw my certified amended motion in favor of the previous action.

THE CHAIR: The Chair accepts your withdrawal. There will be no further discussion on that motion. We're going to move to Motion Sequence 25-17.

MR. RAY: My name is Richard Ray, Cybor Fire Protection. And I'm going to withdraw this motion.

THE CHAIR: Thank you. I accept that
ASSOCIATION AMENDMENT  
BALLOT RESULTS  

DATE:  July 7, 2010

AMENDMENT

Document: NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

Motion: To Accept Comment 25-104 and 25-101

TC PRELIMINARY Ballot Results (Final Ballot due 7/13/10)

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment IS NOT achieving the necessary 2/3 majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the report to be published is 19.

[32 (eligible to vote) - 2 (not returned) - 2 (abstentions) = 28 × 0.66 = 18.48]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

[32 eligible ÷ 2 = 16 + 1 = 17 (this is the simple majority)]

<table>
<thead>
<tr>
<th>32 Eligible to Vote</th>
<th>2 Not Returned (Drysdale and Whitney)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Option 1</strong></td>
<td>2 Agree to Reject Both Comments</td>
</tr>
<tr>
<td></td>
<td>(Fantauzzi, Leavitt)</td>
</tr>
<tr>
<td></td>
<td>8 Agree to Accept Comment 25-101</td>
</tr>
<tr>
<td></td>
<td>(Adams, Elvove, Lake, Larrimer, Muno, Saidi, Underwood w/comment)</td>
</tr>
<tr>
<td><strong>Option 2</strong></td>
<td>18 Agree to Accept Comment 25-104</td>
</tr>
<tr>
<td></td>
<td>(Andress, Feld, Fleming, Fuller, Keeping, Linder, Ray w/comment)</td>
</tr>
<tr>
<td><strong>Option 3</strong></td>
<td>2 Abstentions</td>
</tr>
<tr>
<td></td>
<td>(Bouchard, Stein)</td>
</tr>
</tbody>
</table>

Preliminary Action: FAILING
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:
Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be
to return to previous edition text.

[ ] Option 1: REJECT BOTH COMMENTS
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104.
Accordingly, you are recommending returning Chapter 14 to previous edition text.

[ ] Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually
inconsistent, you must choose only one.

[ ] Accept Comment 25-101 (see Attachment A to see the resulting text)

[ ] Accept Comment 25-104 (see Attachment B to see the resulting text)

[ ] Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why
you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are
optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional
sheets may be attached to this ballot).

SEE ATTACHED.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:
Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]
Name - Please Print: [Russell Leavitt]
Date: [6/30/10]
June 2010
Comment on Voting for Option 1
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 Association Amendment

Although I originally voted to accept comment 104 with the TC, after carefully reviewing the comments given with the negative votes and the obvious "confusion" that resulted in the general membership voting to accept both comments 104 and 101 it is clear to me that there is still much work to do before any revisions are acceptable. Therefore, I believe that we should leave the wording as is currently in the 2008 edition and work to resolve the many outstanding issues during the next revision cycle.
Standards Council Supplemental Agenda

NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
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Please find attached comments.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-944-7110

Signature:

Name: Please Print: James M. Flannery

Date: 7-1-10
June 2010
To: NFPA 25 Committee c/o Jeanne Moreau-Correia  
Re: 25-104  
Log # CC5  
Section Chapter 14  
Action: Reject both comments and return to previous edition text  

Comment:

I have some reservation on how 25-104 reads which may increase cost and place an undo burden upon the end user of the 25 Document.

Secondly, I have reviewed NFPA-13, IBC and NYS Building Code and cannot find a clean clear-cut definition of what is a system. The implication of A.14.2.3 may automatically define what is considered a zone, sectional, and a sub-system or isolation valve, as a system.

Log # CC5 appears to define what a system is which has far reaching ramification in relationship to other inspection and testing function and may be used by other codes and standards as a definition. I feel that it is NFPA-13 committee's position and responsibility to determine the definition of what a system is and not that of the NFPA-25 committee.

Re: Comment 25-101  
Log #98  
Section Chapter 14  
Action: Reject both comments and return to previous edition text

Comment:

Comment 25-101 is some what convoluted, weakens the current chapter 14 and leaves the user confused on what should be done and when to do it.

James M. Fantauzzi
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

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sheets may be attached to this ballot).

Current requirements need clarification which is done in
Comment 25-101. Comment 25-104 removed the internal
inspection requirement which is needed and relies
solely on external factors.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne MOREAU
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7710

[Signature]

Name - Please Print: [Signature] V. POWNELL

Date: 7/2/10

June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

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Despite the fact that 25-101 removes the mandatory 5 year internal inspection requirement, it appears to be the less radical change to chapter 14 than 25-104. 25-101 makes 5 additional changes but they truly are formatting changes that set up the flow of chapter 14 to establish that purpose of obstruction investigations is to “ensure that piping remains clear of all obstructive foreign matter”; that internal inspections are triggered as a result of any one of the 14 established conditions; and that flushing is required when there is sufficient material noted that obstructs any portion of the sprinkler system. 25-104 tries to do too much and actually adds 11 new line items to the chapter (many of which were newly created during ROC) that have their own shortcomings (e.g., exempting non-metallic pipe from internal inspections, requiring the most remote branch on dry pipe systems to be internally inspected, exempting inaccessable pipe from internal inspections, permitting “systems” – which are not clearly defined – to be internally inspected every other 5 years, adds new contradictory annex material regarding what is sufficient to permit this alternative inspection frequency). Because of these issues, I cannot support 25-104.

I Battemarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [s/ JWE]

Name - Please Print: Joshua W. Elvove

Date: 6/25/2010
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

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I still don't agree that CPVC or non-metallic pipe should be exempted. Obstructions can still occur due to other factors such as rocks, glue, pieces of pipe and other debris.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanna Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]
Name - Please Print: [Name]
Date: 6/24/2010
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

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Based on the data from the NFPA report dated February 2010 by John G. Hall Jr., entitled "US Experience with Sprinkler and Fire Automatic Equipment," now available to all on the web, it can be clearly seen that the mandatory 5-year requirement to install sprinkler systems was not warranted. Inspections will only be required when there is due cause.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
PAX: 617-984-7110

Signature:
Peter A. Larrimee

Name - Please Print: Peter A. Larrimee

Date: 7-1-10
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

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OBSTRUCTION INVESTIGATION SHOULD BE BASED ON PERFORMANCE CRITERIA NOT AN ARBITRARY SCHEDULE.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: JOHN HUMANS

Date: 7-2-10
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

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sheets may be attached to this ballot).

There is consensus of the need for internal inspection of the piping to “ensure that piping remains clear of all obstructive foreign matter” when there are triggers as established in
Chapter 14 indicating due cause but should be not mandated as universal requirement
regardless of system conditions and history. Comment 25-101 accomplishes this
objective and appears to be a more rational and the less radical change to the chapter.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jerome Morley
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
PAX: 617-834-2118

Signature:

Name-Please Print: JOHN P. SANDI

Date: 7/2/2010

June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

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I still need a reason to show me there is a problem before taking systems apart.


Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Joanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature:

Name - Please Print: Moreau, L. Underwood

Date: June 2010
NFPA 25  
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems  
June 2010 ASSOCIATION AMENDMENT  
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

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I agree with comment 25-104 (CC5) and agree with the committee action.

I disagree with comment 25-101 and support the committee action that supports the 5 year internal inspection frequency.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeane Moreau  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: 617-984-7110

Signature: ____________________________

Name - Please Print: Gary Andress  
Date: 7/2/2010  
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
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Comment:

I believe the 5-year frequency is necessary. The pipe has been heavily corroded and obstructed as well as valves.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02189
FAX 617-984-7110

Signature: ______________
Name: Please Print: ______________
Date: ______________
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
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☒ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

Comment 25-104 was a committee comment intended to help improve understanding and enforcement of the 5-year random internal inspection that was added in the 2002 edition. It failed ballot by a single vote, with some members claiming it was too severe and others too lax. Comment 25-101 would eliminate the inspection altogether and would be a step backward. I'm concerned that the ballot package does not make this elimination clear through the use of legislative text.

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: R. Fleming

Date: 7/11/10
June 2010
Standards Council Supplemental Agenda

Standards Council Supplemental Agenda

TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems

June 2010 ASSOCIATION AMENDMENT

(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

☐ Option 1: REJECT BOTH COMMENTS
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

☒ Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☒ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

My understanding is that if neither of these amendments pass ballot, the text will return to the flawed text of the previous edition. Therefore I am supporting 25-104.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: David B. Fuller

Date: July 1, 2010
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be
to return to previous edition text.

☐ Option 1: REJECT BOTH COMMENTS
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104.
Accordingly, you are recommending returning Chapter 14 to previous edition text.

☑ Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually
inconsistent, you must choose only one.
☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☑ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why
you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are
optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional
sheets may be attached to this ballot).

SEE ATTACHED SHEET

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moser
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: __________________________
Name - Please Print: LARRY KEEPER
Date: June 2010

Standards Council Supplemental Agenda August 3-5, 2010 Page 684 of 1603
NFPA 25
TC Ballot for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 Association Amendment
(To accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Regarding this issue, I opt for Option 2, to Accept One Comment.

The Comment that I vote to Accept is Comment 25-104.

I do agree with the need to internally inspect the piping every 5 years, in an effort to proactively look for potential problems, before they can impact on system performance in the event of a fire.

During the ROC balloting I actually voted against this comment, because I feel it has some inconsistencies, which I spoke to in my ballot statement. However, I was in general agreement with the attempt to differentiate between an internal inspection and an obstruction investigation and provide some guidance as to what should be done following an inspection.

Now, faced with the choices of accepting Comment 25-104, despite its flaws, or of accepting Comment 25-101, and doing away with the 5 year inspections, or of returning to the text of the 2008 edition, I choose to Accept Comment 25-104, as the best choice that is available.

I cannot vote in favour of Comment 25-101, because despite our best efforts, foreign material does get into our systems, and without looking inside on occasion, there is no way to find it, until it may be too late.

Larry Keeping, P.Eng
Vipond Fire Protection
Moreau-Correia, Jeanne

From: Kenneth_Linder@swissre.com
Sent: Thursday, July 01, 2010 4:23 PM
To: Moreau-Correia, Jeanne
Subject: Re: NFPA 25 Amendments

Jeanne,

Please record me as voting as follows:

Accept Comment 25-41. --- I vote affirmative.

Accept Comment 25-101 and 104. --- I vote for Option 2 and to accept Comment 104. While it is not perfect and I have some concerns on the wording, I feel it best represents the intent of the committee and is better than reverting to the existing language if we reject both.

Let me know if you need anything else,

Regards,
Ken

Kenneth Linder | Vice President | Property & Specialty
Swiss Re/Industrial Risk Insurers | 2 Waterplace Crossing, Suite 200, Windsor, CT 06095, USA
Direct: +1 860 902 7237 Mobile: +1 860 573 7722 E-mail: Kenneth_Linder@swissre.com

http://www.swissre.com

TO: The Technical Committee on Inspection, Testing, and Maintenance of Water-Based Systems

Dear Committee Members:

Attached are the ballot materials for NFPA 25 Amendments. The due date for return of the ballot is Friday, July 2, 2010. Please fax your ballot to 617-984-7110 or email to jmoreaucorreia@nfpa.org (Please note there are two (2) ballots to be returned).

This information has also been posted on your ECommittee Page under the “Ballot Information Heading” and within the “Other Ballots” folder.

If you have any questions, please don’t hesitate to contact me.
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text).

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

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If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

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Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☒ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

Comment 25-101 would eliminate the random internal inspections of fire sprinkler piping. These inspections have proven very worthwhile in ensuring that fire sprinkler systems stand ready to protect life and property.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: Richard M. Hay

Date: 07/02/10
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

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will be to return to previous edition text.

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If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104.
Accordingly, you are recommending returning Chapter 14 to previous edition text.

☐ Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is
mutually inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

☑ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons
why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments
are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed,
additional sheets may be attached to this ballot).

I agree with nearly all that Comment #104 accomplishes, and I believe that most of the committee is in agreement
on that fact, also. However, I do not agree with the mandatory nature of the 5 year requirement for internal
investigation or inspection of piping, unless one of the indicators listed in the document triggers such an
investigation.

Technical justification has not been provided to the committee for either the requirement or the 5 year interval,
without which I feel this becomes an unnecessary and costly requirement that would be placed squarely on the
shoulders of all owners of automatic sprinkler systems.

(PLEASE SEE CONTINUATION OF THIS SUBSTANTIATION FOR ABSTENTION ON THE NEXT PAGE)

Please return as soon as possible, but no later than Friday, July 2, 2010 to:
Joanne Moran
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-994-7140

Signature:
[Signature]

Name - Please Print: JOHN BOUCHARD
Date: 7/1/10
Continuation of substantiation for abstention:

Until such time that documentation or records can show that the viability of many systems is in jeopardy, I do not believe that this action is necessary.

I have abstained from voting on this issue at this time, as I don't feel that Comment #101 accomplishes as much as the committee would like, although I do agree with the removal of a mandatory internal inspection based on a 5 year interval. I am not convinced that Comment #101 creates an improved version over previous text, and prefer to review the circulation of the committee member results and comments prior to making a decision on this issue.

Signature: [Signature]
Name - Please Print: JOHN BOUCHARD
Date: 7/1/10
Standards Council Supplemental Agenda

NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT

(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

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If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

- Accept Comment 25-101 (see Attachment A to see the resulting text)

- Accept Comment 25-104 (see Attachment B to see the resulting text)

Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moran
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-996-7110

Signature

Name - Please Print:

Date:
June 28, 2010
I don't have a significant amount of expertise or opinion on that matter.

From: Moreau-Correia, Jeanne  
To: Chip Stein  
Sent: Thu Jul 01 13:59:22 2010  
Subject: NFPA 25 Amendment 101 and 104

Greg,

I have received your ballot and have you down as abstaining. However, the reason for your abstention is missing.

Please advise.

Best Regards,
Jeanne

Jeanne Moreau  
Technical Projects Supervisor  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
Ph: 617-984-7586  
Fx: 617-984-7110
COMMENT 25-101 (A2010) Accept Comment

25-101 Log 998 Final Action: Reject
(Chapter 14)

Submitter: Peter A. Larrimer, US Department of Veterans Affairs
Comment on Proposal No: 25-185
Recommendation: Revise text to read as follows:
Accept the original proposal.

Substantiation: The committee did not address the substantiation provided by the proponent. The committee has never justified why it is a good idea for an owner to pay someone look inside of the pipe every 5 years as identified in the committee statements. See Negative Explanations.

It would be valuable to the owner if the committee established why these onerous requirements are justified with something more than “it is important to look inside of the pipe every 5 years”.

Committee Meeting Action: Reject
Committee Statement: Reports of obstructions under actual field inspections supports the validity of the 5-year internal inspection criteria. It is important to keep consistent collection points until more data can be collected.

Number Eligible to Vote: 30
Ballot Results: Affirmative: 23 Negative: 6
Ballot No returned: 1 Fuller, D.
Explanation of Negative:

D.4. Drystadale, M.: The triggers identified in the Obstruction chapter should be adequate for initiating an examination for obstructions. It was not clear in our discussions that the obstruction that were being referred to should have gone unnoticed until the 5 yr obstruction inspection.


Larrimer, P.: The committee states: “Reports of obstructions under actual field inspections supports the validity of the 5-year internal inspection criteria. It is important to keep consistent collection points until more data can be collected.” This statement presents “Reports” that are nothing more than unwritten anecdotal data that was not provided to the committee and these “Reports” do not justify the onerous costs placed on owners to perform this mandatory inspection. In addition, just because some material is found inside a piping system doesn’t establish that the system would not have controlled the fire as originally designed. We have unwanted material in the water of most sprinkler systems, but the record of acceptable results where sprinklers are installed speaks for itself. Even NFPA and the insurance companies have not produced data to show that systems are failing due to obstructed piping to the extent that there is a need to require all systems to be opened every five years. This comment should be accepted.

Saidi, J.: Committee statement does not adequately support the rejection of the proposal. Reports (discussions) of obstructions did not justify maintaining this costly and cumbersome task nor the arbitrary 5 year interval. In view of the history of this topic, the committee needs to show more flexibility in reaching a reasonable compromise.

Shippard, J.: Agree with the submitter’s substantiation.

Underwood, D.: I see no reason to open a system when nothing in any test indicates a problem.

PROPOSAL 25-185 (A2010) Backup

25-185 Log 693 Final Action: Reject
(Chapter 14)

Submitter: Joshua Elvo, U.S. General Services Administration
Recommendation: Revise Chapter 14 as follows:

14.1 General
This chapter shall provide the minimum requirements for conducting investigations of fire protection system piping for possible sources of materials that could cause pipe blockage.

14.2 Obstruction Investigation and Prevention

14.2.1 To ensure that piping remains clear of all obstructive foreign matter, an obstruction investigation shall be conducted for system or yard main piping wherever any of the following conditions exist:
(1) Defective intake for fire pumps taking suction from open bodies of water
(2) The discharge of obstructive material during routine water tests
(3) Foreign materials in fire pumps, in dry pipe valves, or in check valves
(4) Foreign material in water during drain tests or plugging of inspector’s test connection(s)
(5) Plugged sprinklers

(6) Plugged piping in sprinkler systems dismantled during building alterations
(7) Failure to flush yard piping or surrounding public mains following new installations or repairs
(8) A record of broken public mains in the vicinity
(9) Abnormally frequent false tripping of a dry pipe valve(s)
(10) A system that is returned to service after an extended shutdown (greater than 1 year)
(11) There is reason to believe that the sprinkler system contains sodium silicate or highly corrosive fluids in copper systems

14.2.2 A system has been supplied with raw water via the fire department connection
(13) Pinhole leaks

14.2.4 If a 50 percent increase in the time it takes water to travel to the inspector’s test connection from the time the valve trips during a full flow test is a dry pipe sprinkler system when compared to the original system acceptance test

14.2.2 Where an obstruction investigation is warranted in accordance with Section 14.2.1, the following shall be required:

14.2.2.1 An inspection of piping and branch line conditions shall be conducted for every 5 years by opening a flushing connection at any line main and by removing a sprinkler toward the end of one branch line for the purpose of inspecting for the presence of foreign organic and inorganic material.

14.2.2.1 Alternative nondestructive examination methods shall be permitted.

14.2.2.2 Tubercules or slime, if found, shall be tested for indications of microbiologically influenced corrosion (MIC).

14.2.2.3 If the obstruction investigation carried out in accordance with 14.2.2.1 indicates the presence of sufficient material to obstruct sprinklers, a complete flushing program shall be conducted by qualified personnel if the obstruction investigation indicates the presence of sufficient material to obstruct any portion of the sprinkler system.

14.2.3 System shall be examined for internal obstructions where conditions exist that could cause obstructed piping.

14.2.3.1 If the condition noted in Section 14.2.2 has not been corrected or the condition is one that could result in obstruction of the system, then any previous flushing procedures that have been performed, the system shall be flushed in accordance with Section 14.2.2.3 and inspected examined for internal obstructions every 5 years.

14.2.3.1.1 Internal inspections shall be accomplished by examining the interior of the following four points:
(1) System valve
(2) Riser
(3) Cross main
(4) Branch line

14.2.3.1.1 Alternative nondestructive examination methods shall be permitted.

14.3 Ice Obstruction
Dry pipe or preaction sprinkler system piping that protects or passes through freezers or cold storage rooms shall be inspected internally on an annual basis for ice obstructions at the point where the piping enters the refrigerated area.

14.3.1 Alternative nondestructive examinations shall be permitted.

14.3.2 All penetrations into the cold storage areas shall be inspected and, if an ice obstruction is found, additional pipe shall be examined to ensure no ice blockage exists.

A.14.2 For obstruction investigation and prevention, see Annex D.
A.14.2.2 For obstruction investigation procedures, see Section D.3.

The type of obstruction investigation should be appropriately selected based on the observed condition. For instance, ordering an internal obstruction investigation would be inappropriate where the observed condition was broken public mains in the vicinity. On the other hand, such an investigation would be appropriate where foreign materials are observed in the dry pipe valve.

A.14.2.3 For obstruction investigation flushing procedures, see Section D.5.
A.14.2.3 For obstruction prevention program recommendations, see Section D.4.

Substantiation: This proposal makes this section flow better, and makes a number of needed technical changes.

Existing Section 14.2.2 was relocated in front of existing Section 14.2.1 and renumbered accordingly as the information contained within this section needs to be stated first. New leading text has been proposed for clarification.

Existing Section 14.2.1 has been renumbered as Section 14.2.2 and revised so:
1. The requirements of renumbered Section 14.2.2 (e.g., removing a sprinkler and testing for MIC) only apply when any of the conditions stated in renumbered Section 14.2.1 are observed, instead of merely every 5 years, since the 5 year requirement was never justified.
2. In addition, a mandatory recurring inspection program, especially one that requires a sprinkler to be opened, should only be implemented when any of the conditions stated in renumbered Section 14.2.1 are discovered.

2. The flushing requirement previously stated in 14.2.4 is incorporated into new Section 14.2.2 where it belongs, instead of being located in a separate section.

The charging text of existing Section 14.2.3 was deleted in favor of existing text from 14.2.3.1, as existing text of Section 14.2.3.2 is redundant. Text was added to clarify that the current 5 year requirement for conducting subsequent obstruction inspections (in existing Section 14.2.3.1) and inspections at four interior points (in existing Section 14.2.3.2) both kick in...
when conditions are noted by obstruction investigations per renumbered Section 14.2.1 that could cause pipe to become obstructed (e.g., zebra mussels, MIC). Text has also been added to ensure the system is also flushed at this time.

Existing Section 14.3 (Ice Obstructions) has not been changed.

The annex note numbers were revised to reflect the aforementioned reference changes.

**Committee Meeting Action: Reject**

**Committee Statement:** It is important to look inside the pipe every five years. 25-187 (Log #27) addresses the structure of this section.

**Number Eligible to Vote:** 30

**Ballot Results:** Affirmative: 26 Negative: 3

**Explanation of Negative:**

ELVOVE, J.: This proposal should be accepted for the reasons stated in the substantiation. However, it’s clear there’s no way this committee will budge on this issue. The 5-year obstruction investigation was never technically substantiated when it was approved by the committee two cycles ago and is required whether or not there is any evidence of MIC. As typical with many ITM frequencies, once in the standard, it’s difficult if not impossible to revise or remove. As such, every property owner is now and forever saddled with this potentially unnecessary effort and expense. NFPA 25 is supposed to be a minimum standard and here is another example of where it clearly has gone beyond being a minimum standard. Of note: a proposal (25-189, Log 101) to eliminate CPVC pipe from obstruction inspection requirements barely passed committee vote during the ROP which shows that there’s even a lot of resistance to removing this requirement from a pipe that’s not subject to MIC.

LARRIMER, P.: There has been no substantiation for this requirement to open up a sprinkler system and inspect the inside of the piping every five years. It is expensive and onerous to the owners of the systems. The code requirement was added to the document in 2002 without the substantiation required by the NFPA Regulations Governing Committee Projects. Subsequent attempts to eliminate it have been rejected by the committee who has still not provided or required substantiated the requirement.

Now the committee retains the requirement with the following committee statement:

“It is important to look inside the pipe every five years.”

How can an argument be made against the justification for putting this requirement in the standard when there was no justification in the first place. Here is a summary of the original proposal substantiation in 2002 and subsequent committee statements from 2002/2006 ROPs and ROCs respectively. Never has the requirement been justified.

