# AGENDA
## Standards Council Meeting
### August 10-13, 2020

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-8-1</td>
<td>Report of the Committee Membership Task Group (J. Quiter, Chair).</td>
</tr>
<tr>
<td>20-8-1-a</td>
<td>Act on pending applications for Committee Members. No Attachment</td>
</tr>
<tr>
<td>20-8-1-b</td>
<td>IEEE Board of Governors Resolutions. No Attachment</td>
</tr>
<tr>
<td>20-8-2</td>
<td>Report of the Policy and Procedures Task Group (J. Foisel, Chair). No Attachment</td>
</tr>
<tr>
<td>20-8-2-a</td>
<td>Overview of electronic Technical Session platform and procedures. No Attachment</td>
</tr>
<tr>
<td>20-8-3</td>
<td>Report of the April 2020 Minutes and June 2020 special revision cycle ballot. No Attachment</td>
</tr>
</tbody>
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## AMENDMENTS

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>20-8-4</td>
<td>Act on the issuance of NFPA 1, <em>Fire Code</em>, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with three amendments and no appeals.</td>
</tr>
<tr>
<td>20-8-4-a</td>
<td>CAM 1-3: Accept an Identifiable Part of Public Comment No. 7. CAM 1-3 passed vote of the participating Membership during the NFPA Technical Meeting. PASSED TC Ballot – 30 voting members/21 agree/3 disagree/1 abstained/5 ballots not returned. See Attachment 20-8-4-a</td>
</tr>
<tr>
<td>20-8-4-b</td>
<td>CAM 1-6: Accept Public Comment No. 34. CAM 1-6 passed vote of the participating Membership during the NFPA Technical Meeting of the NFPA Technical Meeting. PASSED TC Ballot – 30 voting members/18 agree/7 disagree/0 abstained/5 ballots not returned. See Attachment 20-8-4-b</td>
</tr>
<tr>
<td>20-8-4-c</td>
<td>CAM 1-9: Accept Public Comment No. 33. CAM 1-9 passed vote of the participating Membership during the NFPA Technical Meeting of the NFPA Technical Meeting. PASSED TC Ballot – 30 voting members/17 agree/8 disagree/0 abstained/5 ballots not returned. See Attachment 20-8-4-c</td>
</tr>
<tr>
<td>20-8-4-d</td>
<td>Consider the Appeal of Julie Heckman, APA, requesting that the NFPA Standards Council delete Paragraph 65.3 from NFPA 1, 2021 edition to be consistent with Standards Council Decision 14-1 and direction from the Standards Council. See Attachment 20-8-4-d</td>
</tr>
<tr>
<td>20-8-4-d-1</td>
<td>Comment received by C. Stashak, TC Member, Fire Code Committee, regarding the appeal on the issuance of NFPA 1, 2021 edition. See Attachment 20-8-4-d-1</td>
</tr>
<tr>
<td>20-8-4-e</td>
<td>Review inconsistent language as a result of Tech Session and TIAs with NFPA 101. No Attachment</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>20-8-5-a</td>
<td>CAMs 4-1/4-5: Reject Second Revision No. 4. CAMs 4-5/4-5 passed vote of the participating Membership of the NFPA Technical Meeting. <strong>No Ballot Necessary</strong> See Attachment 20-8-5-a</td>
</tr>
<tr>
<td>20-8-6</td>
<td>Act on the issuance of NFPA 30, <em>Flammable and Combustible Liquids Code</em>, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with no amendments (CAM failed) and no appeals.</td>
</tr>
</tbody>
</table>

*Updated: August 4, 2020*
<p>| 20-8-8  | NFPA 99 | Act on the issuance of NFPA 99, <em>Health Care Facilities Code</em>, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with no amendments and no appeals. |
| 20-8-9-a | CAMs 101-10/101-20: Reject Second Revision No. 6587 Including any Related Portions of First Revision and First Correlating Revisions. CAMs 101-10/101-20 passed vote of the participating Membership of the NFPA Technical Meeting. <strong>No Ballot Necessary</strong>. See Attachment 20-8-9-a |
| 20-8-10 | NFPA 790 | Act on the issuance of NFPA 790, <em>Standard for Competency of Third-Party Field Evaluation Bodies</em>, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with no amendments (CAM failed) and no appeals. No Attachment |
| 20-8-11 | NFPA 1006 | Act on the issuance of NFPA 1006, <em>Standard for Technical Rescue Personnel Professional Qualifications</em>, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with no amendments (CAM failed) and no appeals. No Attachment |
| 20-8-12 | NFPA 1500 | Act on the issuance of NFPA 1500, <em>Standard on Fire Department Occupational Safety, Health, and Wellness Program</em>, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with no amendments (CAM failed) and no appeals. No Attachment |
| 20-8-13 | NFPA 1700 | Act on the issuance of NFPA 1700, <em>Guide for Structural Fire Fighting</em>, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with no amendments (CAM failed) and no appeals. No Attachment |
| <strong>TENTATIVE INTERIM AMENDMENTS</strong> |  |  |
| 20-8-14 | NFPA 1 | Act on the issuance of proposed Tentative Interim Amendment (TIA) to update the extracted language from NFPA 90A in NFPA 1 of the 2021 edition of NFPA 1, <em>Fire Code</em> (TIA No. 1491). |
| 20-8-14-a | Text of proposed TIA No. 1491. See Attachment 20-8-14-a |
| 20-8-14-b | Ballot results of TIA No. 1491. PASSED ballot on both technical merit and emergency nature – 30 voting members/22 agree on technical merit/0 disagree/0 abstained/8 ballots not returned/22 agree on emergency nature/0 disagree/0 abstained/8 ballots not returned. See Attachment 20-8-14-b |
| 20-8-14-c | No comments were received. No Attachment |
| 20-8-15 | NFPA 1 | Act on the issuance of proposed Tentative Interim Amendment (TIA) to update the extracted language from NFPA 220 in NFPA 1 of the 2021 edition of NFPA 1, <em>Fire Code</em> (TIA No. 1492). |
| 20-8-15-a | Text of proposed TIA No. 1492. See Attachment 20-8-15-a |
| 20-8-15-b | Ballot results of TIA No. 1492. PASSED ballot on both technical merit and emergency nature – 30 voting members/21 agree on technical merit/0 disagree/0 abstained/9 ballots not returned/21 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 20-8-15-b |
| 20-8-15-c | No comments were received. No Attachment |
| 20-8-16 | NFPA 1 | Act on the issuance of proposed Tentative Interim Amendment (TIA) to update the extracted language from NFPA 303 in NFPA 1 of the 2021 edition of NFPA 1, <em>Fire Code</em> (TIA No. 1493). |
| 20-8-16-a | Text of proposed TIA No. 1493. See Attachment 20-8-16-a |</p>
<table>
<thead>
<tr>
<th>Ballot results of TIA No. 1493. PASSED ballot on both technical merit and emergency nature – 30 voting members/21 agree on technical merit/0 disagree/0 abstained/ 9 ballots not returned/21 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 20-8-16-b</th>
</tr>
</thead>
<tbody>
<tr>
<td>No comments were received. No Attachment</td>
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<tr>
<td><strong>20-8-17</strong></td>
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<tr>
<td>Text of proposed TIA No. 1494. See Attachment 20-8-17-a</td>
</tr>
<tr>
<td><strong>20-8-17-b</strong></td>
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<tr>
<td>No comments were received. No Attachment</td>
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<tr>
<td><strong>20-8-18</strong></td>
</tr>
<tr>
<td>Text of proposed TIA No. 1495. See Attachment 20-8-18-a</td>
</tr>
<tr>
<td><strong>20-8-18-b</strong></td>
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<tr>
<td>No comments were received. No Attachment</td>
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<tr>
<td><strong>20-8-19</strong></td>
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<tr>
<td>Text of proposed TIA No. 1496. See Attachment 20-8-19-a</td>
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<tr>
<td><strong>20-8-19-b</strong></td>
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<tr>
<td>No comments were received. No Attachment</td>
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<tr>
<td><strong>20-8-20</strong></td>
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<tr>
<td>Text of proposed TIA No. 1497. See Attachment 20-8-20-a</td>
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<tr>
<td><strong>20-8-20-b</strong></td>
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<tr>
<td>No comments were received. No Attachment</td>
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<td><strong>20-8-21</strong></td>
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<tr>
<td>Text of proposed TIA No. 1498. See Attachment 20-8-21-a</td>
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<td><strong>20-8-21-b</strong></td>
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<tr>
<td>No comments were received. No Attachment</td>
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<tr>
<td><strong>20-8-22</strong></td>
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<tr>
<td>Code</td>
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<tr>
<td>20-8-22-a</td>
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<tr>
<td>20-8-22-b</td>
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<td>20-8-22-c</td>
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<td>20-8-23</td>
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<td>20-8-23-a</td>
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<td>20-8-23-c</td>
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<td>20-8-26-a</td>
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<td>20-8-26-b</td>
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<td>20-8-26-c</td>
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<td>20-8-27</td>
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<th>Item</th>
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<tbody>
<tr>
<td>20-8-27-a</td>
<td>Text of proposed TIA No. 1507. See Attachment 20-8-27-a</td>
</tr>
<tr>
<td>20-8-27-b</td>
<td>Ballot results of TIA No. 1507. PASSED ballot on both technical merit and emergency nature – 32 voting members/29 agree on technical merit/0 disagree/0 abstained/3 ballots not returned/28 agree on emergency nature/1 disagree/0 abstained/3 ballots not returned. PASS CC ballot on both correlation and emergency nature – 13 voting members/10 agree on correlation/0 disagree/0 abstained/3 ballots not returned/10 agree on emergency nature/0 disagree/0 abstained/3 ballot not returned. See Attachment 20-8-27-b</td>
</tr>
<tr>
<td>20-8-27-c</td>
<td>No comments were received. No Attachment</td>
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<tr>
<td>20-8-28</td>
<td><strong>NFPA 30A</strong></td>
</tr>
<tr>
<td>20-8-28-a</td>
<td>Text of proposed TIA No. 1508. See Attachment 20-8-28-a</td>
</tr>
<tr>
<td>20-8-28-b</td>
<td>Ballot results of TIA No. 1508. PASSED ballot on both technical merit and emergency nature – 33 voting members/29 agree on technical merit/1 disagree/1 abstained/2 ballots not returned/29 agree on emergency nature/1 disagree/1 abstained/2 ballots not returned. See Attachment 20-8-28-b</td>
</tr>
<tr>
<td>20-8-28-c</td>
<td>One comment was received (Opposed). See Attachment 20-8-28-c</td>
</tr>
<tr>
<td>20-8-29</td>
<td><strong>NFPA 30A</strong></td>
</tr>
<tr>
<td>20-8-29-a</td>
<td>Text of proposed TIA No. 1509. See Attachment 20-8-29-a</td>
</tr>
<tr>
<td>20-8-29-b</td>
<td>Ballot results of TIA No. 1509. PASSED ballot on both technical merit and emergency nature – 33 voting members/28 agree on technical merit/1 disagree/1 abstained/3 ballots not returned/28 agree on emergency nature/1 disagree/1 abstained/3 ballots not returned. See Attachment 20-8-29-b</td>
</tr>
<tr>
<td>20-8-29-c</td>
<td>No comments were received. No Attachment</td>
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<tr>
<td>20-8-30</td>
<td><strong>NFPA 30A</strong></td>
</tr>
<tr>
<td>20-8-30-a</td>
<td>Text of proposed TIA No. 1511. See Attachment 20-8-30-a</td>
</tr>
<tr>
<td>20-8-30-b</td>
<td>Ballot results of TIA No. 1511. FAILED ballot on both technical merit and emergency nature – 33 voting members/14 agree on technical merit/13 disagree/2 abstained/ 4 ballots not returned/12 agree on emergency nature/16 disagree/1 abstained/4 ballots not returned. See Attachment 20-8-30-b</td>
</tr>
<tr>
<td>20-8-30-c</td>
<td>7 Comments were received (7 Support). See Attachment 20-8-30-c</td>
</tr>
<tr>
<td>20-8-31</td>
<td><strong>NFPA 58</strong></td>
</tr>
<tr>
<td>20-8-31-a</td>
<td>Text of proposed TIA No. 1480. See Attachment 20-8-31-a</td>
</tr>
<tr>
<td>20-8-31-b</td>
<td>Ballot results of TIA No. 1480. PASSED ballot on both technical merit and emergency nature – 36 voting members/31 agree on technical merit/0 disagree/1 abstained/ 4 ballots not returned/31 agree on emergency nature/0 disagree/1 abstained/4 ballots not returned. See Attachment 20-8-31-b</td>
</tr>
<tr>
<td>20-8-31-c</td>
<td>Two comments were received (1 Support/1 Oppose). See Attachment 20-8-31-c</td>
</tr>
<tr>
<td>20-8-32</td>
<td><strong>NFPA 58</strong></td>
</tr>
<tr>
<td>20-8-32-a</td>
<td>Text of proposed TIA No. 1516. See Attachment 20-8-32-a</td>
</tr>
<tr>
<td>20-8-32-b</td>
<td>Ballot results of TIA No. 1516. PASSED ballot on both technical merit and emergency nature – 36 voting members/30 agree on technical merit/1 disagree/0 abstained/5 ballots not returned/29 agree on emergency nature/2 disagree/0 abstained/5 ballots not returned. See Attachment 20-8-32-b</td>
</tr>
<tr>
<td>20-8-32-c</td>
<td>No comments were received. No Attachment</td>
</tr>
<tr>
<td>20-8-33-a Text of proposed TIA No. 1505. See Attachment 20-8-33-a</td>
<td></td>
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<tr>
<td>20-8-33-b Ballot results of TIA No. 1505. PASSED ballot on both technical merit and emergency nature – 29 voting members/18 agree on technical merit/0 disagree/0 abstained/11 ballots not returned/17 agree on emergency nature/0 disagree/1 abstained/11 ballots not returned. See Attachment 20-8-33-b</td>
<td></td>
</tr>
<tr>
<td>20-8-33-c No comments were received. No Attachment</td>
<td></td>
</tr>
<tr>
<td>20-8-34 NFPA 70</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise Paragraphs 6.27.5 and 6.30.5.1356.10 Item (8) of the 2020 Editions of NFPA 70, <em>National Electrical Code®</em> (TIA No. 1502).</td>
</tr>
<tr>
<td>20-8-34-a Text of proposed TIA No. 1502. See Attachment 20-8-34-a</td>
<td></td>
</tr>
<tr>
<td>20-8-34-b Ballot results of TIA No. 1502. PASSED Panel Ballot on both technical merit and emergency nature – 13 voting members/11 agree on technical merit/0 disagree/0 abstained/2 ballots not returned/11 agree on emergency nature/0 disagree/0 abstained/2 ballots not returned. PASSED CC ballot on both correlation and emergency nature – 11 voting members/11 agree on correlation/0 disagree/0 abstained/0 ballot not returned/11 agree on emergency nature/0 disagree/0 abstained/0 ballot not returned. See Attachment 20-8-34-b</td>
<td></td>
</tr>
<tr>
<td>20-8-34-c Two comments were received (1 Support/1 Oppose). See Attachment 20-8-34-c</td>
<td></td>
</tr>
<tr>
<td>20-8-35-a Text of proposed TIA No. 1501. See Attachment 20-8-35-a</td>
<td></td>
</tr>
<tr>
<td>20-8-35-b Ballot results of TIA No. 1501. PASSED TC Ballot on both technical merit and emergency nature – 16 voting members/11 agree on technical merit/1 disagree/3 abstained/1 ballot not returned/11 agree on emergency nature/0 disagree/4 abstained/1 ballot not returned. PASSED CC ballot on both correlation and emergency nature – 12 voting members/9 agree on correlation/0 disagree/3 abstained/0 ballot not returned/9 agree on emergency nature/0 disagree/3 abstained/0 ballot not returned. See Attachment 20-8-35-b</td>
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</tr>
<tr>
<td>20-8-35-c One comment was received (Support). See Attachment 20-8-35-c</td>
<td></td>
</tr>
<tr>
<td>20-8-36 NFPA 1006</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to move sections 10.3.1, 10.3.2 and 10.3.3 to section 10.2 of the 2021 Edition of NFPA 1006, <em>Standard for Technical Rescue Personnel Professional Qualifications</em> (TIA No. 1488).</td>
</tr>
<tr>
<td>20-8-36-a Text of proposed TIA No. 1488. See Attachment 20-8-36-a</td>
<td></td>
</tr>
<tr>
<td>20-8-36-b Ballot results of TIA No. 1488. PASSED TC Ballot on both technical merit and emergency nature – 29 voting members/18 agree on technical merit/0 disagree/1 abstained/10 ballots not returned/19 agree on emergency nature/0 disagree/0 abstained/10 ballots not returned. PASSED CC ballot on both correlation and emergency nature – 21 voting members/15 agree on correlation/0 disagree/0 abstained/6 ballot not returned/15 agree on emergency nature/0 disagree/0 abstained/6 ballot not returned. See Attachment 20-8-36-c</td>
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<tr>
<td>20-8-36-c No comments were received. No Attachment</td>
<td></td>
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<tr>
<td>20-8-37 NFPA 1192</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to delete 1.3.3 in its entirety from the 2021 Edition of NFPA 1192, <em>Standard on Recreational Vehicles</em> (TIA No. 1490).</td>
</tr>
<tr>
<td>20-8-37-a Text of proposed TIA No. 1490. See Attachment 20-8-37-a</td>
<td></td>
</tr>
<tr>
<td>20-8-37-b Ballot results of TIA No. 1490. PASSED TC Ballot on both technical merit and emergency nature – 21 voting members/16 agree on technical merit/2 disagree/1 abstained/2 ballots not returned/17 agree on emergency nature/2 disagree/0 abstained/2 ballots not returned. See Attachment 20-8-37-b</td>
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<tr>
<td><strong>20-8-38</strong></td>
<td>No comments were received. No Attachment</td>
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<tr>
<td><strong>NFPA 1581</strong></td>
<td><strong>Act on the issuance of proposed Tentative Interim Amendment (TIA) to add new Section 8.4.10 and associated Annex information to the 2015 and proposed 2021 Editions of NFPA 1581, Standard on Fire Department Infection Control Program (TIA No. 1517).</strong></td>
</tr>
<tr>
<td><strong>20-8-38-a</strong></td>
<td>Text of proposed TIA No. 1517. See Attachment 20-8-38-a</td>
</tr>
<tr>
<td><strong>20-8-38-b</strong></td>
<td>Ballot results of TIA No. 1517. PASSED TC Ballot on both technical merit and emergency nature – 34 voting members/27 agree on technical merit/0 disagree/0 abstained/7 ballots not returned/27 agree on emergency nature/0 disagree/0 abstained/7 ballots not returned. See Attachment 20-8-38-b</td>
</tr>
<tr>
<td><strong>20-8-38-c</strong></td>
<td>No comments were received. No Attachment</td>
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<tr>
<td><strong>20-8-39</strong></td>
<td>No comments were received. No Attachment</td>
</tr>
<tr>
<td><strong>NFPA 1851</strong></td>
<td><strong>Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise 7.3.3.2 and add new Annex A.7.3.3.2 to the 2020 Edition of NFPA 1851, Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting (TIA No. 1484).</strong></td>
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<tr>
<td><strong>20-8-39-a</strong></td>
<td>Text of proposed TIA No. 1484. See Attachment 20-8-39-a</td>
</tr>
<tr>
<td><strong>20-8-39-b</strong></td>
<td>Ballot results of TIA No. 1484. PASSED TC Ballot on both technical merit and emergency nature – 35 voting members/27 agree on technical merit/0 disagree/0 abstained/8 ballots not returned/27 agree on emergency nature/0 disagree/0 abstained/8 ballots not returned. PASSED CC ballot on both correlation and emergency nature – 28 voting members/20 agree on correlation/0 disagree/0 abstained/8 ballot not returned/20 agree on emergency nature/0 disagree/0 abstained/8 ballot not returned. See Attachment 20-8-39-b</td>
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<tr>
<td><strong>20-8-39-c</strong></td>
<td>No comments were received. No Attachment</td>
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<tr>
<td><strong>20-8-40</strong></td>
<td>No comments were received. No Attachment</td>
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<tr>
<td><strong>NFPA 1851</strong></td>
<td><strong>Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise figure 7.1.1.2(b) of the 2020 Edition of NFPA 1851, Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting (TIA No. 1504).</strong></td>
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<tr>
<td><strong>20-8-40-a</strong></td>
<td>Text of proposed TIA No. 1504. See Attachment 20-8-40-a</td>
</tr>
<tr>
<td><strong>20-8-40-b</strong></td>
<td>Ballot results of TIA No. 1504. PASSED TC Ballot on both technical merit and emergency nature – 36 voting members/28 agree on technical merit/0 disagree/0 abstained/8 ballots not returned/28 agree on emergency nature/0 disagree/0 abstained/8 ballots not returned. PASSED CC ballot on both correlation and emergency nature – 27 voting members/19 agree on correlation/0 disagree/0 abstained/8 ballot not returned/19 agree on emergency nature/0 disagree/0 abstained/8 ballot not returned. See Attachment 20-8-40-b</td>
</tr>
<tr>
<td><strong>20-8-40-c</strong></td>
<td>No comments were received. No Attachment</td>
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<tr>
<td><strong>20-8-41</strong></td>
<td>No comments were received. No Attachment</td>
</tr>
<tr>
<td><strong>NFPA 1851</strong></td>
<td><strong>Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise 11.1.5 of the 2020 Edition of NFPA 1851, Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting (TIA No. 1512).</strong></td>
</tr>
<tr>
<td><strong>20-8-41-a</strong></td>
<td>Text of proposed TIA No. 1512. See Attachment 20-8-41-a</td>
</tr>
<tr>
<td><strong>20-8-41-b</strong></td>
<td>Ballot results of TIA No. 1512. PASSED TC Ballot on both technical merit and emergency nature – 36 voting members/27 agree on technical merit/0 disagree/0 abstained/9 ballots not returned/27 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. PASSED CC ballot on both correlation and emergency nature – 27 voting members/19 agree on correlation/0 disagree/0 abstained/8 ballot not returned/19 agree on emergency nature/0 disagree/0 abstained/8 ballot not returned. See Attachment 20-8-41-b</td>
</tr>
<tr>
<td><strong>20-8-41-c</strong></td>
<td>No comments were received. No Attachment</td>
</tr>
<tr>
<td><strong>20-8-42</strong></td>
<td>No comments were received. No Attachment</td>
</tr>
<tr>
<td><strong>NFPA 1999</strong></td>
<td><strong>Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise paragraph 7.1.2.1 of the 2018 Edition of NFPA 1999, Standard on Protective Clothing and Ensembles for Emergency Medical Operations (TIA No. 1514).</strong></td>
</tr>
<tr>
<td><strong>20-8-42-a</strong></td>
<td>Text of proposed TIA No. 1514. See Attachment 20-8-42-a</td>
</tr>
</tbody>
</table>
| **20-8-42-b** | Ballot results of TIA No. 1514. PASSED TC Ballot on both technical merit and emergency nature – 17 voting members/14 agree on technical merit/0 disagree/0 abstained/3 ballots not returned/14 agree on emergency nature/0 disagree/0 abstained/3 ballots not returned. PASSED
CC ballot on both correlation and emergency nature –27 voting members/20 agree on correlation/0 disagree/0 abstained/7 ballot not returned/20 agree on emergency nature/0 disagree/0 abstained/7 ballot not returned.  See Attachment 20-8-42-b

20-8-43-Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise specific paragraphs in Chapter 1 of the 2018 Edition of NFPA 2112, Standard on Flame-Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire (TIA No. 1513).

20-8-43-a-Text of proposed TIA No. 1513.  See Attachment 20-8-43-a

20-8-43-b-Ballot results of TIA No. 1513.  PASSED TC Ballot on both technical merit and emergency nature – 20 voting members/16 agree on technical merit/0 disagree/0 abstained/4 ballots not returned/16 agree on emergency nature/0 disagree/0 abstained/4 ballots not returned. See Attachment 20-8-43-b

20-8-43-c-One comment was received (Opposed).  See Attachment 20-8-43-c

20-8-44-Consider processing of TIA regarding storable pools in prior editions of NFPA 70.  See Attachment 20-8-44

**REVISION CYCLE**

20-8-45-Consider requests from NFPA Committees to change the respective revision schedules as follows:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NFPA 11</td>
<td>2016</td>
<td>PI Closing June 1, 2021</td>
</tr>
<tr>
<td>NFPA 14</td>
<td>2019</td>
<td>PI Closing January 1, 2021</td>
</tr>
<tr>
<td>NFPA 58</td>
<td>2020</td>
<td>PI Closing January 1, 2021</td>
</tr>
<tr>
<td>NFPA 59A</td>
<td>2019</td>
<td>PI Closing January 1, 2021</td>
</tr>
</tbody>
</table>

See Attachment 20-8-45

**SCOPES**

20-8-46-Discussion re NFPA 1/101 valet trash committee responsibility.  No Attachment

20-8-47-At the April 2020 meeting, the Standards Council reviewed the request of the Technical Committee on Energy Storage Systems to review the potential scope overlap of NFPA 855, Energy Storage Systems with other NFPA occupancy standards. After review of all information before it, the Council voted to direct NFPA Staff to form a Task Group to be Chaired by Standards Council Member, Jeff Foisel including one member from each of the potentially affected NFPA projects identified (namely NFPA 70, 75, 76, 110, 111, 850 and 855). The Task Group has been established and have met three times. Update on the Task Group’s work to be presented by Chair, Jeff Foisel can be found in Attachment 20-8-47

20-8-47-a-Consider correspondence from Michel O’Brien, IAFC, related to the potential scope overlap of NFPA 855.  See Attachment 20-8-47-a

**NEW PROJECTS**

20-8-48-Review request of the Technical Committee on Emergency Medical Services Protective Clothing and Equipment (FAE-EMS) and the Technical Committee on Hazardous Materials Protective Clothing and Equipment (FAE-HAZ) to revise Standards Council approval to include NFPA 1999, Standard on Protective Clothing and Ensembles for Emergency Medical Operations, within consolidated standard NFPA 1990, Standards for Protective Ensembles for Hazardous Material and Emergency Medical Operations, and to allow necessary second revisions to remove NFPA 1999 text from NFPA 1990 during the current revision cycle. See Attachment 20-8-48

20-8-49-The Fire Test Committee is recommending to no longer pursue the development of the 16 ft. Parallel Panel test. The task group presented their draft to the Fire Test Committee during the First Draft meeting and made a motion to submit the draft to the Standards Council for issuance
<table>
<thead>
<tr>
<th>Fire Test</th>
<th>TG re 16 Ft Parallel Panel Test</th>
<th>in a cycle. That motion failed. A follow up motion was made to cease work on the new project. That motion passed. As a result, the chair disbanded the task group and has forwarded the Committee’s recommendation to Council. See Attachment 20-8-49</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-8-50</td>
<td>NFPA 715</td>
<td>Consider the request of the Technical Committee on Fuel Gas Warning Equipment to approve the preliminary draft of NFPA 715, <em>Standard for the Installation of Fuel Gases Detection and Warning Equipment</em>. If approved, the Technical Committee also requests the Standard to be entered into its initial revision cycle, with a Public Input closing date of October 15, 2020, if approved. See Attachment 20-8-50</td>
</tr>
<tr>
<td>20-8-51</td>
<td>NFPA 915</td>
<td>Consider the request of the Technical Committee on Remote Inspections to approve proposed draft standard NFPA 915, <em>Standard for Remote Inspections</em>. The Technical Committee also requests the Standard be entered into its initial revision cycle, with a Public Input closing date of June 1, 2021, if approved. See Attachment 20-8-51</td>
</tr>
<tr>
<td>20-8-52</td>
<td>NFPA 2800</td>
<td>Consider the request of the Technical Committee on Building Fire and Life Safety Directors to approve proposed draft standard NFPA 2800, <em>Standard for Emergency Action Planning</em>. The Technical Committee also requests the Standard be entered into its initial revision cycle, with a Public Input closing date of January 6, 2021, if approved. See Attachment 20-8-52</td>
</tr>
<tr>
<td>20-8-53</td>
<td></td>
<td>Discussion regarding new project on food producing vehicles. See Attachment 20-8-53</td>
</tr>
</tbody>
</table>

### REPORTS BACK TO COUNCIL

| 20-8-54 | Research foundation report on FM | At the August 2019 meeting, the Council heard a report from Council Member Gary Keith on Factory Mutual’s Research Technical Report on the *Evaluation of Sprinkler Fire Protection of Retail Sales of Consumer Fireworks* (https://www.fmglobal.com/research-and-resources/research-and-testing/research-technical-reports). After a review of all of the material, the Council voted to forward FM’s Technical Report to the NFPA Research Foundation with a request for an analysis of whether the test performed by FM is consistent with the test plan previously developed by the Research Foundation. The Research Foundation has completed their review and analysis as requested and is reporting back to the Council. See Attachment 20-8-54 |
| 20-8-55 | | The Council voted to approve the dates of upcoming Council meetings, as follows: |
| | | December 2-3, 2020 |
| | | TBD |
| | | April 2021 TBD |
In Section 18.5.9.6.1 the actual equation [18.5.9.6.1] reads as follows:

\[
\frac{(H_r \cdot W_p \cdot C_p)}{S} \geq F_y
\]

The equation should be revised to the following:

\[
\frac{(H_r \cdot W_p \cdot C_p)}{S} \leq F_y
\]

**Substantiation:** What we have in the left side of the equation [18.5.9.6.1] is the stretch by flection, it should be less than allowable yield strength not over, like the equation says. 18.5.9.6.1 says riser nipple shall satisfy the equation [18.5.9.6.1]. I think it should not satisfy the equation [18.5.9.6.1]. The stretch by flection should be less than allowable yield strength.

**Emergency Nature:** The standard contains an error or an omission that was overlooked during the regular revision process. The proposed TIA intends to correct a previously unknown existing hazard. If there are systems complying with the equation [18.5.9.6.1] they have risk to get out of service after an earthquake.
MEMORANDUM

TO: Technical Committee on Hanging and Bracing of Water-Based Fire Protection Systems

FROM: Elena Carroll, Sr. Technical Committee Administrator

DATE: June 26, 2020

SUBJECT: NFPA 13 Proposed TIA No. 1506 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA **HAS** achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

31 Eligible to Vote  
9 Not Returned (Dannaway, Laguna, Mack, Martin, Roberts, Sanchez, Silva, Webb, Wilson)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>21 Agree (w/comment, Deutsch, Wagoner)</td>
<td>21 Agree (w/comment, Biggins, Deutsch, Wagoner)</td>
</tr>
<tr>
<td>1 Disagree (Valentine)</td>
<td>1 Disagree (Valentine)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[
\text{[31 eligible ÷ 2 = 15.5 = (16)]}
\]

2) The number of affirmative votes needed to satisfy the ¾ requirement is 17.

\[
(31 \text{ eligible to vote - 9 not returned} - 0 \text{ abstentions} = 22 \times 0.75 = 16.5)
\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **July 1, 2020**.
QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1506 to Revise the equation in Section 18.5.9.6.1.