2002 ROP

**SUBSTANTIATION:** There is a need to check for the possibility of clogged mains and lines other than routine inspector’s test flows. This proposal was developed by the UL/FM/NFSA Standards Review Committee.

2002 ROC

**COMMITTEE STATEMENT:** The committee stands by the original justification. This requirement more appropriately belongs in Chapter 10.

2006 ROP

**Committee Statement:** It is the intent of the committee to retain the 5 year requirement.

2006 ROC

Committee Statement: See committee action and statement on Comment 25-63 (Log #7).


25-46 Committee Meeting Action: Accept

25-48 Committee Statement: It is the intent of the committee to segregate the requirements of obstruction inspection and investigation for clarification.

SAIDI, J. (Chapter 14)

This and other proposals on this section highlight the need for a comprehensive review and re-write of this section on obstruction investigation and prevention. Changes proposed in 25-187 (Log #27) do not fully address the issues in this chapter.

**PROPOSAL 25-187 (A2010) Backup to Committee Statement on Comment 25-187**

25-187 Log #27 Final Action: Accept (14.2)

**Submitter:** Roland J. Huggins, American Fire Sprinkler Association, Inc.

**Recommendation:** Revise text to read as follows:

14.2 Obstruction Investigation and Prevention Internal Inspection of Piping

14.2.1 14.2.1.1 If an obstruction investigation carried out in accordance with 14.2.1 indicates the presence of there is sufficient material to obstruct sprinklers, a complete flushing program shall be conducted by qualified personnel.

14.3 Obstruction Investigation and Prevention

14.3.2 14.3.1 An obstruction investigation ……

Remover 14.2.3 through 14.2.3.3

14.2.3.2 Internal inspection shall be accomplished by examining the interior of examination shall be performed at the following four points:

**Substantiation:** Editorial changes are needed to better differentiate between an inspection and an obstruction evaluation.

**Committee Meeting Action:** Accept

**Number Eligible to Vote:** 30

**Ballot Results:** Affirmative: 27 Negative: 2

**Explanation of Negative:**

ELVOVE, J.: This is not an editorial change. See Mr. Larrimer’s negative ballot comment.

LARRIMER, P.: Section 14.2.4 as written in the standard, was to be used after the system internals (system valve, riser, cross main, and branch line) were properly inspected; and the proper inspection was only to be done after there was SUFFICIENT cause to do so. The SUFFICIENT causes that “triggered” a proper inspection are listed in section 14.2.2. This “editorial” change (relocating 4.2.4 to 14.2.1.3) now requires every five years a contractor who has been asked to perform ITM per NFPA 25 to remove a sprinkler from a branch line and look into a flushing connection and into a ½ inch hole (inspect), and then require a complete flushing program to be done because he thinks there is sufficient material to obstruct sprinklers.

This contractor (who the committee says should not be asked to determine when the sprinkler spacing meets code because he may not be qualified) is supposed to determine when “sufficient” material to obstruct sprinklers in present to require a complete flushing program.

The term sufficient is unenforceable according to the Manual of Style.

The terms inspection, evaluation, and investigation were not a problem until the mandatory five year “inspection” was added without cause and without much thought concerning the actual verbiage. It used to be that an obstruction investigation would be initiated, only after a trigger (in 14.2.2), and that obstruction investigation would include inspections and evaluations as appropriate.

See also my negative comment on 25-185 (Log #93).

**Comment on Affirmative:**

FANTAUZZI, J.: The title still shows deletion of all the text whereas the last portion should be underlined showing it as new text as shown below:

14.2 Obstruction Investigation and Prevention Internal Inspection of Piping
COMMENT 25-104 (A2010) Accept Comment

25-104 Log 

This proposal is reported as “Reject” as it did not receive the 2/3 affirmative vote.

Submitter: Technical Committee on Inspection, Testing, and Maintenance of Water-Based Systems,

Recommendation: Further revise Chapter 14 as follows:

14.2* General. This chapter shall provide the minimum requirements for conducting investigations of fire protection system piping for possible sources of materials that could cause pipe blockage.

A.14.2.1 For obstruction investigation and prevention, see Annex D.

14.2* Obstruction Investigation and Prevention Internal Inspection of Piping [from ROP 25-187]

14.2.1 Except as discussed in 14.2.1.1 and 14.2.1.3, an inspection of piping and branch line conditions shall be conducted every 5 years by opening a flushing connection at the end of one main and by removing a sprinkler toward the end of one branch line for the purpose of inspecting for the presence of foreign organic and/or inorganic material. [from ROP 25-189]

14.2.1.1 Alternative nondestructive examination methods shall be permitted.

14.2.1.2 Tubercles or slime, if found, shall be tested for indications of microbiologically influenced corrosion (MIC).

14.2.1.3* If the presence of sufficient foreign organic and/or inorganic material is found to obstruct sprinklers, an obstruction investigation shall be conducted as described in 14.3.

A.14.2.1.3 Most piping systems may contain some foreign material or other evidence of corrosion but not sufficient to trigger an obstruction investigation. Furthermore, an internal inspection is primarily an inspection for determining corrosion of the pipe but may result in finding the presence of material that would be an obstruction to piping or sprinklers. If such is found an obstruction investigation in 14.3 would be required.

[from ROP 25-187] 14.2.1.4 If an obstruction investigation carried out in accordance with 14.2.1, indicates the presence of sufficient material to obstruct sprinklers, a complete flushing program shall be conducted by qualified personnel.

A.14.2.1.4 For obstruction investigation flushing procedures, see Section D.5.

14.2.1.5* CPVC Non-metallic pipe shall not be required to be inspected internally. [from ROP 25-189]

14.2.1.6* In dry pipe systems and pre-action systems, the sprinkler removed for inspection shall be from the most remote branch line from the source of water that is not equipped with the inspectors test valve. [from ROP 25-190]

14.2.1.6* Inspection of a cross main is not required whereas test system piping is not accessible.

(b) the system does not have a visible means of inspection such as crossed couplings or flushing connections. [from ROP 25-191]

14.2.3* In buildings having multiple wet piping systems, every other system shall have an internal inspection of piping every 5 years as described in 14.2.1.

A.14.2.3 In large warehouses, high rise buildings, and other buildings having multiple systems it would be reasonable to perform the internal inspection on half of the systems, and conclude that these are representative of all systems in the building. The systems in the building not inspected during one inspection cycle should be inspected during the next one. As long as there is no evidence of any foreign organic and/or inorganic material found in any of the systems being inspected, every other system would be inspected once every 10 years. However, if foreign organic and/or inorganic material is found in any system in the building during the 5 year inspection cycle, all systems must be inspected during that inspection cycle.

14.2.3.1* During the next inspection frequency required by 14.2.1, the alternate systems not inspected during the previous inspection shall have an internal inspection of piping as described in 14.2.1.

14.2.3.2* If the presence of foreign organic and/or inorganic material is found in any system in a building during the 5 year internal inspection of piping, all systems shall have an internal inspection.

14.3 Obstruction Investigation and Prevention [from ROP 25-187]

14.3* An obstruction investigation shall be conducted for system or yard main piping wherever any of the following conditions exist:

1. Defective intake for fire pumps taking suction from open bodies of water
2. The discharge of obstructive material during routine water tests
3. Foreign materials in fire pumps, in dry pipe valves, or in check valves
4. Foreign material in water during drain tests or plugging of inspectors test connection
5. Plugged sprinklers
6. Plugged piping in sprinkler systems dismantled during building alterations
7. Failure to flush yard piping or surrounding public mains following new installations or repairs
8. A record of broken public mains in the vicinity
9. Abnormally frequent false tripping of a dry pipe valve(s)
10. A system that is returned to service after an extended shutdown (greater than one year)
11. There is reason to believe that the sprinkler system contains sodium silicate or highly corrosive fluxes in copper systems
12. A system has been supplied with raw water via the fire department connection
13. Pinhole leaks
14. A 50 percent increase in the time it takes water to travel to the inspector’s test connection from the time the valve trips during a full flow trip test of a dry pipe sprinkler system when compared to the original system acceptance test.

A.14.3* For obstruction investigation procedures, see Section D.3. The type of obstruction investigation should be appropriately selected based on the observed condition. For instance, ordering an internal obstruction investigation would be inappropriate where the observed condition was broken public mains in the vicinity. On the other hand, such an investigation would be appropriate where foreign materials are observed in the dry pipe valve.

A.14.3.1* If unknown materials are heard in the system piping during draining, refilling or otherwise flowing water through the system.

14.3* Systems shall be examined for internal obstructions where conditions exist that could cause obstructed piping.

A.14.3.2* For obstruction prevention program recommendations, see Section D.4.

14.3* If the condition has not been corrected or the condition is one that could result in obstruction of the piping despite any previous flushing procedures that have been performed, the system shall be examined for internal obstructions every 5 years.

14.3* Internal inspections shall be accomplished by examining the interior of [from ROP 25-187] examination shall be performed at the following four points:

1. System valve
2. Riser
3. Cross main
4. Branch line

14.3* Alternative nondestructive examination methods shall be permitted.

14.3* If an obstruction investigation indicates the presence of sufficient material to obstruct pipe or sprinklers, a complete flushing program shall be conducted by qualified personnel.

A.14.3* For obstruction investigation flushing procedures, see Section D.5.

14.4 Ice Obstruction

14.4 Ice Obstruction

Dry pipe or preaction sprinkler system piping that protects or passes through freezers or cold storage rooms shall be inspected internally on an annual basis for ice obstructions at the point where the piping enters the refrigerated area. [from ROP 25-187]

14.4.1 Alternative nondestructive examinations shall be permitted.

14.4.2 All penetrations into the cold storage areas shall be inspected and, if an ice obstruction is found, additional piping shall be examined to ensure no ice blockage exists.

Substantiation: New A.14.1.4 is moved from A.14.2 for a more inclusive reference.

New 14.2.1.3.1 and A.14.2.1.3 is added because in the current language the standard does not advise what to do if something is found during the internal inspection. Finding something in the system piping should trigger an obstruction investigation.

Paragraph 14.2.1.4 deletes CPVC for a more inclusive reference to other plastic piping systems and these would not require an internal inspection either.

Paragraph 14.2.1.6 is further revised from the ROP because whether a pipe is accessible or not is subjective. This change is intended to clarify that if a lift is required, or if it’s above a lay-in tile ceiling, it’s not accessible. This change should cover both situations described in the annex note.

New 14.2.3 is added in an effort to relax the requirement that all systems in a building must be inspected every 5 years, it is reasonable to inspect half this cycle and the other half the next cycle. However, if tubercules or slime or obstructing material is found in any system, all systems should undergo an obstruction investigation.

New A.14.3.1.4 clarifies that it is not uncommon to actually hear rocks, stones, and other materials rattle through the piping when water is moving. These sounds should trigger an obstruction investigation.

New 14.3.3 adds the same language here as in new 14.2.1.3.1 because this should apply to both sections 14.2 & 14.3.

Committee Meeting Action: Accept

Number Eligible to Vote: 30

Ballot Results: Affirmative: 17 Negative: 9
Ballot Not Returned: 4 Drysdale, M., Garber, G., Stein, G., Whitney, J.

ELVOVE, J.: This is one of eight comments (ROC 25-103, 104, 105, 106, 107, 110, 111 and 133) pertaining to three public proposals (ROP 25-187, 25-189 and 25-191) on Chapter 14. This particular comment was generated by the committee in order to consolidate actions on all three public proposals and all seven subsequent public comments and attempts to incorporate those actions into a single committee comment. Unfortunately, the committee statement herein doesn’t clearly delineate how all this transpired. Therefore, I am very uncomfortable presenting this comment to the membership and the public when it comes up for a vote at the annual meeting in June. In addition, there are erroneous committee statements in related comments ROC 25-103, 25-105, 25-107, 25-110 and 25-133 which directly relate to this comment. Those committee statements refer to ROC 25-76 for all actions taken, but that ROC 25-76 has nothing to do with Chapter 14 (it references 8.3.5.7). As a result, the public may not understand how to interpret individual committee member “explanation of negative” and “affirmative with comment” statements made on all those comments as they relate to this comment. Next, there is no section 14.2.2. Is this an editorial mistake, or did the committee miss some key text when rearranging this section to address this comment as well as all the other related comments (and earlier proposals) on Chapter 14? Finally, all the text in section 14.2.3 is new material which has not been reviewed by the public. For all these reasons, this committee comment should be rejected.

FANTAUZZI, J.: I have some reservation on how chapter 14 reads which may increase cost and undo burden upon the end user of the 25 Document. I feel that we are losing our goals for a reasonable application and cost effectiveness of this standard.

I have reviewed the ROP and it appears that this may be new material and has not been reviewed by anybody other than the committee itself.

Secondly, I have reviewed NFPA 13, IBC and NYS Building Code and can not find a clean clear-cut definition of what is a system. The implication of A.14.2.3 may automatically define what is considered a zone, sectional, and a subsystem or isolation valve as a system.

Log #CCS appears to define what a system is which has far reaching ramification in relationship to other inspection and testing function and may be used by other codes and standards as a definition. I feel that it is NFPA 13 committee’s position and responsibility to determine the definition of what a system is and not that of the NFPA 25 committee.

KEEPING, L.: While I definitely I agree with the intent of this offering to provide advice for what to do if something is found during an internal inspection, I take issue with some of the directions within the text.

1. I do not believe that non-metallic pipe (CPVC) should be excluded from the inspection requirements as stated in the new text for 14.2.1.4. This material may be resistant to corrosion, but it is every bit as susceptible to collecting foreign materials (sand, mud or stones, cigarette butts, paper, rags, etc.) as any other type of system. Since as per 14.1.4 a key reason for an internal inspection is to look for materials that could cause a blockage, to exempt this pipe type from the same scrutiny that metallic pipe must be subjected is a wrong step.

2. I disagree with the premise of always looking at one branch line, that is adjacent to the trip test connection as stated in the new text for 14.2.1.5. I believe that for each inspection a different part of the system should be investigated. To always look in one place is ignoring the possibility that foreign material or products of corrosion could be located elsewhere in the system.

3. I do not agree that the new text of 14.2.1.6 adequately explains when a cross main is exempted from inspection, because it does not properly address the issues of accessibility. Despite the implication in the substantiation, the new text on offer is actually silent on both the questions of the height of a system (which is not discussed in the ROP text either) and of the types of ceiling. Therefore I believe more thought needs to go into the subject. For example at what height should we consider the cut-off point or what type of ceilings should be exempt?

Also, on the subject of accessibility, the revised text for 14.2 does not actually let a contractor off the hook for the rental of a lift due to the height of a cross main, because the cost of renting a lift must still be borne to allow the inspection of the branch line piping.

4. I believe that the new text for A.14.2.1.3 is in conflict with the new text for 14.2.3.2.

The verbiage of A.14.2.1.3 is to clarify that some minor amounts of stuff found in a system is kind of typical and should not trigger an internal examination.

However, 14.2.3.2 contains a contrasting statement: “if the presence of foreign and/or organic material is found in any system... all systems shall have an internal inspection”, which basically says that even an insignificant amount of stuff in one system would trigger an internal inspection - not only for that one system, but for all of the other systems in a building.

KETNER, C.: Corrosion is not the only concern for obstruction to non-metallic pipe or even metallic pipe. Another concern is that it is still subject to possible obstructions from foreign materials entering into the system the same as metallic piping. We cannot give non-metallic pipe this exemption.

IKE, J.: I do not believe that the obstruction testing should be exempted. The possibilities and probabilities for obstructions occur each time the system is modified, repaired or extended (chunks of glue, pieces of pipe) or any time the system or its supply gets opened. MIC is not the only reason for obstructions.

LARRIMER, P.: There has never been technical justification provided in this minimum standard to justify a mandatory five year inspection of the internal piping of a wet pipe sprinkler system. The operational record for wet pipe sprinkler systems has been exceptional over the years. There has never been any data submitted, not even any anecdotal data, showing an internal piping problem that this onerous inspection will solve.

The new language added in 14.2.3 does just the opposite of what is stated in the committee substantiation. Requiring internal inspection of every other system in a building will significantly increase the burden on building owners. The requirement of 14.2.3 will require a typical high rise hospital building that might have three sprinkler systems or more per floor (often segregated by the smoke zones in the building to meet the fire alarm code) to have an internal inspection of the sprinkler piping for every other system.

The requirement in 14.2.1.3 to determine if “the presence of sufficient foreign organic or inorganic matter is found to obstruct pipe or sprinklers” is not enforceable. The personnel qualification requirements for those performing routine the routine inspection and testing required by this standard does not qualify them to make that judgment call.

The proposals (25-185 and/or 25-186) to delete the five year mandatory requirement unless there is cause for an investigation should have been accepted for this minimum standard.

LINDER, K.: While the committee tried to clean this up and make it more reasonable, the more I read this the more inconsistencies I see. For example, 14.2.1.3 refers to “sufficient foreign organic or inorganic material” while other sections state “any foreign organic and/or inorganic material.” Also section 14.2.5 which allows every other wet system to be tested is confusing, unless you do all the testing at the same time. If to spread the costs out you do a portion each year, so that over 5 years you do 1/2, what happens if you find material that triggers the “test all systems” requirement of section 14.2.3.2? Do you re-inspect the systems you inspected last year? The appendix to that section does not clarify the issue. I also think that to test all or even 50% of the wet pipe systems is too much, especially for large facilities. In areas where there is no history of problems and you open 5 or 10 systems and find no problems I do not believe it is necessary to open 20, 30 or more just to get 50%.

SAIDI, J.: Per my previously ballots comment, I continue to disagree with the committee action on 25-104 for several reasons.

For start, I see this comment related to other ROC’s 25-103, 25-105 and 25-133, yet committee actions on these ROC’s are inconsistent, disconnected and confusing. Committee action is too segmented and has failed to properly address the proposals and comments. What is at stake here may also be the credibility with end users and the public at large. Therefore in my view, this committee comment should be rejected and all 4 ROC’s and perhaps the entire Chapter 14 should be re-visited and re-worked.

SHEPPARD, J.: With respect to this submittal, I continue to vote negative and stand by my comment on the previous ballot.

Comment on Affirmative:

FIELD, J.: Although this work is better than what appears in the 2008 Edition, there is more work to be done.

RAY, R.: I agree with the committee vote yet I think there is a mistake in the substantiation for paragraph 14.2.1.6; the change is intended to clarify that if a lift is required to access a pipe or if the pipe is above a lay-in ceiling, the pipe is STILL accessible (and thus not exempt from inspection).

UNDERWOOD, D.: See my comment on Comment 25-101 it still is not right.
PROPOSAL 25-187 (A2010) Backup

25-187 Log #27  Final Action: Accept
(14.2)

Submitter: Roland J. Huggins, American Fire Sprinkler Association, Inc.
Recommendation: Revise text to read as follows:
14.2 Obstruction Investigation and Prevention Internal Inspection of Piping
14.2.4 14.2.1.3 If an obstruction investigation carried out in accordance with 14.2.1 indicates the presence of there is sufficient material to obstruct sprinklers, a complete flushing program shall be conducted by qualified personnel.
14.3 Obstruction Investigation and Prevention
14.3.2-14.3.1 An obstruction investigation ……. 
Renumber 14.2.3 through 14.2.3.3
14.2.3.2 Internal inspection shall be accomplished by examining the interior of examination shall be performed at the following four points:
Substantiation: Editorial changes are needed to better differentiate between an inspection and an obstruction evaluation.
Committee Meeting Action: Accept
Number Eligible to Vote: 30
Ballot Results: Affirmative: 27 Negative: 2
Ballot Not Returned: 1 Hoover, S.
Explanation of Negative:
ELVOYE, J.: This is not an editorial change. See Mr. Larrimer’s negative ballot comment.
LARRIMER, P.: Section 14.2.4 as written in the standard, was to be used after the system internals (system valve, riser, cross main, and branch line) were properly inspected; and the proper inspection was only to be done after there was SUFFICIENT cause to do so. The SUFFICIENT causes that “triggered” a proper inspection are listed in section 14.2.2. This “editorial” change (relocating 4.2.4 to 14.2.1.3) now requires every five years a contractor who has been asked to perform ITM per NFPA 25 to remove a sprinkler from a branch line and look into a flushing connection and into a ½ inch hole (inspect), and then require a complete flushing program to be done because he thinks there is sufficient material to obstruct sprinklers.
This contractor (who the committee says should not be asked to determine when the sprinkler spacing meets code because he may not be qualified) is supposed to determine when “sufficient” material to obstruct sprinklers in present to require a complete flushing program.
The term sufficient is unenforceable according to the Manual of Style.
The terms inspection, evaluation, and investigation were not a problem until the mandatory five year “inspection” was added without cause and with much thought concerning the actual verbiage. It used to be that an obstruction investigation would be initiated, only after a trigger (in 14.2.2), and that obstruction investigation would include inspections and evaluations as appropriate.
See also my negative comment on 25-185 (Log #93).
Comment on Affirmative:
FANTAUZZI, J.: The title still shows deletion of all the text whereas the last portion should be underlined showing it as new text as shown below:
14.2 Obstruction Investigation and Prevention Internal Inspection of Piping

PROPOSAL 25-189 (A2010) Backup

25-189 Log #101  Final Action: Accept
(14.2.1 and 14.2.1.3 (New))

Submitter: Kenneth E. Isman, National Fire Sprinkler Association, Inc.
Recommendation: Revise 14.2.1 to start as follows, and then add a new section 14.2.1.3:
14.2.1 Except as discussed in 14.2.1.1 and 14.2.1.3, an inspection of piping and branch line conditions…
14.2.1.3 CPVC Pipe shall not be required to be inspected internally.
Substantiation: First, the exception to section 14.2.1 that is in section 14.2.1.1 needs to be referenced in 14.2.1 or the sections contradict each other. Second, an exception to the internal inspection shall be granted for CPVC pipe since it is not subject to the corrosion problems that are the concern of this section and it is difficult to get to the pipe as it is usually buried in walls or soffits.
Committee Meeting Action: Accept
Number Eligible to Vote: 30
Ballot Results: Affirmative: 29 Negative: 2
Ballot Not Returned: 1 Hoover, S.
Explanation of Negative:
KEEPING, L.: I believe that this proposal should be rejected, because the concern of 14.2 is for obstructions of all types, not just those caused by corrosion. Foreign material such as sand and stones, etc. can enter a CPVC system just as easily as it can get into a system built of copper or steel.
NITMAM 25-19 Resulting Language (Peter Larrimer – Accept Comment 25-101 Log#98)

The following represents the recommended language for Chapter 14 if Comment 25-101 is accepted by the committee.

14.1 General.
This chapter shall provide the minimum requirements for conducting investigations of fire protection system piping for possible sources of materials that could cause pipe blockage.