Eligible to Vote: 31
Not Returned: 9
Samuel S. Dannaway, Ronald N. Webb, Alan R.
Laguna, Daniel Sanchez, Wayne M. Martin, Warren
Douglas Wilson, William Scott Roberts, John
Silva, Travis Mack

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Ray Lambert</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Chase A. Browning</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Joseph R. Sanford</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Zeljko Sucevic</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Peter T. Schwab</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Daniel C. Duggan, Sr.</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Michael Tosunian</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>John Deutsch</td>
<td>The equation should be less than or equal to: ((H_r \cdot W_p \cdot C_p) \div F_y)</td>
<td></td>
</tr>
<tr>
<td>Steve Berry</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>James B. Biggins</td>
<td>Change needed to correct error.</td>
<td></td>
</tr>
<tr>
<td>Leslie (Chip) L. Lindley, II</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Jeff Hebenstreit</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>J. Scott Mitchell</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Kenneth W. Wagoner</td>
<td>This issue was previously raised by a member during committee meetings. This will correct the error.</td>
<td></td>
</tr>
<tr>
<td>Marco R. Nieraeth</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Michael A. Rothmier</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>James Tauby</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Thomas J. Forsythe</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Christopher I. Beneff</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Joe Beagen</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Michael Wade McDaniel</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>DISAGREE</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Victoria B. Valentine</td>
<td>The proposed TIA shows that the wording of those sections does need to be improved. However, the equation is not wrong. The language in the paragraph where the equation is located (18.5.9.6.1) is stating that the equation only needs to be calculated when the list of conditions is not met. Section 18.5.9.6.2 indicates when longitudinal sway bracing would be necessary on the branch line, which would make the correct as written.</td>
<td></td>
</tr>
<tr>
<td>ABSTAIN</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 31
Not Returned: 9
Samuel S. Dannaway, Ronald N. Webb, Alan R.
Laguna, Daniel Sanchez, Wayne M. Martin, Warren
Douglas Wilson, William Scott Roberts, John
Silva, Travis Mack

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Ray Lambert</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Chase A. Browning</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Joseph R. Sanford</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Zeljko Sucevic</td>
<td>A.</td>
<td></td>
</tr>
<tr>
<td>Peter T. Schwab</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Daniel C. Duggan, Sr.</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Michael Tosunian</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>John Deutsch</td>
<td>The equation is wrong and should be correct. The load on the riser nipple must be less than or equal to the strength of the material made from.</td>
<td></td>
</tr>
<tr>
<td>Steve Berry</td>
<td>A.</td>
<td></td>
</tr>
<tr>
<td>James B. Biggins</td>
<td>Incorrect formula could result in inadequate designs.</td>
<td></td>
</tr>
<tr>
<td>Leslie (Chip) L. Lindley, II</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Jeff Hebenstreit</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>J. Scott Mitchell</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Kenneth W. Wagoner</td>
<td>Application of this equation in the previous language could result in the allowance of the seismic loads on riser nipples to exceed the (F_y) value of the material.</td>
<td></td>
</tr>
<tr>
<td>Marco R. Nieraeth</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Michael A. Rothmier</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>James Tauby</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>
A.
Reason: A - contains an error that was overlooked
agree
A

1

Victoria B. Valentine

I can agree with the submitter that the committee needs to address this section and most likely move the equation to Section 18.5.9.6.2 and reference that section from the prior, but I do not think that changing the equation to be “less than or equal to” would remedy the confusion as that section does not indicate an action that would be taken other than performing the calculation.

ABSTAIN: 0
MEMORANDUM

TO: Correlating Committee on Automatic Sprinkler Systems

FROM: Elena Carroll, Sr. Technical Committee Administrator

DATE: June 26, 2020

SUBJECT: NFPA 13 Proposed TIA No. 1506 FINAL CC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

<table>
<thead>
<tr>
<th>21</th>
<th>Eligible to Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Not Returned (Palenske, Su)</td>
</tr>
</tbody>
</table>

**Correlation Issues:**

<table>
<thead>
<tr>
<th>0</th>
<th>Abstentions</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Agree (w/comment, Lowrey)</td>
</tr>
<tr>
<td>2</td>
<td>Disagree (Phillips, Thompson)</td>
</tr>
</tbody>
</table>

**Emergency Nature:**

<table>
<thead>
<tr>
<th>0</th>
<th>Abstentions</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Agree</td>
</tr>
<tr>
<td>1</td>
<td>Disagree (Lowrey)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

   \[21 \text{ eligible} \div 2 = 10.5 = (11)\]

2. The number of affirmative votes needed to satisfy the ¾ requirement is **15**.

   \[(21 \text{ eligible to vote} - 2 \text{ not returned} - 0 \text{ abstentions} = 19 \times 0.75 = 14.25)\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is July 1, 2020.
### QUESTION NO. 1: I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.

<table>
<thead>
<tr>
<th>Eligible to Vote: 21</th>
<th>Not Returned : 2</th>
<th>Joseph Su,Garner A. Palenske</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vote Selection</strong></td>
<td><strong>Votes</strong></td>
<td><strong>Comments</strong></td>
</tr>
<tr>
<td>AGREE</td>
<td>17</td>
<td>I can't say that this creates a correlation issues however, I find it concerning that if this is truly a mistake in the document than I would expect 100% agreement within the committee. The question is, is the equation printed incorrect in the document? After reading the substantiation as well as the disagreement comment I type this comment not knowing if the equation is or isn’t correct. I don’t believe that is the intent of a TIA.</td>
</tr>
<tr>
<td>DISAGREE</td>
<td>2</td>
<td>J. Michael Thompson</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unfortunately, the TIA does create a small technical coordination issue with 18.5.9.6.2. Corrected 18.5.9.6.1 uses allowable yield strength “less than or equal to” in the formula whereas 18.5.9.6.2 uses allowable yield strength “greater than or equal to” referring to the same formula. The coordination error is in the “equal to” that is used in both sections. Either 18.5.9.6.1 or 18.5.9.6.2 needs to delete “equal to”. This error is far less significant than the error corrected but nevertheless is a correlation issue.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lawrence Richard Phillips</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I concur with the comment that this creates a correlating issue between sections 18.5.9.6.1 and 18.5.9.6.2.</td>
</tr>
<tr>
<td>ABSTAIN</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total Voted : 19</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

<table>
<thead>
<tr>
<th>Eligible to Vote: 21</th>
<th>Not Returned : 2</th>
<th>Joseph Su,Garner A. Palenske</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vote Selection</strong></td>
<td><strong>Votes</strong></td>
<td><strong>Comments</strong></td>
</tr>
<tr>
<td>AGREE</td>
<td>18</td>
<td>Alex Hoffman</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chase A. Browning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>John A. LeBlanc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>William E. Koffel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>J. Michael Thompson</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>James D. Lake</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sultan M. Javeri</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kerry M. Bell</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Roland A. Asp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steven W. Dellasanta</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>John August Denhardt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lawrence Richard Phillips</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>DISAGREE</td>
<td>1</td>
<td>David O. Lowrey</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I don’t believe this can be an emergency if the committee isn’t in agreement on if an equation is correct in the document.</td>
</tr>
<tr>
<td>ABSTAIN</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total Voted : 19</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Regarding NFPA 13 - 2019 Edition Standard for the Installation of Sprinkler Systems TIA Log No.: 1506 Reference: Equation 18.5.9.6.1  Comment Closing Date: June 17, 2020

Comment:

Overall, I agree with this TIA, however, the way it is written will cause confusion between Sections 18.5.9.6.1 and 18.5.9.6.2 if the equation results in a stress that equals the yield stress.

18.5.9.6.1 will provide that riser nipples not meeting one of the three listed conditions shall still be adequate if the calculated stress is less than or equal to the yield stress. That is, satisfying the equation “(H_r · W_p · C_p)/S ≤ F_y”.

But, then 18.5.9.6.2 reads “If the calculated value is equal to or greater than the yield strength of the riser nipple, the longitudinal seismic load of each line shall be evaluated individually, and branch lines shall be provided with longitudinal sway bracing per 18.5.6.” This creates a conflict when the equation equals the yield stress $F_y$ since the equation in 18.5.9.6.1 says it is ok while 18.5.9.6.2 says that longitudinal sway bracing must be provided.

Resolution: pick either a) or b) below. I think Option b) is the most correct.

a) change the equation in 18.5.9.6.1 to require that the equation is only satisfied if it is less than (not less than or equal to) $F_y$, that is “(H_r · W_p · C_p)/S < F_y”.

b) change 18.5.9.6.2 to read “If the calculated value is greater than the yield strength of the riser nipple, the longitudinal seismic load of each line shall be evaluated individually, and branch lines shall be provided with longitudinal sway bracing per 18.5.6.”

Regards,
Chris Deneff

Christopher Deneff, P.E., S.E.
Staff Vice President, Senior Engineering Technical Specialist
Chief Engineer’s Group, Natural Hazards and Structures
FM Global
270 Central Avenue
Johnston, RI 02919

FM Global - "Protecting the value business creates"
Consider defining the left side of the equation as the flexural stress to make the equation more apparent to the user:

\[ \sigma_r = \frac{H_r \cdot W_p \cdot C_p}{S} \leq F_y \]

where:
- \( \sigma_r \) = flexural stress on the riser nipple
- \( H_r \) = length of riser nipple piping (in inches)
- \( W_p \) = tributary weight (in pounds) for the branch line or portion of branch line within the zone of influence including the riser nipple
- \( C_p \) = seismic coefficient
- \( S \) = sectional modulus of the riser nipple pipe
- \( F_y \) = allowable yield strength of 30,000 psi (2070 bar) for steel, 30,000 psi for copper (soldered), 8000 psi (550 bar) for CPVC

Kevin Hall, P.E., MSFPE
Manager of Engineering Research
National Fire Sprinkler Association
NFPA 30-Proposed 2021 Edition
*Flammable and Combustible Liquids Code*
TIA Log No.: 1503
Reference: 3.3.34.3 and A.3.3.34.3
Comment Closing Date: May 8, 2020
Submitter: John A. LeBlanc, FM Global
www.nfpa.org/30

1. Revise 3.3.34.3 to read as follows:

   **3.3.34.3** *Ignitible Liquid.* Any liquid or liquid mixture that has a measurable fire closed-cup flash point.

2. Revise A.3.3.34.3 to read as follows:

   **A.3.3.34.3** *Ignitible Liquid.* Unless otherwise specified, the term *liquid* means an ignitible liquid.

   The term *ignitible liquid* refers to any liquid that has a measurable closed-cup flash point will burn. Class I liquids [FP < 100°F (37.8°C)], Class II and Class III liquids [FP ≥ 100°F (37.8°C)], and inflammable liquids are all ignitible liquids.

**Substantiation:** The original definition of ignitible liquid used fire point, however, during discussions with the committee it became clear that the definition needed to be tied to closed cup flash point to ensure potential explosion hazards in processes that use ignitible liquids are properly identified. The updated definition was never included but all discussions within the committee and the overall structure of the standard assumed the definition was tied to closed cup flash point.

**Emergency Nature:** The standard contains an error or an omission that was overlooked during the regular revision process. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.
MEMORANDUM

TO: Technical Committee on Fundamentals

FROM: Diane Matthews, Technical Committee Administrator

DATE: May 11, 2020

SUBJECT: NFPA 30 Proposed TIA No. 1503 FINAL TC BALLOT RESULTS

___________________________________________________________________________

No public comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

22 Eligible to Vote
0 Not Returned

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>22 Agree (w/comment, Jaskolka, Morris, Ramirez, Shepard and Wechsler)</td>
<td>20 Agree (w/comment, Jaskolka and Shepard,)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>2 Disagree (Ramirez and Wechsler)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) affirmative ¾ vote and (2) simple majority] with both questions needing to pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[
[22 \text{ eligible} \div 2 = 11 + 1 = (12)]
\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is \textbf{17 (rounded up)}.

\[
(22 \text{ eligible to vote} - 0 \text{ not returned} - 0 \text{ abstentions} = 22 \times 0.75 = 16.50)
\]

Ballot comments are attached for your review.

The \textit{Regs} at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

\textbf{Appeal Closing Date} for this TIA is \textbf{May 16, 2020}. 
**NFPA 30 Proposed TIA Log No. 1503 Technical Committee on Fundamentals Final Ballot Results**

**QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the PROPOSED TIA LOG No. 1503 to the Proposed 2021 Edition of NFPA 30 to Revise 3.3.34.3 and A.3.3.34.3**

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Dwight H. Havens</td>
<td></td>
<td>Agree.</td>
</tr>
<tr>
<td>John W. Richmond, Sr.</td>
<td></td>
<td>Agree.</td>
</tr>
<tr>
<td>John A. LeBlanc</td>
<td></td>
<td>Agree.</td>
</tr>
<tr>
<td>Jay J. Jablonski</td>
<td></td>
<td>Agree.</td>
</tr>
<tr>
<td>Clark D. Shepard</td>
<td></td>
<td>Agree that definition and appendix addressing ignitable liquids is important to correct as it is the first time in standard.</td>
</tr>
<tr>
<td>Claire V. De Taeye</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>David P. Nugent</td>
<td></td>
<td>I agree.</td>
</tr>
<tr>
<td>Warren G. Stocker</td>
<td></td>
<td>Agree.</td>
</tr>
<tr>
<td>David B. Wechsler</td>
<td></td>
<td>While the committee messed up by not providing the correct and clear language during this revision cycle, Section 4 corrects this problem as we still are classifying these liquids with closed cup FP and testing.</td>
</tr>
<tr>
<td>John W. King</td>
<td></td>
<td>Agree.</td>
</tr>
<tr>
<td>Peter M. Shank</td>
<td></td>
<td>Agree.</td>
</tr>
<tr>
<td>Alfredo M. Ramirez</td>
<td></td>
<td>The proposed explanation is clear.</td>
</tr>
</tbody>
</table>
Scott M. Tyler  Agree
Robert Upson  Agree
Bob D. Morgan  Agree
Mark Hopkins  Agree
Stephen M. Jaskolka  Agree with proposed change as described in TIA.
Bill Johns, P.E.  Agree
Jeramie W. Morris  I agree and support the change.
Todd Lalley  Agree
Alwin A Kelly  Agree
William V. F. Cosey  Agree
Disagree  0
Abstain  0

Comment from Jack Woycheese, Non-Voting
Member: Nonvoting member, but I agree with the proposed TIA.

QUESTION NO. 2: I AGREE that the subject is of an Emergency Nature for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 22
Not Returned : 0

<table>
<thead>
<tr>
<th>Vote Selection</th>
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<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>
A. The standard contains an error or an omission that was overlooked during the regular revision process. D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

John W. Richmond, Sr. A
John A. LeBlanc A.D.
Jay J. Jablonski A
Clark D. Shepard

Agree that definition and appendix addressing ignitible is important to correct as it is the first time in standard

Claire V. De Taeye a
David P. Nugent I agree
Warren G. Stocker A
John W. King A.
Peter M. Shank a.
Scott M. Tyler Agree
Robert Upson A.
Bob D. Morgan Agree
Mark Hopkins

A. The standard contains an error or an omission that was overlooked during the regular revision process.

Stephen M. Jaskolka
Bill Johns, P.E. A
Jerame W. Morris I agree.
Todd Lalley A.
Alwin A Kelly A and D
William V. F. Cosey  
**Disagree** 2  
David B. Wechsler  

As indicated in question 1, Section 4 corrects this issue. However this revision to me is a mess and we did no service to the public with work in this section.

Alfredo M. Ramirez  
**Abstain** 0

*Comment from Jack Woycheese, Non-Voting Member: Nonvoting member, but I agree with the proposed TIA.*
No comments were received on this TIA, therefore, according to 5.6(b) in the NFPA Regs, the results show this TIA **HAS** achieved the ¾ majority vote needed on both Ballot Item No. 1 (**Correlation Issues**) and Ballot Item No. 2 (**Emergency Nature**).

<table>
<thead>
<tr>
<th></th>
<th>Eligible to Vote</th>
<th>Emergency Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation Issues:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Abstentions</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Agree (w/comment, Shepard and Lebowitz)</td>
<td>11 Agree</td>
</tr>
<tr>
<td>0</td>
<td>Disagree</td>
<td>1 Disagrees (Riegel)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

1. In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
   
   \[13 \text{ eligible} \div 2 = 6.5 = (7)\]

2. The number of affirmative votes needed to satisfy the ¾ requirement is **9**.
   
   \((13 \text{ eligible to vote - 1 not returned - 0 abstentions} = 12 \times 0.75 = 9)\)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **May 16, 2020**.
NFPA 30 Proposed TIA Log No. 1503 Correlating Committee Final Ballot Results

QUESTION NO. 1: I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.

Eligible to Vote: 13
Not Returned: 1
John P. Woycheese

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<td>12</td>
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<tr>
<td>John A. LeBlanc</td>
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<td>Agree</td>
</tr>
<tr>
<td>Luis F. Arango</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Tracey D. Bellamy</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Bill Johns, P.E.</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Roland A. Riegel</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Clark D. Shepard</td>
<td></td>
<td>I agree with 1503 which outlines a different pg number 3.3.34.3</td>
</tr>
<tr>
<td>David P. Nugent</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Douglas W. Fisher</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Leo T. Old</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Scott Wright</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jeremy Lebowitz</td>
<td></td>
<td>Agree; There should also be a parenthetical reference to Section 4.4 (determination of flash point) for consistency with the definitions of Flammable Liquid and Combustible Liquid.</td>
</tr>
<tr>
<td>William V. F. Cosey</td>
<td></td>
<td>Agree</td>
</tr>
</tbody>
</table>

Disagree 0
Abstain 0
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

<table>
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<tr>
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<tbody>
<tr>
<td>Not Returned: 1</td>
</tr>
<tr>
<td>John P. Woycheese</td>
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<tr>
<td>Agree</td>
<td>11</td>
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<tr>
<td>John A. LeBlanc</td>
<td></td>
<td>A, D.</td>
</tr>
<tr>
<td>Luis F. Arango</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Tracey D. Bellamy</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Bill Johns, P.E.</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Clark D. Shepard</td>
<td></td>
<td>I agree</td>
</tr>
<tr>
<td>David P. Nugent</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Douglas W. Fisher</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Leo T. Old</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Scott Wright</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Jeremy Lebowitz</td>
<td></td>
<td>A + D</td>
</tr>
<tr>
<td>William V. F. Cosey</td>
<td></td>
<td>A and D.</td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Roland A. Riegel</td>
<td></td>
<td>Revising this definition is not an emergency.</td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
1. Revise the text in the decision box at the Figure 16.4.1(c) as follows:

“Is acceptable protection criteria available per 4.8.2.3-16.3.5?”

2. Revise the text in the process box at the bottom of the same figure as follows:

“The storage is unprotected (see 4-4.4 and Table 4-4.4.1) (see Table 12.6.2.2)”

**Substantiation:** Figure 16.4.1(c) – Fire Protection Criteria Decision Tree for Miscible Flammable and Combustible Liquids in Nonmetallic Containers, has incorrect references in a decision box (diamond) and a process box (rectangle) located at the bottom of the figure and
highlighted in the attachment. The references cited do not correspond to a table or section of the code.

**Emergency Nature:** As currently submitted, the Figure has incorrect information and may not allow proper evaluation of ignitable liquids in nonmetallic containers.
MEMORANDUM

TO: Technical Committee on Storage and Warehousing of Containers and Portable Tanks

FROM: Diane Matthews, Technical Committee Administrator

DATE: June 18, 2020

SUBJECT: NFPA 30 Proposed TIA No. 1507 FINAL TC BALLOT RESULTS

No public comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA **HAS** achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

<table>
<thead>
<tr>
<th></th>
<th>Eligible to Vote</th>
<th>Not Returned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Merit</td>
<td>32</td>
<td>3</td>
</tr>
<tr>
<td>Emergency Nature</td>
<td>0</td>
<td>28</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) affirmative ¾ vote and (2) simple majority] with both questions needing to pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[32 \text{ eligible} \div 2 = 16 + 1 = 17\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is **22**.

\[(32 \text{ eligible to vote} - 3 \text{ not returned} - 0 \text{ abstentions} = 29 \times 0.75 = 21.75)\]

Ballot comments are attached for your review.

The *Regs* at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **June 23, 2020**.
NFPA 30 Proposed TIA Log No. 1507 Technical Committee on Storage and Warehousing of Containers and Portable Tanks Final Ballot Results

<table>
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<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
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<tr>
<td>Agree</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Duane L. Rehmeyer</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Richard J. Hild</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Donald B. Hicks</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>John A. LeBlanc</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Martin H. Workman</td>
<td>A.</td>
<td></td>
</tr>
<tr>
<td>Tracey D. Bellamy</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>George A. Seuss, Jr.</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td>I AGREE with the TECHNICAL MERITS of the PROPOSED TIA</td>
<td></td>
</tr>
<tr>
<td>Anthony M. Ordile</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Todd M. Kidd</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Lee T. Rindfuss</td>
<td>I agree that as written, one would be misguided and thus this is of an emergency nature.</td>
<td></td>
</tr>
<tr>
<td>David P. Nugent</td>
<td>Agree</td>
<td></td>
</tr>
</tbody>
</table>
Thomas S. Lentz                   Current reference does not exist
Glen A. Carter                    Agree
Claire V. De Taeye                agree
Ronald N. Webb                   Agree
Dwight H. Havens                  Agree.
Roland A. Riegel                 Would lead to a wrong decision if not corrected.
Susan Nauman                     Agree
Randy Slama                      Agree
Brian Minnich                    Agree
Kevin M. Wypychoski              Should be same as 2018 edition, and no need to change.
Steven D. Wolin                  Agree
Tim D. Blackford                 Agree
William E. Koffel                Agree
David B. Wechsler                There are two points in this proposed TIA. As indicated below, 4-8.2.3 is not a valid section and therefore 16.3.5 is valid. Second section 4.4.4 dealing with flash point has little to do with unprotected storage. However Figure 16.4.1 c is dealing with water-miscible liquids in non-metallic containers, and referencing and implying that only Table 12.6.2.2 applies for Chapter 16 is truly not correct. It may be more true than looking 4-8.2.3.

Ronald G. Schaffhauser           Agree
William V. F. Cosey               Agree
Nicholas Ozog                     Agree
Disagree                          0
Abstain                           0
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 32
Not Returned: 3
Scott Wright, Anthony R. Cole, Keric M. Fitzgerald

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>28</td>
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</tr>
<tr>
<td>Duane L. Rehmeyer</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Richard J. Hild</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Donald B. Hicks</td>
<td>A and B</td>
<td></td>
</tr>
<tr>
<td>John A. LeBlanc</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Martin H. Workman</td>
<td>A.</td>
<td></td>
</tr>
<tr>
<td>Tracey D. Bellamy</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>George A. Seuss, Jr.</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td>I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.</td>
<td></td>
</tr>
<tr>
<td>Anthony M. Ordile</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Todd M. Kidd</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Lee T. Rindfuss</td>
<td>I agree that as written, one would be misguided and thus this is of an emergency nature.</td>
<td></td>
</tr>
<tr>
<td>David P. Nugent</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Thomas S. Lentz</td>
<td>Need to provide the proper referenced section</td>
<td></td>
</tr>
<tr>
<td>Glen A. Carter</td>
<td>Reason A is my understanding.</td>
<td></td>
</tr>
</tbody>
</table>
Claire V. De Taeye
The standard contains an error or an omission that was overlooked during the regular revision process.

Ronald N. Webb
A. The standard contains an error or an omission that was overlooked during the regular revision process.

Dwight H. Havens
Would lead to a wrong decision if not corrected.

Roland A. Riegel
A.

Susan Nauman
A.

Randy Slama
A

Brian Minnich
selection A

Kevin M. Wypychoski
Should be same as 2018 edition, and no need to change.

Steven D. Wolin
A

Tim D. Blackford
A

William E. Koffel
A. The standard contains an error or an omission that was overlooked during the regular revision process.

Ronald G. Schaffhauser
A

William V. F. Cosey
A.

Nicholas Ozog
Agree to replace table.

Disagree
1
David B. Wechsler

Point 1- This action is clearly to correct a typo and since there is no section '4-8.2.3' for someone using NFPA 30 they would not be able to misapply a requirement or recommendation which is not shown. Instead they would have to contact someone like NFPA staff for guidance. It does appear that 16.3.5 would address the figure decision block for protection. Point 2- The revision does contain 4.4.4. However discussion of flash point does not agree with decision block on unprotected storage. Issues regarding unprotected storage should reference 12.2.1 and not just the suggested specific paragraph. Consider holding off on the action and making a more complete correction.

Abstain

0
MEMORANDUM

TO: Correlating Committee on Flammable and Combustible Liquids

FROM: Diane Matthews, Technical Committee Administrator

DATE: June 18, 2020

SUBJECT: NFPA 30 Proposed TIA No. 1507 FINAL CC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(b) in the NFPA Regs, the results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

13 Eligible to Vote
3 Not Returned (Bellamy, Shepard and Wright)

<table>
<thead>
<tr>
<th>Correlation Issues:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>10 Agree (w/comment, Riegel)</td>
<td>10 Agree (w/comment, Riegel and Woycheese)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

1. In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
   
   \[13 \text{ eligible} \div 2 = 6.5 = (7)\]

2. The number of affirmative votes needed to satisfy the ¾ requirement is 8.
   
   \[(13 \text{ eligible to vote} - 3 \text{ not returned} - 0 \text{ abstentions}) = 10 \times 0.75 = 7.5\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is June 23, 2020.
NFPA 30 Proposed TIA Log No. 1507 Correlating Committee Final Ballot Results

**QUESTION NO. 1: I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.**

<table>
<thead>
<tr>
<th>Eligible to Vote: 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Returned: 3</td>
</tr>
<tr>
<td>Tracey D. Bellamy, Clark D. Shepard, Scott Wright</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Bill Johns, P.E.</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>William V. F. Cosey</td>
<td></td>
<td>Agree.</td>
</tr>
<tr>
<td>John A. LeBlanc</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Douglas W. Fisher</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jeremy Lebowitz</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Roland A. Riegel</td>
<td></td>
<td>I don't see any items to correlate with the proposed TIA revisions.</td>
</tr>
<tr>
<td>Luis F. Arango</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Leo T. Old</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>David P. Nugent</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>John P. Woycheese</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Updated: August 4, 2020
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 13  
Not Returned : 3  
Tracey D. Bellamy, Clark D. Shepard, Scott Wright

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Bill Johns, P.E.</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>William V. F. Cosey</td>
<td>A.</td>
<td></td>
</tr>
<tr>
<td>John A. LeBlanc</td>
<td>A.</td>
<td></td>
</tr>
<tr>
<td>Douglas W. Fisher</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Jeremy Lebowitz</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Roland A. Riegel</td>
<td>Needs to be fixed now to avoid the wrong decision.</td>
<td></td>
</tr>
<tr>
<td>Luis F. Arango</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Leo T. Old</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>David P. Nugent</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>John P. Woycheese</td>
<td>A. This appears to revert a change proposed during the 2021 review process, returning the text to the 2018 version.</td>
<td></td>
</tr>
</tbody>
</table>

| Disagree | 0    |
| Abstain  | 0    |
NFPA 30A-2018 Edition

*Code for Motor Fuel Dispensing Facilities and Repair Garages*

TIA Log No.: 1508

Reference: 7.4.4.1

Comment Closing Date: June 17, 2020

Submitter: Ronald B. Laurence, Jr., Stantec Consulting Services Inc.

[www.nfpa.org/30A](http://www.nfpa.org/30A)

1. Revise Section 7.4.4.1 as follows:

   **7.4.4.1** Slip-resistant, nonabsorbent, interior floor finishes having a critical radiant flux not more less than 0.45 W/cm² (9.87 Btu/in.²-hr), as determined by NFPA 253, shall be permitted required.

**Substantiation:** NFPA 101® 10.2.7.4.1 states: “Class I Interior Floor Finish shall have a critical radiant flux of not less than 0.45 W/cm².” The critical radiant flux is a measure of radiant heat energy that will ignite a material and sustain a fire. The higher the value for a material, the more energy is required to ignite that material. The current code is permitting the installation of flooring materials that have a critical radiant flux that is lower than 0.45 W/cm², which therefore implies that materials that can ignite more easily can be installed. This change will make NFPA 30A consistent with NFPA 101 and eliminate confusion.

The second change is in relation to units. The unit for watts (W) is an energy or heat per time unit which is in Joules/second. The English units do not specify the time unit. 0.45 W/cm² converts to 9.87 BTU/(in.² – hr). The time unit is added to reduce confusion.

The third change is to clarify that using these types of materials are not simply allowed but are required.

**Emergency Nature:** The discrepancy between NFPA 101® and NFPA 30A may cause confusion on selecting the proper flooring materials and could potentially lead a user to select a less flammable resistant material. This discrepancy was brought to NFPA’s attention by an inquiry in the TQS.
MEMORANDUM

TO: Technical Committee on Automotive and Marine Service Stations

FROM: Diane Matthews, Technical Committee Administrator

DATE: June 26, 2020

SUBJECT: NFPA 30A Proposed TIA No. 1508 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

33 Eligible to Vote

2 Not Returned (Deacon and Katekar)

Technical Merit:  Emergency Nature:

1 Abstention (Robbins)  1 Abstention (Robbins)

29 Agree (w/comment, Boyd, Burns, Moses, Myers, Phelan and Renkes)  29 Agree (w/comment, Moses, Myers, Phelan, Renkes and Walters)

1 Disagrees (Jones, Jr.)  1 Disagrees (Jones, Jr.)

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[
\text{[33 eligible ÷ 2} = 16.5 = (17)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 23.

\[
(33 \text{ eligible to vote - 2 not returned - 1 abstention} = 30 \times 0.75 = 22.50)
\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is July 1, 2020.
## NFPA 30A Proposed TIA Log No. 1508 Fnal Ballot Results

**QUESTION NO. 1:** I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1508 to the 2018 Edition of NFPA 30A to Revise 7.4.4.1.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Ronald B. Laurence, Jr.</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Scott C Boorse</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Peter E. Manger</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Johnny Rhodes</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Curtis N. Harding</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Dennis Boyd</td>
<td>The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard</td>
<td></td>
</tr>
<tr>
<td>Robert N. Renkes</td>
<td>Clarification. reduce confusion.</td>
<td></td>
</tr>
<tr>
<td>James R. Rocco</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Randy Moses</td>
<td>This standard should not be in conflict with other standards</td>
<td></td>
</tr>
<tr>
<td>Eric C. Smith</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Alfredo M. Ramirez</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Bruce J. Swiecicki</td>
<td>I agree with the technical merits.</td>
<td></td>
</tr>
<tr>
<td>Andrew S. Klein</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>David T. Phelan</td>
<td>Correlates NFPA 30-A to NFPA 101</td>
<td></td>
</tr>
</tbody>
</table>
Thomas K. Drube
Agree

Joseph Spaeder
agree

Joel E. Sipe
Agree

Philip Myers
clarifies meaning and i support it.

Bill Hickman
Agree

Mike Walters
i agree.

Rob Brown
I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1508 to the 2018 Edition of NFPA 30A to Revise 7.4.4.1.

Thomas J. Forsythe
Agree.

Daniel John Hunter
Agree

Charles A. Burns
This Change will provide uniformity with NFPA 101 and will clear up any confusion. I believe this change reflects the intent of the code.

Richard G. Fredenburg
Agree

R. Jeff Tanner
B

Mathew Smith
agree

Ted Williams
Agree

Paul J. Doyle
I agree with the technical merits

Disagree
1

Guy L. Jones, Jr.
The added requirement fundamentally falls outside of the scope of this document.

Abstain
1

Jess A. Robbins
I do not have the background to evaluate.
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
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</thead>
<tbody>
<tr>
<td>Agree</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Ronald B. Laurence, Jr.</td>
<td></td>
<td>A and B</td>
</tr>
<tr>
<td>Scott C Boorse</td>
<td></td>
<td>A.</td>
</tr>
<tr>
<td>Peter E. Manger</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Johnny Rhodes</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Curtis N. Harding</td>
<td></td>
<td>D</td>
</tr>
<tr>
<td>Dennis Boyd</td>
<td></td>
<td>The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard</td>
</tr>
<tr>
<td>Robert N. Renkes</td>
<td></td>
<td>reduce confusion with 101</td>
</tr>
<tr>
<td>James R. Rocco</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Randy Moses</td>
<td></td>
<td>We should not be sending this standard out with known errors that can be corrected</td>
</tr>
<tr>
<td>Eric C. Smith</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Alfredo M. Ramirez</td>
<td></td>
<td>agree in view of Item A</td>
</tr>
<tr>
<td>Bruce J. Swiecicki</td>
<td></td>
<td>I agree that this is of an emergency nature.</td>
</tr>
<tr>
<td>Andrew S. Klein</td>
<td></td>
<td>A, B</td>
</tr>
<tr>
<td>David T. Phelan</td>
<td></td>
<td>Corrects two different requirements within 2 different NFPA documents.</td>
</tr>
<tr>
<td>Thomas K. Drube</td>
<td></td>
<td>Agree</td>
</tr>
</tbody>
</table>
I agree that this is highly important
I agree with the substantiation.
I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

The added requirement fundamentally falls outside of the scope of this document.

I do not have the background to evaluate.
I understand the desire of the developer of this TIA. However, prior to his change, a “normal” concrete floor was acceptable. By changing “permitted” to “required” a concrete floor is no longer acceptable. It must have an acceptable nonslip coating.

Best regards,

Bill Young
NFPA 30A-Proposed 2021 Edition

*Code for Motor Fuel Dispensing Facilities and Repair Garages*

TIA Log No.: 1509
Reference: 7.4.3.1 and 7.8.5.4
Comment Closing Date: June 17, 2020
Submitter: Ronald B. Laurence, Jr., Stantec Consulting Services Inc.
www.nfpa.org/30A

1. *Revise Section 7.4.3.1 as follows:*

   7.4.3.1 Slip-resistant, nonabsorbent, interior floor finishes having a critical radiant flux not **more less** than 0.45 W/cm² (9.87 Btu/in.²-hr), as determined by NFPA 253, shall be **permitted required**.

2. *Revise Section 7.8.5.4 as follows:*

   7.8.5.4 Where installed, slip-resistant, nonabsorbent interior floor finishes shall have a critical radiant flux of not **more less** than 0.0045 0.45 W/cm² (9.87 Btu/in.²-hr), as determined by NFPA 253.

**Substantiation:** NFPA 101® 10.2.7.4.1 states: “Class I Interior Floor Finish shall have a critical radiant flux of not less than 0.45 W/cm².” The critical radiant flux is a measure of radiant heat energy that will ignite a material and sustain a fire. The higher the value for a material, the more energy is required to ignite that material. The current code is permitting the installation of flooring materials that have a critical radiant flux that is lower than 0.45 W/cm², which therefore implies that materials that can ignite more easily can be installed. This change will make NFPA 30A consistent with NFPA 101 and eliminate confusion.

The second change is in relation to units. The unit for watts (W) is an energy or heat per time unit which is in Joules/second. The English units do not specify the time unit. 0.45 W/cm² converts to 9.87 BTU/(in.2 – hr). The time unit is added to reduce confusion.

The third change is to clarify that using these types of materials are not simply allowed but are required. This change will align the intent of 7.4.3.1 with 7.8.5.4.

The fourth change is regarding a unit conversion that was added at the 2019 SD meeting. The basis of the requirement is 0.45 W/cm² and an attempt was made to convert the British units back to SI units. This change aligns the critical flux value in NFPA 30A with NFPA 101®.

**Emergency Nature:** The discrepancy between NFPA 101® and NFPA 30A may cause confusion on selecting the proper flooring materials and could potentially lead a user to select a less flammable resistant material. This discrepancy was brought to NFPA’s attention by an inquiry in the TQS.
MEMORANDUM

TO: Technical Committee on Automotive and Marine Service Stations

FROM: Diane Matthews, Technical Committee Administrator

DATE: June 18, 2020

SUBJECT: NFPA 30A Proposed TIA No. 1509 FINAL TC BALLOT RESULTS

No public comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

| 33 | Eligible to Vote
| 3  | Not Returned (Deacon, Katekar and Sipe)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Abstention (Robbins)</td>
<td>1 Abstention (Robbins)</td>
</tr>
<tr>
<td>28 Agree (w/comment, Boyd, Burns, Moses, Meyers, Phelan, Renkes, Walters and Williams)</td>
<td>28 Agree (w/comment, Moses, Myers, Phelan, Renkes, Walters and Williams)</td>
</tr>
<tr>
<td>1 Disagrees (Jones, Jr.)</td>
<td>1 Disagrees (Jones, Jr.)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) affirmative ¾ vote and (2) simple majority] with both questions needing to pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[33 \text{ eligible} \div 2 = 16.5 = (17)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 22.

\[33 \text{ eligible to vote} - 3 \text{ not returned} - 1 \text{ abstention} = 29 \times 0.75 = 21.75\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is June 23, 2020.
QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the PROPOSED TIA LOG No. 1509 to the Proposed 2021 Edition of NFPA 30A to Revise 7.4.3.1 and 7.8.5.4.

Eligible to Vote: 33
Not Returned: 3
Chaitanya Katekar, Nils Deacon, Joel E. Sipe

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Alfredo M. Ramirez</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Randy Moses</td>
<td></td>
<td>The standard should be consistent with other standards, not opposed.</td>
</tr>
<tr>
<td>Robert N. Renkes</td>
<td></td>
<td>Will eliminate confusion with 101</td>
</tr>
<tr>
<td>R. Jeff Tanner</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Charles A. Burns</td>
<td></td>
<td>This change provides consistency with NFPA 101 and clears up any confusion between the two codes</td>
</tr>
<tr>
<td>James R. Rocco</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Rob Brown</td>
<td></td>
<td>I AGREE with the TECHNICAL MERITS of the PROPOSED TIA LOG No. 1509 to the Proposed 2021 Edition of NFPA 30A to Revise 7.3.4.1 and 7.8.5.4.</td>
</tr>
<tr>
<td>Mathew Smith</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>David T. Phelan</td>
<td></td>
<td>Correlates NFPA 30-A with NFPA 101</td>
</tr>
<tr>
<td>Andrew S. Klein</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Thomas K. Drube</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Ronald B. Laurence, Jr.</td>
<td></td>
<td>agree</td>
</tr>
</tbody>
</table>
Paul J. Doyle  
Curtis N. Harding  
Richard G. Fredenburg  
Bruce J. Swiecicki  
Scott C Boorse  
Joseph Spaeder  
Peter E. Manger  
Johnny Rhodes  
Mike Walters  
Bill Hickman  
Philip Myers  
Daniel John Hunter  
Eric C. Smith  
Dennis Boyd  
Ted Williams  
Thomas J. Forsythe  

disagree  
Guy L. Jones, Jr.  

Agree  
I agree with the technical merits.  
Agree  
I agree with consistency.  
Agree  
The changes improve clarity.  
Agree  
Agree  
The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard  
I agree with the characterization of the technical merits of proposed TIA as needed to address shortcomings of the final action of the Technical Committee.  
Agree  
1  
The added requirement fundamentally falls outside of the scope of this document.  
1  
I do not have the background to evaluate.
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 33
Not Returned: 3

Chaitanya Katekar, Nils Deacon, Joel E. Sipe

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Alfredo M. Ramirez</td>
<td></td>
<td>Reason - Item A</td>
</tr>
<tr>
<td>Randy Moses</td>
<td></td>
<td>We should not be publishing this standard with what appears to be an error.</td>
</tr>
<tr>
<td>Robert N. Renkes</td>
<td></td>
<td>Discrepancy with 101.</td>
</tr>
<tr>
<td>R. Jeff Tanner</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Charles A. Burns</td>
<td></td>
<td>A &amp; B</td>
</tr>
<tr>
<td>James R. Rocco</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Rob Brown</td>
<td></td>
<td>I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box. '.</td>
</tr>
<tr>
<td>Mathew Smith</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>David T. Phelan</td>
<td></td>
<td>Corrects conflicting language between two NFPA documents.</td>
</tr>
<tr>
<td>Andrew S. Klein</td>
<td></td>
<td>A, B</td>
</tr>
<tr>
<td>Thomas K. Drube</td>
<td></td>
<td>Agree</td>
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<td>Ronald B. Laurence, Jr.</td>
<td></td>
<td>A and B</td>
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<tr>
<td>Paul J. Doyle</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
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<tr>
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<td>Curtis N. Harding</td>
<td>D</td>
<td>I agree that this is of an emergency nature.</td>
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<tr>
<td>Richard G. Fredenburg</td>
<td>Agree F</td>
<td></td>
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<tr>
<td>Bruce J. Swiecicki</td>
<td>A &amp; B.</td>
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<tr>
<td>Scott C Boorse</td>
<td>agree</td>
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<td>Joseph Spaeder</td>
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<tr>
<td>Peter E. Manger</td>
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<td>Johnny Rhodes</td>
<td>Agree</td>
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<tr>
<td>Mike Walters</td>
<td>I agree with the stated substantiation.</td>
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<tr>
<td>Bill Hickman</td>
<td>A and B</td>
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<tr>
<td>Philip Myers</td>
<td>i agree that this is an important enough item to fast track it.</td>
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<td>Daniel John Hunter</td>
<td>B and D.</td>
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<tr>
<td>Eric C. Smith</td>
<td>A</td>
<td>The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard</td>
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<tr>
<td>Dennis Boyd</td>
<td>B and D.</td>
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<tr>
<td>Ted Williams</td>
<td>I agree with the characterization of the technical merits of proposed TIA as needed to address shortcomings of the final action of the Technical Committee.</td>
<td></td>
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<tr>
<td>Thomas J. Forsythe</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>The added requirement fundamentally falls outside of the scope of this document.</td>
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<tr>
<td>Guy L. Jones, Jr.</td>
<td></td>
<td></td>
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<tr>
<td>Abstain</td>
<td>1</td>
<td>I do not have the background to evaluate.</td>
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Updated: August 4, 2020
NFPA 30A-Proposed 2021 Edition
Code for Motor Fuel Dispensing Facilities and Repair Garages
TIA Log No.: 1511
Reference: 2.4, and 14.2.7
Comment Closing Date: June 25, 2020
Submitter: Nick Alexander, Yoshi, Inc.
www.nfpa.org/30A

1. Add a new reference in Section 2.4 as follows:
   2.4 References for Extracts in Mandatory Sections.

2. Revise Section 14.2.7 as follows:
   14.2.7 Mobile fueling operations shall be prohibited in buildings and in covered parking
   structures, unless such operations are approved by the authority having jurisdiction and
   conducted in aboveground open parking structures in accordance with 14.2.7.1 using a non-
   tank vehicle that meets the requirements of 14.3.1(2) or 14.3.1(3).

14.2.7.1 Opening Requirements for Open Parking Structures. [88A:5.5]

14.2.7.1.1 For natural ventilation purposes, the exterior sides of the structure shall have
   uniformly distributed openings on two or more sides. [88A: 5.5.1]

14.2.7.1.2 The area of such openings in exterior walls on a level shall be not less than 20
   percent of the total perimeter wall area of each level. [88A: 5.5.2]

14.2.7.1.3 The aggregate length (i.e., total of widths) of the openings considered to be
   providing natural ventilation shall be not less than 40 percent of the perimeter of the level.
   [88A: 5.5.3]

14.2.7.1.4 Where the required openings are uniformly distributed over two opposing sides of
   the building, 14.2.7.1.3 shall not apply. [88A: 5.5.4]

14.2.7.1.5 Interior wall lines and column lines shall be at least 20 percent open, with openings
   uniformly distributed to provide ventilation. [88A: 5.5.5]

Substantiation: There are significant and damaging limitations to the current draft of Section
14.2.7 of NFPA 30A Chapter 14. Unlike other sections of Chapter 14, 14.2.7 does not distinguish
between tank and non-tank vehicles, as defined under 14.3.1. This guidance has been written
very broadly, without consideration of companies deploying non-tank vehicles that can, and
do, operate safely. Rather than banning all mobile fueling operations, the standard should
recognize the technical differences in, and safety specifications of, both tank and non-tank
vehicles.
A large portion of Yoshi’s business is conducted in parking structures that fit NFPA 88A’s definition of open parking structures. These structures are popular across the country, seen at corporate campuses, train stations, hospitals, etc. Their open air plan accommodates safe ventilation, and it is safe to operate non-tank vehicles in these structures. Yoshi has been doing so for over 5 years without incident.

However, the current 2021 language for 14.2.7 broadly bans such services by prohibiting mobile fueling operations in any “covered structures.” This is why we support adding language from NFPA 88A 5.5, which defines Open Parking Structures, to 14.2.7.

Yoshi’s equipment, vehicles, and procedures are fully compliant with federal, state, and local regulations. In fact, the safety mechanisms of Yoshi’s retrofitted fleet of fuel trucks often exceed these regulations. Yoshi and other similar companies are committed to the safety of the environment and the general public to allow for safe fuel transfer. Simply put, the standard, as currently written, does not consider the variety of mobile fueling trucks that service this industry.

Finally, 14.2.7 does not allow exceptions for approval by ‘authorities that have jurisdiction (AHJ).’ This is a strange departure from most of the chapter, which otherwise accommodates such language. Many AHJs adhere to and enforce the most recent version of NFPA’s codes, not the latest code implemented by the AHJ’s state, which is often out of date. An AHJ should have the authority to certify a location safe to conduct mobile fueling operations for a non-tank vehicle, as our TIA recommends. AHJs are the local authorities that know the locations and understand the specifications required for conducting safe mobile fueling operations.

Should 14.2.7 of NFPA 30A be certified as currently written, any potential growth, and frankly the survival, of this exciting and important, emerging, and disruptive industry of on-demand mobile fueling will be completely crippled.

**Emergency Nature:** The proposed TIA intends to correct a previously unknown existing hazard. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

The emergency nature of this TIA is that operations within the mobile fueling industry have been hamstrung since the 2018 standard was released. Without clearly including the language “authority having jurisdiction” in 14.2.7, privately-held properties are not permitted to allow mobile fueling companies to operate on their grounds because AHJs are not aware they have the authority to approve such operations inherently through NFPA code. Though 1.6 (Enforcement) of Chapter 1 (Administration) of NFPA 30A grants overall authority to an ‘authority having jurisdiction,’ the inconsistency within the various parts of NFPA 30A that do and do not include the language duplicatively leads to the overall cessation of authority by AHJs, which is what led to the ending of a vast portion of Yoshi’s mobile fueling operations in 2018. Yoshi’s entire business model, since its inception in 2015, has focused on the market of corporate, on-demand fueling, especially in covered parking structures and specifically in the open air structures discussed earlier. Yoshi passed Exxon Mobil’s (EM) very strict safety measures to refuel vehicles
in EM structures and did so until the 2018 Code came out, which completely banned mobile fueling operations and did not specifically give the AHJ the authority to oversee the mobile fueling operations in its jurisdiction. Yoshi’s operations at Exxon and General Motors (GM, similar scenario) were completely shut down because it was not clearly stated that an AHJ that oversaw these properties’ parking structures could step in and confirm that such operations were safe and secure. This is why the ‘authority having jurisdiction’ language is so important: after passing EM’s & GM’s self-imposed safety certifications, an AHJ should have the authority to also sign off on the mobile fueling operations. In addition, unlike other sections of NFPA 30A Chapter 14, 14.2.7 does not distinguish between tank and non-tank vehicles, as defined under 14.3.1. This guidance has been written without consideration of companies deploying non-tank vehicles, such as retrofitted trucks, that can safely navigate and conduct operations in above-ground, open-air covered parking structures. Similar to our first concern, the immediacy of this request is that, once implemented, this regulatory language prohibits Yoshi, and similar industry members, from operating in countless, safe locations, regardless of the size of the vehicle. The industry of on-demand mobile fueling is incredibly important, but also very young and economically fragile. 14.2.7, as currently written, will cripple, if not doom, this industry if the market is limited so significantly. This TIA alters the language of 14.2.7 to allow the mobile fueling industry to grow responsibly while implementing and maintaining strict safety standards to adhere to.
MEMORANDUM

TO: Technical Committee on Automotive and Marine Service Stations
FROM: Diane Matthews, Technical Committee Administrator
DATE: July 6, 2020
SUBJECT: NFPA 30A Proposed TIA No. 1511 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS NOT achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

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<th>Eligible to Vote</th>
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<td><em>4</em></td>
<td>Abstention (Sipe)</td>
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<td></td>
<td></td>
<td>Agree (w/comment, Klein, Moses and Swiecicki)</td>
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<td></td>
<td></td>
<td>Disagree (Boorse, Boyd, Burns, Fredenburg, Harding, Jones, Jr., Phelan, Ramires, Rocco, E. Smith, M. Smith, Tanner, Walters and Williams)</td>
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There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

   $33 \text{ eligible} \div 2 = 16.5 = (17)$

2. The number of affirmative votes needed to satisfy the ¾ requirement is:

   - **Technical Merit:** (33 eligible to vote - 4 not returned - 2 abstentions = $27 \times 0.75 = 20.25 = 21$)
   - **Emergency Nature:** (33 eligible to vote – 4 not returned – 1 abstention = $28 \times 0.75 = 21$)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is July 11, 2020.
**NFPA 30A Proposed TIA Log No. 1511 Technical Committee on Automotive and Marine Service Stations Final Ballot Results**

**QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the PROPOSED TIA LOG No. 1511 to the Proposed 2021 Edition of NFPA 30A to Add a New Reference in Section 2.4 and Revise Section 14.2.7.**

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<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
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<tr>
<td>Agree</td>
<td>14</td>
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- Johnny Rhodes: Agree
- Rob Brown: Agree
- Joseph Spaeder: agree
- Randy Moses: I am in favor of clarifying conditions under which mobile fueling can take place safely while acknowledging that the proposed practice has been taking place for 5 years without incident. We should also allow for AHJ intervention as we do in so many other situations.
- Bill Hickman: Agree
- Bruce J. Swiecicki: I found the public comments that were submitted to be persuasive and valuable testimony as to the impact that this mode of refueling would have to the general public. The fact that it would be limited to open parking structures using non-tank vehicles adds a level of reassurance.
- Mathew Smith: agreed
- Daniel John Hunter: Agree
- Jess A. Robbins: Agree
Thomas J. Forsythe                      Agree
Ted Williams                           While I agree with providing AHJ discretion in approving this mode of refueling, it is unclear whether NFPA 30A jurisdictional facilities could in general comply with the building openings requirements. Also, it is unclear that there is a compelling need to provide for this mode of refueling in repair garages.
Curtis N. Harding                     Agree
Nils Deacon                           Agree
Thomas K. Drube                       Agree
**Disagree** 13
Charles A. Burns                      The financial feasibility of any business is not the committee's concern. I believe preventing a dangerous activity in a congested, improperly vented area which would likely result in the delivery vehicle parking in a public way was the intent of the prohibition.
Andrew S. Klein                       This TIA focused only on what types of garages an AHJ may permit fueling in and ignored the additional safety requirements applicable to the mobile fueling vehicles themselves when operating in a garage. Furthermore, it seems illogical to prohibit tank vehicles, which are the safest of all mobile fueling vehicles. At a minimum, mobile fueling vehicles should be required to have a vapor suppressing fire extinguisher, and tank vehicles (which are limited in size to only 1200 gallons in Chapter 14) should be permitted. If any fueling model is prohibited, it should be the 5-gallon safety can model which is most prone to human error. With those changes, I would support this TIA.
Richard G. Fredenburg                 This was discussed at length at the technical committee meetings and the committee's intent was clearly stated in the new edition.
Eric C. Smith                         Disagree
David T. Phelan  
My ballot comment exceeds the 4000 character limit and is being submitted electronically in Word document format to the project administrator.

Mike Walters  
I have read the proposal and subsequent substantiation. I have many questions that lead me to believe that this proposal needs more discussion in committee. Therefore, a negative ballot.

Alfredo M. Ramirez  
NFPA 30A requirements align with IFC.

James R. Rocco  
The committee considered a proposal to include parking structures (along with on-road fueling) during the last revision cycle; however, after considerable discussion it was decided not to include parking structures. The proposed language in this TIA does not address all of the potential concerns discussed with respect to mobile fueling in a parking structure.

Ronald B. Laurence, Jr.  
NFPA 30A (Chapter 7) has numerous building infrastructure requirements that are required for fixed indoor fueling facilities. It is unlikely that an open parking structure not designed as such would have many of these features. Additionally, the International Building Code (IBC) specifically prohibits fuel dispensing in open parking structures, i.e. parking structures that do not require sprinklers. As such, it appears the proposal is inconsistent with the most common US building code.

R. Jeff Tanner  
Unfortunately, in these very political times, AHJ’s are having their hands tied constantly by political appointees that make determinations instead of allowing the source matter experts to review and approve items based on their merits. If the language is changed, we will be forced to accept the fueling inside of structures without being able to review and approve or deny these applications. With the way it currently written, anyone wanting to do the fueling inside will have to come thru the AHJ to get approval to do so. And, as I have already seen, if one step is taken in a certain direction, its like allowing the flood gates to open, everything will be allowed, typically without our say in the matter.
Guy L. Jones, Jr.  The technical requirements presented are outside the scope of the NFPA 30A standard.

Scott C Boorse  Based on the potential for fire to occur in a parking garage whether open or not and the potential spread of liquid fuel if there was a leak with sloped floors as well as the limited firefighting capabilities if a fire did occur in a parking structure, this effort should be defeated. Not to mention the prohibition of refueling inside a structure in NFPA 30.

Robert N. Renkes  I find comments submitted by fellow committee members to be persuasive.

Abstain  2

Dennis Boyd  Abstain. API is a national trade association representing hundreds of member companies involved in all aspects of the oil and natural gas industry. API’s members include producers, refiners, suppliers, retailers, pipeline operators, and marine transporters, as well as service and supply companies and contractors that support all segments of the industry. API’s retail infrastructure group is unable to come to consensus with the proposed changes. As such API abstains from voting.

Joel E. Sipe  Abstain due to business conflict from consulting work in the area of mobile fueling.
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 33
Not Returned: 4

Chaitanya Katekar, Philip Myers, Peter E. Manger, Paul J. Doyle

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<tr>
<th>Vote Selection</th>
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<tr>
<td>Agree</td>
<td>12</td>
<td>Johnny Rhodes: A</td>
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<td>Andrew S. Klein: D Mobile fueling is now more relevant provides an even more important service since COVID-19.</td>
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<td>Joseph Spaeder: agree</td>
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<td>Bruce J. Swiecicki: Based on public testimony, this mode of refueling had been approved by jurisdictions in the past. Therefore, it appears to meet the criterion for emergency nature based on revisions that had an adverse impact on a method that was already in use.</td>
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<td>Bill Hickman: C, F</td>
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<td>Rob Brown: A</td>
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<td>Randy Moses: The existing edition would say what has been happening can no longer take place. They should not have to live with this for 3 years.</td>
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<td>Daniel John Hunter: F</td>
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<td>Thomas J. Forsythe: A.</td>
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<td></td>
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<td>Ronald B. Laurence, Jr.: agree</td>
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</table>
F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

Disagree 16

Charles A. Burns
Does not meet the criteria

Mike Walters
Negative ballot, therefore no need for emergency status.

Richard G. Fredenburg
Reason C: Allowing this activity does not correct a previously unknown existing hazard. It would introduce a hazard. The hazard can and has resulted in significant fires, not necessarily from activities of the proponent's business. Reason F: I agree that this restricts the proponent's business activity, but the committee's action was taken after extensive discussion and close examination of the activity. The committee determined that, at least for now, this activity must be restricted.

Eric C. Smith
Disagree

David T. Phelan
My ballot comment exceeds the 4000 character limit and is being submitted electronically in Word document format to the project administrator.

Dennis Boyd
There is no hazard or public benefit of an Emergency nature which this TIA would correct.
Alfredo M. Ramirez
No emergency nature exists, requirements align with model fire codes

James R. Rocco
Correcting a previously unknown existing hazard is not an appropriate justification since the potential hazard would be due to the implementation of the activity. There is no hazard under the current exclusion of fueling in a parking structure. Further the issue of mobile fueling in parking structures was thoroughly discussed by the committee. While ventilation is one of the concerns for mobile fueling within a parking structure, it is not the only concern. Further this proposal suggests non-tank vehicles can safely navigate and conduct operations in a parking structure without providing specifications or references to standards and certifications for these vehicles.

Jess A. Robbins
The substantiation does not offer any data or specific number of business' that may be commercially at risk.

Ted Williams
I do not believe the proposed change meets the requirements of an "emergency nature" need for change to Section 14,2.7. The proponent does not define an "emergency" with respect to safety of NFPA 30A jurisdictional buildings.

R. Jeff Tanner
See question #1 response.

Guy L. Jones, Jr.
The technical requirements are outside the scope of the NFPA 30A standard and changes are therefore not an emergency.

Scott C Boorse
It does not appear that the proposed change meets the requirements of an "emergency nature" since the prohibition has been maintained for several cycles of the code, especially in NFPA 30 that has restricted inside refueling for many years

Robert N. Renkes
Needs to be discussed at full committee meeting.
Mathew Smith

The emergency nature justification in the documentation provided states that this has been a known issue since 2018. This should have been addressed in the standard revision cycle.

Curtis N. Harding

Not recognized as emergency in nature.

Abstain 1

Joel E. Sipe

Abstain due to business conflict from consulting work in the area of mobile fueling.
Background:

The mobile fueling for non-fleet vehicle requirements first appeared in the 2018 edition of NFPA 30-A as a newly created Chapter 14. At that time NFPA 30-A was the first code to specifically regulate mobile fueling and it has now been joined by the most widely accepted and comprehensive model fire code. Since inception the mobile fueling requirements have been expanded into the 2021 edition and it is likely that there will be further development of the code requirements during future revision cycles.

As to the subject of this TIA, mobile fueling in open parking structures, the 2018 edition of NFPA 30-A contained the following provision:

'Section 14.2.6 Mobile fueling and delivery vehicle parking shall be prohibited in buildings, in covered parking structures, on public streets, and on public ways.'

From the inception of the mobile fueling requirements in NFPA 30-A there has been a clear prohibition on the dispensing and parking of mobile fuel vehicles in covered parking structures. That is not something new which was added suddenly during the revision process of the 2021 edition. When the Committee completed its portion of the 2021 edition revision process the following language was present regarding parking structures:

'Section 14.2.7 Mobile fueling operations shall be prohibited in buildings and in covered parking structures.'

The prohibition language for mobile fueling in buildings and covered parking structures is technically unchanged from inception in the 2018 edition and into the proposed 2021 edition.

Emergency Nature Claim of TIA

In presenting for consideration of a TIA the Submitter opens with the following statement under the 'Emergency Nature' section of the proposal:

'The proposed TIA intends to correct a previously unknown existing hazard. The proposed TIA intendeds to correct a circumstance in which the revised NFPA Standard has resulted in an
adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.'

While this language is copied directly from Sections 5.4(c) and (f) 'Evaluation of Emergency Nature' of the Regulations Governing the Development of NFPA Standards it is not factually correct. The NFPA 30-A Committee has well considered of the practice of mobile fueling inside of buildings and parking garages since the inception of the code requirements in the 2018 edition. Simply stated, it is a prohibited act to conduct mobile fueling operations inside a building or a covered parking structure. The NFPA 30-A Committee has completed the revision process for the 2021 edition and that prohibition remains in place.

It then follows that there is no previously unknown existing hazard which needed correction. The NFPA 30-A Committee has been addressing the hazards of mobile fuel dispensing inside of buildings since the 2018 edition when they first drafted language prohibiting the activity. The proposed 2021 language does not lift the prohibition and therefore the known existing hazard of the TIA proposed activity is still adequately addressed.

The next part of the claim regarding correction of an adverse impact by overlooking is also entirely without merit. The NFPA 30-A Committee began the 2021 edition revision process by convening a Task Group to review and consider the totality of mobile fueling as there were six (6) public inputs submitted on a variety of mobile fueling requirements, including location prohibitions in Section 14.2.6. Of these six public inputs none of them sought to revise the 2015 language prohibiting mobile fueling operations inside of buildings or covered parking garages and none of them came from this TIA Submitter, his business entity, or a lobbyist who identified as representing that business. It's a little off-handed to now claim the 30-A Committee facilitated an adverse impact by overlooking when there was ample prior opportunity for anyone, including this TIA Submitter, his business entity, or a lobbyist to submit a public input or file a public comment which would have forced the 30-A Committee to review and respond to the matter. With no such inputs or comments introducing new technical information or research filed for consideration the 30-A Committee maintained the prior edition's prohibition language.

For disclosure purposes this author volunteered and was selected as a member of the NFPA 30-A 2021 Edition's Mobile Fueling Task Group and personally participated in eight group conference calls wherein the multitude of proposals and issues with mobile fueling were discussed and worked. There were also email correspondence's and draft language circulations between those conference calls as the Task Group was active throughout the time period between the First Meeting and Second Meeting. In the end the Mobile Fueling Task Group presented a report to the entire NFPA 30-A Committee during the 2nd Revision meeting in Pittsburgh on 9/17-9/18/2019. The entire Committee heard that report, discussed it as part of the meeting, and ultimately voted to accept the Task Group's report & draft language which included the preservation of the 2018 prohibition language for buildings and covered parking structure operations. One of the changes which was made to mobile fueling operations in the 2021 edition was the lifting of 2018's prohibition of on-street mobile fueling operations. In the
2018 edition the very same section\(^1\) which prohibited parking structure mobile fueling operations also contained a prohibition for on-street mobile fueling operations. Through the established revision process the 2021 edition would permit on-street mobile fuel operations but it preserved the previously standing prohibition on buildings and covered parking structure mobile fueling operations.

Clearly, there is no supporting evidence that either the Task Group or the 30-A Committee inadvertently overlooked the location prohibitions on mobile fueling operations. The record clearly reflects the opposite, that there was a considerable amount of time and resources expended to lift one of the location prohibitions, on-street, based on the submission of public inputs. That is not to say that mobile fueling in parking structures was not discussed or considered. There also was discussion of parking structure mobile fueling but in the end the Task Group could not come to a resolution of the issues and returned a report to the 30-A Committee which preserved the 2018 prohibition language. That however was still not the end of the road for parking structure operations as once the 30-A Committee met in whole at Pittsburgh there was another opportunity to discuss any and all of the Mobile Fuel Task Group's report. When it came to the discussion of parking structure mobile fueling the discussion could not even get started as the one member who moved to open discussion could not elicit a supporting second from any other member of the 30-A Committee. At that moment it was patently clear to anyone in the room, Committee member or guest, that the ongoing prohibition language for parking structures was going to stand for another cycle. The matter was placed before the 30-A Committee in clear form and there was but one affirmative vote to reconsider. The overwhelming lack of affirmative votes refutes any suggestion the matter was inadvertently overlooked by the 30-A Committee.

As to the Submitters claim that there was a lack of technical justification for the Committee's action in creating the prohibition language the following discussions should demonstrate that there is a legitimate justification for the ongoing prohibition language regarding mobile fueling operations in buildings, including covered parking structures.

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**Technical Justification for Covered Parking Structure Prohibition Language**

This TIA attempts to differentiate open parking structures\(^2\) from enclosed parking structures, essentially concluding that any open parking structure is inherently suitable for mobile fueling. Regardless of whether a parking garage is considered open or enclosed by the most widely accepted and comprehensive model building code or NFPA 5000 it is essentially universal that

\(^1\) NFPA 30-A (2018) Section 14.2.6

\(^2\) Model building codes, including NFPA 5000 and NFPA 88A, all effectively define an open parking garage as one with eligible ventilation openings, relative to wall area, on two or more exterior walls.
both types would be considered 'covered' in the context of NFPA 30-A whether by roofs, canopies, garage floor levels above, or other occupancies. The model building codes classify parking structures in two ways, either open or enclosed, based on the size, placement, and quantity of any exterior wall openings. This TIA is attempting to distract from the underlying issue of in-building and covered parking structures prohibition by carving out an exception for covered parking structures which have adequate eligible exterior wall openings to be considered 'open' type. Regardless these open parking structures would still be covered and the mobile fueling operation would be taking place inside of the building. The TIA also does not carve out any limitations or restrictions on the open parking structures to which the proposed wording would apply. Examples of such limitations would be the overall structure height in feet and story count, the overall height of the parking portion of the structure, adjacent & attached (non-parking) occupancies, occupancies above the parking portion of the structure, the type and materials of building construction, and the presence (or absence) of fixed fire suppression systems. As presented this TIA language would permit mobile fueling operations in ANY size, shape, height, and characteristic open parking structure without any limitation.