14.2* Obstruction Investigation and Prevention.
A.14.2 For obstruction investigation and prevention, see Annex D.
14.2.1* To ensure that piping remains clear of all obstructive foreign matter, an obstruction investigation shall be conducted for system or yard main piping wherever any of the following conditions exist:
(1) Defective intake for fire pumps taking suction from open bodies of water
(2) The discharge of obstructive material during routine water tests
(3) Foreign materials in fire pumps, in dry pipe valves, or in check valves
(4) Foreign material in water during drain tests or plugging of inspector’s test connection(s)
(5) Plugged sprinklers
(6) Plugged piping in sprinkler systems dismantled during building alterations
(7) Failure to flush yard piping or surrounding public mains following new installations or repairs
(8) A record of broken public mains in the vicinity
(9) Abnormally frequent false tripping of a dry pipe valve(s)
(10) A system that is returned to service after an extended shutdown (greater than 1 year)
(11) There is reason to believe that the sprinkler system contains sodium silicate or highly corrosive fluxes in copper systems
(12) A system has been supplied with raw water via the fire department connection
(13) Pinhole leaks
(14) A 50 percent increase in the time it takes water to travel to the inspector’s test connection from the time the valve trips during a full flow trip test of a dry pipe sprinkler system when compared to the original system acceptance test
A.14.2.1 For obstruction investigation procedures, see Section D.3. The type of obstruction investigation should be appropriately selected based on the observed condition. For instance, ordering an internal obstruction investigation would be inappropriate where the observed condition was broken public mains in the vicinity. On the other hand, such an investigation would be appropriate where foreign materials are observed in the dry pipe valve.
14.2.2 Where an obstruction investigation is warranted in accordance with Section 14.2.1, the following shall be required:
14.2.2.1 An inspection of piping and branch line conditions shall be conducted by opening a flushing connection at the end of one main and by removing a sprinkler toward the end of one branch line for the purpose of inspecting for the presence of foreign organic and inorganic material.
14.2.2.1.1 Alternative nondestructive examination methods shall be permitted.
14.2.2.2 Tubercules or slime, if found, shall be tested for indications of microbiologically influenced corrosion (MIC).
14.2.2.3* A complete flushing program shall be conducted by qualified personnel if the obstruction investigation indicates the presence of sufficient material to obstruct any portion of the sprinkler system.
A.14.2.2.3 For obstruction investigation flushing procedures, see Section D.5
14.2.3* If the condition noted in Section 14.2.1 has not been corrected or the condition is one that could result in obstruction of the piping despite any previous flushing procedures that have been performed, the system shall be flushed in accordance with Section 14.2.2.3 and inspected for internal obstructions every 5 years.
A.14.2.3 For obstruction prevention program recommendations, see Section D.4.
14.2.3.1 Internal inspections shall be accomplished by examining the interior of the following four points:
(1) System valve
(2) Riser
(3) Cross main
(4) Branch line
14.2.3.1.1 Alternative nondestructive examination methods shall be permitted.
14.3 Ice Obstruction.
Dry pipe or preaction sprinkler system piping that protects or passes through freezers or cold storage rooms shall be inspected internally on an annual basis for ice obstructions at the point where the piping enters the refrigerated area.

14.3.1 Alternative nondestructive examinations shall be permitted.
14.3.2 All penetrations into the cold storage areas shall be inspected and, if an ice obstruction is found, additional pipe shall be examined to ensure no ice blockage exists.
NFPA 25

TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems

June 2010 ASSOCIATION AMENDMENT -ATTACHMENT B

NITMAM 25-15 Resulting Language (Russell Fleming – Accept Comment 25-104 Log#CC5)

The following represents the recommended language for Chapter 14 if Comment 25-104 is accepted by the committee.

14.1* General.
This chapter shall provide the minimum requirements for conducting investigations of fire protection system piping for possible sources of materials that could cause pipe blockage.

A.14.1 For obstruction investigation and prevention, see Annex D.

14.2* Internal Inspection of Piping

14.2.1 Except as discussed in 14.2.1.1 and 14.2.1.3 an inspection of piping and branch line conditions shall be conducted every 5 years by opening a flushing connection at the end of one main and by removing a sprinkler toward the end of one branch line for the purpose of inspecting for the presence of foreign organic and inorganic material.

14.2.1.1 Alternative nondestructive examination methods shall be permitted.

14.2.1.2 Tubercules or slime, if found, shall be tested for indications of microbiologically influenced corrosion (MIC).

14.2.1.3* If the presence of sufficient foreign organic or inorganic material is found to obstruct pipe or sprinklers, an obstruction investigation shall be conducted as described in 14.3.

A.14.2.1.3 Most piping systems may contain some foreign material or other evidence of corrosion but not sufficient to trigger an obstruction investigation. Furthermore, an internal inspection is primarily an inspection for determining corrosion of the pipe but it may result in finding the presence of material that would be an obstruction to piping or sprinklers. If such is found an obstruction investigation in 14.3 would be required.

14.2.1.4 Non-metallic pipe shall not be required to be inspected internally.

14.2.1.5 In dry pipe systems and pre-action systems, the sprinkler removed for inspection shall be from the most remote branch line from the source of water that is not equipped with the inspectors test valve.

A.14.2.1.6 The inspection of piping is not required where the pipe is not readily-accessible such as above gypsum ceilings. Additionally, not all systems, such as those installed in accordance with NFPA 13R, have grooved couplings or flushing connections.

14.2.2* In buildings having multiple wet pipe systems, every other system shall have an internal inspection of piping every 5 years as described in 14.2.1.

A.14.2.2 In large warehouses, high rise buildings, and other buildings having multiple systems, it is reasonable to perform the internal inspection on half of the systems, and conclude that these are representative of all systems in the building. The systems in the building not inspected during one inspection cycle should be inspected during the next one. As long as there is no evidence of any foreign organic and/or inorganic material found in any of the systems being inspected, every other system would be inspected once every 10 years. However, if foreign organic and/or inorganic material is found in any system in the building during the 5 year inspection cycle, all systems must then be inspected during that inspection cycle.

14.2.2.1 During the next inspection frequency required by 14.2.1, the alternate systems not inspected during the previous inspection shall have an internal inspection of piping as described in 14.2.1.

14.2.2.2 If the presence of foreign organic and/or inorganic material is found in any system in a building during the 5 year internal inspection of piping, all systems shall have an internal inspection.

14.3 Obstruction Investigation and Prevention

14.3.1* An obstruction investigation shall be conducted for system or yard main piping wherever any of the following conditions exist:

1. Defective intake for fire pumps taking suction from open bodies of water
2. The discharge of obstructive material during routine water tests
3. Foreign materials in fire pumps, in dry pipe valves, or in check valves
4.* Foreign material in water during drain tests or plugging of inspector’s test connection(s)
5. Plugged sprinklers
6. Plugged piping in sprinkler systems dismantled during building alterations
7. Failure to flush yard piping or surrounding public mains following new installations or repairs
8. A record of broken public mains in the vicinity
9. Abnormally frequent false tripping of a dry pipe valve(s)
10. A system that is returned to service after an extended shutdown (greater than 1 year)
11. There is reason to believe that the sprinkler system contains sodium silicate or highly corrosive fluxes in copper systems
A system has been supplied with raw water via the fire department connection

Pinhole leaks

A 50 percent increase in the time it takes water to travel to the inspector’s test connection from the time the valve trips during a full flow trip test of a dry pipe sprinkler system when compared to the original system acceptance test.

A.14.3.1 For obstruction investigation procedures, see Section D.3. The type of obstruction investigation should be appropriately selected based on the observed condition. For instance, ordering an internal obstruction investigation would be inappropriate where the observed condition was broken public mains in the vicinity. On the other hand, such an investigation would be appropriate where foreign materials are observed in the dry pipe valve.

A.14.3.1(4) If unknown materials are heard in the system piping during draining, refilling or otherwise flowing water through the system.

14.3.2* Systems shall be examined for internal obstructions where conditions exist that could cause obstructed piping.

A.14.3.2 For obstruction prevention program recommendations, see Section D.4.

14.3.2.1 If the condition has not been corrected or the condition is one that could result in obstruction of the piping despite any previous flushing procedures that have been performed, the system shall be examined for internal obstructions every 5 years.

14.3.2.2 Internal examination shall be performed at the following four points:

1. System valve
2. Riser
3. Cross main
4. Branch line

14.3.2.3 Alternative nondestructive examination methods shall be permitted.

14.3.3* If an obstruction investigation indicates the presence of sufficient material to obstruct pipe or sprinklers, a complete flushing program shall be conducted by qualified personnel.

A.14.3.3 For obstruction investigation flushing procedures, see Section D.5.

14.4 Ice Obstruction. Dry pipe or preaction sprinkler system piping that protects or passes through freezers or cold storage rooms shall be inspected internally on an annual basis for ice obstructions at the point where the piping enters the refrigerated area.

14.4.1 Alternative nondestructive examinations shall be permitted.

14.4.2 All penetrations into the cold storage areas shall be inspected and, if an ice obstruction is found, additional pipe shall be examined to ensure no ice blockage exists.
ASSOCIATION AMENDMENT
BALLOT RESULTS

DATE: July 15, 2010

AMENDMENT


Motion: To Accept Comment 25-104 and 25-101

TC FINAL Ballot Results

According to 4.7.1 in the NFPA Regs (RGCP), the final results show this Amendment **HAS** achieved the necessary 2/3 majority vote needed to recommend approval of the Association Action by the Technical Committee.

The number of affirmative votes needed for the report to be published is **20**.

\[32 \text{ (eligible to vote)} - 0 \text{ (not returned)} - 2 \text{ (abstentions)} = 30 \times 0.66 = 19.8\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[32 \text{ eligible} \div 2 = 16 + 1 = 17 \text{ (this is the simple majority)}\]

<table>
<thead>
<tr>
<th>Option 1</th>
<th>3 Agree to Reject Both Comments</th>
<th>(Fantauzzi, Lake, Leavitt)</th>
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<tbody>
<tr>
<td>Option 2</td>
<td>7 Agree to Accept Comment 25-101</td>
<td>(Drysdale, Elvove, Larrimer, Muno, Saidi, Underwood w/comment)</td>
</tr>
<tr>
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<td>20 Agree to Accept Comment 25-104</td>
<td>(Adams, Andress, Feld, Fleming, Fuller, Keeping, Linder, Ray w/comment)</td>
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<tr>
<td>Option 3</td>
<td>2 Abstentions</td>
<td>(Bouchard, Stein)</td>
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**Final Action: PASS**
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:
Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

☐ Option 1: REJECT BOTH COMMENTS
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

☒ Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☒ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the ease of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

Current requirements need clarification which is done in comment 25-101. Comment 25-104 removes internal inspection requirement which is needed and relies solely on external factors.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jemme Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-914-6118

Signature:

Name - Please Print: Clement J. Adams

Date: 7/7/10

June 2010
NFPA 25

TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems

June 2010 ASSOCIATION AMENDMENT

(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

Option 1: REJECT BOTH COMMENTS
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

I agree with comment 25-104 (CC5) and agree with the committee action.

I disagree with comment 25-101 and support the committee action that supports the 5 year internal inspection frequency.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: ________________________________

Name - Please Print: Gary Andress

Date: 7/2/2010
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

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☒ Accept Comment 25-101 (see Attachment A to see the resulting text)
☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

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BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

SEE ACCOMPANYING NOTE

Please return as soon as possible, but no later than Friday, July 2, 2010 to:
Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [signature]

Name - Please Print: [NAME]

Date: ________
June 2010
Moreau-Correia, Jeanne

From: Matthew G Drysdale [Matthew.G.Drysdale@USA.dupont.com]
Sent: Wednesday, July 07, 2010 3:52 PM
To: Moreau-Correia, Jeanne
Cc: Klaus, Matthew
Subject: re: Circulation of Votes - 25 Amendment Ballots - Due Tuesday, July 13, 2010

Jeanne,
Attached is my ballot, voting for comment 25-101. My comment / justification is below.

Matt

Comment:

After reviewing the data compiled by NFPA (U.S. EXPERIENCE WITH SPRINKLERS AND OTHER AUTOMATIC FIRE EXTINGUISHING EQUIPMENT – John R. Hall, jr.) I do not see the justification for a 5 yr. obstruction inspection. Per his report, between 2003 and 2007 only 3% of sprinklers were not effective and of those only 15% were due to lack of maintenance (0.45% failure rate). That includes all issues associated with lack of maintenance. The 14 triggers for an obstruction investigation remain and, if reacted to properly, will reduce the failure rate further.

This communication is for use by the intended recipient and contains information that may be privileged, confidential or copyrighted under applicable law. If you are not the intended recipient, you are hereby formally notified that any use, copying or distribution of this e-mail, in whole or in part, is strictly prohibited. Please notify the sender by return e-mail and delete this e-mail from your system. Unless explicitly and conspicuously designated as "E-Contract Intended", this e-mail does not constitute a contract offer, a contract amendment, or an acceptance of a contract offer. This e-mail does not constitute a consent to the use of sender's contact information for direct marketing purposes or for transfers of data to third parties.

Francais Deutsch Italiano Espanol Portugues Japanese Chinese Korean

NFPA 25

TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be
to return to previous edition text.

[ ] Option 1: REJECT BOTH COMMENTS
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104.
Accordingly, you are recommending returning Chapter 14 to previous edition text.

[ ] Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually
inconsistent, you must choose only one.

[ ] Accept Comment 25-101 (see Attachment A to see the resulting text)
[ ] Accept Comment 25-104 (see Attachment B to see the resulting text)

[ ] Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why
you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are
optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional
sheets may be attached to this ballot).

Despite the fact that 25-101 removes the mandatory 5 year internal inspection requirement, it appears to be the less
radical change to chapter 14 than 25-104. 25-101 makes 5 additional changes but they truly are formatting changes that
set up the flow of chapter 14 to establish that purpose of obstruction investigations is to "ensure that piping remains
clear of all obstructive foreign matter"; that Internal Inspections are triggered as a result of any one of the 14 established
conditions; and that flushing is required when there is sufficient material noted that obstructs any portion of the sprinkler
system. 25-104 tries to do too much and actually adds 11 new line items to the chapter (many of which were newly
created during ROC) that have their own shortcomings (e.g., exempting non-metallic pipe from Internal Inspections,
requiring the most remote branch on dry pipe systems to be internally inspected, exempting inaccessible pipe from
internal inspections, permitting "systems" – which are not clearly defined - to be internally inspected every other 5 years,
adds new contradictory annex material regarding what is sufficient to permit this alternative inspection frequency).
Because of these issues, I can not support 25-104.

1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: /s/ JWE

Name - Please Print: Joshua W. Elvove

Date: 6/25/2010
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

X  Option 1: REJECT BOTH COMMENTS
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

☐ Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot.)

Please find attached comment.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-913-7110

Signature

Name: Please Print: James M. Javors
Date: 7-1-10
June 2010
To: NFPA 25 Committee c/o Jeanne Moreau-Correia
Re: 25-104
Log #: CC5
Section: Chapter 14
Action: Reject both comments and return to previous edition text

Comment:

I have some reservation on how 25-104 reads which may increase cost and place an undo burden upon the end user of the 25 Document.

Secondly, I have reviewed NFPA-13, IBC and NYS Building Code and can not find a clean clear-cut definition of what is a system. The implication of A.14.2.3 may automatically define what is considered a zone, sectional, and a sub-system or isolation valve, as a system.

Log # CC5 appears to define what a system is which has far reaching ramification in relationship to other inspection and testing function and may be used by other codes and standards as a definition. I feel that it is NFPA-13 committee's position and responsibility to determine the definition of what a system is and not that of the NFPA-25 committee.

Re: Comment 25-101
Log: #98
Section: Chapter 14
Action: Reject both comments and return to previous edition text

Comment:

Comment 25-101 is somewhat convoluted, weakens the current chapter 14 and leaves the user confused on what should be done and when it to do it.

James M. Fantauzzi
NFFA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:
Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

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If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

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Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☒ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

Comment (1) deletes the 5 YEAR FREQUENCY WHICH I BELIEVE IS NECESSARY. WE HAVE FOUND PIPE HEAVILY CORRODED AND OBSTRUCTED AS WELL AS VALUES.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Morasci
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX 617-984-7110

Signature: [Signature]
Name: Please Print: [James M. Feld]
Date: 7/11/10
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

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If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

COMMENT 25-104 WAS A COMMITTEE COMMENT INTENDED TO HELP IMPROVE UNDERSTANDING AND ENFORCEMENT OF THE 5-YEAR RANDOM INTERNAL INSPECTION THAT WAS ADDED IN THE 2002 EDITION. IT FAILED BALLOT BY A SINGLE VOTE, WITH SOME MEMBERS CLAIMING IT WAS TOO SEVERE AND OTHERS TOO LAX. COMMENT 25-101 WOULD ELIMINATE THE INSPECTION ACT TOGETHER AND WOULD BE A STEP BACKWARD. I'M CONCERNED THAT THE BALLOT PACKAGE DOES NOT MAKE THIS ELIMINATION CLEAR THROUGH THE USE OF LEGISLATIVE TEXT.

Joanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: P. Fleming

Date: 7/1/10
June 2010
NFPA 25

TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

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If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

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Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text).
☒ Accept Comment 25-104 (see Attachment B to see the resulting text).

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

My understanding is that if neither of these amendments pass ballot, the text will return to the flawed text of the previous edition. Therefore I am supporting 25-104.

________________________________________________________________________

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]

Name - Please Print: David B. Fuller

Date: July 1, 2010
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
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to return to previous edition text.

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Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually
inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☒ Accept Comment 25-104 (see Attachment B to see the resulting text)

Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why
you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are
optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional
sheets may be attached to this ballot).

SEE ATTACHED SHEET

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Joanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]
Name - Please Print: LARRY KEEPING
Date: 30 June 2010
June 2010
NFPA 25
TC Ballot for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 Association Amendment
(To accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Regarding this issue, I opt for Option 2, to Accept One Comment.

The Comment that I vote to Accept is Comment 25-104.

I do agree with the need to internally inspect the piping every 5 years, in an effort to proactively look for potential problems, before they can impact on system performance in the event of a fire.

During the ROC balloting I actually voted against this comment, because I feel it has some inconsistencies, which I spoke to in my ballot statement. However, I was in general agreement with the attempt to differentiate between an internal inspection and an obstruction investigation and provide some guidance as to what should be done following an inspection.

Now, faced with the choices of accepting Comment 25-104, despite its flaws, or of accepting Comment 25-101, and doing away with the 5 year inspections, or of returning to the text of the 2008 edition, I choose to Accept Comment 25-104, as the best choice that is available.

I cannot vote in favour of Comment 25-101, because despite our best efforts, foreign material does get into our systems, and without looking inside on occasion, there is no way to find it, until it may be too late.

L. Keeping
Larry Keeping, P.Eng.
Vipond Fire Protection
Jeanne,  

After careful consideration of the issues on both sides of the 25-101 and 25-104 I wish to change my vote to rejection of both proposals.  

Both proposals have their good points and conversely they both have their bad. They should be returned to the committee for further review and development of a consensus.

John Lake  

----- Original Message -----  
From: "Jeanne Moreau-Correia" <jmoreau@NFPA.org>  
To: "Nancy Walker" <nwalker@NFPA.org>, "Ann Coughlin" <acoughlin@NFPA.org>, "Jeanne Moreau-Correia" <jmoreau@NFPA.org>  
Sent: Tuesday, July 6, 2010 5:26:42 PM GMT -05:00 US/Canada Eastern  
Subject: Circulation of Votes - 25 Amendment Ballots - Due Tuesday, July 13, 2010  

TO: The Technical Committee on Inspection, Testing, and Maintenance of Water-Based Systems  

Dear Committee Members:  

Attached are the Circulation of Votes for the NFPA 25 Amendment Ballots. If you wish to change your vote, changes are due back at NFPA by Tuesday, July 13, 2010. If you haven't yet returned a ballot, you may return your vote during the circulation period.  

Please submit your ballot by fax to 617-984-7110 or e-mail jmoreaucorreia@nfpa.org  

Please remember that the return of ballots and attendance at Committee Meetings are required in accordance with the Regulations Governing Committee Projects.  

Thank you,  

Jeanne Moreau  
Technical Projects Supervisor  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
Ph: 617-984-7586  
Fx: 617-984-7110
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

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☒ Accept Comment 25-101 (see Attachment A to see the resulting text)
☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

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Based on the data from the NFPA report dated February 2010 by John P. Mullen titled "The Experience with Sprinkler and Other Automatic Fire Extinguishing Equipment" now available to all on the web, it can be clearly seen that the mandatory 5-year requirement to maintain sprinkler systems was not warranted. Inspections will only be required when there is due cause.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:
Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

The problem is identified in
The negative votes on 25-104 shows some of the problems that would be included in the document if comment 25-104 was to be accepted.

Signature: __________________________
Name - Please Print: PAUL A. LAREMER
Date: 7-1-10
June 2010
NFFA 25

TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

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☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

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SEE ATTACHED.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeannine Morgan
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]
Name - Please Print: ROSELL LEAVITT
Date: 6/20/10
June, 2010
Comment on Voting for Option 1
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 Association Amendment

Although I originally voted to accept comment 104 with the TC, after carefully reviewing the comments given with the negative votes and the obvious "confusion" that resulted in the general membership voting to accept both comments 104 and 101 it is clear to me that there is still much work to do before any revisions are acceptable. Therefore, I believe that we should leave the wording as is currently in the 2008 edition and work to resolve the many outstanding issues during the next revision cycle.
Moreau-Correia, Jeanne

From: Kenneth_Linder@swissre.com
Sent: Thursday, July 01, 2010 4:23 PM
To: Moreau-Correia, Jeanne
Subject: Re: NFPA 25 Amendments

Jeanne,

Please record me as voting as follows:

Accept Comment 25-41. -- I vote affirmative.

Accept Comment 25-101 and 104 -- I vote for Option 2 and to accept Comment 104. While it is not perfect and I have some concerns on the wording, I feel it best represents the intent of the committee and is better than reverting to the existing language if we reject both.

Let me know if you need anything else,

Regards,
Ken

Kenneth Linder | Vice President | Property & Specialty
Swiss Re/Industrial Risk Insurers | 2 Waterside Crossing, Suite 200, Windsor, CT 06095, USA
Direct: +1 860 902 7237 Mobile: +1 860 573 7722 E-mail: Kenneth.Linder@swissre.com

http://www.swissre.com

From: "Moreau-Correia, Jeanne" <jmoreau@NFPA.org>
To: "Walker, Nancy" <nwalker@NFPA.org>, "Moreau-Correia, Jeanne" <jmoreau@NFPA.org>
Date: 05/24/2010 02:08 PM
Subject: NFPA 25 Amendments

TO: The Technical Committee on Inspection, Testing, and Maintenance of Water-Based Systems

Dear Committee Members:

Attached are the ballot materials for NFPA 25 Amendments. The due date for return of the ballot is Friday, July 2, 2010. Please fax your ballot to 617-984-7110 or email to jmoreaucorreia@nfpa.org. (Please note there are two (2) ballots to be returned).

This information has also been posted on your eCommittee Page under the "Ballot Information Heading" and within the "Other Ballots" folder.

If you have any questions, please don’t hesitate to contact me.
NFFA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT

(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:
- Accept Comment 25-101 (see Attachment A to see the resulting text)
- Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

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Accordingly, you are recommending returning Chapter 14 to previous edition text.

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☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

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BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

OBSTRUCTION INVESTIGATION SHOULD BE BASED ON PERFORMANCE CRITERIA NOT AN ARBITRARY SCHEDULE.

________________________________________________________________________
________________________________________________________________________

Please return as soon as possible, but no later than Friday, July 2, 2010 to:
Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature: [Signature]
Name - Please Print: [Name]
Date: 7-2-10
June 2010
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

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Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

☐ Option 1: REJECT BOTH COMMENTS
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

☒ Option 2: ACCEPT ONE COMMENT
Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☒ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

Comment 25-101 would eliminate the random internal inspections of fire sprinkler piping. These inspections have proven very worthwhile in ensuring that fire sprinkler systems stand ready to protect life and property.