Let there be no confusion here, exterior wall openings that create an 'open' parking structures are not intended to achieve fire safety by the free relief of fire, smoke, and heat. When the most widely accepted and comprehensive model building code and NFPA 5000 created the open parking structure concept it was a means to utilize natural ventilation for the removal of airborne particulate and exhaust gases associated with motor vehicle operation. In addition to not requiring mechanical ventilation for 'open' parking garages the most widely accepted and comprehensive model building code does not generally require fire sprinkler systems unless the garage is attached to other buildings or occupancies. By and large most stand-alone open constructed parking structures are not equipped with fire sprinkler systems. For those who think that an open parking structure design will inherently limit the accumulation of heat, smoke, and flame through its openings to the exterior I encourage you to perform an Internet search for the November 8, 2016 parking garage fire at 1508 Blodgett Street in Houston TX. In that event a vehicle fire inside the 'open' parking structure presented immediate threat to occupants in the upper residential floors and substantially challenged firefighters from the moment they arrived. Publicly available video found online is as compelling as it is alarming to all those who mistakenly feel open parking garages are fire 'safe' for purposes of any code exceptions or special exemptions. If you think that this one Houston fire is an anomaly then a simple online video search using the term 'Parking Garage Fire' might prove eye-opening. Additionally, a review of the NFPA Journal article on the King's Dock Parking Garage fire in Mersey-Liverpool, England and the Merseyside Fire & Rescue Service Report is also in order for anyone currently operating under the misguided belief that naturally ventilated 'open' parking structures are inherently fire safe or offer enhanced fire safety performance over enclosed parking structures. The leading research on parking structure fire safety and fire performance is coming around to the reality that the current model building code requirements may not be aligned with the actual risk and challenges of vehicle fires in parking structures. This is not the

specific responsibility of NFPA 30-A but there is enough developing research on parking structure fire risks that thus far have not considered the introduction of a mobile fueling operation. The further reality is that aside from the anecdotal offering of the Submitter that his company has been performing in-building mobile fueling operations for over 5-years without incident we truly don’t know the full risk profile and hazards associated with the process and operation. The body of independent research on in-building mobile fueling operations is practically non-existent since NFPA 30-A and the most widely accepted and comprehensive model building and fire codes currently prohibit the activity and no other businesses have openly or publicly identified themselves as conducting mobile fueling operations in violation of these codes.

**Building Design Dictates Process and Operational Capability**

In all matters, the design of a building or structure’s enclosing walls, floors, and roof establishes the basis for future process or operational activity within the building. You must have a building design which supports the process or operational needs of the occupancy. When conceiving of a building design it would be inappropriate to build a structure of unprotected wood and then try to figure out how to make it compliant for use as an explosives manufacturing facility or a hospital. There is nothing which can be done through the use of more alarms, more fire extinguishers, more exits, or more suppression systems which will overcome a building design which is incompatible with the proposed process or operations. This concept is outlined in the most widely accepted & comprehensive model building code and NFPA 5000 as a function of proposed building use group, desired material & method of construction, proposed building height & area, and potentially special provisions. With those fundamental elements identified and resolved it is then possible to navigate through the rest of the model codes and produce a functional and compliant building which accommodates the intended process or operations. Those building design fundamentals persist for the life of the building even as occupants or tenants may change the underlying design of the building is persistent until it is substantially reconstructed or destroyed. Not all building’s can accommodate all possible occupancy, process, or operational hazards. It violates one of the basic tenets of safe building design to assume that any building can accommodate any occupancy, process, or operation. Don’t quite believe that? Keep reading...

**Permitted Uses in Open Parking Garage Structures**

The most widely accepted & comprehensive model building code contains requirements for open parking structures whether stand-alone or mixed with other uses or occupancies. Just because there are provisions for mixed-use open parking garages that should not however be construed to mean that it is permissible to mix open parking structures with fuel dispensing operations. This becomes incredibly more relevant when one reviews the mixed use & occupancy requirements for OPEN PARKING GARAGES in the most widely accepted and comprehensive model building code. That section then cross references to another section of the most widely accepted and comprehensive model building code which PROHIBITS fuel dispensing in open parking garages.
You can read that again but it won't change the fact that the most widely accepted and comprehensive model building code clearly and unmistakably prohibits the dispensing of fuel inside of an open type parking structure.

Stated differently, it is a violation of the most widely accepted and comprehensive model building code to take a new or previously constructed open parking structure and introduce fuel dispensing into the building. This includes fixed location fuel dispensing as well as the subject TIA's proposed mobile fueling operation.

What NFPA 30-A Already Requires for Fuel Dispensing Inside Any Building

If a business was contemplating indoor fixed location fuel dispensing inside an eligible building then NFPA 30-A contains long-standing requirements that address the hazards of fuel dispensing.

Briefly summarized, the 2018 edition of NFPA 30-A specifically requires the following when performing fixed indoor fuel dispensing:

- Indoor Gasoline Fuel Storage Tank - Maximum 120 Gallons (4.3.9.1.1)
- Indoor Fuel Piping From Tank to Dispenser - Fire Resistance Rated Physical Enclosure (5.2.4)
- Vehicle Traffic Management to Prevent Vehicles Not Being Fueled From Passing Through the Dispensing Area (6.3.7)
- Drainage Which Prevents Spills from Flowing Into the Building (7.3.4)
- Fuel Dispensing Area Physically Separated by Fire Resistance Rated Assemblies - 2 Hour (7.3.6.1)
- Non-Combustible Interior Finish Materials (7.3.6.2)
- Fuel Dispenser Area Only Located at Street Level and Not More Than 50-Feet from Vehicle Exit to Building Exterior (7.3.6.5)
- Floor of Dispensing Area is Liquid-Tight with Drain Containment Provisions (7.3.6.8)

Clearly these are very extensive requirements which are meant to address the fire and environmental hazards which would accompany fixed indoor fuel dispensing. When applied together and in harmony the end result is a cohesive indoor fixed fuel dispensing operation that effectively manages the hazards present and limits exposure to the remainder of the surrounding building from spill or ignition.

Just because NFPA 30-A permits and regulates indoor fuel dispensing it in no way overrides or countermands the building code prohibition which specifically prohibits fuel dispensing in open parking garages. There are many of other business models and occupancies which employ indoor fuel dispensing and NFPA 30-A provides the guidance on how to do it.
Why Not Permit Mobile Fueling Inside a Covered Parking Garage with Local AHJ Approval?

The NFPA 30-A Committee has, in some aspects, permitted local code authorities to exercise discretion with regard to mobile fueling operations. When the Committee has found that mobile fueling operations could be performed safely it has prescribed equipment and operational requirements but deferred to local code authorities to grant final approval as they are best positioned to understand their community. Together that local code authority knowledge and discretion joined with the technical requirements set forth in NFPA 30-A mobile fueling operations which were once limited to open privately owned properties are not situated to be expanded to public on-street delivery under the 2021 edition.

When it comes to mobile fueling operations inside a covered parking structure the NFPA 30-A Committee has not developed equipment and operational requirements and they have not left the matter to strictly local code authority discretion. Given the known requirements of NFPA 30-A for fixed indoor fuel dispensing it is difficult at the present time to see how the mobile fuel operations model would interface to achieve an equivalent level of safety and protection. Surely anyone could drive a vehicle loaded with gasoline into a parking garage and dispense it into parked vehicles but it is not a simple issue of the design and operation of the mobile fuel delivery vehicle but rather a total encompassing view of how a mobile fuel delivery vehicle would interact with the customer vehicle within the interior of a building / parking garage. Immediately two requirements of NFPA 30-A would have to be addressed if mobile operations were to have a comparable managed risk with fixed indoor fuel dispensing; limiting fueling to the ground level within 50-feet of an exterior vehicle access⁴ and prohibiting non-involved vehicles from passing through the fuel dispensing area⁵. These two requirements are based purely in fire and operational safety. The first ensures that emergency responders have direct access within a reasonably short travel distance from their apparatus on the building exterior and the fuel dispensing area (location of fire / spill). By placing the hazard and the responders on the same level and limiting interior travel distance to a maximum of 50-feet the 'access time' from incident arrival to the body of fire is kept very short. This distance limitation also ensures that conventional firefighting hoselines stretched from fire apparatus are well within reach of the fuel dispensing area. Responder access at the same level and within 50-feet of the exterior vehicle access point is much the same as would be encountered in responding to a vehicle fire in a private garage at the back of a single family property, on the same level and likely less than 50-feet from the street curb. If you think this requirement is a trivial convenience for firefighters then I encourage you to perform an Internet search for the '10-19-2018 Harrah's Casino Parking Garage Fire' video. In this instance a vehicle on the third level of the open parking structure caught fire and the responding firefighters were forced to rope raise a hose line from their ground level fire apparatus to extinguish the fire. The lack of fire sprinklers in the open parking structure combined with the lack of a vertical standpipe system resulted in delayed water to attack the fire. As you watch this video bear in mind the fact that this is an

⁴ NFPA 30-A 2018 Section 7.3.6.5
⁵ NFPA 30-A 2018 Section 6.3.7
'open' parking garage and as you have been led to believe there should be ample airflow to prevent the accumulation of banking smoke to the floor level.

The second requirement places the fuel dispensing area out of the main flow and travel of vehicles navigating the interior of the building. This requirement works to prevent the possibility of a non-involved vehicle striking a fueling operator, running over and dislodging a hose, or colliding with the stopped vehicle being fueled. Indoor fuel dispensing is not particularly common in public access parking structures and vehicle operators not familiar with the location or the presence of fuel dispensers increase the risk of collision or impact damage. When dealing with fixed location indoor fuel dispensing the design of the building addresses this requirement. When bringing mobile fueling operations into a building not originally designed for such there is essentially no opportunity for preventing non-involved vehicles from approaching and traveling through the fuel dispensing area. With this passing vehicle comes not only the risk of collision but also the introduction of potential ignition sources. Many parking structures are tightly designed to accommodate the most number of vehicles in the space provided and a stopped mobile fuel delivery vehicle will in almost all instances obstruct a travel lane or turning area. Drivers in the garage who are not expecting to encounter a stopped fuel delivery vehicle may react unexpectedly and collide with the delivery vehicle, the vehicle being fueled, or another vehicle all of which brings about damage and losses.

There are certainly other technical requirements in NFPA 30-A for fixed indoor fuel dispensing that could possibly be engineered into equivalent protections for mobile fueling operations but there are no readily identified equivalent protections for ease of emergency responder access and prevention of uninvolved vehicle movement in the dispensing area. From a purely fire & life safety viewpoint these two elements of well managed indoor fixed fuel dispensing risk cannot be met by indoor mobile fuel dispensing operations and until they are it is the opinion of this author that NFPA 30-A's prohibition on mobile fuel operations inside of covered parking structures is necessary and rooted in long standing in-building fuel dispensing requirements. It is not advisable for any local code authority to waive or otherwise endorse the practice and the current lack of any such option in NFPA 30-A is a prudent and necessary compliment to similar prohibition language in the most widely accepted and comprehensive model building code.

Conclusion

As submitted TIA Log # 1511 has failed to demonstrate an applicable emergency condition as defined by the Regulations Governing the Development of NFPA Standards. The proposal's claim that a technical error by the Committee requires corrective action is false. The fact that the prohibition language was first instituted in the 2018 edition and went into effect without any challenge from this Submitter or any other industry representative severely impairs the credibility of an 'emergency action needed' claim now two years later. Furthermore, there were no public inputs or public comments on this issue during the 2021 revision process so to introduce it now may signal a business emergency for the Submitter but it does not substantiate a code document emergency. In filing this TIA application the Submitter declared
that 'operations within the mobile fuel industry have been hamstrung since the 2018 standard was released'. If this was indeed true it would stand to reason then that the 2021 revision process would have been besieged by input and comments from all over the mobile fuel industry attempting to resolve their hammy injury. While the Submitter does not explain how the mobile fuel industry is currently 'hamstrung' they are very clear that a 'large portion' of their business is already being conducted inside of open parking structures. Evidently NFPA 30-A's prohibition language has not impacted their business as they are currently operating outside of the prohibition language to the success of their business bottom line. These two statements by the Submitter challenge the very premise of their TIA application in that they continue to operate in violation of the Code's prohibition which has been in effect since the 2018 edition yet they also feel there is an emergent need to change the Code outside of the standard revision process. This TIA application is an unmistakable public acknowledgment of this business's knowing disregard for NFPA 30-A and signals their intention to continue conducting mobile fueling operations inside of buildings regardless of the final published 2021 edition. Mobile fueling operations conducted inside of buildings prior to the codification of the 2018 NFPA 30-A notwithstanding, if the current prohibition language stands for the 2021 edition there is no reason to think it would somehow cause them to cease in-building or parking garage operations when they have thus far built a large portion of their business for the last 5 years around the prohibited act. The most likely explanation for this sudden 'emergency' filing is that their business growth has run into jurisdictions where they are encountering local code authorities who are not issuing waivers, permits, or otherwise granting relief from the current prohibition language. Thus this end-run push to add the option for 'unless approved by the authority having jurisdiction' as a way to shift the determination of fire & life safety matters away from the NFPA 30-A Committee and onto a single local code authority who may not have a solid and rich embrace of the Committee's discussions on the topic. It also looks to exploit any local code authority who may not be aware that of a similar prohibition on fuel dispensing in an open parking garage under the most widely accepted and comprehensive model building code. If the local code authority somehow subscribes to the request they end up becoming the scapegoat for a future incident.

Notwithstanding the lack of any legitimate emergency nature criteria the NFPA 30-A Committee has clearly considered the merits and hazards of mobile fueling operations in a covered parking structure and they have found technical substantiation why the activity should continue to be prohibited. The NFPA 30-A Committee's findings on the matter are also consistent with and complimentary to the most widely accepted and comprehensive model building code which also specifically prohibits the dispensing of fuels inside of open parking structures.

NFPA 30-A is on a 3-year revision cycle and the Submitter has been free at any time in the past, and continues to be so going forward, to make a public input or comment for consideration by the Committee.

Submitted May 20, 2020
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<td>2021</td>
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<td>No reported change to this prohibition language</td>
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Members of the NFPA voting committee, attached please find my comment letter in support of TIA 1511. Please let me know if you have any questions!

Appreciate your consideration.

Senator Bill Frist, M.D.
Chairman, COVID-19 Response Fund of Greater Nashville

To donate to United Way’s COVID-19 Response Fund, simply visit nashvilleresponsefund.com or text NashvilleUnited to 41444.

This week’s podcast: ASecondOpinionPodcast.com or iTunes or YouTube. Please rate, review and subscribe!
May 12, 2020

To Whom It May Concern,

In my hometown of Nashville, Tennessee, I have seen firsthand how valuable a gas delivery service like Yoshi can be in these times. This service has allowed essential workers, government employees, and hospital staff to maintain social distancing policies and avoid stopping for gas and car maintenance items while they are required to commute to their jobs for extended shifts.

I have used Yoshi’s service for years as a convenience at my place of work – but now it is more than a time saver, it is a service that is playing a little seen but valuable role in reducing COVID-19 spread.

It is my understanding that the newly proposed TIA would allow Yoshi’s service to continue in above-ground, open parking structures when it has been approved by the local authorities. As both a doctor and former United States Senator, I can attest that such a policy change is needed now more than ever.

We defer to local authorities on a wide range of issues, understanding that communities know how to best meet the individual needs of their people and keep them safe. Today in the midst of a global pandemic, it is the local health departments and mayors such as our own in Nashville that are mapping out how to safely reopen our cities based on local data. In the case of permitting non-tank vehicles to offer mobile fueling service in a limited number of scenarios, we should again to defer to local authorities to consider and approve.

I appreciate your consideration, and strongly urge you to support TIA 1511.

Sincerely,

Senator William H. Frist, MD
Larry Crockett  
406 Lincoya Bay Drive  
Nashville, TN 37214-2366  

To Whom it May Concern:  

I have the unique position in Yoshi currently as a Field Technician but having previous experiences that are relevant. I was a certified Emergency Medical Services First Responder, Tennessee State Fire School graduate and firefighter for 12 years, and an Acute Care Nurse Practitioner. Particularly as a Nurse Practitioner (NP), I worked at Vanderbilt’s Level 1 Trauma/Burn Patient Care Center, and also at two other tertiary care hospitals in Nashville as a cardiology/intensive care NP. I have a unique view of fire safety and human physiology as a Yoshi Field Technician.  

I have worked for Yoshi for over four years as a Field Technician, and I have always looked for ways for us to keep safety at the forefront of our operations. Over the years, we have improved our operations and safety protocols in partnership with Exxon Mobil’s safety team and others.  

I have literally filled tens of thousands of vehicles in my time at Yoshi, many in open air covered structures, with no major incidents.  

All in all, I believe that Yoshi’s trucks, by design, should be permitted to continue doing fillups safely in open air structures. I also believe that the wording of the TIA appropriately addresses this situation by giving the right to the local officials to permit non-tank vehicles on a case by case basis if they deem it to be safe.  

Sincerely,  

Larry M. Crockett  
Yoshi Field Technician
My name is Judy Underhill Anchors. I am the General Manager for the John Hand Building with Harbert Realty in Birmingham, Alabama. In my position, I manage the twenty-story John Hand Building, which was built more than 100 years ago and is on the National Register of Historic Places. It is a mixed-used, high-density property with a multi-level parking garage. Our team and our tenants take great pride in this property and have high expectations for our vendors.

I am writing in strong support of Yoshi. Our property management company was one of the first Yoshi customers in Birmingham. When we heard about the service, we knew that our tenants would be drawn to the convenience. What we didn’t know was how strong our partnership would be with Yoshi. From day one, the team at Yoshi worked closely with us to provide certificates of insurance and understand our expectations for operating on site. They have worked closely with our team to safely perform their services in our parking deck without incident or issue.

Our partnership with Yoshi here in Birmingham demonstrates that mobile fueling can be conducted safely. I believe that these types of vendors can also be properly managed at the local level through collaboration with local authorities. Please feel free to contact me with any questions.

Judy Underhill Anchors RPA® FMA® | General Manager
Harbert Realty Services
John Hand Building
17 20th Street North, Suite 360 | Birmingham, AL 35203

www.harbertrealty.com
Dear NFPA team,

I’m writing about TIA #1511. I’m Megan Bloomgren, single mother of three living in McLean, VA. I work in Public Affairs in Washington, DC.

I have used Yoshi services and been a thrilled customer for 18 months.

It has been a game changer for me in terms of convenience, customer service and safety on my residential block. Every operator was top notch and it spared me the time of going to the gas station with three young children. They are a fabulous addition to our community and I believe any regulations should be determined at the local level.

Please contact me with any questions and please don’t limit this essential innovation to ensure cleaner and more efficient fuel is available for cars particularly in the wake of the pandemic.

Megan Bloomgren
1509 Highwood Drive
McLean, VA 22101
Foran, Rosanne

From: Matt M
Sent: Wednesday, May 13, 2020 4:23 PM
To: TIAs
Subject: Support of TIA 1511 Comment Letter

Support of TIA #1511
Sandra Morgan, Healthcare Executive Nashville, TN

To Whom It May Concern,

My husband and I have been Yoshi customers in Nashville, TN for many years. They come to both our home and my place of work to fill up our vehicles with fuel and perform other services. The place I work (a large publicly traded hospital company) has many open air parking garages and Yoshi has been approved to operate there by our company and landlord. Many of my colleagues park in these open air parking structures and would be excluded from using this service if there was a blanket ban put on the current operations. Many of these people are parents and they drive far to get to work. They would be concerned if they could no longer get gas, oil changes, have tire issues fixed, etc right in their normal parking spots.

Beyond office workers, many of our hospital staff must park in our garages as well. Many have relied on Yoshi for multiple services, and the service has become very important to healthcare workers with the COVID crisis and social distancing. Stopping for gas not only exposes them, it also may slow them down when there is an emergency and the patient is waiting.

I write in support of TIA #1151 which would allow Yoshi to continue to operate as it has for years and also which would give authority to the local fire marshals in the municipalities where they operate.

Contactless services are extremely important in 2020 during the pandemic and for our future. These car support services must be performed where the car is parked, which is quite often in parking garages at work or at their home condo parking garages.

I very much appreciate your consideration.

Respectfully,

Sandra Morgan
Comment No. 6
SUPPORT
(also the submitter)
page 1 of 2

From: Shared TIAs
Subject: FW: Public Comment for TIA: 1511

From: Nick Alexander
Sent: Thursday, May 14, 2020 10:59 AM
To: TIAs <TIAs@NFPA.org>
Subject: Public Comment for TIA: 1511

Public Comment for TIA: 1511

To Whom It May Concern,

I’m a co-founder and the CEO of Yoshi, a company that has been in the fuel delivery space since 2015. Since Yoshi’s inception, we have prioritized safety above all else, and we are proud of our perfect safety record after 5 years of service and millions of gallons safely pumped in 15 states across the US.

One of the big decisions that we’ve made as a company is to exclusively use non-tank vehicles. Our trucks are top-loading and carry fuel in D.O.T.-approved tanks that hold no more than 110 gallons each. There is a definite tradeoff here between safety and efficiency; larger, bottom-loading tankers hold more fuel and are economically advantageous, but we have not been willing to trade off safety for this gain.

However, the new Chapter 14 code does not recognize this tradeoff, as it groups tank vehicles, holding up to 1200 gallons, the same as much smaller, non-tank vehicles. Throughout the rest of NFPA 30A, the definition of ‘tank vehicle’ is cited along the lines of ‘in compliance with NFPA 385,’ which differentiates between non-tank vehicles. Chapter 14 clearly defines the difference between tank and non-tank vehicles as well, but does not provide any reason why there should be a defined difference. This TIA is the only language in NFPA 30A that stipulates a difference in the allowed operational activities between tank and non-tank vehicles. Without it, all 14.2.7 does is define different types of fuel vehicles that are all treated equivalently despite being radically different. Without recognizing the clear safety benefits non-tank vehicles have over their tank counterparts, NFPA is encouraging companies to opt for the larger, less safe tank vehicles.

To this point, many of the municipalities and private organizations we currently service (and have serviced for years now, in some cases) have begun looking at the new Chapter 14 language and have been becoming increasingly concerned that 14.2.7 implies that they must treat non-tank vehicles just like larger tankers underneath a covered structure of any kind, even though prior to Chapter 14, they had deemed Yoshi’s operation safe.

This TIA fixes this by giving local authorities the green light to continue to allow only non-tank vehicles to operate in aboveground, open parking structures. Note: this TIA continues to prohibit tank vehicles from operating in these covered structures, and it would also prohibit mobile fueling of any kind in underground garages or enclosed, indoor structures that are not open-air. In fact, this TIA goes further and mandates strict adherence to NFPA 88’s definition of an open parking structure.

As a topical example of the important work that will be interrupted by NFPA 30A moving forward without this TIA, one population that will be most impacted by this proposed Code is healthcare workers. In recent months, Yoshi’s service has been deemed an essential service for many nurses and doctors who have been forced to continue to commute to hospitals and clinics despite shelter in place guidance. Many articles have been published as to the risks that gas stations carry for COVID-19 transmission, and so hospitals have been eager to offer Yoshi’s service on-site for hospital
employees. Many times, these are in aboveground, open parking structures. This is just one example of the small part Yoshi, and the mobile fueling industry as a whole, is playing during this ongoing public health crisis. Such operations will be forced to halt if the currently written version of NFPA 30A moves forward.

This TIA does not ask for carte blanche approval of all mobile fueling operations. This is a very safety conscious proposal that simply allows local authorities to permit non-tank vehicles to offer mobile fueling services in a limited number of scenarios when they deem it to be safe.

Overall, I am very appreciative of the work the NFPA has done to respond to changing innovation and our emerging industry. NFPA 30A’s Chapter 14 is an important and foundational piece of documentation that will shape our industry for decades to come. This TIA addresses only one line in that code - a small number of words, but some that will have a tremendous impact.

Sincerely,
Nick Alexander
Co-founder and CEO of Yoshi, Inc
Nick Alexander
Co-founder and CEO | Yoshi Inc.

Web: www.startyoshi.com
June 9, 2020

To National Fire Protection Association,

I am submitting this letter to the public comment record for NFPA 30A TIA 1511.

My name is J. Chris Martin, and I live in Northern Virginia. My career in the oil and gas industry started in 1988 with Mobil Oil in Fairfax, Virginia. During the course of 30+ years with Mobil and ExxonMobil, I held more than a dozen different positions across the fuels refining, marketing, liquids supply chain, liquefied natural gas and public & government affairs divisions of the company.

I'm writing as a customer and advocate for Yoshi. As I trust you are aware, ExxonMobil is an investor in Yoshi. The Valdez oil spill in 1989 was a moment of truth and pain for Exxon, and it formed the foundation of a multi-year reinvention of the company's operations management that resulted in a culture with a relentless focus on safety. The company's Operational Integrity Management System has proven its worth through many years of industry-leading safety performance. ExxonMobil remains a leader on safety and holds all its employees, affiliates and partners to the highest safety standards in the industry.

ExxonMobil applies this safety focus in its facility design, its operational procedures and its investment decisions. In fact, ExxonMobil has been involved with the design of Yoshi's trucks and hardware, as well as its operational procedures. ExxonMobil would not have invested millions of dollars into a company like Yoshi if it was deemed a risky or reckless enterprise.

Yoshi may be small, but it has the leadership, corporate support, and oversight to mitigate its operational risk, and has demonstrated that through its results. During the past five years, Yoshi has been safely servicing customers - myself included - across 20 cities in the U.S. without incident. Yoshi consistently delivers quality customer service in a safe and responsible manner, and I have recommended the company's offering to many friends and associates.

I understand and respect the panel's role in this area. Public safety is an important priority as gasoline delivery service to homes and businesses becomes more common. That said, I trust that your team will take account of any safety incidents (or lack thereof) in the gas delivery market while evaluating the economic impact and unintended consequences of an ill-advised rule. I hope that you will carefully consider whether additional federal regulations are necessary given the industry's record to date and the safety precautions inherent in its design and processes, and explore whether oversight can be properly handled at the local and state levels.

Thank you,

J. Chris Martin
ExxonMobil retiree
Yoshi customer
1. Revise Table 16.1(n) to read as follows (highlighted to show corrections):

### Table 16.1(n) Polyethylene Plastic Pipe — IPS

<table>
<thead>
<tr>
<th>Plastic Pipe Length (ft)</th>
<th>½ in. SDR 9.33 (0.660)</th>
<th>¾ in. SDR 11 (0.860)</th>
<th>1 in. SDR 11 (1.007)</th>
<th>1½ in. SDR 11 (1.554)</th>
<th>2 in. SDR 11 (1.943)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9.33</td>
<td>11</td>
<td>11</td>
<td>1.53</td>
<td>1.94</td>
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<tr>
<td></td>
<td>(0.660)</td>
<td>(0.860)</td>
<td>(1.007)</td>
<td>(1.554)</td>
<td>(1.943)</td>
</tr>
<tr>
<td>INTENDED USE: Sizing Between First-Stage Pressure Regulator and Second-Stage (Low-Pressure) Regulator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>2140</td>
<td>239904290</td>
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<td>20300</td>
</tr>
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<td>60</td>
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<td>2950</td>
<td>5320</td>
<td>9220</td>
<td>13990</td>
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<td>7400</td>
<td>11200</td>
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<td>6990</td>
<td>10600</td>
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<td>6200</td>
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<td>9331620</td>
<td>16162440</td>
</tr>
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<td>2000</td>
<td>221</td>
<td>221443</td>
<td>443798</td>
<td>4981380</td>
<td>13832090</td>
</tr>
</tbody>
</table>
Substantiation: An error was made in a proposal to change the sizing table values that appear in the 2017 edition. The proposal (First Revision No. 127) would return the values in the Table 16.1(n) to the values that appeared in Table 15.1(o) in the 2014 edition. It appears the columns got transposed when the table was deleted and rounded to 3 significant figures from the 2014 edition to the 2017 and 2020 editions.

Reference table 15.1(o) in the 2014 edition and tables 16.1(n) in the 2017 and 2020 editions. The ⅜ inch SDR 11 column is incorrect in the 2017 and 2020 editions. The entry for 30 ft is incorrect, and every entry from 125 ft through 2000 ft. Also, there are errors in the 1-inch SDR 11 column starting at 450 feet, the 1 ¼ inch and 1 ½ inch columns starting at 1500 feet.

To correctly size PE Pipe (IPS) between the 1st and 2nd stage regulators these tables need to be corrected.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process.

During the 2017 revision cycle table 15.1(o) from the 2014 edition was updated (deleted and rounded to 3 significant figures). This updated table was renumbered as table 16.1(n) in the 2017 edition and is the same in the 2020 edition. This was done as an incorrect revision which means to correct these errors a TIA is needed to fix this in both the 2017 and 2020 editions. To correctly size Polyethylene Plastic Pipe (IPS) between the 1st and 2nd stage regulators these tables need correction to ensure the use of properly sized piping.
MEMORANDUM

TO: Technical Committee on Liquefied Petroleum Gases

FROM: Diane Matthews, Technical Committee Administrator

DATE: June 26, 2020

SUBJECT: NFPA 58 Proposed TIA No. 1480 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

<table>
<thead>
<tr>
<th>Eligible to Vote</th>
<th>Not Returned</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>4</td>
</tr>
<tr>
<td>(Garza-Obregon, Hazra, Labonte and Newman)</td>
<td></td>
</tr>
</tbody>
</table>

**Technical Merit:**

- 1 Abstention (C. Bloom)
- 31 Agree (w/comment, Barber, Fasel, Lemoff, Meyer and Spataru)
- 0 Disagree

**Emergency Nature:**

- 1 Abstention (C. Bloom)
- 31 Agree (w/comment, Barber, Kluge, Lemoff and Meyer)
- 0 Disagree

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[36 \text{ eligible} \div 2 = 18 + 1 = (19)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 24.

\[(36 \text{ eligible to vote} - 4 \text{ not returned} - 1 \text{ abstention} = 31 \times 0.75 = 23.25)\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is July 1, 2020.
QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the PROPOSED TIA LOG No. 1480 to the 2017 and 2020 Edition of NFPA 58 to Revise Table 16.1(n)

Eligible to Vote: 36
Not Returned: 4

Joseph Labonte, Swapan Kumar Hazra, Sam Newman, Cesar E. Garza-Obregon

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Eric C. Smith</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Richard L. Gilbert</td>
<td></td>
<td>I agree</td>
</tr>
<tr>
<td>Stephen Pepper</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Thomas B. Dunn</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Alberto Jose Fossa</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Alex Spataru</td>
<td></td>
<td>Agree. Interested to learn how the error was detected. Please advise. Thank you.</td>
</tr>
<tr>
<td>Donald Barber</td>
<td></td>
<td>Errors need to be corrected without delay</td>
</tr>
<tr>
<td>Leslie Woodward</td>
<td></td>
<td>agree</td>
</tr>
</tbody>
</table>
Jean L. McDowell

I AGREE with the TECHNICAL MERITS of the PROPOSED TIA LOG No. 1480 to the 2017 and 2020 Edition of NFPA 58 to Revise Table 16.1(n)

Edgar Wolff-Klammer

agree

Bruce J. Swiecicki

I agree with the technical merits.

Steven T. Gentry

AGREE

Joan Segura

Agree

Robert S. Blackwell

Agree

Michael J Cooney

Agree

Phillip H. Ribbs

Agree

Steven E. Younis

Agree

David W. Meyer

The original values displayed severely impact the capacities and should be updated to ensure correct sizing of the piping.

John W. King

Agree

April Dawn Richardson

Agree

Mark Fasel

Agree this was an error.

William J. Young

A. The standard contains an error or an omission that was overlooked during the regular revision process.

Theodore C. Lemoff

This error must be fixed.

Gerry E. Misel, Jr.

I agree
James C. Belke                         Agree.
Richard G. Fredenburg                  Agree
Richard G. Kluge                       Agree
Kevin Joseph Dowling                   Agree
David J. Stainbrook                    Agree
James Kendzel                          Agree
Kody N. Daniel                         Agree
Disagree                                0
Abstain                                 1
Christopher J. Bloom                   I have no opinion on the technical merits

**QUESTION NO. 2: I AGREE that the subject is of an Emergency Nature for one ore more of the reasons noted in the Instructions box.**

Eligible to Vote: 36
Not Returned : 4
Joseph Labonte, Swapan Kumar Hazra, Sam Newman, Cesar E. Garza-Obregon

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>31</td>
<td>A</td>
</tr>
<tr>
<td>Eric C. Smith</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Richard L. Gilbert  
I agree

Stephen Pepper  
Agree

Thomas B. Dunn  
A

Alberto Jose Fossa  
A. The standard contains an error or an omission that was overlooked during the regular revision process.

Alex Spataru  
Agree. The reasons for agreeing are: (a), (d), and (f).

Donald Barber  
It is important to correct errors to avoid any possible misuse of the information

Leslie Woodward  
agree

Jean L. McDowell  
A & B

Edgar Wolff-Klammer  
agree

Bruce J. Swiecicki  
I agree that this is an emergency.

Steven T. Gentry  
AGREE

Joan Segura  
agree

Robert S. Blackwell  
Agree

Michael J Cooney  
A

Phillip H. Ribbs  
A

Steven E. Younis  
A

David W. Meyer  
The inaccurate information could severely impact the sizing of perhaps hundreds of piping systems and therefore should be corrected as soon as possible.
John W. King

April Dawn Richardson

Mark Fasel

Agree this meets the requirements for emergency nature.

William J. Young

A. The standard contains an error or an omission that was overlooked during the regular revision process.

Theodore C. Lemoff

This is a significant error which must be fixed to prevent mis sizing of piping systems.

Gerry E. Misel, Jr.

I agree

James C. Belke

A.

Richard G. Fredenburg

Agree A

Richard G. Kluge

Agree Reason A - this fixes an important error made in the earlier revision.

Kevin Joseph Dowling

Reason A

David J. Stainbrook

A.

James Kendzel

Agree

Kody N. Daniel

A

Disagree

0

Abstain

1

Christopher J. Bloom

Because of Answer to Question 1, I have no opinion as to whether this is of an Emergency Nature
I agree that this error in BTU load rating is such that it creates an emergent need for revision in order to ensure that properly sized Polyethylene Plastic Pipe guidance exists within the code.

Christopher J Wagner  
Director of Compliance and Regulatory Affairs  
AmeriGas Propane  
460 N. Gulph Road  
King of Prussia, PA 19406
Good Afternoon,

IS there a reason why theses tables do not have a 10 & 20 foot column? The 10 & 20 foot column would also not be present on tables 16.1(o).... If not could theses be added additionally...Short runs of P.E. piping are commonly used on generator installations

Cody Reeves
Technical Services Specialist

100 RegO Drive, Elon, NC 27244  USA

regoproducts.com
NFPA 58-2020 Edition
Liquefied Petroleum Gas Code
TIA Log No: 1516
Reference: 6.27.5, and 6.30.5.1
Comment Closing Date: July 9, 2020
Submitter: Richard Fredenburg, NC Department of Agriculture and Consumer Services
www.nfpa.org/58

1. Revise paragraph 6.27.5 to read as follows:

   6.27.5 Fugitive Emission Requirements. Vehicle fuel dispensers shall be equipped. Vehicles complying with Chapter 12 shall be refueled with vehicle fuel dispensers equipped for low-emission transfer systems in accordance with 6.30.5.2.

2. Revise paragraph 6.30.5.1 and renumber subsequent subsections to read as follows:

   6.30.5.1 Where the installation meets all the provisions of 6.30.5, that are applicable to the liquid transfer processes on site, the following shall apply:

   (1) The minimum separation distances shall comply with 6.7.3.4.

   (2) 6.30.5.2 The transfer site shall be identified as “Low-Emission Transfer Site” by having a sign or other marking posted in the area.

   6.30.5.3 6.30.5.2 Transfer into permanently mounted ASME engine fuel containers on vehicles shall meet the provisions of 6.30.5.32(A) through 6.30.5.32(D).

   …

   6.30.5.4 6.30.5.3 Transfer into a stationary ASME container shall meet the provisions of 6.30.5.43(A) through 6.30.5.43(F).

   …

   6.30.5.5 6.30.5.4 Transfer into a portable DOT cylinder shall meet the provisions of 6.30.5.54(A) through 6.30.5.54(F).

   …

Substantiation: Section 6.27.5, Fugitive Emission Requirements, was extensively revised for the 2020 edition, including the title. Rather than clarifying the requirements for low-emission transfer, it causes some confusion. Not all vehicles are required to be filled by low-emission transfer, only the on-road vehicles. There are off-road vehicles (forklifts, yard vehicles, mowers, etc.) that are not required to be filled by low-emission transfer, but may be. The requirement in 6.27.5 contradicts that or creates confusion about which vehicles are included. This is not what the committee intended. Revising 6.27.5 allows fuel transfers for each type of vehicle to be addressed in the part of the code appropriate for that vehicle and keeps from requiring cylinder-filling operations at the same dispenser to be low-emission transfers. Also, the requirements in the current sections 6.30.5.1 and 6.30.5.2 should be co-dependent on each other and not independent requirements. Please note that the reference in the revised 6.27.5 as 6.30.5.2 is dependent on combining the current sections 6.30.5.1 and 6.30.5.2, as shown above.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was
inadvertently overlooked in the total revision process or was without adequate technical (safety) justification of the action.

Failure to make the requested changes will likely result in misapplication of low-emission transfer requirements, including citations on dispensers operating completely safely but not limiting cylinder filling to low-emission transfers. These citations could cause improper cost in requiring un-needed equipment modifications and/or assessment of violations/penalties. Also, there are many cylinders in use that are not equipped for filling following low-emission transfer requirements. These cylinders would have to be turned away from all sites that fill vehicle containers. If this TIA is not issued, dispensers that currently fill both vehicle containers and cylinders will no longer be allowed to fill cylinders. Also, the requirements in the current sections 6.30.5.1 and 6.30.5.2 should be co-dependent on each other and not independent requirements. These effects were not recognized during discussion and voting, thus containing an error that was overlooked during the regular revision process. This change will correct a circumstance in which the revised standard has resulted in an adverse impact on a method, inability to use a dispenser for both highway-use-vehicle container filling and non-low-emission cylinder filling, that was inadvertently overlooked in the total revision process.
MEMORANDUM

TO: Technical Committee on Liquefied Petroleum Gases

FROM: Diane Matthews, Project Administrator

DATE: July 10, 2020

SUBJECT: NFPA 58 Proposed TIA No. 1516 FINAL TC BALLOT RESULTS

No public comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

36 Eligible to Vote
5 Not Returned (Garza-Obregon, Hazra, Labonte, Newman and Richardson)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>30 Agree (w/comment, Blackwell, Dowling, Gilbert, Lemoff, Swiecicki and Young)</td>
<td>29 Agree (w/comment, Blackwell, Gilbert, Swiecicki and Young)</td>
</tr>
<tr>
<td>1 Disagrees (Spataru)</td>
<td>2 Disagree (Smith and Spataru)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

36 eligible ÷ 2  = 18 + 1  =  (19)

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 24 (rounded up):

(36 eligible to vote - 5 not returned - 0 abstentions = 31 × 0.75 = 23.25)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is July 15, 2020.
NFPA 58-2020 Edition
Liquefied Petroleum Gas Code

TIA Log No: 1516
Reference: 6.27.5, and 6.30.5.1
Comment Closing Date: July 9, 2020
Submitter: Richard Fredenburg, NC Department of Agriculture and Consumer Services
www.nfpa.org/58

1. Revise paragraph 6.27.5 to read as follows:
   
   6.27.5 Fugitive Emission Requirements. Vehicle fuel dispensers shall be equipped for low-emission transfer systems in accordance with 6.30.5.2.

2. Revise paragraph 6.30.5.1 and renumber subsequent subsections to read as follows:
   
   6.30.5.1 Where the installation meets all the provisions of 6.30.5, that are applicable to the liquid transfer processes on site, the following shall apply:
      (1) the minimum separation distances shall comply with 6.7.3.4.
      (2) The transfer site shall be identified as “Low-Emission Transfer Site” by having a sign or other marking posted in the area.

   6.30.5.2 Transfer into permanently mounted ASME engine fuel containers on vehicles shall meet the provisions of 6.30.5.2(A) through 6.30.5.2(D).

   …

   6.30.5.3 Transfer into a stationary ASME container shall meet the provisions of 6.30.5.3(A) through 6.30.5.3(F).

   …

   6.30.5.4 Transfer into a portable DOT cylinder shall meet the provisions of 6.30.5.4(A) through 6.30.5.4(F).

   …

Substantiation: Section 6.27.5, Fugitive Emission Requirements, was extensively revised for the 2020 edition, including the title. Rather than clarifying the requirements for low-emission transfer, it causes some confusion. Not all vehicles are required to be filled by low-emission transfer, only the on-road vehicles. There are off-road vehicles (forklifts, yard vehicles, mowers, etc.) that are not required to be filled by low-emission transfer, but may be. The requirement in 6.27.5 contradicts that or causes confusion about which vehicles are included. This is not what the committee intended. Revising 6.27.5 allows fuel transfers for each type of vehicle to be addressed in the part of the code appropriate for that vehicle and keeps from requiring cylinder-filling operations at the same dispenser to be low-emission transfers. Also, the requirements in the current sections 6.30.5.1 and 6.30.5.2 should be co-dependent on each other and not independent requirements. Please note that the reference in the revised 6.27.5 as 6.30.5.2 is dependent on combining the current sections 6.30.5.1 and 6.30.5.2, as shown above.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was
inadvertently overlooked in the total revision process or was without adequate technical (safety) justification of the action.

Failure to make the requested changes will likely result in misapplication of low-emission transfer requirements, including citations on dispensers operating completely safely but not limiting cylinder filling to low-emission transfers. These citations could cause improper cost in requiring un-needed equipment modifications and/or assessment of violations/penalties. Also, there are many cylinders in use that are not equipped for filling following low-emission transfer requirements. These cylinders would have to be turned away from all sites that fill vehicle containers. If this TIA is not issued, dispensers that currently fill both vehicle containers and cylinders will no longer be allowed to fill cylinders. Also, the requirements in the current sections 6.30.5.1 and 6.30.5.2 should be co-dependent on each other and not independent requirements. These effects were not recognized during discussion and voting, thus containing an error that was overlooked during the regular revision process. This change will correct a circumstance in which the revised standard has resulted in an adverse impact on a method, inability to use a dispenser for both highway-use-vehicle container filling and non-low-emission cylinder filling, that was inadvertently overlooked in the total revision process.
QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the PROPOSED TIA LOG No. 1516 to the 2020 Edition of NFPA 58 to Revise Paragraph 6.27.5 and Revise Paragraph 6.30.5.1 and Renumber Subsequent Subsections.

Eligible to Vote: 36

Not Returned: 5

Cesar E. Garza-Obregon, Sam Newman, Joseph Labonte, April Dawn Richardson, Swapan Kumar Hazra

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>30</td>
<td>I AGREE with the TECHNICAL MERITS of the PROPOSED TIA LOG No. 1516 to the 2020 Edition of NFPA 58 to Revise Paragraph 6.27.5 and Revise Paragraph 6.30.5.1 and Renumber Subsequent Subsections.</td>
</tr>
<tr>
<td>Richard A. Hoffmann</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stephen Pepper</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Edward Ferguson</td>
<td></td>
<td>Agree with the technical merits to revise the section</td>
</tr>
<tr>
<td>Gerry E. Misel, Jr.</td>
<td></td>
<td>I agree</td>
</tr>
<tr>
<td>Eric C. Smith</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Edgar Wolff-Klammer</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Kevin Joseph Dowling</td>
<td></td>
<td>Agree. Since the TIA makes the provision applicable to chapter 12 vehicles only, the committee should consider moving this section to chapter 12 during the regular revision process.</td>
</tr>
<tr>
<td>Steven T. Gentry</td>
<td></td>
<td>AGREE</td>
</tr>
<tr>
<td>Leslie Woodward</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>James C. Belke</td>
<td></td>
<td>Agree</td>
</tr>
</tbody>
</table>
Theodore C. Lemoff
The current text goes beyond the committee's intent.

Steven E. Younis
Agree

Robert S. Blackwell
2020 edition can be interpreted more restrictive than intended.

Jean L. McDowell
AGREE

Bruce J. Swiecicki
I agree that the TIA is technically accurate.

Thomas B. Dunn
Agree

Mark Fasel
Agree

William J. Young
Clarifies fugitive emissions concerns on various types of filling

Richard L. Gilbert
This reconciles a conflict between 6.27.4.3 and 6.27.5. It should have been corrected in the 2017 edition.

David J. Stainbrook
Agree

Phillip H. Ribbs
Agree

Richard G. Kluge
Agree

Richard G. Fredenburg
Agree

Joan Segura
Agree

Kody N. Daniel
Agree

James Kendzel
Agree

Christopher J. Bloom
I agree with the merits

Jose Antonio Morales
Agree

John W. King
Agree

Alberto Jose Fossa
Agree
Alex Spataru

Going backwards is not where the industry should be going. All vehicles must be filled by low-emission transfer, not only the on-road vehicles. The intent of the low emission transfer system was to lower VOC’s indoor and outdoors, reduce fire hazards in enclosed and semi enclosed environments and provide greater value to the end user for the LP gas that he/she purchased.

Abstain 0

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 36
Not Returned: 5

Cesar E. Garza-Obregon, Sam Newman, Joseph Labonte, April Dawn Richardson, Swapan Kumar Hazra

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
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<td>29</td>
<td>I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.</td>
</tr>
<tr>
<td>Richard A. Hoffmann</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stephen Pepper</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Edward Ferguson</td>
<td></td>
<td>Agree with substantiation</td>
</tr>
<tr>
<td>Gerry E. Misel, Jr.</td>
<td></td>
<td>I agree</td>
</tr>
<tr>
<td>Edgar Wolff-Klammer</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jean L. McDowell</td>
<td></td>
<td>A &amp; F.</td>
</tr>
<tr>
<td>Kevin Joseph Dowling</td>
<td></td>
<td>Reason A.</td>
</tr>
<tr>
<td>Steven T. Gentry</td>
<td></td>
<td>AGREE</td>
</tr>
</tbody>
</table>
Leslie Woodward agree
James C. Belke A
Theodore C. Lemoff A and F.
Richard G. Fredenburg A and F
Steven E. Younis F
Bruce J. Swiecicki I agree that this TIA will clarify the code and help prevent misinterpretations of its intent.
Thomas B. Dunn A, F
Mark Fasel The standard contains an error that was overlooked during the regular revision cycle.
William J. Young Clarifies fugitive emissions concerns on various types of filling
Richard L. Gilbert This needs to be implemented immediately.
David J. Stainbrook A. The standard contains an error or an omission that was overlooked during the regular revision process.
Phillip H. Ribbs A & F
Richard G. Kluge A
Joan Segura Agree
Kody N. Daniel A
James Kendzel Agree
Christopher J. Bloom I agree
Jose Antonio Morales Agree
John W. King A.
Alberto Jose Fossa

**Disagree**

Eric C. Smith

**Disagree**

Alex Spataru

This is not an emergency situation. Does not qualify under A or B. Time for the industry to step out of the dark ages.

**Abstain**

0
A. The standard contains an error or an omission that was overlooked during the regular revision process.

B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.

C. The proposed TIA intends to correct a previously unknown existing hazard.

D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.

F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.
NFPA 67 - 2019 Edition

Guide on Explosion Protection for Gaseous Mixtures in Pipe Systems

TIA Log No.: 1505

Reference: Equation A.7.1a

Comment Closing Date: June 17, 2020

Submitter: Richard Fredenburg, NC Department of Agriculture (IFMA)

www.nfpa.org/67

Revise A.7.1a as follows:

In equation A.7.1a in section A.7.1, move the exponent \((2y/(y-1))\) from outside of the parentheses to outside of the brackets to show as it does on page 7 in the referenced document and below. Also remove the closing curly bracket:

\[
P(x,t) = \begin{cases} 
P_1 \\ P_3 \left(1 - \frac{y-1}{\gamma+1} \left(1 - \frac{x}{c_3 t} \right) \right)^{2y/(y-1)} \\ P_3 \\ \end{cases} 
\quad \text{if } \frac{x}{t} > U_{cl}
\frac{x}{t} < U_{cl}
\frac{x}{t} < c_3

Substantiation: This error of the exponent was pointed out in Public Input number 1. Since there is intent to change the cycle length for NFPA 67 and because of the error, the equation needs to be changed now to show it correctly.

Emergency Nature: The equation is not accurately copied from the reference document. Use of the incorrect equation could lead to erroneous conclusions with an unknown effect on the piping or system where it is applied. The error must be corrected before the normal revision process would do so. This error was overlooked during the revision process. Use of the incorrect equation could result in a circumstance of an adverse impact on a product or method.
MEMORANDUM

TO: Technical Committee on Explosion Protection Systems
FROM: Sarah Caldwell, Technical Committee Administrator
DATE: June 18, 2020
SUBJECT: NFPA 67 Proposed TIA No. 1505 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

29 Eligible to Vote
11 Not Returned (Brazier, Clouthier, Floyd, Frank, Guaricci, McCoy, Ostrowski, Penno, Stottmann, Ural, Zalosh)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>1 Abstentions (Hard)</td>
</tr>
<tr>
<td>18 Agree (w/comment: Hard, Feldkamp, Ibarreta)</td>
<td>17 Agree</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative ¾ vote]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[ 29 \text{ eligible} \div 2 = 14.5 = (15) \]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is:
   Technical Merit: (29 eligible to vote - 11 not returned - 0 abstentions = 18 \times 0.75 = 13.5 \approx 14)
   Emergency Nature: (29 eligible to vote - 11 not returned - 1 abstentions = 17 \times 0.75 = 12.75 = 13)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is June 23, 2020.
**QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1505 to revise Equation A.7.1a.**

**Eligible to Vote: 29**  
**Not Returned: 11**  
Erdem A. Ural, Robert G. Zalosh, Walter L. Frank, Larry D. Floyd, Dan A. Guaricci, Steven A. McCoy, Stefan Penno, David R. Stottmann, Geof Brazier, Martin P. Clouthier, Scott W. Ostrowski

<table>
<thead>
<tr>
<th><strong>Vote Selection</strong></th>
<th><strong>Votes</strong></th>
<th><strong>Comments</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Samuel A. Rodgers</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Richard G. Fredenburg</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Bill Stevenson</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Michael D. Hard</td>
<td></td>
<td>This corrects technical guidance with the new equation.</td>
</tr>
<tr>
<td>Randal R. Davis</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Robert J. Feldkamp</td>
<td></td>
<td>I AGREE with the technical merits of the proposed TIA log No. 1505 to revise Equation A.7.1A</td>
</tr>
<tr>
<td>Thomas C. Scherpa</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>C. Regis Bauwens</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>David E. Trull</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Alvin Grant Roach</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Thomas Heidermann</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Cleveland B. Skinker</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Alfonso F. Ibarreta</td>
<td></td>
<td>The error was identified in a Public Comment and corroborated by a Committee Member after review of the referenced publication.</td>
</tr>
<tr>
<td>James Kelly Thomas</td>
<td></td>
<td>Agree</td>
</tr>
</tbody>
</table>
William V. F. Cosey  
Nathan R. Egbert  
Andrew Tworek  
Michael Rons  

Disagree: 0  
Abstain: 0

**QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.**

**Eligible to Vote:** 29  
**Not Returned:** 11  
Erdem A. Ural, Robert G. Zalosh, Walter L. Frank, Larry D. Floyd, Dan A. Guaricci, Steven A. McCoy, Stefan Penno, David R. Stottmann, Geof Brazier, Martin P. Clouthier, Scott W. Ostrowski

<table>
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<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Agree</td>
<td>17</td>
<td>Reasons A (The standard contains an error or an omission that was overlooked during the regular revision process) and F (The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process)</td>
</tr>
</tbody>
</table>

Richard G. Fredenburg  
Bill Stevenson  
Randal R. Davis  

Agree A  
Agree A & F  
A.  
The standard contains an error that was overlooked during the regular revision process.
A. The standard contains an error or an omission that was overlooked during the regular revision process.

Reason A

A
A
A
A
A
A.
A.
A
A
A
A
A
0
1

This is not a standard and therefore, it hard for me to consider this an emergency as a guide.
NFPA 70®-2020 Edition

National Electrical Code®

TIA Log No.: 1502

Reference: 356.10(8)

Comment Closing Date: May 11, 2020

Submitter: Megan Hayes, National Electrical Manufacturers Association (NEMA)

www.nfpa.org/70

1. Revise 356.10 item (8) to read as follows:

356.10(8) Conductors or cables rated at a temperature higher than the listed temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

Substantiation: The revision accepted by the panel in PI 1126 (submitted by NEMA) was incorrectly recorded in FR 7894. The highlighted text from the PI was not included in the FR.

PI 1126 text

(8) Conductors or cables rated at a temperature higher than the listed temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

FR 7894 text

(8) Conductors or cables rated at a temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

The text was correct in the task group report which is what the CMP reviewed at the panel meeting. The omission apparently occurred as the information was transferred from the WORD document to Terra and on to the written ballot. The vote on the FR was unanimous so it appears that the error was not noticed.

The panel acted to accept a similar PI and FR for 350.10(4) for LFMC which is the same concept and where the proper text was balloted.

350.10 (4): Conductors or cables rated at a temperature higher than the listed temperature rating of LFMC conduit shall be permitted to be installed in LFMC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFMC per 110.14(C).

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular process.

As currently covered in 2020 NEC 356.10(8), Conductors of a temperature rating higher than that of the LFNC are not permitted. Such prohibition never existed, was never proposed, nor was it considered at any point in the process.
MEMORANDUM

TO: NEC® Code-Making Panel 8

FROM: Sarah Caldwell, Technical Committee Administrator

DATE: May 28, 2020

SUBJECT: NEC® Proposed TIA No. 1502 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

13 Eligible to Vote
2 Not Returned (Adams, Crider)

<table>
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<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>11 Agree</td>
<td>11 Agree</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[ \frac{13 \text{ eligible}}{2} = 6.5 = (7) \]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 9.

\[ (13 \text{ eligible to vote} - 2 \text{ not returned} - 0 \text{ abstentions} = 11 \times 0.75 = 8.25) \]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is June 2, 2020.
NEC CMP-8 TIA No. 1502 Ballot Final
Election:70_A2022_NEC_P08_Log1502_TIAballot
Results by Revision

QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1502 to Revise Section 356.10 item (8).

Eligible to Vote: 13
Not Returned: 2
Joel (Joey) Crider, Doug Adams

<table>
<thead>
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<tr>
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<tr>
<td>Raul L. Vasquez</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Michael C. Martin</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Pete Jackson</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jay Burris</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Paul W. Myers</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>David M. Campbell</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>David H. Kendall</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Rhett A. Roe</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Raymond H Smith</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Rodney J. West</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Richard J. Berman</td>
<td></td>
<td>Agree.</td>
</tr>
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Disagree: 0
Abstain: 0
### QUESTION NO. 2

**I AGREE** that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

<table>
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<tr>
<td>Joel (Joey) Crider, Doug Adams</td>
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</table>

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<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>Agree</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Raul L. Vasquez</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Michael C. Martin</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Pete Jackson</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Jay Burris</td>
<td>Agree</td>
<td>Reason A</td>
</tr>
<tr>
<td>Paul W. Myers</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>David M. Campbell</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>David H. Kendall</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Rhett A. Roe</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Raymond H Smith</td>
<td>A. The standard contains an error or omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Rodney J. West</td>
<td>Agree</td>
<td>Reason A</td>
</tr>
<tr>
<td>Richard J. Berman</td>
<td>A</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Disagree</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstain</td>
<td>0</td>
</tr>
</tbody>
</table>
MEMORANDUM

TO: NEC® Correlating Committee
FROM: Sarah Caldwell, Technical Committee Administrator
DATE: May 28, 2020
SUBJECT: NEC® Proposed TIA No. 1502 FINAL CC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

<table>
<thead>
<tr>
<th>Eligibility</th>
<th>Correlation Issues</th>
<th>Emergency Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>11</td>
<td>11 Agree</td>
<td>11 Agree</td>
</tr>
<tr>
<td>0</td>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[ \frac{11 \text{ eligible}}{2} = 5.5 = 6 \]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 9.

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

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is June 2, 2020.
NEC® Correlating Committee TIA No. 1502 Ballot Final
Election:70_A2022_NEC_AAC_Log1502_TIABallot

Results by Revision

**QUESTION NO. 1: I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.**

Eligible to Vote: 11
Not Returned: 0

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>11</td>
<td>No correlation issues</td>
</tr>
<tr>
<td>Michael J. Johnston</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Richard A. Holub</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>George A. Straniero</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Christine T. Porter</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Palmer L. Hickman</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Roland E. Deike, Jr.</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>David L. Hittinger</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>James E. Brunssen</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Alan Manche</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>David A. Williams</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
**QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.**

Eligible to Vote: 11  
Not Returned: 0

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Michael J. Johnston</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Richard A. Holub</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>George A. Straniero</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Christine T. Porter</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td></td>
<td>&quot;A&quot;</td>
</tr>
<tr>
<td>Palmer L. Hickman</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Roland E. Deike, Jr.</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>David L. Hittinger</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>James E. Brunssen</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Alan Manche</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>David A. Williams</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Good Afternoon,

I support Proposed Tentative Interim Amendment (TIA): No. 1502, Reference: 356.10(8), comment closing date: May 11, 2020.

Thank you,

Carl Johnson
NFPA # 2417330

Carl S. Johnson II, ACE
Senior Aviation Lighting Specialist | AVCON, INC.

Transforming Today's Ideas into Tomorrow's Reality

Engineers & Planners
5555 E. Michigan Street, Suite 200
Orlando, Florida 32822

www.avconinc.com

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Good Day Technical Committee

Regarding : Revise 356.10 item (8)
I have some concern regarding the application and implementations according to the following reference. I might be misunderstanding of the phrase used.

356.10(8) Conductors or cables rated at a temperature higher than the listed temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

1. NFPA 70 Edition date- 2017

Article 353.1 Scope. (NFPA, 2017)
This article covers the use, installation, and construction specification for liquid-tight flexible non-metallic conduit (LFNC) and associated fittings.

As I understand that there is the main parts of LFNC used ( please correct me if I am wrong.

-LFNC A and LFNC B.

LFNC A- According to manufacture.

"Type LFNC-A. The product is UL Listed for 80°C (176°F) in a dry location, 60°C (140°F) in a wet location and 60°C (140°F) in a oily location. It is also UL Listed through 2-inch trade sizes for outdoor use and sunlight resistance. This Liquidtight Flexible Non-Metallic Conduit is manufactured and tested in accordance with Harmonized Underwriters Laboratories Inc. Standard UL 1660."

LFNC B is a prewired by manufacture.

Notes: Could it be possible to reference the following: * shall be permitted to be installed in accordance with manufacturer specifications*
Of course if the conductors temperature reference is made to what the specific conductors is of specific material ( resistance, length ETC..) ( The rating factors to be considered?)

Conductor and cable (Insulated type) Rubber type?

356.12 . Not permitted (use)
4. In any hazardous ( classified ) location.

As I understand - Any equipment shall be suitable as per classification of hazardous environment (Example : According to Class, deivation, most importantly the ambient
temperature that could course an ignition and regarding the nature of the volatile or explosive gas

The nature of the conductors could be relying on the following: is that it is insulated as to withstand the highest temperature and voltage to which it is likely to be exposed.

*Thank you in advance and please let me know if there might be somethings I might not understand.*

Regards
Nico van den Berg

Guide to Alternative Approaches to Life Safety

TIA Log No.: 1501
Reference: Worksheet 4.7.8A, footnote c (new)
Comment Closing Date: June 17, 2020
www.nfpa.org/101A

I. Revise Worksheet 4.7.8A to read as follows:

<table>
<thead>
<tr>
<th>Zone Location</th>
<th>Containment (S_a)</th>
<th>Extinguishment (S_b)</th>
<th>People Movement (S_a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High rise</td>
<td>18</td>
<td>17(9)c</td>
<td>19(16)a</td>
</tr>
</tbody>
</table>

Use ( ) where the phase-in period for the requirement for sprinklers in 19.4.2 of NFPA 101 has not yet elapsed.

Substantiation: 4.7.8A presently requires the use of the mandatory value for high rise buildings containing health care occupancies even though the phase-in deadline for installing sprinklers in all high-rise buildings containing health care occupancies may not yet have been reached. The requirement for installing sprinklers in all high-rise buildings containing health care occupancies was the basis for adding a mandatory value for high rise in the FSES. (See 2009 Annual Revision Cycle Report on Proposals, page 101A-3, 101A-7 Log #CPI SAF-ALS, copy attached.) Subsection 19.4.2 of NFPA 101-2009, which requires sprinklers in all high-rise buildings containing health care occupancies, does not take effect until 12 years after the date of adoption of the code by an authority having jurisdiction. An existing high-rise building containing a health care occupancy that is not protected with automatic sprinklers is not in violation of 19.4.2 of NFPA 101-2009 until the 12-year deadline has been reached. Therefore, Worksheet 4.7.8 should not require the use of a higher mandatory value until that deadline has passed.

The same issue applies to the 2010, 2013, 2016, and 2019 editions of NFPA 101A. As such, this revision is intended to also be made to those editions.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular process. The NFPA Standard contains a conflict within the NFPA Standard or within another NFPA Standard.

This TIA is of emergency nature as high-rise buildings containing health care occupancies that achieved a passing FSES score prior to the 2010 edition of NFPA 101A suddenly do not with the 2010, 2013, 2016, and 2019 editions, even though the requirement for installing sprinklers in high rise health care occupancies has not yet taken effect. As a result, high-rise buildings that contain health care occupancies that utilize the FSES as an equivalency for compliance with NFPA 101 are no longer able to achieve a passing score, and are being required to suddenly
undertake extremely burdensome capital improvements that would not be required if the FSES were consistent with the requirements in NFPA 101.
WORKSHEET 4.7.8A MANDATORY SAFETY REQUIREMENTS – NEW HOSPITALS, EXISTING HOSPITALS, OR NEW NURSING HOMES

<table>
<thead>
<tr>
<th>Zone Location</th>
<th>Containment (S.)</th>
<th>Extinguishment (S.)</th>
<th>People Movement (S.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New</td>
<td>Existing</td>
<td>New</td>
</tr>
<tr>
<td>1st story</td>
<td>11</td>
<td>5</td>
<td>15(12)</td>
</tr>
<tr>
<td>2nd or 3rd story*</td>
<td>15</td>
<td>9</td>
<td>17(14)</td>
</tr>
<tr>
<td>4th story or higher but not high rise</td>
<td>18</td>
<td>9</td>
<td>19(16)</td>
</tr>
<tr>
<td>High rise</td>
<td>18</td>
<td>12</td>
<td>19(16)</td>
</tr>
</tbody>
</table>

Substantiation: NFPA 101 is being revised for the 2009 edition to require all existing high-rise buildings containing health care occupancies to be sprinklered. The mandatory safety requirements values in Worksheet 4.7.8A are being revised to accurately reflect the sprinkler requirement.

Committee Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 9
Ballot Not Returned: 2 Carson, W., Stroup, D.

WORKSHEET 7.5.4A MANDATORY SAFETY REQUIREMENTS – NEW LARGE FACILITY

<table>
<thead>
<tr>
<th>Building Height</th>
<th>Control Requirement (S.)</th>
<th>Egress Requirement (S.)</th>
<th>Refuge Requirement (S.)</th>
<th>General Fire Safety Requirement (S.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 2 Stories</td>
<td>9.5</td>
<td>46.5</td>
<td>10</td>
<td>46</td>
</tr>
<tr>
<td>≥ 3 Stories</td>
<td>49.5</td>
<td>86.5</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>≤ 1 Story</td>
<td>6</td>
<td>12</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>≥ 2 Stories</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>≥ 3 Stories</td>
<td>19.5</td>
<td>18</td>
<td>13</td>
<td>25</td>
</tr>
</tbody>
</table>

Substantiation: NFPA 101 is being revised for the 2009 edition to include 101.32.3.1.3 a table of minimum construction requirements for large board and care occupancies. The mandatory safety requirements values in Worksheet 7.5.4A are being revised to accurately reflect the change being made to NFPA 101. The terminology of 7.4.1.1 is being revised to reflect standardization within NFPA 101 on use of the term “number of stories in height.”