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7110

Signature:

Name - Please Print: Richard M. Ray

Date: 07/02/10
June 2010
Standards Council Supplemental Agenda  
August 3-5, 2010  

Revised Page Number 724 of 813
NFPA 25
TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems
June 2010 ASSOCIATION AMENDMENT
(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments:  Accept Comment 25-101 (see Attachment A to see the resulting text)  
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

☐ Option 1: REJECT BOTH COMMENTS
If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

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☒ Accept Comment 25-101 (see Attachment A to see the resulting text)
☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

☐ Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

I still need a reason to show me there is a problem before taking systems apart.

________________________________________________________________________

________________________________________________________________________

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Joanne Merseu
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-844-7110

Signature: [Signature]

Name - Please Print: Darrell W. Underwood

Date: June 2010
NFPA 25

TC BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems

June 2010 ASSOCIATION AMENDMENT

(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

Amendments: Accept Comment 25-101 (see Attachment A to see the resulting text)
Accept Comment 25-104 (see Attachment B to see the resulting text)

CHECK ONE OPTION ONLY. In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

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If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

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Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.

☐ Accept Comment 25-101 (see Attachment A to see the resulting text)
☐ Accept Comment 25-104 (see Attachment B to see the resulting text)

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BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

I agree with nearly all that Comment #104 accomplishes, and I believe that most of the committee is in agreement on that fact, also. However, I do not agree with the mandatory nature of the 5 year requirement for internal investigation or inspection of piping, unless one of the indicators listed in the document triggers such an investigation.

Technical justification has not been provided to the committee for either the requirement or the 5 year interval, without which I feel this becomes an unnecessary and costly requirement that would be placed squarely on the shoulders of all owners of automatic sprinkler systems.

(PLEASE SEE CONTINUATION OF THIS SUBSTANTIATION FOR ABSTENTION ON THE NEXT PAGE)

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Joanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7100

Signature: [Signature]
Name - Please Print: JOHN BOUCHARD
Date: 7/7/10
CONTINUATION OF SUBSTANTIATION FOR ABSTENTION:

Until such time that documentation or records can show that the viability of many systems is in jeopardy, I do not believe that this action is necessary.

I have abstained from voting on this issue at this time, as I don't feel that Comment #101 accomplishes as much as the committee would like, although I do agree with the removal of a mandatory internal inspection based on a 5 year interval. I am not convinced that Comment #101 creates an improved version over previous text, and prefer to review the circulation of the committee member results and comments prior to making a decision on this issue.

Signature: [Signature]
Name - Please Print: JOHN BOUCHARD
Date: 7/1/10
Moreau-Correia, Jeanne

From: Chip Stein [stein@tankindustry.com]  
Sent: Thursday, July 01, 2010 2:05 PM  
To: Moreau-Correia, Jeanne  
Subject: Re: NFPA 25 Amendment 101 and 104

I don't have a significant amount of expertise or opinion on that matter.

From: Moreau-Correia, Jeanne  
To: Chip Stein  
Sent: Thu Jul 01 13:59:22 2010  
Subject: NFPA 25 Amendment 101 and 104  

Greg,

I have received your ballot and have you down as abstaining. However, the reason for your abstention is missing.

Please advise.

Best Regards,

Jeanne

Jeanne Moreau  
Technical Projects Supervisor  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169  
Ph: 617-984-7586  
Fx: 617-984-7110
**NFPA 25**

**TC: BALLOT for Inspection, Testing, and Maintenance of Water-Based Systems**

**June 2010 ASSOCIATION AMENDMENT**

(To Accept Comment 25-101, to Accept Comment 25-104 or return to previous edition text)

**Amendments:**
- Accept Comment 25-101 (see Attachment A to see the resulting text)
- Accept Comment 25-104 (see Attachment B to see the resulting text)

**CHECK ONE OPTION ONLY.** In the event that neither amendment passes the vote, the recommendation to Council will be to return to previous edition text.

- [ ] Option 1: REJECT BOTH COMMENTS
  - If you check this box, this means you are opposed to the Acceptance of both Comments 25-101 and 25-104. Accordingly, you are recommending returning Chapter 14 to previous edition text.

- [ ] Option 2: ACCEPT ONE COMMENT
  - Check the amendment which you vote to accept. Note that because these amendments contain text that is mutually inconsistent, you must choose only one.
  - [ ] Accept Comment 25-101 (see Attachment A to see the resulting text)
  - [ ] Accept Comment 25-104 (see Attachment B to see the resulting text)

- [ ] Option 3: ABSTAIN
  - **BALLOT COMMENTS.** Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moran
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-996-7118

Signature: [signature]
Name - Please Print: [name]
Date: 6/28/10
June 2010

Standards Council Supplemental Agenda
August 3-5, 2010
Page 726 of 1603
July 8, 2010

Ms. Amy Cronin  
Assistant Vice President  
Secretary, Standards Council  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02269


Dear Ms. Cronin,

In accordance with Section 1-6 of the NFPA Regulations Governing Committee Projects (Regulations), please accept this letter as a formal appeal to the NFPA Standards Council regarding NFPA 25, Inspection, Testing and Maintenance of Water Based Fire Protection Systems, proposed 2011 edition, Certified Amending Motion 25-19 which aimed to accept comment 25-101. The following information is provided as prescribed in Section 1-6.3 of the Regulations:

1. Name, affiliation and address of the appellant:

   Peter A. Larrimer, PE,  
   Representing the Department of Veterans Affairs  
   323 North Shore Drive, Suite 400  
   Pittsburgh, PA 15212

2. Statement identifying the particular action to which the appeal relates:

   This appeal relates to the final action taken on June 9, 2010 at the annual NFPA meeting in Las Vegas on certified amending motion 25-19. Based on the letter dated June 7, 2010 from Linda Fuller, it appears that the committee will not recommend acceptance of the floor amendment.

3. Argument setting forth the grounds for appeal:

   Please see Attachment to this letter.

4. Statement of the precise relief requested:

   Request that the Standards Council recommend that certified amending motion 25-19, which aimed to accept comment 25-101, for the proposed 2011 edition of NFPA 25, be approved.

Sincerely,

/s/
Peter A. Larrimer, P.E.  
Fire Safety Program Manager  
VHA Center for Engineering & Occupational Safety and Health (CEOSH)

Attachment
Argument setting forth the grounds for appeal:

In accordance with Section 4.3.3 (d) of NFPA Regulations Governing Committee Projects (see below), each proposal must include a statement of the problem and substantiation for the proposal.

4.3.3 Content of Proposals. Each Proposal shall be submitted to the Council Secretary and shall include the following:
(a) Identification of the submitter and his or her affiliation (i.e., TC, organization, company), where appropriate
(c) Proposed text of the Proposal, including the wording to be added, revised (and how revised), or deleted
(d) Statement of the problem and substantiation for Proposal
(e) The signature of the submitter or other means of authentication approved by the Council Secretary

The original proposal was submitted with the following substantiation that can be found in 25-35 on page 54 of the 2002 ROP.

SUBSTANTIATION: There is a need to check for the possibility of clogged mains and lines other than routine inspector’s test flows. This proposal was developed by the UL/FM/NFSA Standards Review Committee.

As expressed in my negative vote on proposal 25-185 on page 25-44 of the 2010 ROP and copied below for your convenience (see Figure 1), the substantiation for this requirement contains neither the statement of the problem nor any technical substantiation to require a mandatory 5 year inspection of all sprinkler systems. This mandatory inspection is a major cost burden on system owners.

The burden on system owners and lack of substantiation has also been identified by Mr. Bouchard, the Chairman of the NFPA 25 Technical Committee, in his abstention vote on CAM 25-19, copied below (see Figure 2).
LARRIMER, P.: There has been no substantiation for this requirement to open up a sprinkler system and inspect the inside of the piping every five years. It is expensive and onerous to the owners of the systems. The code requirement was added to the document in 2002 without the substantiation required by the NFPA Regulations Governing Committee Projects. Subsequent attempts to eliminate it have been rejected by the committee who has still not provided or required substantiated the requirement.

Now the committee retains the requirement with the following committee statement:

"It is important to look inside the pipe every five years."

How can an argument be made against the justification for putting this requirement in the standard when there was no justification in the first place. Here is a summary of the original proposal substantiation in 2002 and subsequent committee statements from 2002/2006 ROPs and ROCs respectively. Never has the requirement been justified.

2002 ROP
SUBSTANTIATION: There is a need to check for the possibility of clogged mains and lines other than routine inspector’s test flows.
This proposal was developed by the UL/FM/NFSA Standards Review Committee.

2002 ROC
COMMITTEE STATEMENT: The committee stands by the original justification; this requirement more appropriately belongs in Chapter 10.

2006 ROP
Committee Statement: It is the intent of the committee to retain the 5 year requirement.

2006 ROC
Committee Statement: See committee action and statement on Comment 25-63 (Log #7).


25-46 Committee Meeting Action: Accept
25-48 Committee Statement: It is the intent of the committee to segregate the requirements of obstruction inspection and investigation for clarification.

Figure 1.
Option 3: ABSTAIN

BALLOT COMMENTS. Please provide your statement of reasons or other comments on your ballot. Note that the reasons why you disagree with either or both of the amendments should be provided. Reasons why you support one of the amendments are optional but encouraged in order to assist the Standards Council in the case of an appeal. (If additional space is needed, additional sheets may be attached to this ballot).

I agree with nearly all that Comment 104 accomplishes; and I believe that most of the committee is in agreement on that fact, also. However, I do not agree with the mandatory nature of the 5 year requirement for internal investigation or inspection of piping, unless one of the indicators listed in the document triggers such an investigation.

Technical justification has not been provided to the committee for either the requirement or the 5 year interval, without which I feel this becomes an unnecessary and costly requirement that would be placed squarely on the shoulders of all owners of automatic sprinkler systems.

(PLEASE SEE CONTINUATION OF THIS SUBSTANTIATION FOR ABSTENTION ON THE NEXT PAGE)

Please return as soon as possible, but no later than Friday, July 2, 2010 to:

Jeanne Moreau
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7100

Signature:

[Signature]

Name - Please Print: JOHN BOUCHARD

Date: 7/1/10

Figure 2.
1 withdrawal. No further discussion on that item.

2 We're now on Motion Sequence 25-18.

3 MR. LEAVITT: Russell Leavitt, Telgian Corporation. And I also remove my motion.

4 THE CHAIR: Thank you. The Chair accepts that withdrawal. There will be no further discussion on that item. We're now on Motion Sequence 25-19.

5 Mike 1.

6 MR. LARRIMER: Pete Larrimer, Department of Veteran Affairs. I'd like to make a motion to accept 25-19.

7 THE CHAIR: What's your motion? Is it to accept Comment 25-101?

8 MR. LARRIMER: Oh, yeah. With this motion I'm asking to accept Comment 25-101.

9 THE CHAIR: Okay. Is there a second?

10 Proceed.

11 MR. LARRIMER: That comment is on page 25-26 of the ROC. This is actually to accept the original proposal of 25-185, which can be found on page 25-44 of the ROP.

12 If this motion is accepted, it will clarify a lot of this stuff, but we will have to go back and address 104. If this motion is accepted, the

requirement to do an internal inspection of sprinkler
piping will not be eliminated from the standard, but it will require one of the 14 triggers as identified in Chapter 14 to initiate that inspection and/or investigation be conducted. Please note that pinhole leaks suggesting the presence of MIC is in that list of triggers as Number 13.

There has never been any technical substantiation provided for this mandatory requirement to inspect the internal piping of sprinkler systems every five years. I have documented the lack of substantiation by the Committee in my negative vote on Proposal 25-185 on page 25-44 of the ROP.

The substantiation now provided by the Committee in the ROC Committee Statement states, "Reports of obstructions under actual field inspections supports the validity of the five-year internal inspection criteria. It is important to keep consistent collection points until more data can be collected."

Please understand that there were never any written reports on obstructions provided to the Technical Committee to support the inspection requirement, at least for the last three cycles that I've been on the committee. But now data has, in
fact, been collected. And it can be found in the NFPA report dated February 2010 by John R. Hall, Jr., titled "U.S. Experience with Sprinklers and other Automatic Fire Distinguishing Equipment." And it's readily available on the NFPA website.

A summary of this data shows that sprinklers have an excellent record of operating. And when they do fail, they operate effectively. Obstructions of the piping account for no more than 1 percent of those failures. The written data in the NFPA report identifies that there truly is no justification for inspecting every system every five years.

Accepting this motion will still require an inspection but only when there's just cause to do so. I ask you to support this motion. Thank you.

THE CHAIR: Thank you. Mr. Brushard?

MR. BRUSHARD: I'll defer to the committee members.

THE CHAIR: Thank you. I'm going to go to microphone 4.

MR. VICTOR: Terry Victor, Simplex Grinnell Tyco, member of the NFPA 25 Committee. And I speak against the motion on the floor.

First, the requirement to inspect the inside of two pipes in a system every five years is not
onerous, as the submitter of the comment stated in the substantiation. Each system by design has at least one check valve, and that check valve must be inspected every five years internally.

While the system is drained down before this inspection, to also open up and inspect the inside of two pieces of pipe is not onerous. The Committee has never received an objection to the internal inspection of these check valves, and yet we still have these objections to inspecting the internal pipes, these two pipes on the system.

Second, since the introduction of the five-year internal pipe inspection two editions ago, results of these inspections have yielded many problems that would have affected system performance.

And I understand the 1 percent failure rate based on plug systems is a low percentage, but I think we've eliminated a lot of potential problems with this five-year internal inspection by picking up debris that we found in the pipes.

I personally have collected numerous pictures of the obstructions found in systems while performing the five-year inspection, which include rust, scale, rags, rocks, sludge, solid caking of material, and microbiologically influence corrosion.
In 2008 and 2009 Simplex Grunnell submitted to one lab what are samples or evidence of MIC that was observed in 254 systems. Of those 254 systems, 65, or 26 percent, showed evidence of high MIC activity. And 132, or 52 percent, showed medium MIC activity. In total, 78 percent of these systems needed some sort of action taken to address the MIC activity that was in these pipes.

While the original intent of this requirement was to proactively address the impact of MIC that it was having on our systems, other benefits have been realized, and this internal inspection every five years is needed. Again, I oppose the motion, and I ask you to also oppose it. Thank you.

THE CHAIR: Mike 5.

MR. DESHANAY: My name is Dave Deshanay. And I speak on behalf of the Healthcare Section. And we speak in favor of the motion.

This morning at the Healthcare Section of the Executive Board Meeting, the membership voted to support this motion. We feel that the five-year requirement inspection is completely unjustified and has no technical merit.

The requirement for the five-year investigation has been around for a few cycles. At
every one of these cycles, there have been debate as to the rationale and the need for this inspection. And this cycle has no difference.

One justification was given to support the five-year requirement. And I quote, There is a need to check for possible obstruction in the lines, end quote. This statement carries no technical data, no justification to support, and is a requirement that has no merit.

Furthermore, the existing 4.2.2 has language that basically has 14 different items that would trigger such of an investigation if there were problems within the system.

The process of conducting investigations based on evidence and risk makes sense. The requirement to investigate or inspect every five years just for the sake of doing it does not make sense. We are all working in an environment where we're asked to do more for less. And this requirement is a perfect example of waste of time and resources.

The Healthcare Section fully supports all Codes and Standards that brings safety and value to the industry. However, this five-year requirement brings no added value or no safety to the industry.
The Healthcare Section urges the membership to support this motion. Thank you.

THE CHAIR: Thank you. Mike 4.


Fire sprinklers have an excellent record, as Josh brought up, and I'm glad that he did. The reason we have an excellent record is because we test and maintain our systems. We don't take requirements that have been in there keeping that record off, keeping that 90-something percent liability off. What is the point of that? Just because we don't want to do it? So do we let the liability slide? Whoa, we did too much. We did too much. We've got to start requiring things again.

That's not the right way to do this. We have reached a pinnacle of excellence. Why go backwards. Terry's right. The standard already requires that every five years there's a check valve requirement. The system has to be drained to do that. I've got some crazy fitters, but they wouldn't even try that one on the fly. The system has to be drained down. You're asking somebody to take the cap off of a flushing connection and remove one sprinkler.
I've been doing fire sprinklers for over 25 years. I found pieces of asphalt bigger than my hand, workman's gloves, sandwich baggies, coupons. We call them coupons. You know, if you drill a hole in a piece of pipe, you've collected handfuls of those out of branch lines. I've gone to jobs where a flushing connection is removed on a piece of 2-inch cross-main. I ask you to remove this motion.

THE CHAIR: Thank you. Mike 7.

MR. LARRIMER: Pete Larrimer, Department of Veteran Affairs, speaking for the motion.

I want to address the check valve comment first. We often have systems where we'll have a fire pump with the check valve in line but a bypass in the check valve. Both of those check valves, if we were to do the five-year inspection, could be looked at internally without shutting the system down, causing a big problem.

So I'm not sure that we're real concerned about the check valve. They don't have a great effect on the system operation of our systems.

Also, I want to comment on it not being onerous. We have to follow impairment procedures in hospitals and take interim life safety measures. Not only are there costs involved in performing the
inspection, but the impairment procedures that must
take place to do the inspection does require a lot of
effort.

In healthcare facilities, interim life
safety measures must be instituted because they are
usually taking a sprinkler system out of service to
pull the required sprinkler. In a healthcare
facility that operates 24/7, this is not as easy as
the ITM votes would have you believe. Due to the
necessary coordination among safety and facility
staff, tags are required to be placed along fire
department connections and control valves.

The authority having jurisdiction must be
notified that the system must be taken out of
service. The fire alarm system has to be taken out
of service more often than not due to the numerous
false trips of the flow switches while they're
draining and filling up systems. People in the area
of the system must be notified that their required
sprinkler system is out of service.

Once the job is complete, the tags have to
be removed from the fire department connection and
control valve. The HGA must be notified that the
system is back in service. The fire alarm system
must be placed back into service. So the people in
the area must be notified that the system is back in service.

This all takes a significant amount of resources in a hospital. This is not an easy task. With thousands of sprinkler systems in the VA Medical Center, the costs are not insignificant. Contractors coming to our Medical Center providing pricing for this internal inspection as a main focus of their ITM pass --

THE CHAIR: Pete, can you slow down a little? We're having a hard time with the transcript.

MR. LARRIMER: We have numerous systems at each campus, and we just haven't had failures with sprinkler systems that this inspection will remedy. And in my industry, the healthcare industry, we modify our systems so much that we're always inside our pipe.

And we might not be the same as some of these highly protective risk. And I understand it would probably behoove them to go out and inspect inside their piping if they're going to do systems like a healthcare facility. But in the healthcare area, we modify our systems. So we see the internals of our pipe. And also the items that Mr. Ray finds
is through routine testing. We find the same thing.

One last point I want to make. Sprinkler systems operate effectively with some rust in the pipe. We designed it with a seeding factor of 120. And now it's going to go to 100 and even below that. The systems are still effective. The statistics bear that out. Most systems operate effectively with only one or two heads. 89 percent of the wet pipe sprinkler systems control the fire with one or two heads. That is not a lot of water flowing.

Even with some obstructions, you will have a very effective system. We're not eliminating the requirement to do the inspection. We're just making the requirement conditional upon all the triggers that are in Chapter 14. Thank you.

THE CHAIR: Thank you. Mike 4.

MR. BELLEMY: Tracy Bellem, Telgian Corporation, with a call to question.

THE CHAIR: We've got a call to question. Please raise your hands. Thank you. Those opposed. That motion carries. We're going to proceed with the vote.

The motion is to accept Comment 25-101. All those in favor please raise your hands. Thank you. All those opposed. I think we're going to go to a
Standing vote. All those in favor of accepting Comment 25-101, please stand. Thank you. Be seated. Those opposed to the motion, please stand. Thank you. You can be seated. The vote was 45 to 35. The motion passes.

Moving on. The next motion on NFPA 25, Motion Sequence 25-20, appeared on our agenda. However, the authorized maker of the motion or their designated representative has notified NFPA that they no longer wish to present this motion.

Therefore, in accordance with the NFPA rules, the motion may not be considered by the assembly, and it’s removed from the agenda. We will now move on to the next motion.

The next motion is Motion Sequence 25-21.

And I'm going to go to mike 4.


THE CHAIR: The Chair accepts your withdrawal, and there will be no further discussion on that item. We're going to move on to Motion Sequence 25-22. Mike 1.

MR. ELVOVE: Josh Elvove with the U.S. General Services Administration, and I'm here to withdraw my motion.
June 28, 2010

Ms. Amy Cronin
Assistant Vice President
Secretary, Standards Council
National Fire Protection Association
1 Batterymarch Park
Quincy, MA  02269

Subject: Formal Appeal of NFPA 25-2011: Accept CAM 25-4 (i.e., Accept Comment 25-11)

Dear Ms. Cronin,

In accordance with Section 1-6 of the NFPA Regulations Governing Committee Projects (Regulations), please accept this letter as a formal appeal to the NFPA Standards Council regarding NFPA 25, Inspection, Testing and Maintenance of Water Based Fire Protection Systems, proposed 2011 edition, Certified Amending Motion 25-4 which aimed to accept comment 25-11. The following information is provided as prescribed in Section 1-6.3 of the Regulations:

1. Name, affiliation and address of the appellant:
   Joshua W. Elvove, PE, CSP, FSFPE
   Representing the U.S. General Services Administration, Public Buildings Service
   3478 S. Cimarron Way
   Aurora, CO 80014

2. Statement identifying the particular action to which the appeal relates:
   The U.S. General Services Administration, Public Buildings Service is hereby appealing the final action taken on June 9, 2010 at the annual NFPA meeting in Las Vegas on certified amending motion 25-4, which failed after an assembly vote.

3. Argument setting forth the grounds for appeal:
   Please see Attachment 1 to this letter.

4. Statement of the precise relief requested:
   The U.S. General Services Administration, Public Buildings Service requests that the Standards Council recommend that certified amending motion 25-4, which aimed to accept comment 25-11, for the proposed 2011 edition of NFPA 25, be approved.

Thank you for placing this matter on the Standards Council’s August 2010 meeting agenda. I’ll look forward to seeing you at the meeting.

Sincerely,

Joshua W. Elvove
Senior Fire Protection Engineer
U.S. General Services Administration, Public Buildings Service
The U.S. General Services Administration, Public Buildings Service proposed certified amending motion 25-4. This motion aimed to accept our comment 25-11, which proposed to return the definition of “Deficiency” to the 2008 edition of NFPA 25, Inspection, Testing and Maintenance of Water Based Fire Protection Systems. We believe the proposed new definition of “Deficiency” as revised by comment 25-12 is flawed since it will define the term “Deficiency” as follows: “Deficiency” - *For the purposes of inspection, testing, and maintenance, a condition in which a system or portion thereof is damaged, inoperable, or in need of service that is not an impairment*. In other words, it defines a deficiency as an inoperable system that does not rise to the level of impairment. Therefore, an inoperable system could be a deficiency or an impairment. We believe the new definition actually causes more confusion.

The new definition proposed by comment 25-12 goes further and introduces two new terms - Critical Deficiency and Non-Critical Deficiency. Those two terms are not used anywhere in the body of the standard, but are addressed in two annexes as a result of action taken by comment 25-119. This concerns us as 25-119 introduced extensive new text in A.4.1.4 and also introduced a new 14-page table in Annex E. Neither of these had proper public review via a related proposal as published in the ROP. Moreover, Annex E has several inconsistencies and mistakes. For example, page 25-35 shows that paper bags used to protect against paint overspray is an impairment, when in fact, it’s a complying condition; and page 25-34 says a spray pattern that is obstructed by ducts, decks or overhead doors over 4 feet wide is listed as a non-critical deficiency. This finding is not even addressed in the standard. And there are more.