Committee Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 9
Ballot Not Returned: 2 Carson, W., Stroup, D.

Submitter: Technical Committee on Alternative Approaches to Life Safety,
Recommendation: Add 8.1.3 as follows:
8.1.3 This chapter is provided to assist in completion of Figure 8.6. Worksheets for Evaluating Fire Safety in Business Occupancies. The step-by-step instructions for completion appear in the text of 8.6. This chapter provides expanded discussion and definition of the various items in the worksheet to assist the user when questions of definitions or interpretation arise. The chapter is organized to follow the format of the worksheet progressively.

Substantiation: The proposed text provides clarification, similar to that provided by current paragraph 4.1.3.

Committee Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 9
Ballot Not Returned: 2 Carson, W., Stroup, D.
MEMORANDUM

TO: Technical Committee on Alternative Approaches to Life Safety

FROM: Kelly Carey, Technical Committee Administrator

DATE: June 18, 2020

SUBJECT: NFPA 101A Proposed TIA No. 1501 FINAL TC BALLOT RESULTS

No comments opposing this TIA were received, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA **HAS** achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

A public comment in support of this TIA was received and is attached for your information only-no action needed. According to the Regs a comment in agreement with the TC vote is not required to be circulated.

<table>
<thead>
<tr>
<th>16 Eligible to Vote</th>
<th>1 Not Returned (Morris)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical Merit:</strong></td>
<td><strong>Emergency Nature:</strong></td>
</tr>
<tr>
<td>3 Abstentions (Carson, Crowley, Koffel)</td>
<td>4 Abstentions (Carson, Crowley, Hall, Koffel)</td>
</tr>
<tr>
<td>11 Agree (w comment, Humble, Schmitt)</td>
<td>11 Agree (w/comment, Humble)</td>
</tr>
<tr>
<td>1 Disagree (Hall)</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[\frac{16}{2} + 1 = 9\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is as follows:

**Technical Merit:** (16 eligible to vote - 1 not returned - 3 abstentions = 12 × 0.75 = 9)

**Emergency Nature:** [16 eligible to vote - 1 not returned - 4 abstentions = 11 × 0.75 = 8.25 (9)]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **June 23, 2020**.
## NFPA 101A TECHNICAL COMMITTEE ON ALTERNATIVE TO APPROACHES TO LIFE SAFETY

### PROPOSED TIA NO. 1501 - FINAL RESULTS

**QUESTION NO. 1:** I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1501 to revise Worksheet 4.7.8A on the 2010, 2013, 2016 and 2019 editions to NFPA 101A.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Chad E. Beebe</td>
<td>Agree</td>
<td>I agree with the technical merits as described in the substantiation</td>
</tr>
<tr>
<td>Peter A. Larrimer</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Robert Sontag</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Aleksy L. Szachnowicz</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Jonathan Humble</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Joshua W. Elvove</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Michael L. Edwards</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Hisham Saeed Ismaiel</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Joseph H. Versteeg</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>J. Francois Simard</td>
<td>I Agree</td>
<td></td>
</tr>
<tr>
<td>Dennis L. Schmitt</td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1501 to revise Worksheet 4.7.8A on the 2010, 2013, 2016 and 2019 editions to NFPA 101A.</td>
<td></td>
</tr>
</tbody>
</table>

**Disagree**

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kevin Ryan Hall</td>
<td>1</td>
<td>High-rise buildings pose significant fire risks. With many local jurisdictions adopting high-rise retro-fit amendments, it would not be wise to reward non-sprinklered buildings with lower mandatory safety requirements -- even if they are within the 12-year adoption period.</td>
</tr>
</tbody>
</table>

**Abstain**

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael A. Crowley</td>
<td>3</td>
<td>I am abstaining due to a conflict of interest.</td>
</tr>
<tr>
<td>William E. Koffel</td>
<td>3</td>
<td>In accordance with the policy of the Standards Council, I have abstained from voting on the proposed TIA.</td>
</tr>
<tr>
<td>Wayne G. Chip Carson</td>
<td>3</td>
<td>Due to client interest</td>
</tr>
</tbody>
</table>

**QUESTION NO. 2:** I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Chad E. Beebe</td>
<td>Agree</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
</tbody>
</table>
Peter A. Larrimer A. The standard contains an error that was overlooked during the regular revision process.

Robert Sontag The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.

Aleksy L. Szachnowicz A

Jonathan Humble I agree that the urgency of this recognition of the 12 year grace period for retrofitting with an automatic fire suppression system is necessary in order to be consistent with NFPA 101.

Joshua W. Elvove A

Michael L. Edwards A and B

Hisham Saeed Ismaiel (A)

Joseph H. Versteeg A. The standard contains an error or an omission that was overlooked during the regular revision process.

J. Francois Simard A

Dennis L. Schmitt I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Disagree 0

Abstain 4

Michael A. Crowley I am abstaining due to a conflict of interest.

William E. Koffel In accordance with the policy of the Standards Council, I have abstained from voting on the proposed TIA.

Kevin Ryan Hall I was not a part of the committee discussions during the last revision cycle and cannot express an informed opinion on this question.

Wayne G. Chip Carson Due to client interest.
MEMORANDUM

TO: Correlating Committee on Safety to Life
FROM: Kelly Carey, Technical Committee Administrator
DATE: June 18, 2020
SUBJECT: NFPA 101A Proposed TIA No. 1501 FINAL CC BALLOT RESULTS

No comments opposing this TIA were received, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

A public comment in support of this TIA was received and is attached for your information only—no action needed. According to the Regs a comment in agreement with the TC vote is not required to be circulated.

12 Eligible to Vote
0 Not Returned

<table>
<thead>
<tr>
<th>Correlation Issues:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Abstentions (Carson, Gilyeat, Rosenbaum)</td>
<td>3 Abstentions (Carson, Gilyeat, Rosenbaum)</td>
</tr>
<tr>
<td>9 Agree (w/ comment, Hugo)</td>
<td>9 Agree</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[ \frac{12 \text{ eligible}}{2} = 6 + 1 = (7) \]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 7.

\( (12 \text{ eligible to vote} - 0 \text{ not returned} - 3 \text{ abstentions} = 9 \times 0.75 = 6.75) \)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is June 23, 2020.
Eligible to Vote: 12
Not Returned: 0

Vote Selection

<table>
<thead>
<tr>
<th>Agree</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard Hopper</td>
<td>Agree this is a correlation issue with NFPA 101, Section 19.4.2.</td>
</tr>
<tr>
<td>Stanley C. Harbuck</td>
<td>agree</td>
</tr>
<tr>
<td>Kenneth E. Bush</td>
<td>Agree</td>
</tr>
<tr>
<td>Jeffrey A. Lucas</td>
<td>Agree</td>
</tr>
<tr>
<td>Rodger Reiswig</td>
<td>Agree</td>
</tr>
<tr>
<td>Dale L. Lyman</td>
<td>Agree</td>
</tr>
<tr>
<td>James R. Quiter</td>
<td>Agree</td>
</tr>
<tr>
<td>Jeffrey M. Hugo</td>
<td>The new footnote c terminology uses the term &quot;sprinklers&quot; when NFPA 101, Section 19.4.2 uses the term &quot;approved, supervised automatic sprinkler system&quot; as the prescriptive requirement. The term &quot;sprinklers&quot; is used frequently in NFPA 101A, but usually with &quot;automatic&quot; in front of it. The term &quot;sprinklers&quot; is also used in NFPA 101A for spot or partial protection values. As currently written it is unclear how to apply the value. The requirement in NFPA 101, Section 19.4.2 is for a complete NFPA 13 system throughout. The referral for the type and extent of the system from NFPA 101A to NFPA 101 should be clear. Is &quot;elapsed&quot; the correct term to use to apply these values? NFPA 101A does not use elapsed in any other way, so it is hard to compare the intent. The way this is written the values could apply after the phase-in period is complete without an automatic sprinkler system per NFPA 13. The building would be in violation, but footnote c is vague.</td>
</tr>
<tr>
<td>Jon Taluba</td>
<td>Agree</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
</tr>
<tr>
<td>Abstain</td>
<td>3</td>
</tr>
<tr>
<td>Eric R. Rosenbaum</td>
<td>I am abstaining due to a conflict of interest.</td>
</tr>
<tr>
<td>Wayne G. Chip Carson</td>
<td>Potential client interest conflict.</td>
</tr>
<tr>
<td>Sharon S. Gilyeat</td>
<td>conflict</td>
</tr>
</tbody>
</table>

Eligible to Vote: 12
Not Returned: 0

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.
<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agree</strong></td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Howard Hopper</td>
<td></td>
<td>Emergency nature as described in item A.</td>
</tr>
<tr>
<td>Stanley C. Harbuck</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Kenneth E. Bush</td>
<td></td>
<td>F.</td>
</tr>
<tr>
<td>Jeffrey A. Lucas</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Rodger Reiswig</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Dale L. Lyman</td>
<td></td>
<td>Agree - &quot;A&quot;</td>
</tr>
<tr>
<td>James R. Quiter</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Jeffrey M. Hugo</td>
<td></td>
<td>A.</td>
</tr>
<tr>
<td>Jon Taluba</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td><strong>Disagree</strong></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Abstain</strong></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Eric R. Rosenbaum</td>
<td></td>
<td>I am abstaining due to a conflict of interest.</td>
</tr>
<tr>
<td>Wayne G. Chip Carson</td>
<td></td>
<td>Potential client interest conflict.</td>
</tr>
<tr>
<td>Sharon S. Gilyeat</td>
<td></td>
<td>conflict</td>
</tr>
</tbody>
</table>
Proposed TIA 1501
Add footnote c to WORKSHEET 4.7.8A

c. Use ( ) where the phase-in period for the requirement for sprinklers in 19.4.2 of NFPA 101 has not yet elapsed.

Comment in support of the TIA
The 2012 edition (and subsequent editions) require mandatory sprinkler retrofit requirements from the date of the adoption of the code. Many states follow the adoption by CMS which adopted the 2012 edition effective July 5, 2016. This would permit hospitals that are not fully sprinkler protected to be unprotected until July 5, 2028.

The values in the Mandatory Safety Requirements in Table 4.7.8A for High-rise buildings under Chapter 4 (Healthcare) should be tied to the 12 year retroactive sprinkler requirement (from the date of adoption of the Life Safety Code). Without some direction, the 2013 edition would penalize a fully sprinklered facility from effectively using the FSES for a period of time that the retroactive requirements allow.
Existing high rise hospitals that have a valid FSES are being cited for non-compliance because the values in Table 4.7.8A cause the FSES to fail when the high rise values are used. This fails to allow for a phase in time without proper notification. A hospital that is not sprinkler protected is permitted to take the 12 years from the date of adoption to install the automatic sprinkler protection. A hospital that is fully sprinkler protected should be permitted to use this same time period to take credit for the non-mandatory sprinkler system that is already provided. Many hospitals use the FSES for structural fire resistance issues (Type II (000) or Type II (111) that needs to be Type II (222)). The corrective action for this deficiency requires significant renovation (even more so than sprinkler retrofit).

James Peterkin, PE, LEED AP, SASHE  
Principal | Fire Protection Engineer | Life Safety

TLC ENGINEERING SOLUTIONS®
1700 Market St., Ste 1525  
Philadelphia, PA 19103

PLEASE NOTE: TLC team members are currently working on your projects from home. We are prepared for this and committed to continued excellence for our clients. Thank you for your patience in these unprecedented times.
NFPA 1006-Proposed 2021 Edition
Standard for Technical Rescue Personnel Professional Qualifications
TIA Log No.: 1488
Reference: 10.3.1, 10.3.2 and 10.3.3
Comment Closing Date: March 24, 2020
Submitter: Brandi Phillips, University of Florida
www.nfpa.org/1006

1. Move sections 10.3.1, 10.3.2 and 10.3.3 to section 10.2 to read as follows and renumber associated Annex A sections accordingly:

**10.3.1**  **10.2.14** Construct a simple, rope mechanical advantage system, given an incident, representative animal load, an anchor system, life safety rope, carabiners, pulleys, rope grab devices, and rope rescue equipment, so that the system constructed accommodates the load and reduces the force required to lift the load; operational interference is factored and minimized; the system is efficient; a system safety check is completed; and the system is connected to an anchor system and the load, with recognition a suboptimal static system factor (SSSF) might be required to accomplish the rescue.

**A Requisite Knowledge.** Determination of incident needs as related to choosing simple rope systems, the elements of efficient design for compound rope systems, knot selection, methods for reducing excessive force to system components, evaluation of incident operations as related to interference concerns and set-up, rope commands, rigging principles, system safety check procedures, and methods of evaluating system components for compromised integrity.

**B Requisite Skills.** The ability to determine incident needs as related to choosing simple rope systems, select effective knots, calculate expected loads, evaluate incident operations as related to interference concerns and setup, perform a system safety check, and evaluate system components for compromised integrity.

**10.3.2**  **10.2.15** Construct a compound rope mechanical advantage system, given an incident, a representative animal load, an anchor system, life safety rope, carabiners, pulleys, rope grab devices, and rope rescue equipment, so that the system constructed accommodates the load and reduces the force required to lift the load; operational interference is factored and minimized; the system is efficient; a system safety check is completed; and the system is connected to an anchor system and the load, with recognition a suboptimal SSSF might be required to accomplish the rescue.

**A Requisite Knowledge.** Determination of incident needs as related to choosing compound rope systems, the elements of efficient design for compound rope systems, knot selection, methods for reducing excessive force to system components, evaluation of incident operations as related to interference concerns and set-up, rope commands, rigging principles, system safety check procedures, and methods of evaluating system components for compromised integrity.

**B Requisite Skills.** The ability to determine incident needs as related to choosing compound rope systems, select effective knots, calculate expected loads, evaluate incident operations as related to interference concerns and set-up, perform a system safety check, and evaluate system components for compromised integrity.

**10.3.3**  **10.2.16** Manage a portable highpoint anchor and multiple compound rope mechanical advantage system in a high-angle environment, as a member of a team, given an incident, multiple rope rescue systems incorporating a compound rope mechanical advantage system, a representative animal load to be moved, and a specified minimum travel distance for the load, so that a system safety check is performed; a reset is accomplished, and the movement is
controlled; the load can be held in place when needed; operating methods do not stress the system to the point of failure; operational commands are clearly communicated; and potential problems are identified, communicated, and managed.

(A) Requisite Knowledge. Methods to determine incident needs, types of interference concerns, rope commands, safe operating limits of the portable highpoint anchor, system safety check protocol, procedures for continued evaluation of system components for compromised integrity, common personnel assignments and duties, common commands, methods for controlling a load’s movement, system stress issues during operations, animal stress issues during movement, and management methods for common problems.

(B) Requisite Skills. The ability to determine incident needs, evaluate incident operations as related to interference concerns, complete a system safety check, continually evaluate system components for compromised integrity, direct personnel effectively, operate multiple mechanical advantage systems in balance, communicate commands, analyze system efficiency, manage load movement, and identify concerns.

A.10.3.1 A.10.2.14 ...
A.10.3.2 A.10.2.15 ...

Substantiation: Edits were made during the second draft meeting which relocated the three identified JPRs from the operations level to the technician level. This was an oversight, as rope rescue skills are a critical life safety requirement for animal victims and the rescuers retrieving the animal victims. It is the request that these three JPRs be returned to the operations level section 10.2.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification of the action.

Without return of 10.3.1, 10.3.2, and 10.3.3 to Section 10.2 for the Operations Level, responders may not have the skills required to safely operate the equipment and employ techniques critical to the life safety of the animal victims. This may also negatively influence the safety of rescuers themselves
MEMORANDUM

TO: Technical Committee on Rescue Technician Professional Qualifications
FROM: Jenny Depew, Technical Committee Administrator
DATE: March 25, 2020
SUBJECT: NFPA 1006 Proposed TIA No. 1488 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

29 Eligible to Vote
10 Not Returned (Carpenter, Childs, Creel, DeLuca, Jr., Gannon, Kitchel, Kovacs, Lombardi, Matthews, Sproul)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Abstentions (Burrero)</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>18 Agree</td>
<td>19 Agree</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative ¾ vote]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

[29 eligible ÷ 2 = 14.5 = (15)]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is:

**Technical Merit:** (29 eligible to vote - 10 not returned - 1 abstentions = 18 × 0.75 = 13.5 = 14)

**Emergency Nature:** (29 eligible to vote - 10 not returned - 0 abstentions = 19 × 0.75 = 14.25 = 15)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **March 30, 2020**.
### QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1488 to move sections 10.3.1, 10.3.2 and 10.3.3 to section 10.2 and renumber associated Annex A sections accordingly.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Scott R. Altemose</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Richard Wright</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Francis J. Brennan</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Brandi K. Phillips</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Glenn E. Mate</td>
<td>AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1488 to move sections 10.3.1, 10.3.2 and 10.3.3 to section 10.2 and renumber associated Annex A sections accordingly.</td>
<td></td>
</tr>
<tr>
<td>John Dennis</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Ryan J. McGovern</td>
<td>Agree with proposed change</td>
<td></td>
</tr>
<tr>
<td>Ralph McNemar</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Peter M. Schecter</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Matthew A. Brown</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Michael P. Brink</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>R. Patrick Furr</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Steven A. Treinish</td>
<td>I agree</td>
<td></td>
</tr>
<tr>
<td>Shawn Haynes</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Dustin Spires</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Christopher Warren</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Heather Moore</td>
<td>AGREE</td>
<td></td>
</tr>
<tr>
<td>William Wailgum</td>
<td>Agree</td>
<td></td>
</tr>
</tbody>
</table>

| Disagree | 0 |
| Abstain | 1 |
| Alberto Burrero | None |  |

### QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the following reasons noted in the Instructions box.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Scott R. Altemose</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Richard Wright</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Francis J. Brennan</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Brandi K. Phillips</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Glenn E. Mate</td>
<td>F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.</td>
<td></td>
</tr>
<tr>
<td>Alberto Burrero</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>John Dennis</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Ryan J. McGovern</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Ralph McNemar</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Peter M. Schecter</td>
<td>Agree reason A</td>
<td></td>
</tr>
<tr>
<td>Matthew A. Brown</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Michael P. Brink</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>R. Patrick Furr</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Steven A. Treinish</td>
<td>I agree</td>
<td></td>
</tr>
<tr>
<td>Shawn Haynes</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Dustin Spires</td>
<td>Comment A</td>
<td></td>
</tr>
<tr>
<td>Christopher Warren</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Heather Moore</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>William Wailgum</td>
<td>Agree</td>
<td></td>
</tr>
</tbody>
</table>

| Disagree | 0 |
| Abstain | 0 |
MEMORANDUM

TO: Correlating Committee on Professional Qualifications

FROM: Jenny Depew, Technical Committee Administrator

DATE: March 25, 2020

SUBJECT: NFPA 1006 Proposed TIA No. 1488 FINAL CC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

21 Eligible to Vote
6 Not Returned (Dolf, Dunton, Goodings, Slosson, Toten, Zielinski)

Correlation Issues:           Emergency Nature:
0 Abstentions                0 Abstentions
15 Agree (w/comment: Clouston) 15 Agree (w/comment: Clouston, Peterson, Watson)
0 Disagree                   0 Disagree

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative ¾ vote]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

   \[ \frac{21 \text{ eligible}}{2} = 10.5 = 11 \]

2. The number of affirmative votes needed to satisfy the ¾ requirement is 12.

   \( (21 \text{ eligible to vote} - 6 \text{ not returned} - 0 \text{ abstentions} = 15 \times 0.75 = 11.25 = 12) \)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is March 30, 2020.
## QUESTION NO. 1: I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Alec Feldman</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>William E. Peterson</td>
<td></td>
<td>I agree to the issuance of a TIA for NFPA 1006 as there are no correlation issues.</td>
</tr>
<tr>
<td>Philip C. Stittleburg</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Michael J. Yurgec</td>
<td>I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.</td>
<td></td>
</tr>
<tr>
<td>Derrick S. Clouston</td>
<td></td>
<td>Agree based on comments from the 1006 committee on the nature of the needed change.</td>
</tr>
<tr>
<td>Charles Randy Watson</td>
<td></td>
<td>No Correlation issues noted</td>
</tr>
<tr>
<td>Douglas P. Forsman</td>
<td></td>
<td>I agree.</td>
</tr>
<tr>
<td>Gregory S. Cross</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>R. Kirk Hankins</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Brian Baughman</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Matthew Brian Thorpe</td>
<td></td>
<td>There are no correlation issues in accordance with 3.4.2 and 3.4.3 of the NFPA regs.</td>
</tr>
<tr>
<td>Brian R. Brauer</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Richard A. Dunn</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Richard Galtieri</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Angus Maclean Duff</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

## QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Alec Feldman</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>William E. Peterson</td>
<td></td>
<td>I agree that the subject of this TIA is of an emergency nature for the following reasons: The revised NFPA 1006 contains an error that was overlooked during the regular revision process. The proposed TIA will correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a method that was inadvertently overlooked in the total revision process.</td>
</tr>
<tr>
<td>Philip C. Stittleburg</td>
<td>A.</td>
<td></td>
</tr>
<tr>
<td>Michael J. Yurgec</td>
<td>I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.</td>
<td></td>
</tr>
<tr>
<td>Derrick S. Clouston</td>
<td></td>
<td>Agree based on comments from the 1006 committee on the nature of the needed change.</td>
</tr>
<tr>
<td>Charles Randy Watson</td>
<td></td>
<td>Based on Substantiation, agree with the emergency nature.</td>
</tr>
<tr>
<td>Douglas P. Forsman</td>
<td></td>
<td>I agree</td>
</tr>
<tr>
<td>Gregory S. Cross</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>R. Kirk Hankins</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Brian Baughman</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Matthew Brian Thorpe</td>
<td>The subject is of an emergency nature for one or more reasons noted in the instructions box.</td>
<td></td>
</tr>
<tr>
<td>Brian R. Brauer</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Richard A. Dunn</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Richard Galtieri</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Angus Maclean Duff</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
NFPA 1192-Proposed 2021 Edition
*Standard on Recreational Vehicles*
TIA Log No.: 1490
Reference: 1.3.3
Comment Closing Date: April 16, 2020
Submitter: Kent Perkins, Recreational Vehicle Industry Association
www.nfpa.org/1192

1. *Delete 1.3.3 in its entirety as follows:*

1.3.3 This standard shall apply to new recreational vehicles manufactured on or after September 1, 2020.

**Substantiation:** Deleting section 1.3.3, which specifies the application date of this standard, will permit AHJs to establish an application date that fits the parameters of their programs. It will keep these AHJs from needing to modify the standard when they adopt it into law or regulation. This section was instituted a number of code cycles ago to help AHJs and industry maintain timing consistency with enforcement. However, since the approval of the NFPA 1192 standard moved from the Fall Meeting to the Annual Meeting, having an application date within the requirements of the standard actually causes more issues than it resolves.

Without considering the impact of a NITMAM being submitted, the approval process of NFPA 1192 at the Annual Meeting in June, the standard’s publication and its availability may not occur until July, August or even later. If this section 1.3.3 remains in the 2020 edition of 1192, state AHJs may not be able to adopt it, industry cannot be trained effectively and components addressed by new requirements still need to be developed for the RV industry’s use. Most importantly, it will provide plaintiff’s attorney’s broader claims as industry stakeholders will not be positioned to comply with the standard as it directs.

**Emergency Nature:** The standard contains an error or an omission that was overlooked during the regular revision process.

Having the standard’s application date so close to its approval and publication will prevent proper timing for implementation, industry training of new requirements, and development of new components needed for compliance not readily available in the market. Examples of issues with a shortened time frame between publication and application nearly eliminates the opportunity for training at the enforcement level, with AHJs adoption processes, plan approval submittals and production modification to reflect new requirements. Typically, the standards application date is determined by the AHJs; not identified as a part of the standard’s requirements. Deleting this requirement will allow the AHJs, trainers, industry user and others to adopt and use the standard on a timeline that better addresses safety for the consumer.
MEMORANDUM

TO: Technical Committee on Recreational Vehicles

FROM: Elena Carroll, Sr, Technical Committee Administrator

DATE: April 17, 2020

SUBJECT: NFPA 1192 Proposed TIA No. 1490 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

21 Eligible to Vote
2 Not Returned (Day, Habib)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Abstentions (Daugherty)</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>16 Agree (w/comment, Arnold, Christner, Mulvaney, Staves)</td>
<td>17 Agree (w/comment, Arnold, Christner, Mulvaney, Parrott, Staves)</td>
</tr>
<tr>
<td>2 Disagree (Bloom, Parrott)</td>
<td>2 Disagree (Bloom, Daugherty)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[
\frac{21 \text{ eligible}}{2} = 10.5 = 11
\]

2) The number of affirmative votes needed to satisfy the ¾ requirement is as follows:

Technical Merit: (21 eligible to vote - 2 not returned - 1 abstentions = 18 × 0.75 = 13.5) 14
Emergency Nature: (21 eligible to vote - 2 not returned - 0 abstentions = 19 × 0.75 = 14.25) 15

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is April 22, 2020.
QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1490 to Delete 1.3.3 in its entirety.

Eligible to Vote: 21
Not Returned: 2

Khaled E. Habib, Richard L. Day

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>16</td>
<td>Bruce J. Swiecicki: I agree with the technical merits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bruce A. Hopkins: Agree</td>
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<td>David M. Mihalick: Agree</td>
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<td></td>
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<td>Thomas R. Arnold: It is necessary for all factors to be correct and in place for the proper implementation of the up-dated standard</td>
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<td>Jeffrey A. Christner: Based on timing and needed training for our industry users.</td>
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<td>Charles N. Ballard: Agree</td>
</tr>
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<td></td>
<td>Homer A. Staves: Having the standard’s application date so close to its approval and publication will prevent proper timing for implementation, industry training of new requirements, and development of new components needed for compliance not readily available in the market.</td>
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<tr>
<td></td>
<td></td>
<td>James Alan Johnson: Agree</td>
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<td></td>
<td></td>
<td>Leslie Woodward: Agree</td>
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<tr>
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<td></td>
<td>Ryan Hyer: Agree</td>
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<tr>
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<td></td>
<td>Doug Mulvaney: Approval of this TIA will allow the AHJs responsible for the enforcement of this Standard to determine the ability to enforce the document.</td>
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<td>Paul Sinclair: Agree</td>
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<td>Mark Luttich: Agree</td>
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<td>Leo Akins: agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shane Devenish: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1490 to Delete 1.3.3 in its entirety</td>
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<td></td>
<td>Benjamin Knox: Agree</td>
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</tbody>
</table>

| DISAGREE       | 2     | Christopher J. Bloom: From the 1999 edition and prior this section was not necessary. However, per the NFPA rule change in 2002 edition, this language was necessary to have an Effective Date standardized for the code. This language has been in the code ever since the 2002 edition with ZERO issues until now. I DO NOT care what date the Technical Committee chooses, but there has to be a start date in the code to comply with the NFPA rules. It was suggested that we leave this up to the Authority Having Jurisdiction. For those with grey hair on the TC, the problem with this is that the AHJ in Nebraska may have a different effective date than the AHJ in California, than the AHJ in Iowa, etc. etc. The effective date language was chosen (from my recollection) to establish an objective, not subjective, uniform application of the code to all AHJs for easier conformity for code enforcement. I see real liability problems and potential litigation for companies with plants in different states having different effective dates according to their own AHJ. |

| ABSTAIN        | 1     | Shane B. Daugherty: Further discussions should be addressed and alignment with publication can be addressed. A date of implementation is necessary. |

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 21
Not Returned: 2

Khaled E. Habib, Richard L. Day

<table>
<thead>
<tr>
<th>Vote Selection</th>
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<tbody>
<tr>
<td>AGREE</td>
<td>17</td>
<td>Bruce J. Swiecicki: I agree that this is an emergency.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bruce A. Hopkins: Agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>David M. Mihalick: Agree</td>
</tr>
</tbody>
</table>
The timing for this implementation is not consistent with the requirements. Also, there are some errors in the new Standard that must be corrected before this requirement can be properly effective.

With the date remaining, we would not have ample time to train users.

Having the standard’s application date so close to its approval and publication will prevent proper timing for implementation, industry training of new requirements, and development of new components needed for compliance not readily available in the market.

It is important that this TIA be accepted in time for the next edition of NFPA 1192 to include this change to the Standard.

A. The standard contains an error or an omission that was overlooked during the regular revision process.

The nature is not emergent. Further discussions should be addressed and alignment with publication can be addressed. A date of implementation is necessary.
NFPA 1581-2015 and Proposed 2021 Editions
Standard on Fire Department Infection Control Program
TIA Log No: 1517
Reference: 8.4.10 (new), D.1.1, and D 1.2.5
Comment Closing Date: July 9, 2020
Submitter: Christina Baxter, Emergency Response TIPS, and David Bernzweig, Columbus, OH Division of Fire
www.nfpa.org/1581

1. Add new Section 8.4.10 and associated Annex information to read as follows:

8.4.10* APR and SCBA Facepieces Exposed to Airborne and Liquidborne Pathogens.

8.4.10.1 Individuals involved in the cleaning and disinfection of air-purifying respirator (APR) and SCBA facepieces shall be trained in cleaning and disinfecting procedures in accordance with 8.4.10 and shall be familiar with the facepieces being cleaned and disinfected, including their inspection and assembly procedures.

8.4.10.2* Individuals handling contaminated APR and SCBA facepieces shall wear a minimum of a protective garment, gloves, goggles, and a respirator appropriate for the type of disinfectant and hazards associated with the respective airborne and liquidborne pathogens.

8.4.10.3* Where available, the specific instructions provided by the manufacturer shall be used for the cleaning and disinfection of APR and SCBA facepieces that have been exposed to airborne or liquidborne pathogens.

8.4.10.4* In the absence of specific cleaning and disinfection instructions, the procedures in 8.4.10.4.1 through 8.4.10.4.10.2 shall be used.

8.4.10.4.1 If filters or cartridges are present, the filters and cartridges shall be removed from the facepiece. Reusable filters or cartridges shall be cleaned as specified in 8.4.10.4.10.

8.4.10.4.2 Facepieces shall be further disassembled by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer.

8.4.10.4.3 The facepiece shall be washed in warm [43°C (110°F) maximum] water with a mild detergent or with a cleaning agent recommended by the manufacturer.

8.4.10.4.3.1 Use of a stiff bristle, not wire, brush shall be permitted to facilitate the removal of dirt.

8.4.10.4.4 Facepiece components shall be thoroughly rinsed in clean, warm [43°C (110°F) maximum], preferably running water.

8.4.10.4.4.1 If the rinsing is accomplished in a bucket or other vessel, the bucket or vessel shall be drained.

8.4.10.4.5* When the cleaning agent used does not contain a disinfecting agent, respirator components shall be immersed for 2 minutes in one of the following:

(1) A hypochlorite solution (50 ppm chlorine) that is made by adding approximately 1 mL laundry bleach to 1 L water at 43°C (110°F).

(2) An aqueous solution of iodine (50 ppm iodine) that is made by adding approximately 0.8 mL tincture of iodine (6 g to 8 g ammonium and/or potassium iodide/100 mL 45 percent alcohol) to 1 L water at 43°C (110°F).

(3)* Other commercially available cleaning agents of equivalent disinfectant quality used as directed in terms of its concentration, application, and dwell time, if their use is recommended or approved by the respirator manufacturer; where possible, EPA-registered disinfectants shall be used that are specific to the pathogens involved.