Because the new definition for “Deficiency” proposed by comment 25-12 is potentially confusing and relies extensively on information introduced by comment 25-119 that did not have public review (and as a result, has some questionable/conflicting content), we respectively request comment 25-11 be approved and thus the definition of “Deficiency” be returned to that of the 2008 edition.
25-11 Log #105
(3.3.4 Deficiency)

Final Action: Reject

Submitter: Joshua W. Elvove, US General Services Administration
Comment on Proposal No: 25-19

Recommendation: Revised text to read as follows:
Reject proposal and return definition of “deficiency” back to what’s contained in the current edition of NFPA 25

Substantiation: The term “deficiency” appears 3 times in the body of NFPA 25:
1. In 3.3.4 as a definition
2. In 4.1.6.1 under the owner’s evaluation of a change in hazard
3. In 12.1.5.2 under changes of occupancy.

In all three cases, the term “deficiency” is being used per its official NFPA definition. Therefore, there is no reason to revise the definition. The proposed revised definition appears to be more appropriate to the term “condition”, not “deficiency”, especially given the majority of the committee’s concern over contractor liability. If so, the committee should have created a new definition for “condition” rather than revise the definition of “deficiency”.

Committee Meeting Action: Reject

Committee Statement: Committee action on Comment 25-12 (Log #122) further defines the term and added two subdefinitions that provide additional guidance.

Number Eligible to Vote: 30

Ballot Results: Affirmative: 23 Negative: 6

Ballot Not Returned: 1 Fuller, D.

Explanation of Negative:

DRYSDALE, M.: See comments for 25-9 and 25-12

ELVOVE, J.: Do not accept proposed new definition for "deficiency." See my comment on ROC 25-12 (Log #122).

Accept language from current edition or accept proposed language from GOT task group noted in ROC 25-13 (Log #77).

LAKE, J.: I agree with Mr. Elvove.

SAIDI, J.: Do not agree with committee action. The submitter’s substantiation was correct and should have been accepted.


Recommendation: Revise text to read as follows:

3.3.4 Deficiency. A condition in which the application of the components is not within its designed limits or specifications. A condition in which a system or portion thereof is damaged, inoperable, or in need of service.

Substantiation: The existing definition is the primary NFPA definition but it is not consistent with the scope of NFPA 25. The wording can be used to construe an argument that the owner should identify design and or installation “deficiencies” which is not the intent of the inspections and tests specified by the standard. It is recognized that the owner is required to conduct an evaluation of the system capabilities when the building or hazard is changed but the specific requirements for this evaluation are not identified.

Committee Meeting Action: Accept in Principle

Revise proposed definition as follows:

3.3.4* Deficiency. For the purposes of inspection, testing and maintenance, a condition in which a system or portion thereof is damaged, inoperable, or in need of service.

A.3.3.4 Depending on the nature and significance of the deficiency it may result in a system impairment.

Committee Statement: The revision adds a delimiting phrase to limit the definition to inspection, testing and maintenance and provides additional annex language for clarification.

Number Eligible to Vote: 30

Ballot Results: Affirmative: 27 Negative: 2

Ballot Not Returned: 1 Hoover, S.

Explanation of Negative:

ELVOVE, J.: This proposal should be rejected. NFPA 25 should use the primary NFPA definition as it accurately describes this term in its correct context (i.e., design and/or installation problems are “deficiencies.”) Moreover, the term “in need of service” is redundant. If the definition of “deficiency” doesn’t work appropriately, then the committee should define a new term to describe items applicable to NFPA 25 (e.g., “conditions”).

LAKE, J.: I vote to negative on this proposal. This committee should not be changing the definition of deficiency because of the language contained in the NFPA 25 Handbook (see comments on 25-4 (Log #44). This code should be used to identify anything in a water-based fire protection system that might cause it to fail. The name of the document infers the intent. If it is the intent of the committee to remove these requirements, then the name of the document needs to be changed and the associated water-based documents need to be notified so they can develop appropriate provisions to address this void.
RALPH GERDES: That motion fails. Thank you.

We're going to move on to motion sequence 25-4.

Mic 1.

JOSH ELVOVE: Thank you. Mr. Chair. Josh Elvove with the U.S. General Service Administration, also a member of the NFPA 1025 technical committee meeting. I'd like to move 25-4 which accepts Comment 11.

(Second.)

RALPH GERDES: We've got a motion to accept Comment 25-11. We've got a second.

Proceed.

JOSH ELVOVE: This motion pertains to the new definition of "deficiency" which was revised by Proposal 19 and then further revised by Comment 11. The proposed new definition is flawed and my motion returns the definition back to the current text of the 2008 edition.

The new definition defines "deficiency" as a condition in which a system or portion thereof is damaged, inoperable, or in need of service but does not rise to the level of an impairment. So an inoperable system can be a deficiency. Many would think an inoperable system would be considered an impairment.

There we have a direct conflict.

In addition, the text as revised during the
ROC introduced two new completely subdefinitions for critical and noncritical deficiencies that have not yet been vetted by the membership. They were just introduced in the ROC.

Moreover, these two new definitions which are introduced aren't even used in the body of the standard so why are they needed? So for those reasons, I ask you to approve this motion and return the definition to the current edition.

RALPH GERDES: Thank you. Now, before I ask the committee chair for his comments, I want to inform the membership that the next motion also proposes a definition for deficiency, so I anticipate in this floor discussion you may be going between both the motions. Please take that under consideration.

Mr. Bouchard, do you have any comments?

JOHN BOUCHARD: Again, the committee spent quite a bit of time at both the ROP stage and at the ROC stage debating and discussing the term "deficiency" and I would like to just point out that the ballots, although a little closer this time, but was 26 to 6 in defeating the comment.

RALPH GERDES: Thank you.

We're going to proceed with floor discussion.

I'm going to got to Mic 5.
MARCELO HIRSCHLER: Marcelo Hirschler, GBH

I am the proponent of the next NITMAM, and I definitely, I prefer the definition that we've put forward with the glossary committee. However, if this definition were to pass --

RALPH GERDES: Marcelo, are you speaking for or against the motion?

MARCELO HIRSCHLER: Speaking for the motion.

RALPH GERDES: Thank you.

MARCELO HIRSCHLER: Excuse me, I thought I said that. I apologize. Sorry. Again, I would prefer that we move to 25-5, and I think even Josh would have preferred that. Unfortunately, the order in which things came is the order in which they come. So if this motion passes, I'll -- I'll leave it at that.

The problem is that the existing definition of "deficiency" that the committee proposed makes no sense because what we're talking about is something that can be inoperable and yet not necessarily result in system impairment. Makes no sense. It's just technically incorrect and needs to be deleted.

I hope that you will go with my -- with mine in the next motion, but whichever you choose to do, we need to get rid of the definition that the committee put
1 forward this cycle because it is technically incorrect.
2 Thank you.
3 RALPH GERDES: Thank you.
4 And we will go to Mic 2.
5 KEN ISMAN: Thank you. Ken Isman with the
6 National Fire Sprinkler Association and I'm against the
7 motion on the floor. I'm also going to ask for a ruling
8 from the chair so we can understand exactly what the
9 effect of the motion is.
10 We had testimony from the proponent of the
11 motion that this is somehow going to affect Comment
12 25-12 and the two definitions for different kinds of
13 deficiencies that are in Comment 25-12 and that's not my
14 understanding of how this motion is going to work, so
15 I'd like some clarification that if this motion passes,
16 is that also going to send back the definition for
17 "critical deficiency" and "noncritical deficiency" in
18 Comment 25-12?
19 RALPH GERDES: Okay. Acceptance of this
20 comment is not going to effect Comment 25-12, but there
21 may be a follow-up motion regarding those definitions.
22 KEN ISMAN: Okay. Thank you, Mr. Chair. So we
23 still stand in opposition to the motion. The definition
24 of "deficiency" that this motion would bring into NFPA
25 25 or bring back to NFPA 25 comes from a completely
It comes from our 1000 series of standards that has to do with professional qualifications, and it's a little bit different than the way NFPA 25 really wants to use the concept of a deficiency.

In this case, if you bring the language into NFPA 25 or you keep it in 25 where it's been inappropriately used in the past, we'll end up having to evaluate every component and its designed limitations or specifications.

Do we have the design specifications for every component of a sprinkler system when we go out there and do our inspections and tests? The answer is no. That's not the intent of NFPA 25. We don't want to go out there and evaluate something and see whether it's in its designed limitations or specifications. We're out there to see if it's still functioning the way it's supposed to function.

RALPH GERDES: Thank you.

RUSS LEAVITT: Russ Leavitt, Telgian Corporation, member of the committee speaking against. I'm speaking against principally because the proponent brought in the definitions of "critical and noncritical deficiencies."
I was chair of the task group that was appointed at the end of the ROP process at the request of the committee chair and the committee to address these specific challenges that are present right now in real world situations where we have no guidance concerning deficiency. There was literally -- we've literally seen very punitive application because the standard basically treats all deficiencies the same.

We have documented instances in states where tagging and system rating is being applied where buildings have been declared unoccupiable [sic] and the building shut down because of missing signs which is not the intent. And so the committee felt strongly, the task group was appointed to be very clear about not only deficiency, the definition of deficiency, but also giving some guidance concerning that all deficiencies are not created equally.

And that -- and gentlemen and ladies, that is really, really needed particularly in the environment where we work and operate now where we have a number of states that are requiring mandatory reporting, mandatory rating, and mandatory correction of deficiencies. The guidance is needed. Thank you.

RALPH GERDES: Thank you.

Mic 1.
1 JOSH ELVOVE: Josh Elvove with the U.S. General
2 Service Administration speaking in favor of the motion.
3 In response to Mr. Isman's comment, he submitted Comment
4 25-9 which I find very interesting. He basically
5 restated in his comment the existing definition of
6 "deficiency" but added the words "but does not rise to
7 level of impairment." That would have worked, but that
8 got changed to what we have now, so, you know, sorry
9 that No. 9 didn't go through, but we're not debating
10 that right now.
11 And then just for the record, I don't know if I
12 would (indiscernible) I didn't raise 25-12. I guess
13 that was in the comment. I didn't speak to that point.
14 Regarding the 25 119, the critical versus noncritical.
15 Conceptually I have no issue with that. I
16 mean, if there's a need to define between critical and
17 noncritical, so be it, and I commend the task group
18 effort that Russ Leavitt shared.
19 The problem is if you go to your ROC, to page
20 2534, you will find 13 pages of tables, 13 pages of
21 information that is pretty darn new that was given to
22 our committee. The committee was supposed to evaluate
23 this about a week before.
24 Now, I know we're supposed to be diligent NFPA
25 committee members, but I got to tell you, I was at the
committee meeting. We didn't spend a lot of time going through these 13 pages of stuff that are now thrust upon you and that are in Annex E that are basically the backbone of this critical and noncritical deficiency debate.

This is the only time we're talking about critical and noncritical that's right here in Annex E which is a nice list if it was correct.

Now, 13 pages, you want to spend some time going through it or should I save you some time? I've gone through some of these things and if you accept -- if you deny this motion and then this remains, you're going to accept an annex that's got flawed material as guidance out there for our inspections to go by.

Let me start. On 2535, it shows that paper bags used to protect against paint overspray is an impairment. Paper bags is okay. That was just NFPA 13. That was changed recently to NFPA 25. That's okay. It says that it's not okay. It says that's an impairment.

That's a flaw.

On page 2534, it says a spray pattern that is obstructed by ducks, decks, or overhead doors over 4 feet wide is listed as a noncritical deficiency. Oh, wait a minute here. Why we getting involved with the design issues all of a sudden? That's not even touching
NFPA 25. That's two. You got time? Go through the stuff.

It's -- I commend the committee. I commend the task group. It's a wonderful job. If you accept this definition, you get Annex E because you have to get Annex E because if you don't get Annex E, there's no reason for the words "critical," "noncritical," so you get everything as a package. Keep that in mind and please support the motion.

RALPH GERDES: Thank you.

I'm going to go to Mic 4.

RUSS FLEMING: Thank you, Mr. Chairman.

Mr. Russ Fleming, National Fire Sprinkler Association speaking against the motion. I'm a member of the NFPA 25 committee. I'm speaking against the motion. I mainly wanted to address Mr. Hirschler's comments about the lack of the standardized definition.

And I understand that his heart is in the right place, but the fact is if you go back to the original proposal in this item which is 25-19, you'll see the paper trail that the committee deliberately chose to disassociate itself from the standardized definition and did so with the guidance from the staff liaison by using the terms "for the purposes of inspection, testing, and maintenance" and went on with their definition.
And they did so because, as Mr. Isman pointed out, the standardized definition includes the design side of things which based on our earlier discussion is clearly not intended to be covered within NFPA 25.

I'd also like to make one more comment which is with regard to the word "inoperable" and whether that's automatically an impairment of two speakers that said that's a problem. But if you'll notice, this definition talks about system or portion system being inoperable.

And referring to those tables that Mr. Elvove referred to, for example, if you have an inoperable alarm, that does not rise to a level of an impairment. It's a serious deficiency with the system, but it doesn't mean your system itself will not respond to the fire, so I urge you to vote against this motion.

RALPH GERDES: Thank you.

Mic 2.

MARCELO HIRSCHLER: Marcelo Hirschler, GBH International, against the motion. I know I spoke for the motion before. My point is that what we need is to get rid of this definition, and I think the last speaker just made my point.

If it is inoperable, it is deficient in some way and yet according to the definition we're putting in now, if either this motion or the next motion doesn't
pass, it can be inoperable and not deficient. That's ridiculous.

So criticism has been raised by the committee to the original definition. Fine. Let's get rid of the original definition, vote this down, then support 25-13 because that's a generic definition which then has the annex item that depending on the nature of significance of the deficiency, it may result in system impairment.

So 25 -- Comment 25-13 does exactly what everyone is asking for, so if you defeat this -- but the key thing is that we need to get rid of the definition that the committee put forward which is wrong.

RALPH GERDES: Thank you.

Mic 4.

RUSS LEAVITT: Russ Leavitt, Telgian Corporation, speaking against the motion. We heard about the 13 pages and yes, there is a lot there, but I want to make sure that you understand why the technical committee and the task group on the task group recommendation put this as an annex and we it in Annex E with this note that says, "This annex is not a part of the requirement of this NFPA document, but is included for informational purposes only."

And it goes on to say that it is providing some examples, and the table is not all inclusive, but it is
included in this annex to provide some guidance in responding to needed corrections or repairs.

The table does not take into account the nature of the hazard or the life safety exposure of the occupancy and should be used with good judgment. The feeling of the technical committee was that we needed to get this out there so that we could get some feedback, okay, and those who are -- we've already had some feedback and we will not get this feedback if we don't have something out there. Let's put in the annex with specific language that is not intended and it is not a part of the standard.

RALPH GERDES: Thank you.

Mic 2.

ART BLACK: Mr. Chair, Art Black, Carmel Fire Protection. As fascinating as all this is, I'm going to call the question.

RALPH GERDES: There's a call for the question. Is there a second?

(Second.)

RALPH GERDES: We have a second. We are going to proceed with the vote on calling the question. All those in favor, raise your hands.

(Raising Hands.)

RALPH GERDES: All those opposed?
RALPH GERDES: That motion carries.

We're going to go to the motion to accept Comment 25-11. All those in favor of accepting that comment, please raise your hands.

(Raising Hands.)

RALPH GERDES: Thank you.

Those opposed?

(Raising Hands.)

RALPH GERDES: That motion fails.

We're going to take a stretch break. Give everybody a chance to just stand up and stretch for a minute or two.

(A short recess was taken.)

RALPH GERDES: We're going to move on with motion sequence 25-5.

Mic 5.

MARCELO HIRSCHLER: Marcelo Hirschler, GBH International, speaking for the glossary of terms, technical advisory committee, and I move to accept Comment 25-13.

RALPH GERDES: Is there a second?

(Second.)

RALPH GERDES: Proceed.

MARCELO HIRSCHLER: I don't want to go through
June 28, 2010

Ms. Amy Cronin
Assistant Vice President
Secretary, Standards Council
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269

Subject: Formal Appeal of NFPA 25-2011: Accept CAM 25-7 (i.e., Accept Comment 25-24)

Dear Ms. Cronin,

In accordance with Section 1-6 of the NFPA Regulations Governing Committee Projects (Regulations), please accept this letter as a formal appeal to the NFPA Standards Council regarding NFPA 25, Inspection, Testing and Maintenance of Water Based Fire Protection Systems, proposed 2011 edition, Certified Amending Motion 25-7 which aimed to accept comment 25-24. The following information is provided as prescribed in Section 1-6.3 of the Regulations:

1. **Name, affiliation and address of the appellant:**
   
   Joshua W. Elvove, PE, CSP, FSFPE
   Representing the U.S. General Services Administration, Public Buildings Service
   3478 S. Cimarron Way
   Aurora, CO 80014

2. **Statement identifying the particular action to which the appeal relates:**

   The U.S. General Services Administration, Public Buildings Service is hereby appealing the final action taken on June 9, 2010 at the annual NFPA meeting in Las Vegas on certified amending motion 25-24, which failed after an assembly vote.

3. **Argument setting forth the grounds for appeal:**

   Please see Attachment 1

4. **Statement of the precise relief requested:**

   The U.S. General Services Administration, Public Buildings Service requests that the Standards Council recommend that certified amending motion 25-7, which aimed to accept comment 25-24, for the proposed 2011 edition of NFPA 25, be approved.

Thank you for placing this matter on the Standards Council’s August 2010 meeting agenda. I'll look forward to seeing you at the meeting.

Sincerely,

Joshua W. Elvove, PE, CSP, FSFPE
Senior Fire Protection Engineer
U.S. General Services Administration, Public Buildings Service
The U.S. General Services Administration, Public Buildings Service proposed certified amending motion 25-7. This motion aimed to accept our comment 25-24 (which accepts proposal 25-44) to delete sections 4.1.5 and 4.1.6 in their entirety from NFPA 25, Inspection, Testing and Maintenance of Water Based Fire Protection Systems. Note: acceptance of certified amending motion would also satisfy comment 25-23.

The technical committee has gone beyond the written scopes of the technical committee and the standard by developing language pertaining to the adequacy of the design in sections 4.1.5 and 4.1.6. The committee subsequently established conflicting requirements in the related annex that states “…the adequacy of design criteria or the capability of the fire protection system to protect the building or its contents” is not part of the standard. Is the adequacy of the design to be determined per sections 4.1.5 and 4.1.6 of the standard or is it not part of the standard? The standard can’t have it both ways.

Language added to this edition moves in a direction to further obviate the “inspector” (or inspection, testing and maintenance service provider) from any responsibility pertaining to the adequacy of the design and conversely places more and more responsibility on the owner for this purpose. Language goes further to state that the “inspector” should never have any responsibility for evaluating the adequacy of the design, even if the owner wishes him to as part of the inspection, testing and maintenance of the system.

We believe the best course of action for resolving this issue is to delete sections 4.1.5 and 4.1.6. Deleting these two sections will also remove a number of questionable changes made to these sections during ROP and ROC as follows:

It removes inappropriate language from 4.1.5.1 that was inserted as a result of accepting comment 25-21. This comment added “4.1.5.1 The evaluation required by 4.1.5 is not part of the normal inspection, testing and maintenance required by this standard.” The word “is” is not in accordance with the manual of style nor is it appropriate to replace the words “is not part” with “shall not be part” (should that be what’s intended) as that clearly removes any option of using the inspection, testing and maintenance process to perform an evaluation per 4.1.5 should that be desired.

It removes inappropriate scoping and conflicting language from A.4.1.5 that was inserted as a result of accepting proposal 25-197 in principle in part. Regarding inappropriate scoping language, this proposal added new text to A.4.1.5 that definitively states that the standard is not to “address the adequacy of design criteria or the capability of the fire protection system to protect the building or its contents.” How can this standard say something this outlandish when the purpose of the standard states “The purpose of this document is to provide requirements that ensure a reasonable degree of protection for life and property from fire…”? Regarding conflicting language, this proposal added new text to A.4.1.5 that stated that “if no changes to the building or its use have transpired since it was originally occupied there is no evaluation required.” This contradicts language in 4.1.5 (and 4.1.6) which states that changes in process or materials (or hazard) will trigger an evaluation.

It removes inappropriate language from 4.1.6.1 that was inserted as a result of accepting comment 25-25. We believe the action taken by the Technical Committee in response to ROC 25-25 is completely out of order, because it significantly modified text during the comment period to a part of the standard that was only modified editorially by (my) proposal 25-47; and it introduced new material that completely deleted life safety (“a threat to life”) from existing text that is contrary to the purpose statement in 1.2.1 and 1.2.2 of the standard which reads as follows:

1.2* Purpose.
1.2.1 The purpose of this document is to provide requirements that ensure a reasonable degree of protection for life and property from fire through minimum inspection, testing, and maintenance methods for water-based fire protection systems.
1.2.2 In those cases where it is determined that an existing situation involves a distinct hazard to life or property, the authority having jurisdiction shall be permitted to require inspection, testing, and maintenance methods in excess of those required by the standard.
Accept original proposal (i.e., delete sections 4.1.5 and 4.1.6)

As stated numerous times before by myself and other dissenting individuals, this is a fire code/enforcement issue and not within the scope and purview of NFPA 25 (see substantiation in my original proposal, along with the respective negative ballot votes). The following is the committee scope as charged by the NFPA Standards Council.

**Committee Scope:** This Committee shall have primary responsibility for documents on inspection, testing, and maintenance of systems utilizing water as a method of extinguishment. These include sprinkler systems, standpipe and hose systems, fire service piping and appurtenances, fire pumps, water storage tanks, fixed water spray systems, foam-water systems, valves, and allied equipment. This Committee shall also develop procedures for the conduct and reporting of routine system impairments.

The committee’s reason for rejecting this comment states “It is the intent of NFPA 25 to address owner responsibilities which include indicating when a change in occupancy or use impacts the fire protection system.” Where in the aforementioned scope statement is the committee charged with addressing changes in hazard, occupancy or use? Moreover, Chapter 1 doesn’t even include similar provisions for owners. Finally, removing these sections won’t negate these requirements because the local building and fire codes contain similar language. So, for all the reasons previously stated, these sections need to be removed from this document.

**Committee Meeting Action:** Reject

**Committee Statement:** Committee action on Comment 25-23 (Log #95) addresses this issue.

**Number Eligible to Vote:** 30

**Ballot Results:** Affirmative: 23 Negative: 6

**Ballot Not Returned:** Fuller, D.

**Explanation of Negative:**

DGYSDALE, M.: See 25-23
ELVOVE, J.: Where in Chapter 1 are "verifications under sections 4.1.5 and 4.1.6" addressed as the committee states in its committee statement? And where does it say that "the intent of NFPA 25" is "to address owner's responsibilities..." as stated in the committee statement in ROP 25-44? These two sections have to be removed because the scope of Chapter 1 says nothing about either of the aforementioned items nor does it address changes of occupancies and hazards. This is the paradox that I keep raising. Sections 4.1.5 and 4.1.6 should never have been permitted to be included in this document in the first place. These two sections are enforcement issues and don't belong in this standard until such time as Standards Council revises the committee's scope and says the committee is responsible for such.

LARRIMER, P.: See my comment on 25-23.

SAIDI, J.: See my comments on 25-23.


**SCOPE**

This document establishes the minimum requirements for the periodic inspection, testing, and maintenance of water-based fire protection systems, including land-based and marine applications.

1.1 This standard does not address all of the inspection, testing, and maintenance of the electrical components of the automatic fire detection equipment for preaction and deluge systems that are addressed by NFPA 72, National Fire Alarm Code. The inspection, testing, and maintenance required by this standard and NFPA 72, National Fire Alarm Code, shall be coordinated so that the system operates as intended.

1.1.2 The types of systems addressed by this standard include, but are not limited to, sprinkler, standpipe and hose, fixed water spray, and foam water. Included are the water supplies that are part of these systems, such as private fire service mains and appurtenances, fire pumps and water storage tanks, and valves that control system flow. The document also addresses impairment handling and reporting. This standard applies to fire protection systems that have been properly installed in accordance with generally accepted practices. Where a system has not been installed in accordance with generally accepted practices, the corrective action is beyond the scope of this standard. The corrective action to ensure that the system performs in a satisfactory manner shall be in accordance with the appropriate installation standard.
SAIDI, J.: Why: The committee action on the log yet again skirts the issue of addressing the design and installation deficiencies, occupancy changes, etc. and leaves the owners (most of whom don’t have the expertise) to sort these issues out. It would make a lot more sense to have the IMT service provider to record their observations and notify the owners.

I vote to accept the proposal.

SHEPPARD, J.: Agree with the submitter’s substantiation.
We are going to move on to the motion to accept Comment 25-17. All those in favor, please raise your hands.

(Raising Hands.)

RALPH GERDES: Thank you.

Those opposed?

(Raising Hands.)

RALPH GERDES: Thank you. That motion fails.

Moving on to motion sequence 25-7.

Mic 1.

JOSH ELVOVE: Josh Elvove with the U.S. General Service Administration speaking in favor of 25-7 (indiscernible) Comment 25-14.

(Second.)

RALPH GERDES: We have a second.

Proceed.

ART BLACK: Point of order 25-24?


I better talk quickly before someone calls the question.

RALPH GERDES: I do have a second so you can proceed.

JOSH ELVOVE: Thank you. That may be all I get. This may sound like heresy, but this motion removes Section 415 and 416 from NFPA 25. These
sections require an owner to address changes in
occupancy, hazard use, and materials and processes.

These two sections should have never been
inserted into the standard in the first place, and
hazard evaluations do not belong in an ITM document.

Moreover, NFPA 25 has no provisions for
ensuring the adequacy of design. When this comment was
rejected, the committee stated, "Verifications of this
section are within the scope of the document." I
challenge anyone to find where this is stated.

If you look at pages 1, 2, and 5 in the
standard, you will note that this is not addressed or
implied in either the preamble on the origin,
development of the standard, the technical committee
scope, or the document scope. This committee has been
and continues to overstep its bounds.

Now, as an owner, do I want this stuff?
Absolutely. But does it belong in the standard that was
not scoped out properly? Absolutely not. Because of
that, I urge you to accept this motion and remove those
sections that should never be there and why should NFPA
25 be there for all the other standards that have
similar types of issues? Thank you.

RALPH GERDES: Thank you.

Mr. Bouchard.
JOHN BOUCHARD: As I've indicated, I have been on the committee since its inception and have been heavily involved with NFPA 13 and 13A, the predecessor to the sprinkler portion at least of NFPA 25, and there has always been the discussion and the concept has always been included that the owner has certain responsibilities and that has been there from the beginning.

In the discussion that we're about to hear, understand that we're not asking for the owner to do a lot, but he needs to understand that if the building has changed or the occupancy has changed, that it's incumbent upon the owner to verify that the building is still safe. In other words, that the system now is adequate for whatever change has been made and that is what the Sections 415 and 416 speak to.

RALPH GERDES: Thank you.

We are going to go to Mic 4.

RUSS FLEMING: Russ Fleming, National Fire Sprinkler Association, speaking against the motion on the floor. Almost hesitate to bring up maybe an inconsistency in the NFPA definitions, but there is a relevant one here that argues against Mr. Elvove's claim that this is a scope issue.

This committee has given authority for
inspection, testing, and maintenance of water based systems and how they define the scope of their document is generally left to them.

But in the greater picture of what an inspection means, it should be recognized that there are two definitions floating through the NFPA system. If you look at the definition of the word "inspect," the preferred definition come from NFPA 1915, and it goes beyond the use of the word "inspection" in NFPA 25 because the preferred definition of "inspect" actually includes a comparison with the established standards.

So it gets into that area that NFPA 25 doesn't want to be the area of responsibility of a typical system inspector.

Now, NFPA 25 also uses a preferred definition, but they're careful to use a definition of the term "inspection" because that definition finds its relevance in the base document of NFPA 820 and this definition used in 820 and also in NFPA 25 and also in NFPA 12 and NFPA 17, and that's a definition that doesn't include a comparison with design standards.

So the way the NFPA 25 committee has tried to approach this is to take that aspect, comparison with the established design standards, and make it part of what they term a "hazard evaluation" and put it in these
sections, 415 and 416. But, in fact, the committee itself could write a separate document if it wanted to on this concept of hazard evaluation. This is the way it's chosen to deal with it.

But I'm simply saying that Mr. Elvove is incorrect and it's within the scope of the committee as assigned by the standards council and this is simply the way it's chosen to deal with the issue so I urge you to vote against this motion.

Ralph Gerdes: Thank you.

We'll continue at Mic 4.

Russ Leavitt: Russ Leavitt, Telgian Corporation, and member of the NFPA 25 committee. I just want to say one thing that's key here. Number 1, don't forget the fact that there's triggers, and the triggers are if you change the use of this room or you change the room itself. You have to -- the owner has to get somebody that's qualified to evaluate the system.

Ralph Gerdes: I want to clarify, you're for or against --

Russ Leavitt: I'm sorry. I'm against, Mr. Chairman. And if you don't say it here, where do we say it?

Ralph Gerdes: Thank you.

Mic 1.
JOSH ELVOVE: Josh Elvove with the U.S. General Service Administration. I knew this would -- speaking in favor of the motion. I knew this would be heresy.

If Russ is correct regarding the committee scope, I'd like to see that actually headed forth to our committee by the standards council.

I'm reading this committee scope. I've read this scope a number of times. I don't see anywhere where that's part of it. I look at other documents that have similar issues where there could be hazard evaluations required, and nowhere do you see the extensive issues of NFPA 25 language written in those types of documents.

We were just looking at 96 and the word "owner" shows up three times. Once so they can receive a report and another one you say basically that the responsible ITM belongs with the owner. Yeah. We're not going to argue with that. It's these other things that are going on.

I really question that this is actually in the scope of the document, and this was one that I think needs to go further. Thank you.

RALPH GERDES: Thank you.

Seeing no further discussion on the floor, Mr. Bouchard, do you have any final comments?
1          JOHN BOUCHARD: No. I am all set.
2          RALPH GERDES: Thank you. We're going to
3 proceed with the vote. The motion is to accept Comment
4 25-24. All those in favor, please raise your hands.
5                     (Raising Hands.)
6          RALPH GERDES: Thank you.
7          Those opposed, raise your hands.
8                     (Raising Hands.)
9          RALPH GERDES: That motion fails. Thank you.
10          We're moving on to motion sequence 25-8.
11          Mic 1.
12          JOSH ELVOVE: Josh Elvove with the U.S. General
13 Service Administration speaking in favor of 25-8 which
14 is to reject Comment 21.
15          RALPH GERDES: Do I have a second.
16                     (Second.)
17          RALPH GERDES: Proceed.
18          JOSH ELVOVE: If you accept this comment,
19 you'll delete the proposed new text for 40151.
20          Basically, I don't know what that means. It says, "The
21 new text states that the evaluation is not part of
22 normal ITM." I know we've beat this one to death. I
23 know where the assembly stands, but uses the term "is."
24 That's not appropriate language. I'm not trying to be
25 Bill Clinton.
Final Action: Reject

(4.1.5 and 4.1.6)

Submitter: Peter A. Larrimer, US Department of Veterans Affairs
Comment on Proposal No: 25-44
Recommendation: Delete text to read as follows:
Accept the original proposal.
Substantiation: As identified in my negative votes as well as the others, it is not within the scope of this document nor the scope of this committee to establish the owner’s responsibilities as is done in these sections. It is clearly outside the scope of this document.
Committee Meeting Action: Reject
Committee Statement: Verifications under sections 4.1.5 and 4.1.6 are within the scope of NFPA 25 because occupancy or use has a potential impact on the system effectiveness.
Number Eligible to Vote: 30
Ballot Results: Affirmative: 23 Negative: 6
Ballot Not Returned: 1 Fuller, D.
Explanation of Negative:
DRYSDALE, M.: The substantiation of the submitter is correct. This standard is intended to verify that the system will function as designed. Evaluation of the system against the hazards is a separate exercise and is complicated by changes to the installation standard since the original installation and the degree of property and business risk the owner is willing to accept.
ELVOVE, J.: See my comment on ROC 25-24 (Log #108).
LARRIMER, P.: Agree with the commenter.
Committee Statement: Verifications under sections 4.1.5 and 4.1.6 are within the scope of NFPA 25 because occupancy or use has a potential impact on the system effectiveness.
From Comment 25-4: A.1.1.3.1 The requirement to evaluate the adequacy of the design of the installed system is not a part of the periodic inspection, testing and maintenance requirements of this standard. However such evaluation is the responsibility of the property owner or designated representative as indicated in Sections 4.1.5 and 4.1.6.
As can be seen by the committee statement and new language added above, the evaluation is not part of the scope of this document but the responsibility of the owner outside of this document. Performing ITM per NFPA 25 will not lead to an evaluation.
The scope of the Technical Committee and NFPA 25 is copied below and the responsibilities of the owner are not within either scope. These items are not within the scope of NFPA 25.
Committee Scope: This Committee shall have primary responsibility for documents on inspection, testing, and maintenance of systems utilizing water as a method of extinguishment. These include sprinkler systems, standpipe and hose systems, fire service piping and appurtenances, fire pumps, water storage tanks, fixed water spray systems, foam-water systems, valves, and allied equipment. This Committee shall also develop procedures for the conduct and reporting of routine system impairments.
1.1* Scope. This document establishes the minimum requirements for the periodic inspection, testing, and maintenance of water-based fire protection systems, including land-based and marine applications.
1.1.1 This standard does not address all of the inspection, testing, and maintenance of the electrical components of the automatic fire detection equipment for preaction and deluge systems that are addressed by NFPA72, National Fire Alarm Code. The inspection, testing, and maintenance required by this standard and NFPA 72, National Fire Alarm Code, shall be coordinated so that the system operates as intended.
1.1.2 The types of systems addressed by this standard include, but are not limited to, sprinkler, standpipe and hose, fixed water spray, and foam water. Included are the water supplies that are part of these systems, such as private fire service mains and appurtenances, fire pumps and water storage tanks, and valves that control system flow. The document also addresses impairment handling and reporting. This standard applies to fire protection systems that have been properly installed in accordance with generally accepted practices. Where a system has not been installed in accordance with generally accepted practices, the corrective action is beyond the scope of this standard. The corrective action to ensure that the system performs in a satisfactory manner shall be in accordance with the appropriate installation standard.
1.1.3 This standard shall not apply to sprinkler systems designed and installed in accordance with NFPA 13D, Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes.
SAIDI, J.: The owners are generally not experts on their fire protection systems and rely primarily on contractors to perform such testing and verifications. It is therefore reasonable for the owners to expect to be informed of non-compliance issues and deficiencies identified or observed by the contractors who is presumed to understand such systems.

This committee action relieves the contractors of all such responsibilities and appears to be too biased in favor of the contractors.

SHEPPARD, J.: Agree with submitter's substantiation.

UNDERWOOD, D.: I AGREE WITH SUBMITTERS SUBSTANTIATION.
Submitter: Joshua Elvoie, U.S. General Services Administration
Recommendation: Delete Sections 4.1.5 and 4.1.6 completely.
Substantiation: Though the content contained in these two sections has been in the standard for many years and addresses a potential problem, they have nothing to do with the performance of the inspection, testing or maintenance of the components of the system and in fact, include tasks that exceed the scope of this document. Changing occupancy, use, process, and material impacts more than just the performance of a water-based fire extinguishing system (e.g., it may also impact a fire alarm system, egress requirements, smoke control system, etc). As such, these are issues that needs to be enforced through local fire codes (or NFPA 1), not NFPA 25. If the committee is unwilling to delete this text, then move it into the Annex and modify text to include a reference to local fire codes.
Committee Meeting Action: Reject
Committee Statement: It is the intent of NFPA 25 to address owner responsibilities which include indicating when a change in occupancy or use impacts the fire protection system.
Number Eligible to Vote: 30
Ballot Results: Affirmative: 25 Negative: 4
Ballot Not Returned: 1 Hoover, S.
Explanation of Negative:

ELVOVE, J.: This proposal should be accepted as the committee statement magnifies the inherent conflict within this document. See my comment on 25-8 (Log #106). By leaving this requirement, NFPA 25 accepts the responsibility of ensuring water based systems perform as designed and installed, yet places the sole responsibility of identifying these deficiencies caused by a change in occupancy, use or storage practice upon the owner, who invariably has no idea when his actions may have caused a problem. If these two sections are permitted to remain, then it's incumbent upon this standard to address design and/or installation deficiencies and to require the ITM service provider to note and report these deficiencies to the owner. If the ITM service provider believes this is beyond his scope (or liability), then it's beyond the scope of this standard and thus, these sections should be removed as originally proposed.

LARRIMER, P.: The responsibilities of the owner, except as they relate to the inspection, testing, and maintenance of the water based systems, is outside the scope of NFPA 25. I have copied the committee scope and the scope of the standard below. Neither of the scopes show that this document or committee is responsible establish owners requirements when changes are made to the building structure, the building's use, or occupancy changes within. These are typical building code and permitting issues that are addressed in documents and ordinances outside of this maintenance standard. If building changes such as changes in occupancy, use, process or materials, are the responsibility of this committee, then the scope of the committee should be expanded and the requirements should be clarified. The proposal should be accepted and these paragraphs deleted.

Committee Scope: This Committee shall have primary responsibility for documents on inspection, testing, and maintenance of systems utilizing water as a method of extinguishment. These include sprinkler systems, standpipe and hose systems, fire service piping and appurtenances, fire pumps, water storage tanks, fixed water spray systems, foam-water systems, valves, and allied equipment. This Committee shall also develop procedures for the conduct and reporting of routine system impairments.

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This document establishes the minimum requirements for the periodic inspection, testing, and maintenance of water-based fire protection systems, including land-based and marine applications.

1.1.1 This standard does not address all of the inspection, testing, and maintenance of the electrical components of the automatic fire detection equipment for preaction and deluge systems that are addressed by NFPA 72, National Fire Alarm Code. The inspection, testing, and maintenance required by this standard and NFPA 72, National Fire Alarm Code, shall be coordinated so that the system operates as intended.

1.1.2 The types of systems addressed by this standard include, but are not limited to, sprinkler, standpipe and hose, fixed water spray, and foam water. Included are the water supplies that are part of these systems, such as private fire service mains and appurtenances, fire pumps and water storage tanks, and valves that control system flow. The document also addresses impairment handling and reporting. This standard applies to fire protection systems that have been properly installed in accordance with generally accepted practices. Where a system has not been installed in accordance with generally accepted practices, the corrective action is beyond the scope of this standard. The corrective action to ensure that the system performs in a satisfactory manner shall be in accordance with the appropriate installation standard.
SAIDI, J.: Why: The committee action on the log yet again skirts the issue of addressing the design and installation deficiencies, occupancy changes, etc. and leaves the owners (most of whom don’t have the expertise) to sort these issues out. It would make a lot more sense to have the IMT service provider to record their observations and notify the owners.

I vote to accept the proposal.

SHEPPARD, J.: Agree with the submitter’s substantiation.
June 25, 2010

Amy Cronin
Secretary, NFPA Standards Council
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269

Sent via e-mail:...

Dear Ms. Cronin:

This letter will express my intent to file an appeal with the NFPA Standards Council regarding Certified Amending Motion 25-13 to Reject Comments 25-68, 25-70, 25-71, and 25-72. The purpose of my appeal is to return the requirement for testing electric motor driven fire pumps to a frequency of weekly in NFPA 25.

While this motion was not successful at the NFPA meeting, I still believe that this is a critical issue of reliability that the NFPA needs to address. I have spoken with individuals at the National Fire Sprinkler Association (NFSA) and at FM Global who agree that this issue should be addressed by the Standards Council. If the Council agrees to grant a hearing on the subject, Kenneth Isman of the NFSA and David Fuller of FM Global would likely want to address the issue before the Council.

Due to a conflict in my schedule, I will not be able to attend the Standards Council meeting myself, but I will rely on Mr. Isman and Mr. Fuller to express our concerns.

Please let me know if you need any additional information from me.

Sincerely,

Richard M. Ray

cc Linda Fuller, Recording Secretary, NFPA Standards Council (lfuller@nfpa.org)
Kenneth Isman, NFSA (isman@nfsa.org)
David Fuller, FM Global (david.fuller@fmglobal.com)
Joshua W. Elvove, US General Services Administration  

25-133

Revise Table 8.1 and Section 8.3 as follows:

***Insert Table 8.1 here***

8.3* Testing.
8.3.1 Frequency
8.3.1.1 Diesel engine driven fire pumps shall be operated weekly.
8.3.1.2 Electric motor driven fire pumps shall be operated monthly.

8.3.2 No-Flow Condition
8.3.2.1 A weekly test of fire pump assemblies shall be conducted without flowing water.
8.3.2.2 The weekly test shall be conducted by starting the pump automatically.
8.3.2.3 The electric pump shall run a minimum of 10 minutes.
8.3.2.4 The diesel pump shall run a minimum of 30 minutes.
8.3.2.5 A valve installed to open as a safety feature shall be permitted to discharge water.
8.3.2.6 The automatic weekly test timer shall be permitted to be substituted for the starting procedure.

8.3.2 Weekly Tests.
8.3.2.1 Qualified operating personnel shall be in attendance during whenever the weekly pump is in operation.
8.3.2.2 More frequent testing may need to be considered in areas susceptible to lightning.

A.8.3.2.2 See Table A.8.3.2.2.

Table A.8.3.2.2 Weekly Observations — While Pumping

8.3.3 Annual Flow Testing

Substantiation: Proposal 25-133 aimed to decrease the no-flow test frequency for all fire pumps from weekly to monthly. After a spirited debate, the technical committee decided to reject the proposal and maintain the weekly no-flow test frequency. Most of the discussion centered on potential problems with diesel engine drivers. Therefore, this comment proposes to limit the monthly test only to electric motor driven fire pumps. The two issues raised by the technical committee in their substantiation to reject this proposal that pertained to electric motor driven pumps were 1) vulnerability to lightning and 2) loss of power phase. Facilities located in areas not subject to lightning should not be subject to more stringent requirements that wouldn’t normally apply. There are power reliability statistics that support the claim that when lightning damages an electric service, the extent of the damage is not limited to the fire pump only. The damage is quite obvious and a responsible assessment of lightning damage would include examination and testing of the fire pump system anyway. Hence, this should not be grounds for establishing a weekly test frequency. But in deference to the risk posed by lightning, a new annex has been provided that suggests increasing the testing frequency in areas subject to lightning. Loss of phase should not be a concern, since NFPA 20 requires monitoring for loss of phase (and loss of power) for all electric motor driven controllers. In response to issues concerning the pump itself, this comment retains all the weekly visual inspection requirements under Section 8.2 to ensure all items related to the pump prior to water flow testing are inspected weekly (e.g., packing flow, pressuring sensing circuits/gages, alignment, etc.). The casing relief only needs to be verified when the pump is operated and the pump frequency has no bearing on the valve’s functionality. Moreover, Armstrong Pump, a casing relief manufacturer, has indicated that poorly set casing relief valves can cause irreparable damage to gaskets and o-rings such that excessive pump testing can actually be more detrimental to a pump if the valves are not set properly.

Requiring new data to justify changing the current weekly test frequency to monthly is unjust and unfair. Unjust, because the weekly requirement became the de facto requirement without any test data to substantiate these frequencies in the first place. Unfair because obtaining new test data is virtually impossible, since AHJs don’t generally permit deviations to existing standards, given the liability it involves. To my knowledge, the only known entities that permit less frequent testing are the Department of Defense (DOD) and Australia. DOD (since 2001) permits monthly testing of diesel engine and electric motor fire pumps; Australia (since 2005) only permits electric motor fire pumps to be tested monthly. In neither case have there been any papers written to indicate that there has been an increased risk to fire pump or sprinkler performance because of these increased test frequencies. NFPA standards are supposed to be minimum standards. As currently written, the weekly test requirement is basically a maximum standard (unless there is a
<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Reference</th>
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<tbody>
<tr>
<td><strong>Inspection</strong></td>
<td></td>
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</tr>
<tr>
<td>Pump house, heating ventilating louvers</td>
<td>Weekly</td>
<td>8.2.2(1)</td>
</tr>
<tr>
<td>Fire pump system</td>
<td>Weekly</td>
<td>8.2.2(2)</td>
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<tr>
<td><strong>Test</strong></td>
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<tr>
<td>Pump operation</td>
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<td>No-flow condition</td>
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<td>8.3.1</td>
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<td>- Diesel engine driven fire pump</td>
<td>Weekly</td>
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<td>- Electric motor driven fire pump</td>
<td>Monthly</td>
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<tr>
<td>Flow condition</td>
<td>Annually</td>
<td>8.3.3.1</td>
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desire to test pumps on a daily basis). Even if the test frequency is increased to monthly, AHJs, property owners and insurers will always have the option of increasing requirements (i.e., decreasing test frequencies) if desired or conditions warrant. It's time to make this change; if evidence appears to the contrary, the frequency could always revert back to weekly.

All other changes to text are merely formatting changes.

Committee Meeting Action: Accept
Number Eligible to Vote: 30
Ballot Results:  Affirmative: 22  Negative: 7
Ballot Not Returned:  1 Fuller, D.

Explanation of Negative:
ADAMS, C.: Action should be to reject. The substantiation is based solely on the drive unit to change operation to monthly. Although the drive unit is critical, failures are more likely to take place with the pump particularly with the packing.

DRYSDALE, M.: While it was reported that performance data exists, it was not reviewed as part of this review cycle. Without performance data, the change is not justified.

MOORE, F.: Without a positive recommendation from the NFPA-20 committee on Fire Pumps, I do not feel our Technical Committee can only require a monthly pump exercise on electric fire pumps. The economic savings of 15 minutes a week does not justify the possibility of possible pump failure with life safety issues at stake. Perhaps future reliability data from DOD and Australia where monthly inspections are being tried would help in the future. A weekly visual and exercise of the Fire Protection pumping equipment is more important than our weekly failure data indicates. I am curious if UL listings and FM approvals of Fire Pumps will OK the product reliability for the Pump Manufacturers on a monthly exercise minimum requirement.