8.4.10.4.6 Following disinfection, facepiece components shall be thoroughly rinsed in clean, warm [43°C (110°F) maximum], preferably running water.
8.4.10.4.6.1 If the rinsing is accomplished in a bucket or other vessel, the bucket or vessel shall be drained.
8.4.10.4.7* Facepiece components shall be hand-dried with a clean lint-free cloth or air-dried.
8.4.10.4.8 The facepiece shall be reassembled, replacing filters, cartridges, and canisters in accordance with manufacturer’s instructions, where necessary.
8.4.10.4.9 The respirator shall be inspected in accordance with the manufacturer’s instructions to ensure that all components work properly and any damaged or defective components shall either be repaired or replaced.
8.4.10.4.10* The outside of any filters or cartridges to be reused shall be wiped down with a disinfectant wipe and then allowed to air dry.
8.4.10.4.10.1 The filter media shall not be wetted or exposed to liquid disinfectant.
8.4.10.4.10.2 Any filter or cartridge that has been soiled, contaminated, or clogged shall be replaced.

A.8.4.10 Departments often use their SCBA facepiece in conjunction with an adapter to configure the facepiece as part of an air-purifying respirator that when worn with appropriate filters or cartridges provides more portable protection against airborne pathogens and exposure to splatters of liquidborne pathogens. Alternatively, departments can have dedicated elastomeric half or full facepiece APRs.

A.8.4.10.2 It is recommended that departments use personal protective equipment that is certified to the respective product categories in NFPA 1999 for emergency medical single-use or multi-use garments, examination or cleaning gloves, eye and face protection devices, and respirators approved by NIOSH per 42 CFR 84.

A.8.4.10.3 SCBA manufacturers are required to provide cleaning instructions and disinfecting procedures as part of their user information as specified in NFPA 1981. Similarly, APR manufacturers are required to provide cleaning and disinfecting instructions for their products as part of the information for becoming approved respirators per 42 CFR 84 by NIOSH. These procedures might not address specific types of pathogens that warrant the use of certain disinfecting procedures to ensure complete decontamination of the facepiece and related parts. Where possible, departments should follow instructions specific to how individual parts of the SCBA facepiece are cleaned and disinfected, including the use of specific cleaning agents and disinfectants that are known not to adversely affect the continued use and performance of the APR or SCBA.

A.8.4.10.4 The procedures provided in this section are based on mandatory requirements established in Appendix B-2, Respirator Cleaning Procedures, of OSHA 29 CFR 1910.134 with minor adaptations to address specific concerns for disinfecting respirators that have been contaminated with airborne or liquidborne pathogens. These procedures are further consistent with the guidelines provided by the Centers for Disease Control and Prevention (CDC) at https://www.cdc.gov/coronavirus/2019-ncov/hcp/elastomeric-respirators-strategy/index.html.

A.8.4.10.4.5 The first two options for disinfecting procedures are given in Appendix B-2 of OSHA 29 CFR 1910.134. The third option is to use a disinfectant that has been registered with the U.S. Environmental Protection Agency (EPA) for demonstrating its effectiveness against specific pathogens to which the wearer has been exposed.

A.8.4.10.4.5(3) The EPA lists specific disinfectants for known forms of microbial contamination. For example, specific disinfectants for use against SARS-CoV-2, the virus responsible for COVID-19, can be found at https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2. It is important to recognize that many disinfectants on this list might not be suitable for use on SCBA facepieces and related components. Any use of a specific disinfectant should be confirmed by
both the respirator manufacturer and disinfectant supplier for its application for disinfecting the specific SCBA facepiece. Departments are encouraged to obtain a copy of the registered EPA labeling for the respective disinfectant(s) under consideration to determine how the disinfectant should be properly used to be effective and to learn of any limitations for its use. A copy of the EPA-registered label instructions can be obtained from the supplier or conducting a search through the EPA website link https://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1. Searches can be conducted using the EPA registration number, supplier name, product name, and active ingredients. 

A.8.4.10.4.7 The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces can result in dermatitis. In addition, some disinfectants can cause deterioration of rubber or corrosion of metal parts if not completely removed. 

A.8.4.10.4.10 Certain types of unprotected filters known as pancake or flat filters cannot be reused. The department should make a determination if reuse of the filter is warranted based on information provided by the manufacturer or other competent sources. 

2. Add the following documents to Annex D.1.1 to read as follows: 

D.1.1 NFPA Publications. 

3. Add the following documents to Annex D.1.2.5 to read as follows: 

D.1.2.5 U.S. Government Publications. 
- Title 42, Code of Federal Regulations, Part 84. 

Substantiation: The proposed additional language addresses the need to provide appropriate instructions for protection of fire fighters during epidemics or pandemics where supplies of disposable respirators are limited. This situation currently exists for the COVID-19 pandemic. The use of APR and SCBA facepieces in this fashion requires specific attention to their cleaning and disinfection that is detailed in the proposed requirements. The requirements are consistent with the OSHA mandatory requirements for cleaning of respirators as well as up-to-date guidance provided in the CDC website that is referenced in the related annex sections. 

Emergency Nature: The proposed TIA offers to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation that is currently being caused by COVID-19 or that could be caused by future pandemics. 

Anyone may submit a comment by the closing date indicated above. Please identify the TIA number and forward to the Secretary, Standards Council.
MEMORANDUM

TO: Technical Committee on Fire Service Occupational Safety and Health

FROM: Jenny Depew, Technical Committee Administrator

DATE: July 10, 2020

SUBJECT: NFPA 1581 Proposed TIA No. 1517 FINAL BALLOT RESULTS

No public comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

34 Eligible to Vote
7 Not Returned (Bogucki, Haines, Lackore, McHugh, Stewart, Tamme, Wann)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>27 Agree (w/comment: Baxter, Childress, Loflin, Niemiec, Schwartz, Smith, Tippett)</td>
<td>27 Agree (w/comment: Kerwood, Krause, Schwartz, Smith)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative ¾ vote]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[
34 \text{ eligible} \div 2 = 17 + 1 = 18
\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 21.

\[
(34 \text{ eligible to vote} - 7 \text{ not returned} - 0 \text{ abstentions}) = 27 \times 0.75 = 20.25
\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is July 15, 2020.
**QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1517 to add Sections 8.4.10 (new), D.1.1, and D 1.2.5 to the 2015 and 2021 editions of NFPA 1581.**

<table>
<thead>
<tr>
<th>Vote Selection</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>27</td>
<td>Christina M. Baxter - Questions that arose during the recent COVID-19 response need to be addressed within NFPA 1581 to ensure that response elements have the guidance for the use and disinfection of APR and SCBA facepieces following exposure.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dennis R. Childress - I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1517 to add Sections 8.4.10 (new), D.1.1, and D 1.2.5 to the 2015 and 2021 editions of NFPA 1581</td>
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<tr>
<td></td>
<td></td>
<td>Daniel G. Samo - Agree</td>
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<td>Brian Carlson - Agree</td>
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<td></td>
<td>Fred C. Terry - Agree</td>
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<td></td>
<td></td>
<td>Fabrice Czarnecki - Agree</td>
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<td>Paul L. Napoli - Agree</td>
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<td>David W. Dodson - Agree</td>
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<td>Philip C. Skittelburg - Agree</td>
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<td>Denise L. Smith - I agree that this additional language is necessary to ensure that equipment is properly cleaned.</td>
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<td>Scott D. Kerwood - Agree</td>
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<td>Andrew G. Schwartz - This is important safety information to be added.</td>
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<td>David T. Berninwag - Agree</td>
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<td>Kepra Jack - Agree</td>
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<td>John R. Neamy - Firefighters need this direction.</td>
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<td>Robert D. Neamy - Agree</td>
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<td>Ronnie Villanueva - I agree.</td>
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<td></td>
<td></td>
<td>Christopher A. Garret - Agree</td>
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<td></td>
<td></td>
<td>Randy J. Krause - Agree</td>
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<td></td>
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<td>Murray E. Loffin - I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1517 to add Sections 8.4.10 (new), D.1.1, and D 1.2.5 to the 2015 and 2021 editions of NFPA 1581</td>
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<tr>
<td></td>
<td></td>
<td>Charles J. Popp, III - Agree</td>
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<tr>
<td></td>
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<td>Steven M. Moffatt - Agree</td>
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<td></td>
<td></td>
<td>Mario D. Rueda - Agree</td>
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<td></td>
<td></td>
<td>Donald Lee Cox - Agree</td>
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<td></td>
<td></td>
<td>John Tippett - Agree with all recommendations.</td>
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<td>David J. Prezant - Agree</td>
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<td>Bradley Roy Davidson - Agree</td>
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<td></td>
<td></td>
<td>Charles J. Popp, III - Agree</td>
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<td>Steven M. Moffatt - Agree</td>
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<tr>
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<td></td>
<td>Mario D. Rueda - Agree</td>
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<tr>
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<td></td>
<td>Donald Lee Cox - Agree</td>
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<tr>
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<td>John Tippett - Agree with all recommendations.</td>
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<td>David J. Prezant - Agree</td>
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<td>Bradley Roy Davidson - Agree</td>
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</tbody>
</table>

**Question NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box. (Note: you must indicate the letter that corresponds with a selection of EMERGENCY NATURE RESPONSES A through F.)**

<table>
<thead>
<tr>
<th>Vote Selection</th>
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</thead>
<tbody>
<tr>
<td>Agree</td>
<td>27</td>
<td>Christina M. Baxter - A AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dennis R. Childress - A AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.</td>
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<tr>
<td></td>
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<td>Daniel G. Samo - A and C</td>
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<td></td>
<td></td>
<td>Brian Carlson - C</td>
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<td></td>
<td></td>
<td>Fred C. Terry - C and D</td>
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<td></td>
<td>Fabrice Czarnecki - C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paul L. Napoli - Agree</td>
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<tr>
<td></td>
<td></td>
<td>David W. Dodson - D</td>
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<td></td>
<td></td>
<td>Philip C. Skittelburg - D</td>
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<tr>
<td></td>
<td></td>
<td>Denise L. Smith - The proposed TIA would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation that exists as departments are using respiratory equipment in new ways during pandemic without adequate guidance on cleaning and disinfecting.</td>
</tr>
<tr>
<td></td>
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<td>Scott D. Kerwood - The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.</td>
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<tr>
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<td>Andrew G. Schwartz - D - The new language will help ameliorate risks from exposure of firefighters to Covid 19.</td>
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<td>David T. Berninwag - D</td>
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<td>Kepra Jack - Agree</td>
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<td>John R. Neamy - I am in agreement with letter A.</td>
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<td></td>
<td>Ronnie Villanueva - I'm in agreement with letter A.</td>
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<tr>
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<td>Randy J. Krause - C - The proposed TIA intends to correct a previously unknown existing hazard.</td>
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<td>Murray E. Loffin - D and E.</td>
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<td>Charles J. Popp, III - A and G</td>
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<tr>
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<td>Steven M. Moffatt - Agree</td>
</tr>
<tr>
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<td>Mario D. Rueda - Agree, I agree with A. This is an error that needs correction</td>
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<td>Donald Lee Cox - Comment 'G'</td>
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<td>John Tippett - C</td>
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<td>David J. Prezant - Agree</td>
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<td>Bradley Roy Davidson - D</td>
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</table>

**Disagree | 0 |**

**Abstain | 0 |**
1. Revise 7.3.3.2 and add new Annex A.7.3.3.2 to read as follows:
   7.3.3.2* Advanced cleaning shall be permitted prior to in lieu of sanitization or disinfection if the procedures for advanced cleaning have proven effective for sanitization or disinfection of the ensemble or ensemble elements.

   A.7.3.3.2 Organizations should consult with ISPs, manufacturers verified in cleaning, and verified cleaners for guidance on appropriate advanced cleaning procedures that are also effective in sanitization and disinfection.

2. Revise 7.3.10.1 thru 7.3.10.3 to read as follows:
   7.3.10.1 Ensembles and ensemble elements shall be dried using one of the following procedures in:
   (1)* Air drying, as follows:
      (a)* Place ensembles or ensemble elements in an area with good ventilation.
      (b)* Do not dry ensembles or ensemble elements in direct or indirect sunlight, under fluorescent light, or under UV light.
      (c) Do not allow the area used for drying to exceed 40°C (105°F).
   (2)* A drying cabinet, as follows:
      (a) Place ensembles or ensemble elements in the drying cabinet to allow good air circulation between each ensemble or ensemble element.
      (b) Use a specific drying time and drying temperature to provide sufficient drying of the ensembles or ensemble elements.
      (c) Do not allow the area used for drying to exceed 40°C (105°F).

   7.3.10.2* When machine drying as follows is used, the following procedures shall be followed:
      (a) The recommended capacity of the machine shall not be exceeded.
      (b) All closures, including pocket closures, hooks and loops, snaps, zippers, and hooks and dees, shall be fastened. A hook that is not part of a closure shall be covered with a piece of loop.
      (c)* A “no heat” or “air dry” option shall be used, if available.
      (d)* In the absence of a “no heat” or “air dry” option, the basket temperature shall not exceed 40°C (105°F).
      (e)* The use of a heat cycle shall be discontinued prior to the removal of all moisture from the ensembles or ensemble elements.
      (f)* The remainder of the drying process shall be accomplished by a “no heat” machine setting or removal of the ensembles or ensemble elements from the machine dryer to air dry.

   7.3.10.3* Ensembles or ensemble elements that are not completely dry shall not be returned to service.
3. Delete 7.3.11.3 and renumber subsequent paragraphs.

7.3.11.3 All closures, including pocket closures, hooks and loops, snaps, zippers, and hooks and dees, shall be fastened.

4. Revise 7.4.4.6.1 and add new Annex 7.4.4.6.1 to read as follows:

7.4.4.6.1* Advanced cleaning shall be permitted prior to in lieu of sanitization or disinfection if the procedures for advanced cleaning have proven effective for sanitization or disinfection of the ensemble or ensemble elements.

A.7.4.4.6.1 Organizations should consult with ISPs, manufacturers verified in cleaning, and verified cleaners for guidance on appropriate advanced cleaning procedures that are also effective in sanitization and disinfection.

5. Revise Table 11.1.1.1, for the entry “Heavy metals cleaning efficiency” to read as follows:

<table>
<thead>
<tr>
<th>Function/Capability</th>
<th>Verified ISP or Verified Organization</th>
<th>Verified Cleaner</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>≥50% 70% for each metal</td>
<td>≥50% 70% for each metal efficiency</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Delete 11.3.7 and renumber 11.3.7.1 thru 11.3.7.5 as shown:

11.3.7* For ISPs, cleaners, manufacturers, and organizations that are subject to cleaning verification, the certification organization shall evaluate their advanced cleaning and sanitization procedures in accordance with Sections 7.3 and 7.4.

11.3.7.1 11.3.7* For verification of cleaning, the certification organization shall evaluate the effectiveness of the ISP’s, cleaner’s, manufacturer’s, or organization’s cleaning processes against the requirements specified in 11.3.7.3 and 11.3.7.4 11.3.7.2 and 11.3.7.3.

11.3.7.2 11.3.7.1 For verification of the ability to sanitize and clean protective garments, the certification organization shall evaluate the effectiveness of the ISP’s, cleaner’s, manufacturer’s, or organization’s sanitization processes against the requirement specified in 11.3.7.5 11.3.7.4.

11.3.7.3 11.3.7.2 When tested for removal of selected products of combustion …

11.3.7.4 11.3.7.3 When tested for removal of selected products of combustion …

11.3.7.5 11.3.7.4 When tested for the neutralization and sanitization of biological …

7. Delete 11.3.8 and renumber subsequent paragraphs, tables and figures accordingly:

11.3.8 For verification of an organization’s or an ISP’s advanced inspection services, the certification organization all evaluate the organization’s or ISP’s procedures in accordance with Sections 6.3 and 6.4 of this standard.

8. Revise 11.3.11 (renumbered per this TIA as 11.3.10) to read as follows:

11.3.11 11.3.10 For verification of an organization’s or ISP’s, cleaner’s, manufacturer’s, or organization’s advanced cleaning and sanitization services, the documentation and measurements specified in Table 11.3.11 11.3.10 shall be evaluated and verified to be compliant by the certification organization.
9. Revise and add new entries to Table 11.3.11 (renumbered per this TIA as 11.3.10) as follows:

<table>
<thead>
<tr>
<th>NFPA 1851 Clause to Be Evaluated</th>
<th>Method of Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.3.4</td>
<td>Audit or review of organization’s or ISP’s procedures and documentation by certification organization</td>
</tr>
<tr>
<td>7.3.5</td>
<td>Audit or review of organization’s or ISP’s procedures and documentation by certification organization</td>
</tr>
<tr>
<td>7.3.6</td>
<td>Audit or review of organization’s or ISP’s procedures and documentation by certification organization</td>
</tr>
<tr>
<td>7.3.9(1)–(3) and 7.3.9(5)–(6)</td>
<td>Audit or review of organization’s or ISP’s procedures and documentation by certification organization</td>
</tr>
<tr>
<td>7.3.9(4)</td>
<td>Direct measurement or observation by a representative of the certification organization</td>
</tr>
<tr>
<td>7.3.11</td>
<td>Audit or review of organization’s or ISP’s procedures and documentation by certification organization</td>
</tr>
<tr>
<td>7.3.16</td>
<td>Audit or review of organization’s or ISP’s procedures and documentation by certification organization</td>
</tr>
<tr>
<td>7.3.10</td>
<td>Audit or review of organization’s or ISP’s procedures and documentation by certification organization</td>
</tr>
<tr>
<td>7.3.10.1(1)(c), 7.3.10.1(2)(c), or 7.3.10.2(4)7.3.10.1(3)(d)</td>
<td>Direct measurement or observation by a representative of the certification organization</td>
</tr>
<tr>
<td>7.4.4.3</td>
<td>Audit or review of organization’s or ISP’s procedures and documentation by certification organization</td>
</tr>
<tr>
<td>7.4.4.4</td>
<td>Audit or review of organization’s or ISP’s procedures and documentation by certification organization</td>
</tr>
<tr>
<td>7.4.4.6</td>
<td>Audit or review of organization’s or ISP’s procedures and documentation by certification organization</td>
</tr>
</tbody>
</table>

10. Delete paragraph 11.3.13:

All repair categories that are verified in accordance with this standard shall undergo verification on an annual basis.

11. Revise 12.3 to read as follows:

12.3 Water Penetration Barrier Evaluation.
12.3.1 Application. This evaluation test method shall apply to moisture barrier materials and moisture barrier seams found in structural or proximity fire fighting protective garment elements that are in service and to moisture barrier repairs that are being subjected to advance repair procedures by an ISP or organization for verification.
12.3.2 Evaluation Areas.
12.3.2.1 For the purposes of evaluating in-service garment elements, a minimum of three moisture barrier material areas and a minimum of three moisture barrier areas with a seam shall be tested on each garment element.
12.3.2.1.1 Moisture barrier material areas shall be from high-abrasion areas of the garment elements... (5) Seat area
12.3.2.1.2 In addition to the areas listed in 12.3.2.1.1 where potential damage to the garment outer shell or the thermal barrier has been detected, ...barrier.

12.3.2.2 For the purposes of verification, a minimum of three repaired samples of each moisture barrier for verification shall be prepared according to 11.3.9.2.

12.3.2.3 Moisture barrier material areas shall be positioned in the evaluation apparatus such that the side of the barrier that is against the outer shell faces the water in the evaluation apparatus.

12.3.2.4 Moisture barrier material areas with seams shall be positioned on the evaluation apparatus so that the seam divides the specimen into two equal halves.

12. Revise 12.9.1.2 to read as follows:

12.9.1.2 Fabric used for the creation of the sample mesh pockets on each garment shall be an aramid-based, warp-knit, mesh-style fabric having an open area of 4020 to 6040 percent and a unit area weight ranging from 220 g/m² to 270 g/m² (6.5 oz/yd² to 8.0 oz/yd²).

13. Revise Annex A.7.3.10.2 numbering to read as follows:

A.7.3.10.2 A.7.3.10.1(3) Machine drying of ensembles and ensemble elements is generally not recommended. Dryers can reach high basket temperatures during operation, ... stopped.

A.7.3.10.2(3) A.7.3.10.1(3)(c) “No heat” is the preferred method of machine drying because it effectively accomplishes forced air ventilation.

A.7.3.10.2(4) A.7.3.10.1(3)(d) Excessive temperatures can cause damage to ensembles and ensemble elements, excessive garment shrink-age, and potentially premature failure ...out.

A.7.3.10.2(5) A.7.3.10.1(3)(e) Removal of garments before they are completely dry prevents exposure to excessive heat and reduces the potential for premature retirement ...setting.

A.7.3.10.2(6) A.7.3.10.1(3)(f) Ensembles and ensemble elements should be completely dry before reuse to avoid the potential for steam burns caused by moisture ...conditions.

Substantiation: In 7.3.10.1, we say that they must use either Air Drying or a Drying Cabinet. Then in 7.3.10.2, we say, If machine drying is used, they must follow a certain procedure. It’s unclear which is meant. This change aligns the requirement to provide clarity.

7.3.11.3 is a duplicate to section 7.2.11.3. This change removes redundancy.

7.3.3: The current wording requires the organizations to perform advanced cleaning and then sanitization and disinfection even when the advanced cleaning procedures have proven to be effective for sanitization and disinfection. The proposed wording revises the requirement so that only advanced cleaning procedures are required when they are proven effective for sanitization and disinfection. Also adding annex information to provide guidance to the organizations for selecting processes that are generally considered acceptable for sanitization and disinfection while performing advanced cleaning.

Table 11.1.1.1: This is a typographical change as the technical change already occurred in Table 11.1.1.1 under TIA 20-2/TIA Log #1446. This aligns the table with the text requirement.

Sections 11.3.7 and 11.3.8 are redundant to 11.3.11 and 11.3.10, respectively. All subsequent sections contained in 6.3, 6.4, 7.3, and 7.4 are not able to be evaluated by the certification organizations. This is the reason for adding 11.3.10 and 11.3.11 which provides specificity related to what should be audited by the CO. In particular, the only requirements for verification relate to the garment items and not to helmets, boots, gloves, or hoods. The proposed language
limits the review to the specific requirements that relate to verification and under audit by the certification organizations.

Removing this 11.3.13 as it was inadvertently left in the standard. The verification cycle was determined and included in Table 11.1.1.1 which states that verification shall occur every two years.

Instructions in 12.3 were not provided for the Application and Evaluation Areas when using this test method for verification. The current requirements are very specific to routine inspections. This language is being added to add clarification on the specimens required for testing when performing testing for verification purposes.

12.9.1.2: UL has been unsuccessful at being able to obtain a material that meets the 40-60% open area. The material that was used during validation testing does not meet this requirement either. It is being suggested to reduce the minimum open area to 20% as this more closely represents the material that was use during validation testing. Also changing the maximum open area by the same magnitude in order to prevent the possibility of a lab sourcing a material with an open area that is considerably larger than the minimum being proposed in this wording.

**Emergency Nature**: The standard contains an error or an omission that was overlooked during the regular revision process.

Many of the items in this TIA are contradictory to others in the document. In order to utilize the document effectively, they must be corrected.
<table>
<thead>
<tr>
<th>Function/Capability</th>
<th>Verified ISP or Verified Organization</th>
<th>Verified Cleaner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced cleaning</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Heavy metals cleaning efficiency</td>
<td>≥570% average for all metals</td>
<td>≥570% average for all metals</td>
</tr>
<tr>
<td>Semivolatile organic compound cleaning efficiency</td>
<td>≥50% average of all compounds</td>
<td>≥50% average of all compounds</td>
</tr>
<tr>
<td>Biological sanitization effectiveness — <em>Staphylococcus aureus</em></td>
<td>3 log reduction or better</td>
<td>3 log reduction or better</td>
</tr>
<tr>
<td>Biological sanitization effectiveness — <em>Klebsiella pneumoniae</em></td>
<td>3 log reduction or better</td>
<td>3 log reduction or better</td>
</tr>
<tr>
<td>Advanced inspection</td>
<td>All ensembles and ensemble elements of structural and proximity fire fighter protective clothing</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Advanced repair</td>
<td>All ensembles and ensemble elements capable of being repaired for structural and proximity fire fighter protective clothing that they have been specifically verified to repair</td>
<td>No repairs allowed</td>
</tr>
<tr>
<td>Advanced repairs for moisture barriers</td>
<td>ISPs have a choice of which moisture barriers to verify</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Verification testing timing</td>
<td>Every two years, or when processes change</td>
<td>Every two years, or when processes change</td>
</tr>
<tr>
<td>Verification facility quality review and inspection</td>
<td>Every six months</td>
<td>Every six months</td>
</tr>
</tbody>
</table>
MEMORANDUM

TO: Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment

FROM: Yvonne Smith, Technical Committee Administrator

DATE: May 1, 2020

SUBJECT: NFPA 1851 Proposed TIA No. 1484 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

35 Eligible to Vote
8 Not Returned (Allen, Durby, Hamma, Ott, Putorti, Tarley, Tomlinson, Weise)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>27 Agree (I w/comment: Stull)</td>
<td>27 Agree</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[
35 \text{ eligible} \div 2 = 17.5 = (18)
\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 21.

\[
(35 \text{ eligible to vote - 8 not returned - 0 abstentions} = 27 \times 0.75 = 20.25)
\]

INFORMATIONAL BALLOT: Twenty-three TC Members submitted votes in support of the Informational Supplemental Ballot circulated to clarify the intent is for Table 11.1.1.1 ISP and Organization Verification Designation Criteria and Section 11.3.7.2 to both reflect the “50% average for all metals”.

Ballot comments are attached for your review.
The *Regs* at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **Wednesday, May 6, 2020**.
I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1484 to Revise Various Sections in Chapters 7, 11 and 12 and related Annexes where indicated of NFPA 1851 2020 Edition.

Eligible to Vote: 35
Not Returned : 8
Jason L. Allen, Anthony D. Putorti, Jr., Tim W. Tomlinson, Dick Weise, Louis V. Ott, Tom Hamma, Jay L. Tarley, Tim Durby

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>William A. Fithian</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Amanda H. Newsom</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Karen E. Lehtonen</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Robert D. Tutterow, Jr.</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Patricia A. Freeman</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Kim Klaren</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Paul F. Curtis</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Anthonney Shawn Deaton</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>David P. Fanning</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Allen Ira Harkness</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Harry P. Winer</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Michael F. McKenna</td>
<td></td>
<td>Agree.</td>
</tr>
<tr>
<td>Jeffrey O. Stull</td>
<td></td>
<td>Further changes to 7.4.4.6.1 and A.7.4.4.6.1 are need to align with the permitted use of specialized cleaning indicated in 7.4.4.6. Consideration should also be provided for the use of specialized cleaning in conjunction with the sanitation or disinfection of other ensemble elements.</td>
</tr>
</tbody>
</table>

Jim Reidy                | agree |
George E. Berger         | Agree |
Daniel Silvestri         | AGREE |
Gene Necklaus             | Agree |
Tom Ragan                | agree |
Earl Hayden               | Agree |
John M. Karban           | AGREE |
James A. Walter           | agree |
Jonathan Fesik, Sr.      | agree |
R. Wendell Robison       | Agree |
Damian L. Owens          | A     |
Webster Henry Marshall   | Agree |
Christopher George Eysser| agree |
Vince Cinque             | Agreed |
I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the

Eligible to Vote: 35
Not Returned : 8

Jason L. Allen, Anthony D. Putorti, Jr., Tim W. Tomlinson, Dick Weise, Louis V. Ott, Tom Hamma, Jay L. Tarley, Tim Durby

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>William A. Fithian</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Amanda H. Newsom</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Karen E. Lehtonen</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Robert D. Tutterow, Jr.</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Patricia A. Freeman</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Kim Klaren</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Paul F. Curtis</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Anthony Shawn Deaton</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>David P. Fanning</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Allen Ira Harkness</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Harry P. Winer</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Michael F. McKenna</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Jeffrey O. Stull</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jim Reidy</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>George E. Berger</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Daniel Silvestri</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Gene Necklaus</td>
<td></td>
<td>Contains error or omission</td>
</tr>
<tr>
<td>Tom Ragan</td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>Earl Hayden</td>
<td></td>
<td>A,B</td>
</tr>
<tr>
<td>John M. Karban</td>
<td></td>
<td>AGREE</td>
</tr>
<tr>
<td>James A. Walter</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Jonathan Fesik, Sr.</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>R. Wendell Robison</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Damian L. Owens</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Webster Henry Marshall</td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>Christopher George Eysser</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Vince Cinque</td>
<td></td>
<td>Agreed</td>
</tr>
<tr>
<td>DISAGREE</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>ABSTAIN</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
I agree that Table 11.1.1.1 "ISP and Organization Verification Designation Criteria" and Section 11.3.7.2 should reflect the "50% average for all metals" as shown in this Supplemental Ballot to revise the 1851 Proposed TIA Log No. 1484 recommendation.

Number of Voting TC Members: 35
Not Returned : 12
Tim Durby, Jay L. Tarley, R. Wendell Robison, Dick Weise, Gene Necklaus, Jason L. Allen, Anthony D. Putorti, Jr., Jonathan Fesik, Sr., Tom Hamma, Tim W. Tomlinson, Louis V. Ott, Jim Reidy

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affirmative</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Affirmative with Comment</td>
<td>1</td>
<td>Agree</td>
</tr>
<tr>
<td>George E. Berger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
<td></td>
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<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Total Voted : 23
MEMORANDUM

TO: Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment

FROM: Yvonne Smith, Technical Committee Administrator

DATE: May 1, 2020

SUBJECT: NFPA 1851 Proposed TIA No. 1484 FINAL CC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

28 Eligible to Vote
8 Not Returned (Allen, Area, Barker, Farley, Johnston, Legendre, Morris, Szalajda)

<table>
<thead>
<tr>
<th>Correlation Issues:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>20 Agree</td>
<td>20 Agree</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[28 \text{ eligible} \div 2 = 14 + 1 = (15)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 15.

\[(28 \text{ eligible to vote} - 8 \text{ not returned} - 0 \text{ abstentions} = 20 \times 0.75 = 15)\]

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is Wednesday, May 6, 2020.
I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.

Eligible to Vote: 28
Not Returned : 8
Jason L. Allen, Roger L. Barker, Jeff Legendre, Jonathan V. Szalajda, John H. Morris, James B. Area, Edmund Farley, Ronald Johnston

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Amanda H. Newsom</td>
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</tr>
<tr>
<td>Joseph Arrington</td>
<td></td>
<td>I agree</td>
</tr>
<tr>
<td>Karen E. Lehtonen</td>
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<tr>
<td>David G. Matthews</td>
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<tr>
<td>Patricia A. Freeman</td>
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<td>Cristine Z. Fargo</td>
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<tr>
<td>Diane B. Hess</td>
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<tr>
<td>Robert D. Tutterow, Jr.</td>
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<tr>
<td>Stephen R. Sanders</td>
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<td>Michael F. McKenna</td>
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<tr>
<td>Dick Weise</td>
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**I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.**

**Eligible to Vote: 31**  
**Not Returned : 11**  

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</tr>
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<td>Contains error or omission not previously addressed.</td>
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<tr>
<td>Robert D. Tutterow, Jr.</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Stephen R. Sanders</td>
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<td>Agree, Item A</td>
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<td>William A. Van Lent</td>
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<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
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<tr>
<td>Michael F. McKenna</td>
<td></td>
<td>The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.</td>
</tr>
<tr>
<td>Jeffrey O. Stull</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Harry P. Winer</td>
<td></td>
<td>A</td>
</tr>
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</table>
Bruce H. Varner  Agree
Thomas M. Hosea  A.
Rick L. Swan  Agree
Beth C. Lancaster  A
Douglas Menard  agree
Steven H. Weinstein  Reason A.
Dick Weise

DISAGREE  0
ABSTAIN  0

The standards contains an error or an omission that was overlooked during regular revision process
NFPA 1851-2020 Edition

Standards on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting

TIA Log No: 1504
Reference: Various
Comment Closing Date: June 29, 2020
Submitter: Jeffrey O. Stull, International Personnel Protection, Inc.
www.nfpa.org/1851

1. Revise Figure 7.1.1.2(b) as appears below:

[see attached figure]

2. Revise 7.1.3.4.1 and add new Annex A.7.1.3.4.1 to read as follows:

7.1.3.4.1* Ensembles and ensemble elements that are known or suspected to be contaminated with body fluids or other forms of microbial contaminants shall be subject to preliminary exposure reduction as specified in Section 7.2 and isolated, tagged, and bagged at the incident scene.