RAY, R.: This comment should be rejected as it was at the ROP meetings. At the ROC meetings, insurance company representatives were queried as to their loss experiences due to electric fire pumps not starting when needed: one rep mentioned some 70 failures many traced to coils on contactors (the coils can be inoperable due to electrical or other damage yet the green light on the controller erroneously indicates the pump is ready); another rep mentioned that they see “problems with contactor coils” and “old” controllers, of which there are many, many in the field today. The committee statement in regard to electric fire pumps at the ROP level was 100% correct and should have resulted in the rejection of this comment. The comment submitter’s substantiation makes little sense: the mere fact that other entities (DOD and Australia) permit less frequent testing means nothing at all since no data has been submitted to indicate that this less frequent testing has resulted in less failures. Also, the current weekly requirement brings “fire protection” to the forefront of property owners’ minds weekly and has resulted in the fact that our customers that perform weekly electric fire pump service have developed unparalleled maintenance programs as a result. Also, fire pumps are readily accessible to many other trades (alarm companies, backflow testing companies, etc) and the chance to discover “man made” mistakes goes from 52 times to only 12 times per year if this comment is accepted. Also, running fresh water weekly through the fire pump packings, glands and relief valve helps these devices from being subject to sediment build-up and extends their life expectancies.

SHEPPARD, J.: Would consider bi-weekly for electric pumps as a first step. No performance data to substantiate proposal.

UNDERWOOD, D.: DO NOT AGREE IN THAT WE HAVE FOUND MOTOR STARTER COILS INOPERABLE & THERE IS NO WAY TO MONITOR, BUT AS A FIRST STEP WOULD AGREE WITH BI WEEKLY UNTIL MORE DATA IS FOUND.

VICTOR, T.: Although the submitter attempted to address the need to relax this frequency point by point, there was no real evidence provided that electric fire pumps are as reliable when exercised once a month instead of once a week.

Comment on Affirmative:

BELL, K.: Editorially, I believe the word “during” should be removed in 8.3.2.7.

ELVOVE, J.: Testing is currently being conducted monthly by DOD and in Australia. NFPA 25 is supposed to be a minimum standard. The current weekly requirement is far from minimum - unless one wishes to test electric motor driven fire pumps even more frequently (daily?). The concerns over problems with contactor coils seemed to apply to older controllers, not newer models. An AHJ or insurer can always require more frequent testing than the proposed monthly requirement, if there are concerns with older controllers or if there are any other concerns. Monthly testing does not obviate the existing requirement to conduct weekly inspections of pump house, pump system and electrical system conditions as required by 8.2.2.

MUNNO, J.: Monthly operation of electric fire pumps has provided acceptable reliability within many industries.
25-70  Log #103  Final Action: Accept in Principle in Part
(8.3.1)

Submitter: Frank L. Van Overmeiren, FP&C Consultants, Inc.
Comment on Proposal No:  25-133
Recommendation:  Revise text to read as follows:

8.3.2 A weekly monthly test of the fire pump assemblies shall be conducted without flowing water.

Substantiation:  Extensive technical data was previously submitted during the 2006 Fall Revision Code Cycle and is available for review at NFPA Headquarters. See Report on Comments 25-31, Log #16, Comment on Proposal No. 25-110.

Inspection and test data was collected from 94 facilities representing 61,070 weekly inspection and test events. A total of 227 failures or deficiencies were noted representing a total failure rate of 0.37 percent. Of the 227 total failures, 201 failures were noted as leaking packaging, dry packaging or a leaking pressure relief valve type of event which would not seriously effect the initial operation of the fire pump. Of the 227 total failures, 2 failures were noted as overheating and misalignment and were discovered during the first weekly inspection after initial installation or major repair work. These failures should be documented as improper installation fire pump inspection and testing and not weekly event failures. The remaining 24 failures noted represent a failure rate of 0.04 percent, where closed valves, dead batteries, controller malfunction, switch adjustment and worn bearing conditions would effect the initial operation of the fire pump. A failure rate of 0.04 percent for a fire and life safety feature is insignificant and identifies an inspection and testing frequency that is excessive and a cost burden. The industry standard requirement for fire pump inspection and testing frequencies should be changed from weekly to monthly.

Committee Meeting Action:  Accept in Principle in Part
See Committee Action on Comments 25-71 (Log #79) and 25-68 (Log #112).

Committee Statement: The data submitted last cycle was limited and not sufficient to overcome committee concerns over diesel engine components. Committee Action on Comment 25-71 (Log #79) addresses this issue for electric drivers.

Number Eligible to Vote:  30
Ballot Results:  Affirmative: 21  Negative: 8
Ballot Not Returned:  1 Fuller, D.
Explanation of Negative:
LARRIMER, P.:  Agree with the commenter. The committee's concerns did not rise to the level of providing convincing evidence that diesel pumps required a weekly run test.
RAY, R.:  This comment should be rejected as it was at the ROP meetings. At the ROC meetings, insurance company representatives were queried as to their loss experiences due to electric fire pumps not starting when needed: one rep mentioned some 70 failures many traced to coils on contactors (the coils can be inoperable due to electrical or other damage yet the green light on the controller erroneously indicates the pump is ready); another rep mentioned that they see “problems with contactor coils” and “old” controllers, of which there are many, many in the field today. The committee statement in regard to electric fire pumps at the ROP level was 100% correct and should have resulted in the rejection of this comment. The comment submitter's substantiation makes little sense: the mere fact that other entities (DOD and Australia) permit less frequent testing means nothing at all since no data has been submitted to indicate that this less frequent testing has resulted in less failures. Also, the current weekly requirement brings "fire protection" to the forefront of property owners' minds weekly and has resulted in the fact that our customers that perform weekly electric fire pump service have developed unparalleled maintenance programs as a result. Also, fire pumps are readily accessible to many other trades (alarm companies, backflow testing companies, etc) and the chance to discover "man made" mistakes goes from 52 times to only 12 times per year if this comment is accepted. Also, running fresh water weekly through the fire pump packings, glands and relief valve helps these devices from being subject to sediment build-up and extends their life expectancies.
SAIDI, J.:  Do not agree with committee action. The submitter's substantiation was correct and should have been accepted. See my comments on 25-50.
SHEPPARD, J.:  See my comment for 25-68.
VICTOR, T.:  The submitter provided statistics that in my opinion proved the need to continue weekly pump tests. A low failure rate does not mean a less frequent test will have the same positive results. Of the failures noted in these...
statistics, a majority were for reasons the technical committee stated as ones for leaving the frequency at weekly: leaking packing, dry packing, or a leaking pressure relief valve.
Accept the Proposal, as written.

There is no data to support the existing language, either. The fact that the requirement exists should bear the same burden of proof as challenges to the requirement. In other words, the fact that we now have a weekly testing requirement for all occupancies under all types of management structures should not be regarded as its own technical substantiation. To wit, the only countable data available is the number of interest groups that benefit from frequent test intervals.

NFPA 25 is not the only committee that labors under ambiguity of practical intent, however. The following excerpt from the NFPA Rules Governing Committee Projects should make it plain that "substantiation" itself is not substantiated.

Each Proposal shall be submitted to the Council Secretary and shall include the following:

(a) Identification of the submitter and his or her affiliation (i.e., TC, organization, company), where appropriate
(c) Proposed text of the Proposal, including the wording to be added, revised (and how revised), or deleted
(d) Statement of the problem and substantiation for Proposal [Emphasis added]
(e) The signature of the submitter or other means of authentication approved by the Council Secretary
(f) Two copies of any document(s) (other than an NFPA document) being proposed as a reference standard or publication (see 3.3.7)

There is no other statement about the criterion for substantiation in the NFPA regulations. There may be a more granular definition of what constitutes technical substantiation farther upstream in an ANSI standards-developing-guidance document but we have to assume that NFPA's implementation of the ANSI process leaves the determination of substantiation in the eye of the committee. Assuming that the use of the phrase "no new data" implies a criterion for substantiation, we believe that the lack of data is neither a necessary nor a sufficient condition for the rejection of this proposal.

Let's move on to other parts of the committee statement.

2. Fire pumps are standby systems that are critical to life safety that are normally in a standby condition (not normally started or run). The only means of detecting many failures is through running the pump. The weekly test frequency is consistent with other water supply inspections and tests. The committee feels that waiting in excess of 7 days to detect a fire protection water supply deficiency (including pumps, tanks, pressures, etc.) is unacceptable.

As for the claim that fire pumps are special because they are a "standby system": Egress lighting and fire doors are also standby systems. Electrical circuit breakers are also "standby systems"; many of them only called upon to operate once or twice in 50 years--if ever. Most of them do operate; so do automobile air bags. All life safety infrastructure is a standby system. Standby systems technology has as its core characteristic high nine availability. The materials, mechanisms, controls, installation and testing methods must be designed and installed to withstand a variety of environmental and operational conditions over a long period of time.

3. Pump needs regular exercise to ensure packing flow is sufficient to lubricate shaft and to cool bearings.

If the pump needs this much exercise to ensure packing flow, the fire pump industry should observe how the automobile industry innovated -- actually competed within itself-- to spread out lubrication intervals to increase engine life and reduce the cost of maintenance.

4. Verify casing relief valve functionality.

Same as above, though we should recognize the frequency of maintenance-induced errors when test valves are not restored to their normal condition after a test has been completed. In this case, the weekly test actually reduces availability and can cause some first class damage to the system.

5. Verify pressure sensing circuit (both mechanically and electrically).

Same as above

6. Ensures that the controller starting circuit is functional.

Same as above

7. Identifies problems of alignment.

Alignment changes are extremely rare. These do not change week-to-week. A monthly, or even semi-annual would be more appropriate and risk-informed.
**A. Electric pump specific issues:**

Electric pumps are particularly vulnerable to lighting and voltage surges since the main contactor coil and relays connected directly to the incoming power line.

Is the committee in possession of loss data that reports fire pump motors damaged by lightning? If there is, then perhaps a requirement for surge protection devices applied at electric services may be in order; though most fire pump controllers have plenty of annunciation features if the fire pump is damaged. Otherwise lightning damage is possible -- but not statistically probable -- to be relevant to this discussion. Two other points:

a. Typically, lightning does damage to more than just the fire pump; the entire service is affected and a weekly no-flow test is irrelevant.

b. Lightning is more likely to damage fire pumps in isolated areas where diesel fire pumps are specified because the utility service does not have the capacity to handle locked-rotor-current (such as in rural, or ex-urban industrial districts) Thus, it is less likely that an electric fire pump would even be present in a place where lightning damage is most likely to damage it.

**Verifies that all three power phases are available (at many locations the fire pump is the only three phase load).**

Same as above: possible but not probable; mitigated by the fact when a phase is dropped or open at the utility level, the event usually has a signature that is recognizable with phase-loss-detectors. Most controllers already have this per NFPA 20.

**Diesel pump specific issues:**

*Monthly testing of the diesel engine is not appropriate per the manufacturers.*

With this as substantiation, the practical effect is to maintain the status quo: without fire pump system manufacturers having any incentive to innovate more reliable products if they can push the total cost of ownership into O&M budgets.

**Some engines are vulnerable to loss of fuel prime if not run regularly.**

With this as substantiation, the practical effect is to maintain the status quo: without fire pump system manufacturers having any incentive to innovate more reliable products if they can push the total cost of ownership into O&M.

**The weekly 30-minute test accomplishes the following:**

1. **Proves the engine can start and produce power.**

   With this as substantiation, the practical effect is to maintain the status quo: without fire pump system manufacturers having any incentive to innovate more reliable products if they can push the total cost of ownership into O&M budgets.

2. **Renews the oil film on internal parts to prevent wear and corrosion.**

   With this as substantiation, the practical effect is to maintain the status quo: without fire pump system manufacturers having any incentive to innovate more reliable products if they can push the total cost of ownership into O&M.

3. **Drives off condensation in the lubrication and exhaust systems.**

   With this as substantiation, the practical effect is to maintain the status quo: without fire pump system manufacturers having any incentive to innovate more reliable products if they can push the total cost of ownership into O&M.

4. **Loads the engine cooling system for sufficient duration to detect if there is a problem.**

   With this as substantiation, the practical effect is to maintain the status quo: without fire pump system manufacturers having any incentive to innovate more reliable products if they can push the total cost of ownership into O&M.

**Why Gensets are different:**

*Most critical applications have a UPS system (battery) in addition to the genset.*

This part of the committee statement is difficult to understand.

**The fire pump service is more severe.**

See statement above regarding the availability of standby systems.

**Fire pumps are under load from the first revolution of the pump up to rated speed.**

This part of the committee statement is difficult to understand.

**Fire pump systems are much more complex than gensets due to the many redundant operational features that must also be verified as being operational.**

Complex systems -- whether it is a component or an assembly of components field installed within a larger network of dependent variables -- do not have constant failure rates. The familiar bathtub curve, shown below, should make this clear.

***Insert Figure 1 here***

**Summary:**

If it is data that is needed in this substantiation, then a second item of easily countable piece of data is the number of proposals from executive facility managers of large building assets that assert that the cost of weekly churn tests for all occupancy types, under all management structures, is out of proportion to its benefit. Say you are a large university plant operations department running 50 million square feet, with 100 fire pumps and are obligated by your
insurance company to conform to industry standards for 10 different life safety systems (egress lighting, generators, fire doors, etc.) and the weekly churn test consumes 25 percent of your inspection, testing and maintenance budget across ten different life safety systems. You will be looking for ways to use limited funding more effectively by scaling your testing efforts according to risk and you will be looking to pay more up front for a product and/or installed system that reduces long-term O&M costs.

O&M costs are in the range of 80% of the total cost of ownership of a building. The funding to maintain the life safety infrastructure is not keeping pace with the accelerating complexity of smart building life safety infrastructure and the complexity of the codes and standards that govern their upkeep. While we recognize that NFPA 25 presents a generic "equivalent performance clause" (as do all other NFPA documents) this committee must already be aware that the practical effect of the testing intervals in Section 8.1 is prescriptive conformity -- especially in jurisdictions without the resources to support performance methods. Prescriptive methods may be in the interest of safety -- statistically -- but there are parts of the US economy -- large parts -- where, the Table 8.1 testing requirements impedes effective rationalizing/balancing of risk across all life safety infrastructure systems.

With permanent full-time maintenance, fire pump and sprinkler system complexities may be managed according to the occupancy class of the facility and the life-cycle of the system. Facility managers in our industry would like to rationalize their testing resources so that, for example, a new fire pump system commissioned within the past year receives semi-annual no-flow testing, while a 50-year old fire pump system receives monthly testing.

We recognize and appreciate the work the committee put into its substantiation of our proposal. We are similarly grateful that the NFPA process allows topics like this to be publicly vetted. Sometimes technical committees, when put around a table face-to-face, have a better ideas than Proposers and Commenters about what compromise language will satisfy all interest groups. APPA will be grateful for any modification of the weekly testing requirement that contains some leeway for the testing interval to be more informed by occupancy risk, by its point on the bathtub curve representing system life-cycle, and by the presence of a full-time, trained and certified maintenance staff.

Standards like NFPA 25 are not just technical documents. Because they are written as model law, they are vehicles of safety and economy. NFPA 25 should not be a "silo" document; one that is concerned only with the system under its scope statement but a document that is sensitive to its relation to other NFPA safety documents. The single document-single system (silo) structure of the NFPA document universe should be encouraged to evolve into a group of industry-specific documents that risks among the different technologies and systems is encouraged.

When you have the managers of several hundreds of millions of square feet (APPA.ORG, the US General Services Administration, VA Hospitals, US Department of Energy) telling you that they simply cannot afford 100% conformity to the weekly requirement -- that it is wasteful -- then the committee must re-think its position. Modifying language must be prepared to sustain NFPA 25 a practical document; one that can be applied in reconciling the competing requirements of safety and economy.

Committee Meeting Action: Accept in Principle in Part
Accepting the proposed revisions for electric pumps. (See Committee Action on Comment 25-68 (Log #112))
Rejecting proposed revisions for diesel engine pumps

Committee Statement: The committee action on Comment 25-68 (Log #112) addresses the changes for electric pumps. But the committee knows that there are significant concerns with the maintenance of diesel engines based on the manufacturers recommendations.

Number Eligible to Vote: 30
Ballot Results: Affirmative: 21 Negative: 8
Ballot Not Returned: 1 Fuller, D.
Explanation of Negative:
ADAMS, C.: Action should be to reject. See remarks on Comment 25-68 (Log #112) reasoning. Procedures are provided to substantiate alternate frequencies in 25 - 4.6.1.1.
LARRIMER, P.: See my comment on 25-70.

RAY, R.: This comment should be rejected as it was at the ROP meetings. At the ROC meetings, insurance company representatives were queried as to their loss experiences due to electric fire pumps not starting when needed: one rep mentioned some 70 failures many traced to coils on contactors (the coils can be inoperable due to electrical or other damage yet the green light on the controller erroneously indicates the pump is ready); another rep mentioned that they see "problems with contactor coils" and "old controllers, of which there are many, many in the field today. The committee statement in regard to electric fire pumps at the ROP level was 100% correct and should have resulted in the rejection of this comment. The comment submitter’s substantiation makes little sense: the mere fact that other entities (DOD and Australia) permit less frequent testing means nothing at all since no data has been submitted to indicate that
this less frequent testing has resulted in less failures. Also, the current weekly requirement brings “fire protection” to the forefront of property owners’ minds weekly and has resulted in the fact that our customers that perform weekly electric fire pump service have developed unparalleled maintenance programs as a result. Also, fire pumps are readily accessible to many other trades (alarm companies, backflow testing companies, etc) and the chance to discover “man made” mistakes goes from 52 times to only 12 times per year if this comment is accepted. Also, running fresh water weekly through the fire pump packings, glands and relief valve helps these devices from being subject to sediment build-up and extends their life expectancies.

SAIDI, J.: Do not agree with committee action. The submitter's substantiation was correct and should have been accepted.

SHEPPARD, J.: See my comment for 25-68.


VICTOR, T.: Although the submitter attempted to address the need to relax this frequency point by point, there was no real evidence provided that electric fire pumps are as reliable when exercised once a month instead of once a week.
Add new section 8.3.1.1 and annex note as follows:

Monthly testing shall be permitted if consecutive weekly tests for one quarter (i.e., 13 consecutive weeks results in the pump starting and operating continuously for the duration of the test. Testing will revert to weekly following a failure to start or operational failure.

A.8.3.1.1. Examples of operational failures would be excessively leaking packing glands, drop in pressure, grinding of bearings, etc.

Substantiation: Rebuttal to Committee Action:

The primary motivation for establishing an interval for fire pump testing is decreasing loss of life and property by fire. Specifically, the goal is to establish a high confidence that fire pumps will operate when needed, at the instance following the previous test when a control sequence attempts to initiate performance.

Component manufacturers study, test and collect data on failures, and can establish tests that reveal the likelihood of failure. However, the committee and the proponents of changing the test frequency have been unsuccessful in finding published data that offers clear guidance on appropriate test intervals for finished assemblies that contain many components, such as fire pumps.

The question is: At what test interval is the probability that the pump will start on the next attempt be at a maximum? Because the life of a component can suffer degradation and loss of reliability based on time (corrosion, oxidation, loss of lubrication, and loss of charge) and use (fatigue and wear related failures), choosing optimum test intervals for systems which include batteries, starters, switches, relays and other components lacks simplicity. The committee, by rejecting Mr. Anthony’s proposal, is concluding that in the presence of uncertainty, the costly alternative of frequent testing is prudent. Perhaps the conclusion reached to date is that many successful tests in a short period provide the best outcome. Consistent with this is the conclusion that past success outweighs the growing risk of a failure from component fatigue or other failure that is substantially use related. Until better data are developed, the committee should consider permitting monthly testing provided that there have been no failures to start in recent tests. Likewise, weekly testing is required following a failure to start until there is operational evidence (such as successful and consecutive starts for a quarter of a year), following which monthly testing may resume.

Committee Meeting Action: Accept in Principle

Committee Statement: Committee action on Comment 25-68 (Log #112) addresses this issue. Furthermore, the standard already acknowledges in 4.6.1.1.1 the use of performance based evaluations to alter ITM frequencies, based on the consideration of numerous variables.

Number Eligible to Vote: 30
Ballot Results: Affirmative: 23 Negative: 6
Ballot Not Returned: 1 Fuller, D.

Explanation of Negative:

ADAMS, C.: Action should be to reject. See remarks on Comment 25-68 (Log #112) and Comment 25-71 (Log #79)
reasoning.

MOORE, F.: See Comments in Log #112.
RAY, R.: This comment should be rejected as it was at the ROP meetings. At the ROC meetings, insurance company representatives were queried as to their loss experiences due to electric fire pumps not starting when needed: one rep mentioned some 70 failures many traced to coils on contactors (the coils can be inoperable due to electrical or other damage yet the green light on the controller erroneously indicates the pump is ready); another rep mentioned that they see “problems with contactor coils” and “old” controllers, of which there are many, many in the field today. The committee statement in regard to electric fire pumps at the ROP level was 100% correct and should have resulted in the rejection of this comment. The comment submitter’s substantiation makes little sense: the mere fact that other entities (DOD and Australia) permit less frequent testing means nothing at all since no data has been submitted to indicate that this less frequent testing has resulted in less failures. Also, the current weekly requirement brings “fire protection” to the forefront of property owners’ minds weekly and has resulted in the fact that our customers that perform weekly electric fire pump service have developed unparalleled maintenance programs as a result. Also, fire pumps are readily accessible to many other trades (alarm companies, backflow testing companies, etc) and the chance to discover “man
made” mistakes goes from 52 times to only 12 times per year if this comment is accepted. Also, running fresh water weekly through the fire pump packings, glands and relief valve helps these devices from being subject to sediment build-up and extends their life expectancies.

SHEPPARD, J.: See my comment for 25-68.

Comment on Affirmative:

ELVOVE, J.: This comment has merit, and is something that should be considered in the future for decreasing the frequency for testing diesel engine fire pumps from weekly to some other frequency.
A weekly test of fire pump assemblies shall be conducted without flowing water.

Chapter 8 Fire Pumps

8.1* General.

This chapter shall provide the minimum requirements for the routine inspection, testing, and maintenance of fire pump assemblies. Table 8.1 shall be used to determine the minimum required frequencies for inspection, testing, and maintenance.

***Insert Table 8.1 Here***

Substantiation: Weekly no-flow ("churn tests") pose significant costs to the higher education industry where electric fire pumps are more the rule than the exception. Many local jurisdictions permit Owners and fire protection contractors to reduce the churn test frequency to every 30 days.

Acceptance of this proposal would bring this section of NFPA in harmony with what already appears to be industry practice. Acceptance does not restrict local authorities from asserting more rigorous, risk-informed testing intervals for special occupancies. The practical affect of reduction in the churn test frequency will permit limited funding for inspection, testing & maintenance to be applied to other areas of our life safety infrastructure in order to manage risks.

During the 2008 code-cycle the first change that was proposed by Atomic Energy of Canada (See ROP Log #1) was the reduction in testing frequency. To quote the one dissenting committee member, Mr Larrimer, someone whose position at the US Department of Veterans Affairs gives him access to a great deal of anecdotal/common knowledge/rule-of-thumb, information:

"Standard for Emergency and Standby Power Systems" has required monthly [M. Anthony emphasis added] testing for diesel driven emergency generators that are used to keep critically ill patients alive under power failure emergencies for many many years with great success. People are not dying because of the failure of the emergency generator systems, even when we all know just by reading the daily newspapers that utility power failures are very common across the country. Surely NFPA 25 can’t consider a fire pump for a sprinkler or spray system more important than a life saving emergency generator such that they would continue to require testing of a fire pump 52 times a year while the generator are tested 12 times per year. The anecdotal data from the successful operation of emergency generators during power failures across the country is sufficient in itself to reduce the fire pump testing to at least that which is acceptable for those systems that are critical for maintaining actual life support... systems

To quote Mr. Everitt of the Western Regional Fire Code Development Committee:

...The requirement for a weekly test is excessive. It does not ensure that the pump will be operational when needed. It only serves to wear the pump out faster increasing the need and expense for servicing, maintenance and repairs.

Having believed that this passed during the last code cycle, one organization went to monthly testing for about one and a half years. The monthly testing was adequate to ensure proper function of the pump...

In its substantiation rejecting each of these proposals, the committee of 25 eligible votes rejected the proposals on the basis of lack of substantiation. Does the committee have its own substantiation that the present testing frequencies result in proportional increases in fire safety? Would daily churn tests make fire pumps seven times safer? Life safety infrastructure on US college campuses is growing at an accelerating rate across multiple dimensions of people, processes and technology. The problem APPA members face is how to optimally balance risks for multi-building, mixed-occupancy campuses with a broad variety of disaster risk aggregations. Over-testing in one life safety infrastructure component makes another part of that infrastructure area less safe.

The US Department of Energy has been tracking this issue since 1998, and has joined the chorus of Owners rejecting the weekly no-flow testing requirement for more risk-informed testing frequencies. They reached the same conclusion in their own study:

"There is a general lack of available data on how previous and existing fire suppression system maintenance requirements were established. Several literature searches and discussions with technical experts in this area failed to reveal definitive research in this area. Failure rate data were obtained from several DOE sites, and some comparisons..."
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<tr>
<th>Item</th>
<th>Frequency</th>
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<tr>
<td><strong>Inspection</strong></td>
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<td>Pump house, heating ventilating louvers</td>
<td>Weekly</td>
<td>8.2.2(1)</td>
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<td>Fire pump system</td>
<td>Weekly</td>
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<td>Pump operation</td>
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<td>No-flow condition</td>
<td>Weekly–[Monthly]</td>
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<td>Motor</td>
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<td>Diesel engine system, various components</td>
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were made on the effects of changing testing frequencies in particular to see what failure rates would subsequently result. For the case where this was done the failure rates were actually worse at the site with the more frequent testing. In some cases, the best answers the Subcommittee was able to justify were that professional judgment and experience, as used by the NFPA committees in establishing the existing maintenance requirements, had to be used when establishing our own requirements. [Emphasis added]

--- Dennis Kubicki, P.E. Chairman DOE Fire Safety Committee, Department of Energy Implementation Guidance:

NFPA 25


While modification of any NFPA requirement is an option available to any adopting jurisdiction, we believe that the present language in NFPA 25 concerning testing frequency weakens the credibility of the document. When an NFPA requirement is ignored as an exception, it creates a burden upon insurance companies and inspection authorities to acquire variances from the national standard. An incorrect or unreasonable standard, even if not adopted by a state, can be used by plaintiff's counsel to establish a standard of care in a negligence claim. This creates an enormous burden on a defendant owner to prove that the standard is unreasonable or erroneous and should not be used, or that failure to follow the standard did not cause the particular harm alleged. The very clout and credibility enjoyed by the NFPA generally makes this legal problem worse.

Committee Meeting Action: Reject

Committee Statement: There was no new data submitted to support the reduction in test frequency.

Fire pumps are standby systems that are critical to life safety that are normally in a standby condition (not normally started or run). The only means of detecting many failures is through running the pump. The weekly test frequency is consistent with other water supply inspections and tests. The committee feels that waiting in excess of 7 days to detect a fire protection water supply deficiency (including pumps, tanks, pressures, etc.) is unacceptable.

Why you need to test the pump weekly?

Pump needs regular exercise to ensure packing flow is sufficient to lubricate shaft and to cool bearings.
Verifies casing relief valve functionality.
Verify pressure sensing circuit (both mechanically and electrically).
Ensures that the controller starting circuit is functional.
Identifies problems of alignment.
Electric pump specific issues:
Electric pumps are particularly vulnerable to lighting and voltage surges since the main contactor coil and relays connected directly to the incoming power line.
Verifies that all three power phases are available (at many locations the fire pump is the only three phase load).
Diesel pump specific issues:
Monthly testing of the diesel engine is not appropriate per the manufacturers.
Some engines are vulnerable to loss of fuel prime if not run regularly.
The weekly 30-minute test accomplishes the following:
1. Proves the engine can start and produce power.
2. Renews the oil film on internal parts to prevent wear and corrosion.
3. Drives off condensation in the lubrication and exhaust systems.
4. Loads the engine cooling system for sufficient duration to detect if a there is a problem.

Why Gensets are different:
Most critical applications have a UPS system (battery) in addition to the genset.
The fire pump service is more severe.
Fire pumps are under load from the first revolution of the pump up to rated speed.
Fire pump systems are much more complex than gensets due to the many redundant operational features that must also be verified as being operational.

Number Eligible to Vote: 30
Ballot Results: Affirmative: 26 Negative: 3
Ballot Not Returned: 1 Hoover, S.

Explanation of Negative: ELVOVE, J.: It is clear that there are two steadfast perspectives on this topic with the majority siding with the current weekly test frequency for both electric and diesel driven fire pumps. Despite the proponents substantiation, the manufacturer's information provided by Mr. Larrimer and the successful record of fire pump testing provided by Mr. Saidi, it is not clear what additional information can be presented to this committee in order to demonstrate that changing the fire pump test frequency from weekly to monthly does not impact on the reliability of the fire pump system (i.e., the water supply, pump and controller). Test data is difficult to obtain, because most AHJs do not permit fire pump owners to deviate from the existing weekly test requirements, even though there is a performance based test option per
4.6.1.1.1. If there is going to be even the remote possibility of decreasing fire pump test frequencies, AHJs such as the Joint Commission, CMS, local and state fire marshals, etc. will need to give due consideration to property owners so this data might be collected and presented to the committee in the future. Otherwise, there will be no way to make any change to current test frequencies, regardless of whether they were ever founded in the first place.

LARRIMER, P.: Significant substantiation has been provided for the change in frequencies and the committee statement provided little documented material to substantiate the existing frequencies. The “electrical pump specific issues” in the committee statement are very interesting. I am not aware that the VA has had any known problems with lightning strikes or voltage surges that affected the hundreds of electric drive pumps that we have nor do I understand how the weekly test will address that.

The following links provide the results of a quick search of the internet for fire pump O&M manuals. The manufacturer’s written documentation appears to recommend that “periodic” maintenance be done and if a frequency is stated, it say that fire pumps be run at a minimum frequency of monthly, not weekly. It appears that the NFPA requirements exceed the written manufacturers requirements.

http://www.pattersonpumps.com/PDFs/schedule%20packaged%20pumps.pdf

Though there may be times when some pumps should possibly be run more often than monthly, it doesn’t appear that that this is a typical recommendation by the manufacturers, nor should it be required for a minimum standard. The committee statement arguments for mandating weekly testing are unconvincing.

SAIDI, J.: Section 8.3.1

Rational for rejection of the proposal to change the “No-flow” weekly test to monthly relied primarily on the operation of the Diesel pumps. The minority view shared by myself and others regarding the need to make the distinction between the drivers (Diesel vs Electric motors) in adjusting this requirement did not receive sufficient consideration. There were no verifiable data to indicate that the change in this test for the electric motors had undesired consequences. Whereas, the experience at several DOE sites that had adopted the reduction of this testing frequency indicates a lower failure rate for those sites on the monthly test schedule.

Furthermore, the assertion that the electric pumps should be tested weekly due to their vulnerability to lightning and voltage surges is without any apparent supporting data.
underground piping, not just seek factor or the flow conditions. And certainly full flow backflow testing is one way to accomplish this as others that Mr. Leavitt enumerated. Thank you.

RALPH GERDES: Thank you.

Mr. Bouchard, any final comments?

JOHN BOUCHARD: No, I don't believe so. I will indicate, however, again, that Ken's comment was basically unanimously defeated, so just to give you a sense of what the committee was thinking. The committee is firmly behind its committee statements and action on this proposal.

RALPH GERDES: Okay. Thank you.

We'll proceed with the vote. The motion is to accept Comment 25-65. All those in favor, please raise your hands.

(Raising Hands.)

RALPH GERDES: Thank you.

All those opposed?

(Raising Hands.)


Microphone 5.

RICHARD RAY: My name's Richard Ray, Cyborg Fire Protection, Downers Grove, Illinois, member of the
1 technical committee.

2 What my motion is is to reinstate the
3 requirement that electric fire pumps be churn tested
4 weekly. This requirement.

5 RALPH GERDES: I'm sorry. Can you state your
6 motion again?

7 RICHARD RAY: My motions is to reinstate the
8 requirement that electrical fire pumps be churn tested
9 weekly.

10 RALPH GERDES: Are you asking to reject Comment
11 25-68?

12 RICHARD RAY: Yes.

13 RALPH GERDES: And 70, 71, and 72?

14 RICHARD RAY: Correct.

15 RALPH GERDES: Okay.

16 RICHARD RAY: They grouped it.

17 (Second.)

18 RALPH GERDES: I hear a second.

19 Proceed.

20 RICHARD RAY: This requirement's weekly churn
21 test of electrical fire pumps has been in NFPA 25 since
22 the very first edition back in 1992, and it's been in
23 every subsequent edition.

24 When we met in Salt Lake City back in January
25 of '09 at the ROP meeting, this requirement was
attacked. Building owner types attacked it; the owner
group attacked it. The committee did the right thing
and they kept the requirement in the standard, and when
we left that meeting, electric fire pumps still had to
be churn tested weekly.

And the substantiations included: There was no
data submitted to substantiate changing to not do it
weekly. The pump is a very critical component and
spends most of its service life in stand-by mode.

Weekly testing of a fire pump is consistent
with other required inspections and tests of water
supplies. Waiting over -- this is a quote, waiting over
seven days to detect a problem is unacceptable to the
committee. And then an issue came up that I wasn't
really familiar with, but boy, did I learn a lot.

Electric fire pumps are vulnerable to these
voltage surges. They come alive, you know, an
electrical line or -- that's where (indiscernible) or
nearby lightening strike. And what can happen in these
controllers is a contactor [sic] coil gets burned out or
a relay gets burned out just from the induced current
that happens when lightening strikes. I am not an
electrician.

The fire pump controller doesn't look any
different after that contactor coil burns. It looks the

So we proceed to the ROC meeting. The requirement for weekly churn test fire pumps -- electrical fire pumps is attacked again. This time it was overturned and the requirement was removed and we went to monthly tests.

In my opinion, that was a big mistake. There was no data submitted to allow going from a weekly frequency to a monthly frequency. The whole issue of the electrical problems and the lightening strikes was discussed again.

In fact, some of the members of the committee who are involved in the insurance industry mentioned that they had been involved in losses in buildings because lightening had taken out a contact coil and the electric fire pump couldn't start, but still it was overturned.

My opinion is there's a lot of people, a lot of people go in and out of pump rooms -- fire pump rooms, lots of people. Sprinkler contractors, backflow testing companies, alarm companies, maintenance people, there's
a lot of people that go in and out of pump rooms. What we're doing is we're losing the chance to make sure that that electric pump is going to start from looking at it 52 times a year to 12 times a year.

The substantiation at the ROC was this: This is what we lost, this is how we lost. This is what they substantiated with: Australia does it. Australia allows monthly churn tests. That was the substantiation.

There was no data submitted going to less frequent churn testing was good. No. They said well, Australia does it. The swayed enough committee votes. The sub -- the substantiation continued. If we screwed up by reducing the frequency or by increasing the frequency from weekly to monthly, then we can always --

RALPH GERDES: 45 seconds.

RICHARD RAY: Then we can always revert to weekly down the road. So when do we do that? After we lose one building? two buildings? three buildings? When do we say enough?

We made a big mistake in Charlotte at the ROC by losing the requirement to weekly churn test fire pumps that have been in this book since the day it was written. Thank you.

RALPH GERDES: Thank you.
Mr. Bouchard.

JOHN BOUCHARD: I will defer to other committee members at this time.

RALPH GERDES: Thank you.

I'm going to go to Microphone 6.

TIM ADAMS: Hello, Mr. Chairman. I am Tim Adams with the American Society for Healthcare Engineering of the American Hospital Association and stand to -- in opposition to this amendment and support the action of the committee to change the testing frequency of electric pumps -- or the churn test to monthly, we support that.

There was data presented I don't think specifically to the comment, perhaps it has been spoken to. There were four different comments regarding this. The data was submitted and looked at by the committee for 61,070 tests that were performed.

This information came from healthcare facilities, from education facilities, and from general services administration showing a 99.96 percent operational state, successful operational state for fire pumps. That included diesel driven and electric driven.

When the committee considered this information in the ROC process, there was a statistical difference noted for electrical pumps as opposed to diesel driven.
pumps and consequently the results of that are that the
electrical pumps, they have chosen to move to a monthly
testing and the diesel driven pumps continue to stay at
a weekly testing.

It was noted that an insurance representative
said there was 70 fire pump failures because -- and many
of those were from contact failures -- contactor
failures or electrical problems. The question that I
don't know that was answered or data presented regarding
those 70 failures were had those particular pumps been
tested according -- and inspected according to the NFPA
25 requirements, and I don't know that that had
happened.

So it would be interesting to look at those
cases or to know were those tests being -- those pumps
being routinely tested and still the insurance company
found that many failures and data seems -- and not
knowing the sample sizing seems a little different than
the data that was presented.

It can be argued that there are conditions that
can cause a pump to fail such as lightening strikes, and
the committee did choose to add into the annex
information that in an area where frequent lightening
strikes happen, an owner or organization can choose to
test those more often. It's -- again, these are minimum
requirements and can always be -- can go even farther.

As an industry, and I'm from the healthcare industry, as an industry that's dedicated to health and healing and providing and the environment, that is exactly what we are after as I know most members in this room are.

I think the data does show, though, that was presented that fire pumps are reliable, and we would like for the members of the NFPA to consider the action that the committee has taken and I support the action they have taken to move churn testing of electric pumps to monthly. Thank you.

RALPH GERDES: Thank you.

Mic 1.

DAVID FULLER: Thank you, Mr. Chairman. My name is David Fuller. I'm from FM Global. I'm an NFPA 20 member as well as an NFPA 25 committee member. I'm speaking in favor of the motion to maintain weekly testing of electric fire pumps.

I'd like to just add in deference to time and respecting everyone's time here tonight, I just wanted to make a few points to follow-up on what Mr. Ray said. Those points being that when you're looking at the differences between electric and diesel drivers relative to testing which we then ignore as the fact
that there's two other parts of the system and that is
the pump itself as well as the controller which both
require weekly testing in order to maintain their
function. And ensure yourself that they're, in fact, in
good working order.

There are certain vulnerabilities associated
with electric fire pump controllers that will go
unnoticed, and they are vulnerable to things like
lightening strike and power surges, and those things are
relays and contactor coils.

Those are not detectable faults within the fire
pump controller, and therefore would be hidden from the
owner/user. The panel itself would show you a green
light when, in fact, that system is not ready to respond
to an automatic start.

Finally, what I would just like to say is that
weekly testing is consistent with other types of NFPA 25
fire protection inspections and tests. For example, an
air compressor on a dry system requires weekly start
testing.

I think it's a little bit inconsistent to look
at this from the perspective of I want to start my air
compressor weekly but not my electric fire pump. It
doesn't seem to make sense to me. Therefore, starting
the pump in addition to the other weekly tests is
logical and consistent with these other types of requirements.

It requires minimal additional manpower burden and provides a benefit of providing insurance that the pump system is ready to start in a fully functional condition. Thank you.

RALPH GERDES: Thank you.

I'm going to go to Mic 6.

JIM PETER: Yes. Jim Peter, came with (indiscernible) International speaking on behalf of the healthcare section. This morning at the annual business meeting --

RALPH GERDES: Are you speaking for or against the motion?

JIM PETER: Speaking against the motion. This morning, the healthcare section voted to oppose this motion. The healthcare section of the hospital industry -- healthcare industry is very accustomed to risk assessments. We require to do them for many things.

A risk assessment here has been done using data. Data has shown that weekly testing does not increase reliability. The data shows that. Is it really necessary? Why not -- if weekly's good enough, why isn't daily better? So what's the level of testing
that's accepted?

And I think the data has shown that and we're trying to move forward with codes and say let's justify what we're doing with technical data, and here we've done that and again the argument comes back well, that's not good enough. So I would urge you to reject this comment.

RALPH GERDES: Thank you.

I'm going to go to Mic 5.

RICHARD RAY: Richard Ray, Cybor Fire, speaking in favor of the motion.

The gentleman over here, The data's at 99.6 percent and fire pumps are operational. That's because we've been testing them quickly since 1992. That's why the data is so strong.

My second point, they didn't bring any data that would show that that 99.96 would stay 99.96 if we went to monthly. Annex, no. Where there's lightening prevalent in the area, maybe you want to think about doing this.

I don't know that I want to be the guy that puts my PE stamp on it saying you know what, we don't get a lot of lightening strikes in this area, so we won't worry about having testing on fire pumps weekly.

It's not always a lightening strike.
Two years ago, a big manufacturer of controllers, I don't if anybody in this room is from that manufacturer, they had to send out an emergency bulletin, emergency bulletin. When I got my copy, I looked at them and said please read this because it may result in loss of life.

And it had something to do with, and again, I'm not an electrician, I'm sorry, it had something to do with transient voltages and they traced it down to our RF, radiofrequency interference. And they think it was these Nextel phones, I'll say the word. That little chirping thing you can do.

If you were near a fire pump controller that had this certain transducer in it, it would put the fire pump to sleep. The pump would go to sleep, never start, and no one would know it.

The gentleman over here just -- I'm glad -- he's speaking against me, but he nailed it. He said fire pumps are reliable. He's right, because we're testing them weekly. I don't understand, a weekly churn test of a fire pimp takes about 11 minutes. Drop pressure, pump starts, runs for 10 minutes, automatically shuts off.

One more point, starting August 1st, one of the biggest insurance companies that's in this room
requirement is if you buy a fire pump controller that's going on one of their insured properties, it has to have a weekly run period time. Weekly. Thank you.

RALPH GERDES: Thank you.

I'm going to go to Microphone 4.

JOHN SADY: John Sady with the U.S. Department of Energy, a technical committee member since inception like John at the podium. This topic that's been --

RALPH GERDES: Speaking for or against the motion?

JOHN SADY: I'm speaking against the motion in support of the committee action. This topic has been thoroughly debated and fully discussed and basic conclusion, the committee action does not change the churn test of the diesel drivers. It addresses the electric motors. I urge this membership to support the committee action and reject the motion on the floor.

Thank you.

RALPH GERDES: Microphone 7.

BILL STALDER: Bill Stalder, Master Control System, a manufacturer of fire pump controller. I'm speaking in favor of the motion on the floor. I'd like to confirm what Ray was saying here, that there is an industrywide product change to all electric fire pump controllers to add weekly tests. This is an effective
August 1st of this year. And we always highly recommend qualified personnel be present during any automatic weekly test.

This change now makes weekly test the same for both electric and diesel and all fire pump controllers.

I support the motion on the floor.

RALPH GERDES: Thank you.

Microphone 6.

CLAUDE BAKER: Claude Baker, the University of Chicago Hospitals, speaking with the experience I have in 22 years --

RALPH GERDES: Are you speaking for or against the motion?

CLAUDE BAKER: I'm speaking against. Thank you.

In 22 years, I've been involved with three fire pumps that needed to be rebuilt. In each of those cases, we always asked, you know, give us some detail, what contributed to it. And without exception, each of the three different types, three different rebuilders, they said it's your frequent start-ups. If you were to run this continuously, you probably wouldn't be rebuilding it at this time.

I believe that the decay and the hospital pumps that I've experienced were due, in fact, to the frequent
start-ups. And with regard to the 10-minute time out, I don't know where he's running it, but we're running it a little longer than that.

With regard to lightening strikes and power bumps that -- in our controllers, that kicks it on and brings the engineer to the pump. He doesn't leave the pump until he's satisfied the pump is ready to go into service again.

If it's a lightening situation, we go on fire guard and have provisions. If you have other considerations, go to hospitals in other states. I think we're pretty good and we're very comfortable with the monthly testing.

RALPH GERDES: Thank you.

Microphone 7.

DARREL UNDERWOOD: Darrel Underwood, Underwood Fire Equipment. My only comment here --

RALPH GERDES: Speaking for or against the motion?

DARREL UNDERWOOD: For. I had to think for a minute. Yeah, for, and here's the reason why: Not everybody is a hospital. There's housing for the elderly out there, and do you think they have the same kind of maintenance crews that you have in a hospital? I don't think so. And are we trying to protect just the
1. hospitals or are we trying to protect everyone? That's my only comment.

RALPH GERDES: Thank you.

Microphone 5.

RICH RAY: Rich Ray, Cybor Fore, in favor of the motion. Real quick: Where do I get the ten minutes? NFPA 25 is where it says you run the pump for 10 minutes.

RALPH GERDES: Thank you.

Mic 4.

RUSS LEAVITT: Russ Leavitt, Telgian Corporation, speaking against the motion. Couple of things that we need to be cognizant of. One, there is no such thing as a 10-minute test when it comes to actual time. NFPA 20 and both 25 require a qualified individual to be there at the test. This is the crux. Lots of the -- lots of our buildings don't have qualified individuals to go out and do a pump test.

Our firm deals with about 7000 pumps of which about 6000 of those are motor driven and most of these pumps are run at best semi-annually. They're run when we're there doing some sort of inspection or test. And I can tell you that the failure rate of the electrical motors is virtually nil. When we have a failure, it's at the annual test when the pump does not perform in
1 delivering the required flow and pressure.
2 But in terms of operating and running a churn,
3 we just do not see the failures with electrical motors.
4 This is a minimum standard. If factory mutual and
5 insurance company or whoever wants to go to a weekly,
6 have at it, but let's go to monthly, give these owners
7 an opportunity to reasonably test. We don't have much
8 test data in the industry for weekly other than the
9 large users because no one's doing it. Thank you.
10 RALPH GERDES: Thank you.
11 Mic 2.
12 ART BLACK: Mr. Chair, Art Black, Carmel Fire
13 Protection, call the question.
14 RALPH GERDES: Is there a second?
15 (Second.)
16 RALPH GERDES: All those in favor of calling
17 the question, please raise your hands.
18 (Raising Hands.)
19 RALPH GERDES: Thank you.
20 All those opposed?
21 (Raising Hands.)
22 RALPH GERDES: That motion passes.
23 We're going to vote on the motion. There's a
24 group amending motion, The motion is to reject Comment
25 25-68, -70, -71, and -72. All those in favor, please
1 raise your hands.

2 (Raising Hands.)

3 RALPH GERDES: Okay. Thank you.

4 All those opposed?

5 (Raising Hands.)

6 RALPH GERDES: That motion fails.

7 Moving on to motion sequence 25-14.

8 Mic 5.

9 KEN ISMAN: Thank you. Ken Isman with the National Fire Sprinkler Association, and I move to accept my comment, 25-75.

10 RALPH GERDES: Is there a second?

11 (Second.)

12 RALPH GERDES: Please proceed.

13 KEN ISMAN: Thank you. The way that the committee processed NFPA 25, the document contradicts itself. Section 8.3.5.2.1 specifically says, quote, theoretical factors for correction to the rated speed shall be applied where determining the compliance of pump per the test, end quote.

14 So you shall apply the correction. It's not even a shall be permitted. It's a shall. You have to apply the corrections, the theoretical corrections, people call them the affinity laws under that section.

15 A few sentences later, Section 8.3.5.7, was