A.7.1.3.4.1 Figure 7.1.1.2(b) shows the application of preliminary exposure reduction if protective ensembles or ensemble elements are suspected of being contaminated by body fluids. Footnote (b) states body fluid contamination also includes other microbial contamination. Other microbial contamination can be interpreted to include airborne pathogenic viruses (such as SARS-CoV-2, which is responsible for COVID-19); however, the preliminary exposure reduction techniques described in Section 7.2 and the related annex sections have not been verified for sanitization, disinfection, or inactivation of airborne pathogenic viruses on protective ensembles and ensemble elements under field conditions and should not be relied upon for these purposes unless specific evidence is provided on the efficacy of specific techniques or cleaning agents applied against contamination caused by airborne pathogenic viruses. Therefore, preliminary exposure reduction should not be considered to be a form of field biological disinfection or sanitization for continued use of protective ensembles or ensemble elements unless the subject techniques have been demonstrated to be effective for reducing microbial loads on protective ensembles or ensemble element materials to acceptable safe levels established by the U.S. Environmental Protection Agency or Centers for Disease Control and Prevention (CDC) and are further shown not to compromise the performance properties of the protective ensemble or ensemble element or create potential skin contact or other health issues associated with residual cleaning agent, disinfectant, or sanitizer remaining in the protective ensemble or ensemble element.

3. Revise 7.1.3.4.2.2 to read as follows:

7.1.3.4.2.2 Based on the assessment of the contaminant, if disinfection or sanitization is considered possible, then the affected ensemble and ensemble elements shall be subjected to disinfection or sanitization procedures, followed by either advanced cleaning or specialized cleaning procedures as specified in Sections 7.4 and 7.3 or 7.5, respectively.

4. Add new 7.1.3.4.2.3 and related Annex A.7.1.3.4.2.3 to read as follows:
7.1.3.4.2.3* The organization or qualified experts shall determine whether advanced cleaning or specialized cleaning shall be applied in conjunction with disinfection or sanitization. Specialized cleaning shall be permitted to be used in lieu of advanced cleaning, in conjunction with disinfection or sanitization, for those contamination circumstances where advanced cleaning is not considered sufficient to provide appropriate cleaning conditions in conjunction with the procedures used for disinfection or sanitization.

A.7.1.3.4.2.3 Some forms of biological contamination can require cleaning processes with higher wash temperatures than are permitted for advanced cleaning of ensembles and ensemble elements. If higher wash temperatures are used, see A.7.3.9(4) for additional information on potential impacts of this process.

5. Revise 7.2.2 and add Annex A.7.2.2 to read as follows:

7.2.2* Preliminary Exposure Reduction Procedures.

A.7.2.2 See A.7.1.3.4.1.

6. Revise 7.3.3.3 and add Annex 7.3.3.3 to read as follows:

7.3.3.3* Ensembles or ensemble elements that have been exposed to bulk chemicals, unusual biological contaminants, asbestos, or other substances of a highly hazardous or unusual nature shall be subjected to specialized cleaning as specified in Section 7.5 in lieu of advanced cleaning.

A.7.3.3.3 Normally the presence of biological contaminants warrants the application of sanitization or disinfection in accordance with Section 7.4 that is followed by either advanced cleaning or specialized cleaning. As one example, in the case of bed bug contamination, the application of disinfection or sanitization may not be effective. Instead, specialized cleaning in the form of applying extended freezing temperatures or hotter wash temperatures than permitted by advanced cleaning is required (see A.7.5.3). It is possible that other unique forms of biological contamination can also require specialized cleaning only with the application of disinfection and sanitization.

7. Revise 7.4.3.2 and add new 7.4.3.2.1 and related Annex A.7.4.3.2.1 to read as follows:

7.4.3.2* Disinfectants and sanitizers shall be registered with the U.S. Environmental Protection Agency (EPA) for efficacy for hard surfaces or fabrics and textiles, whichever is applicable.

7.4.3.2.1* Where disinfection or sanitization is required for specific microbial contamination as determined by the organization or qualified experts, those disinfectants and sanitizers registered with the EPA for the specific form of microbial contamination shall be used.

A.7.4.3.2.1 The U.S. Environmental Protection Agency lists specific disinfectants (and sanitizers) for known forms of microbial contamination. For example, specific disinfectants for use against SARS-CoV-2, the virus responsible for COVID-19, can be found at https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2.

It is important to recognize that many disinfectants on this list may not be suitable for use on protective ensembles and ensemble elements. Any use of a specific disinfectant (or sanitizer) should be confirmed by the supplier for its application for disinfecting or sanitizing the specific ensemble or ensemble element.

It is also important to understand that most disinfectants are primarily intended for use on nonporous surfaces and are only usable for textile-based products if specific instructions are provided as part of the suppliers’ EPA registration that indicate their use for textile products as
part of a laundry or pretreatment process. End users are encouraged to obtain a copy of the registered EPA labeling for the respective disinfectant(s) under consideration to determine how the disinfectant should be properly used to be effective and to learn of any limitations for its use. A copy of the EPA-registered label instructions can be obtained from the supplier or conducting a search through the EPA website link https://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1. Searches can be conducted using the EPA registration number, supplier name, product name, and active ingredients.

The use of most disinfectants requires thorough rinsing of the element following application. Instructions vary based on the specific disinfectant.

8. Add new 7.4.3.7 and related Annex A.7.4.3.7 to read as follows:

7.4.3.7* Specialized cleaning shall be permitted to be used in lieu of advanced cleaning when ensembles and ensemble elements are disinfected or sanitized.

A.7.4.3.7 Specialized cleaning provides for the use of higher wash temperatures that are known to be effective against certain forms of microbial contamination [see A.7.3.9(4) for information related to the use of wash temperatures in cleaning of ensembles and ensemble elements]. Advanced cleaning wash temperatures for machine washing of garments are not permitted to be higher than 40°C (105°F). Specialized cleaning permits wash temperatures up to 60°C (140°F), which is considered a higher wash temperature. It is acknowledged that specialized cleaning for this purpose should not be overused because it is possible that frequent, extensive washing of ensembles and ensemble elements at higher wash temperatures can shorten their service life if applied too often.

9. Add new 7.4.4.4.1 and related A.7.4.4.1 to read as follows:

7.4.4.4.1* Both garment element outer shells and liners shall be subject to sanitation, including garments that have been contaminated with pathogenic bioaerosols.

A.7.4.4.1 Even if contamination of the garment element outer shell is only suspected, the liner should also be subjected to sanitization because bioaerosols can penetrate through the outer shell and cause contamination of the outer surface of the liner. Research on other bioaerosols has shown that aerosolized droplets from coughs range between 0.35 microns to 10 microns in diameter. In contrast, the average measured droplet sizes from sneezes are generally larger but can involve larger volumes of expelled aerosol according to the following references:


10. Revise portion of A.7.4.4.1 and Table A.7.4.4.1 to read as follows:

A.7.4.4.1...

*Use of a Washer/Extractor.* Another recommended procedure for sanitization of protective garments involves using an EPA-registered sanitizer as part of the cleaning formulation. In this approach, an EPA-registered sanitizer or other product that has been demonstrated to be
effective in sanitizing garments is used as a laundry additive. The garments are placed in an extractor with a special programmed formulation into which the sanitizer is added. The specific steps for this formulation are shown in Table A.7.4.4.1.

One of the steps allows for the injection of the sanitizer at a concentration recommended on the sanitizer product label, which is typically 1 ounce per gallon of water added. This step should subject the garment to the sanitizer for at least 10 minutes, followed by extraction (drain and spin) and a rinse cycle at moderate temperature. Following this procedure, the garments should be subjected to normal advanced cleaning as recommended in A.7.3.9(5) or specialized cleaning.

**Table A.7.4.4.1 Suggested Washer/Extractor Procedures for Garment Sanitization**

<table>
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<tr>
<th>Step</th>
<th>Action</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Fill to a maximum of 35°C (95°F) on low</td>
</tr>
<tr>
<td>2</td>
<td>Inject disinfectant</td>
</tr>
<tr>
<td>3</td>
<td>Wash/soak for 10 minutes*</td>
</tr>
<tr>
<td>4</td>
<td>Drain for 1 minute</td>
</tr>
<tr>
<td>5</td>
<td>Extract on low for 4 minutes</td>
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</tbody>
</table>

*Perform advanced or specialized cleaning after disinfecting soak.

**Substantiation:** The emergence of COVID-19 as a global pandemic has necessitated the evaluation of various forms of personal protective equipment (PPE) to protect first responders and the public from transmission. While the use of surgical gowns and isolation gowns are recommended for use to provide a shield from contamination of work clothing when responding to individuals potentially infected with COVID-19, depletion of these conventional PPE items may make firefighters become reliant on their structural firefighting protective clothing, primarily garments, for dermal protection.

The proposed recommended changes:

1. Indicate the limitations of preliminary exposure reduction procedures for reducing biological contamination resulting from contact with bioaerosols and liquids contaminating airborne pathogen viruses;
2. Clarify the permitted use of specialized cleaning in lieu of advanced cleaning, already indicated for garments in paragraph 7.4.4.6, which further requires a modification of the flowchart for the approach in addressing specific types of contamination;
3. Identify the need for using specific disinfectants registered by the EPA for airborne pathogenic viruses with a specific annex reference to the list provided on the EPA website for SARS-CoV-2 that is responsible for COVID-19, and further reinforce the requirement that the selected disinfectant or sanitizer be appropriate for the type of ensemble element;
4. Explain the need for elevated wash temperatures consistent with Center for Disease Control (CDC) recommended guidelines for washing clothing specific to COVID-19 and other corona viruses; and
5. Specify the need to apply sanitization to both the garment element outer shell and liner due to possible penetration of bioaerosols through the outer shell on the liner.

The most recent revision of NFPA 1851 did not anticipate the potential need for field disinfection to enable fire fighters to provide emergency medical services during a pandemic.
where shortages of recommended PPE occur. While the use of isolation gowns offer a suitable and convenient form of protecting work clothing from becoming contaminated, dwindling supplies for most jurisdictions have forced organizations to devise practices to minimize the spread of contamination that include the wearing of structural fire fighting clothing in conjunction with N95 or other respirators, examination gloves, and eye/face protection (where these other PPE items are recommended at https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-for-ems.html).

Current provisions in NFPA 1851 dictate the use of preliminary exposure reduction for controlling contamination on the fireground but these procedures have not been validated for on scene disinfection and sanitization of fire fighter protective ensembles and ensemble elements. This applied to both wet and dry mitigation techniques. The proposed changes as part of this amendment make this limitation clear and through the proposed annex language, warn about possible consequences for relying on this field approach to recycle clothing between uses after being potentially contaminated. Further, the amendment offers advice on the type validation that are needed in terms of not only demonstrating efficacy of the approach for disinfection but also evaluating potential effects of any process on product performance properties and the absence of residual sanitizer or disinfectant that would result in potential skin irritation or other health issues.

The specific changes proposed in new paragraphs 7.1.3.4.2.3 and 7.4.3.7 reinforce already permitted practices established in the 2020 edition of NFPA 1851, but make the connection of specialized cleaning being associated with contamination of clothing by airborne pathogenic viruses. The specific practice for applying higher wash temperatures during laundering is currently specified in paragraph 7.4.4.6. The provision for using higher wash temperature is also currently substantiated in Annex paragraph A.7.3.9(4) and is further provided as guidance by the Center for Disease Control (CDC) at https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/disinfecting-your-home.html. This same annex information warns against the potential tradeoffs for hotter wash temperatures reducing the service life of clothing.

Updated guidance dated March 17, 2020 from CDC for applying high wash temperatures can be found in the section “When No Gowns Are Available” of the webpage, “Strategies for Optimizing the Supply of Isolation Gowns” at the following link: https://www.cdc.gov/coronavirus/2019-ncov/hcp/pppe-strategy/isolation-gowns.html, which in turn has a link at routine procedures to specific laundering information as part of environmental infection control guidance for healthcare facilities within “Section 4. Parameters of the Laundry Process” at: https://www.cdc.gov/infectioncontrol/guidelines/environmental/background/laundry.html#g6. This guidance indicates use of high wash temperatures for disinfecting fabrics, textiles, and clothing. This guidance cites multiple published research articles as the basis of the recommended practices.

The requirement to use EPA-registered disinfectants and sanitizers is also an existing requirement found in paragraph 7.4.3.2. The specific change provided in this proposed amendment is to point out the use of disinfectants and sanitizers that have been specifically registered for use against known pathogens, with the example provided for those positioned for COVID-19.
**Emergency Nature:** The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. This amendment is specifically needed to address an emergency need as the result of first responder exposure to individuals with COVID-19.
Contamination suspected

- Bulk chemicals?
  - Yes: Apply preliminary exposure reduction; isolate/contain PPE.
  - No: Apply preliminary exposure reduction; isolate/contain PPE.

- Asbestos/designed substances?
  - Yes: Apply preliminary exposure reduction; isolate/contain PPE.
  - No: Body fluids?
    - Yes: Apply preliminary exposure reduction; isolate/contain PPE.
    - No: Products of combustion?
      - Yes: Apply preliminary exposure reduction; isolate/contain PPE.
      - No: Apply advanced cleaning.

Have PPE assessed by hazmat team or other expert(s).

Cleaning/decontamination possible?

- Yes: Apply appropriate specialized cleaning for contaminant type.
- No: Conduct routine inspection of PPE.

Determine if exposure permits cleaning and reuse.

Disinfection/sanitization possible?

- Yes: Apply disinfection or sanitization.
- No: Condemn, retire, and dispose of PPE.

Apply advanced cleaning.

Conduct routine inspection of PPE.

Notes:

- and other designated substances
- Includes other microbial contamination
- Includes any significant structural fire exposure
MEMORANDUM

TO: Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment

FROM: Yvonne Smith, Technical Committee Administrator

DATE: June 30, 2020

SUBJECT: NFPA 1851 Proposed TIA No. 1504 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

36 Eligible to Vote
8 Not Returned (Allen, Berger, Deaton, Hamma, Klaren, Ott, Robison, Weise)

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<th>Emergency Nature:</th>
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<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>28 Agree</td>
<td>28 Agree</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
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</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[36 \text{ eligible} \div 2 = 18 + 1 = (19)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 21.

\[(36 \text{ eligible to vote} - 8 \text{ not returned} - 0 \text{ abstentions} = 28 \times 0.75 = 21)\]

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is July 5, 2020.
1. Revise Figure 7.1.1.2(b) as appears below:

[see attached figure]

2. Revise 7.1.3.4.1 and add new Annex A.7.1.3.4.1 to read as follows:

7.1.3.4.1* Ensembles and ensemble elements that are known or suspected to be contaminated with body fluids or other forms of microbial contaminants shall be subject to preliminary exposure reduction as specified in Section 7.2 and isolated, tagged, and bagged at the incident scene.

A.7.1.3.4.1 Figure 7.1.1.2(b) shows the application of preliminary exposure reduction if protective ensembles or ensemble elements are suspected of being contaminated by body fluids. Footnote (b) states body fluid contamination also includes other microbial contamination. Other microbial contamination can be interpreted to include airborne pathogenic viruses (such as SARS-CoV-2, which is responsible for COVID-19); however, the preliminary exposure reduction techniques described in Section 7.2 and the related annex sections have not been verified for sanitization, disinfection, or inactivation of airborne pathogenic viruses on protective ensembles and ensemble elements under field conditions and should not be relied upon for these purposes unless specific evidence is provided on the efficacy of specific techniques or cleaning agents applied against contamination caused by airborne pathogenic viruses. Therefore, preliminary exposure reduction should not be considered to be a form of field biological disinfection or sanitization for continued use of protective ensembles or ensemble elements unless the subject techniques have been demonstrated to be effective for reducing microbial loads on protective ensembles or ensemble element materials to acceptable safe levels established by the U.S. Environmental Protection Agency or Centers for Disease Control and Prevention (CDC) and are further shown not to compromise the performance properties of the protective ensemble or ensemble element or create potential skin contact or other health issues associated with residual cleaning agent, disinfectant, or sanitizer remaining in the protective ensemble or ensemble element.

3. Revise 7.1.3.4.2.2 to read as follows:

7.1.3.4.2.2 Based on the assessment of the contaminant, if disinfection or sanitization is considered possible, then the affected ensemble and ensemble elements shall be subjected to disinfection or sanitization procedures, followed by either advanced cleaning or specialized cleaning procedures as specified in Sections 7.4 and 7.3 or 7.5, respectively.

4. Add new 7.1.3.4.2.3 and related Annex A.7.1.3.4.2.3 to read as follows:
7.1.3.4.2.3* The organization or qualified experts shall determine whether advanced cleaning or specialized cleaning shall be applied in conjunction with disinfection or sanitization. Specialized cleaning shall be permitted to be used in lieu of advanced cleaning, in conjunction with disinfection or sanitization, for those contamination circumstances where advanced cleaning is not considered sufficient to provide appropriate cleaning conditions in conjunction with the procedures used for disinfection or sanitization.

A.7.1.3.4.2.3 Some forms of biological contamination can require cleaning processes with higher wash temperatures than are permitted for advanced cleaning of ensembles and ensemble elements. If higher wash temperatures are used, see A.7.3.9(4) for additional information on potential impacts of this process.

5. Revise 7.2.2 and add Annex A.7.2.2 to read as follows:

7.2.2* Preliminary Exposure Reduction Procedures.
A.7.2.2 See A.7.1.3.4.1.

6. Revise 7.3.3.3 and add Annex 7.3.3.3 to read as follows:

7.3.3.3* Ensembles or ensemble elements that have been exposed to bulk chemicals, unusual biological contaminants, asbestos, or other substances of a highly hazardous or unusual nature shall be subjected to specialized cleaning as specified in Section 7.5 in lieu of advanced cleaning.

A.7.3.3.3 Normally the presence of biological contaminants warrants the application of sanitization or disinfection in accordance with Section 7.4 that is followed by either advanced cleaning or specialized cleaning. As one example, in the case of bed bug contamination, the application of disinfection or sanitization may not be effective. Instead, specialized cleaning in the form of applying extended freezing temperatures or hotter wash temperatures than permitted by advanced cleaning is required (see A.7.5.3). It is possible that other unique forms of biological contamination can also require specialized cleaning only with the application of disinfection and sanitization.

7. Revise 7.4.3.2 and add new 7.4.3.2.1 and related Annex A.7.4.3.2.1 to read as follows:

7.4.3.2* Disinfectants and sanitizers shall be registered with the U.S. Environmental Protection Agency (EPA) for efficacy for hard surfaces or fabrics and textiles, whichever is applicable.

A.7.4.3.2.1 The U.S. Environmental Protection Agency lists specific disinfectants (and sanitizers) for known forms of microbial contamination. For example, specific disinfectants for use against SARS-CoV-2, the virus responsible for COVID-19, can be found at https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2. It is important to recognize that many disinfectants on this list may not be suitable for use on protective ensembles and ensemble elements. Any use of a specific disinfectant (or sanitizer) should be confirmed by the supplier for its application for disinfecting or sanitizing the specific ensemble or ensemble element.

It is also important to understand that most disinfectants are primarily intended for use on nonporous surfaces and are only usable for textile-based products if specific instructions are provided as part of the suppliers’ EPA registration that indicate their use for textile products as...
part of a laundry or pretreatment process. End users are encouraged to obtain a copy of the registered EPA labeling for the respective disinfectant(s) under consideration to determine how the disinfectant should be properly used to be effective and to learn of any limitations for its use. A copy of the EPA-registered label instructions can be obtained from the supplier or conducting a search through the EPA website link https://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1. Searches can be conducted using the EPA registration number, supplier name, product name, and active ingredients.

The use of most disinfectants requires thorough rinsing of the element following application. Instructions vary based on the specific disinfectant.

8. Add new 7.4.3.7 and related Annex A.7.4.3.7 to read as follows:

    7.4.3.7* Specialized cleaning shall be permitted to be used in lieu of advanced cleaning when ensembles and ensemble elements are disinfected or sanitized.

   A.7.4.3.7 Specialized cleaning provides for the use of higher wash temperatures that are known to be effective against certain forms of microbial contamination [see A.7.3.9(4) for information related to the use of wash temperatures in cleaning of ensembles and ensemble elements].

   Advanced cleaning wash temperatures for machine washing of garments are not permitted to be higher than 40°C (105°F). Specialized cleaning permits wash temperatures up to 60°C (140°F), which is considered a higher wash temperature. It is acknowledged that specialized cleaning for this purpose should not be overused because it is possible that frequent, extensive washing of ensembles and ensemble elements at higher wash temperatures can shorten their service life if applied too often.

9. Add new 7.4.4.4.1 and related A.7.4.4.4.1 to read as follows:

    7.4.4.4.1* Both garment element outer shells and liners shall be subject to sanitization, including garments that have been contaminated with pathogenic bioaerosols.

   A.7.4.4.4.1 Even if contamination of the garment element outer shell is only suspected, the liner should also be subjected to sanitization because bioaerosols can penetrate through the outer shell and cause contamination of the outer surface of the liner. Research on other bioaerosols has shown that aerosolized droplets from coughs range between 0.35 microns to 10 microns in diameter. In contrast, the average measured droplet sizes from sneezes are generally larger but can involve larger volumes of expelled aerosol according to the following references:


10. Revise portion of A.7.4.4.1 and Table A.7.4.4.1 to read as follows:

    A.7.4.4.1...

    *Use of a Washer/Extractor.* Another recommended procedure for sanitization of protective garments involves using an EPA-registered sanitizer as part of the cleaning formulation. In this approach, an EPA-registered sanitizer or other product that has been demonstrated to be
effective in sanitizing garments is used as a laundry additive. The garments are placed in an extractor with a special programmed formulation into which the sanitizer is added. The specific steps for this formulation are shown in Table A.7.4.4.1.

One of the steps allows for the injection of the sanitizer at a concentration recommended on the sanitizer product label, which is typically 1 ounce per gallon of water added. This step should subject the garment to the sanitizer for at least 10 minutes, followed by extraction (drain and spin) and a rinse cycle at moderate temperature. Following this procedure, the garments should be subjected to normal advanced cleaning as recommended in A.7.3.9(5) or specialized cleaning.

Table A.7.4.4.1 Suggested Washer/Extractor Procedures for Garment Sanitization

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fill to a maximum of 35°C (95°F) on low</td>
</tr>
<tr>
<td>2</td>
<td>Inject disinfectant</td>
</tr>
<tr>
<td>3</td>
<td>Wash/soak for 10 minutes*</td>
</tr>
<tr>
<td>4</td>
<td>Drain for 1 minute</td>
</tr>
<tr>
<td>5</td>
<td>Extract on low for 4 minutes</td>
</tr>
</tbody>
</table>

*Perform advanced or specialized cleaning after disinfecting soak.

Substantiation: The emergence of COVID-19 as global pandemic has necessitated the evaluation of various forms of personal protective equipment (PPE) to protect first responders and the public from transmission. While the use of surgical gowns and isolation gowns are recommended for use to provide a shield from contamination of work clothing when responding to individuals potentially infected with COVID-19, depletion of these conventional PPE items may make firefighters become reliant on their structural firefighting protective clothing, primarily garments, for dermal protection.

The proposed recommended changes:

1. Indicate the limitations of preliminary exposure reduction procedures for reducing biological contamination resulting from contact with bioaerosols and liquids contaminating airborne pathogen viruses;
2. Clarify the permitted use of specialized cleaning in lieu of advanced cleaning, already indicated for garments in paragraph 7.4.4.6, which further requires a modification of the flowchart for the approach in addressing specific types of contamination;
3. Identify the need for using specific disinfectants registered by the EPA for airborne pathogenic viruses with a specific annex reference to the list provided on the EPA website for SARS-CoV-2 that is responsible for COVID-19, and further reinforce the requirement that the selected disinfectant or sanitizer be appropriate for the type of ensemble element;
4. Explain the need for elevated wash temperatures consistent with Center for Disease Control (CDC) recommended guidelines for washing clothing specific to COVID-19 and other corona viruses; and
5. Specify the need to apply sanitization to both the garment element outer shell and liner due to possible penetration of bioaerosols through the outer shell on the liner.

The most recent revision of NFPA 1851 did not anticipate the potential need for field disinfection to enable fire fighters to provide emergency medical services during a pandemic.
where shortages of recommended PPE occur. While the use of isolation gowns offer a suitable and convenient form of protecting work clothing from becoming contaminated, dwindling supplies for most jurisdictions have forced organizations to devise practices to minimize the spread of contamination that include the wearing of structural fire fighting clothing in conjunction with N95 or other respirators, examination gloves, and eye/face protection (where these other PPE items are recommended at https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-for-ems.html).

Current provisions in NFPA 1851 dictate the use of preliminary exposure reduction for controlling contamination on the fireground but these procedures have not been validated for on scene disinfection and sanitization of fire fighter protective ensembles and ensemble elements. This applied to both wet and dry mitigation techniques. The proposed changes as part of this amendment make this limitation clear and through the proposed annex language, warn about possible consequences for relying on this field approach to recycle clothing between uses after being potentially contaminated. Further, the amendment offers advice on the type validation that are needed in terms of not only demonstrating efficacy of the approach for disinfection but also evaluating potential effects of any process on product performance properties and the absence of residual sanitizer or disinfectant that would result in potential skin irritation or other health issues.

The specific changes proposed in new paragraphs 7.1.3.4.2.3 and 7.4.3.7 reinforce already permitted practices established in the 2020 edition of NFPA 1851, but make the connection of specialized cleaning being associated with contamination of clothing by airborne pathogenic viruses. The specific practice for applying higher wash temperatures during laundering is currently specified in paragraph 7.4.4.6. The provision for using higher wash temperature is also currently substantiated in Annex paragraph A.7.3.9(4) and is further provided as guidance by the Center for Disease Control (CDC) at https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/disinfecting-your-home.html. This same annex information warns against the potential tradeoffs for hotter wash temperatures reducing the service life of clothing.

Updated guidance dated March 17, 2020 from CDC for applying high wash temperatures can be found in the section “When No Gowns Are Available” of the webpage, “Strategies for Optimizing the Supply of Isolation Gowns” at the following link: https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/isolation-gowns.html, which in turn has a link at routine procedures to specific laundering information as part of environmental infection control guidance for healthcare facilities within “Section 4. Parameters of the Laundry Process” at: https://www.cdc.gov/infectioncontrol/guidelines/environmental/background/laundry.html#g6. This guidance indicates use of high wash temperatures for disinfecting fabrics, textiles, and clothing. This guidance cites multiple published research articles as the basis of the recommended practices.

The requirement to use EPA-registered disinfectants and sanitizers is also an existing requirement found in paragraph 7.4.3.2. The specific change provided in this proposed amendment is to point out the use of disinfectants and sanitizers that have been specifically registered for use against known pathogens, with the example provided for those positioned for COVID-19.
**Emergency Nature:** The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. This amendment is specifically needed to address an emergency need as the result of first responder exposure to individuals with COVID-19.
Contamination suspected

- Bulk chemicals?
  - Yes: Apply preliminary exposure reduction; isolate/contain PPE.
  - No: Apply preliminary exposure reduction; isolate/contain PPE.

- Asbestos/designated sub?
  - Yes: Apply preliminary exposure reduction; isolate/contain PPE.
  - No: Apply preliminary exposure reduction; isolate/contain PPE.

- Body fluids?
  - Yes: Apply preliminary exposure reduction; isolate/contain PPE.
  - No: Apply preliminary exposure reduction; isolate/contain PPE.

- Products of combustion?
  - Yes: Apply preliminary exposure reduction; isolate/contain PPE.
  - No: Apply preliminary exposure reduction; isolate/contain PPE.

Cleaning/decontamination possible?

- Yes: Apply appropriate specialized cleaning for contaminant type.
- No: Conduct routine inspection of PPE.

Disinfection/sanitization possible?

- Yes: Apply disinfection or sanitization.
- No: Advanced cleaning sufficient?
  - Yes: Conduct routine inspection of PPE.
  - No: Condemn, retire, and dispose of PPE.

Notes:
- And other designated substances
- Includes other microbial contamination
- Includes any significant structural fire exposure

Apply preliminary exposure reduction; isolate/contain PPE.
Have PPE assessed by hazmat team or other expert(s).
Determine if exposure permits cleaning and reuse.
Apply advanced cleaning.
Apply disinfection or sanitization.
I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1504 to Revise Various Sections of Chapter 7 and related Annexes where indicated.

Eligible to Vote: 36
Not Returned : 8
Jason L. Allen, Kim Klaren, Dick Weise, Louis V. Ott, George E. Berger, R. Wendell Robison, Tom Hamma, Anthony Shawn Deaton

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
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<tr>
<td>AGREE</td>
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<tr>
<td>Earl Hayden</td>
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<td>Agree</td>
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<td>Gene Necklaus</td>
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<td>David P. Fanning</td>
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<td>Amanda H. Newsom</td>
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<td>Paul F. Curtis</td>
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<td>Daniel Silvestri</td>
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<td>Tim Durby</td>
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<td>Harry P. Winer</td>
<td></td>
<td>agree</td>
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</tbody>
</table>
I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the instruction box.

Eligible to Vote: 36
Not Returned : 8

Jason L. Allen, Kim Klaren, Dick Weise, Louis V. Ott, George E. Berger, R. Wendell Robison, Tom Hamma, Anthony Shawn Deaton

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<td>Brian P. Shiels</td>
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</table>

The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.
I Agree

D

D

D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

Agree

D

D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation

Agree

A

Agree

D

d

D

Agree

agree

Agree

0

0
TENTATIVE INTERIM AMENDMENT BALLOT

EMERGENCY NATURE SELECTION OF RESPONSES

A. The standard contains an error or an omission that was overlooked during the regular revision process.

B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.

C. The proposed TIA intends to correct a previously unknown existing hazard.

D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.

F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.
NFPA 1851-2020 Edition

Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting

TIA Log No: 1512
Reference: 11.1.5
Comment Closing Date: June 29, 2020
Submitter: Jeffrey O. Stull, International Personnel Protection, Inc.

www.nfpa.org/1851

1. Revise 11.1.5 to read as follows:

   11.1.5 Organizations, ISPs, or manufacturers verified to the 2014 edition of NFPA 1851 shall undergo verification to the 2020 edition of NFPA 1851 within ±2 18 months of the NFPA effective date for the 2020 edition.

Substantiation: The emergence of COVID-19 as global pandemic has necessitated the evaluation of various forms of personal protective equipment (PPE) to protect first responders and the public from transmission. While the use of surgical gowns and isolation gowns are recommended for use to provide a shield from contamination of work clothing when responding to individuals potentially infected with COVID-19, depletion of these conventional PPE items may make firefighters become reliant on their structural firefighting protective clothing, primarily garments, for dermal protection.

The proposed amendment extends the period for currently verified organizations, independent service providers, or manufacturers to become verified for advanced cleaning and sanitization as part of the new requirements in the 2020 edition of NFPA 1851 due to the disruption of travel and institution of social distancing as the result of the global COVID-19 pandemic within most regions of the United States and Canada where this verification is being applied. The verification process requires on-scene auditor or technical support for its execution, which is not currently possible in many locations. The current deadline advanced cleaning and sanitization verification based on the paragraph 11.1.5 (before the amendment) is August 25, 2020.

The provision of verified sanitization (and advanced cleaning) capabilities for fire departments and other organizations is considered an essential part for helping to ensure that firefighter protective clothing is safe to reuse after potential exposure to SARS-CoV-2, the virus responsible for COVID-19.

Emergency Nature: The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.
MEMORANDUM

TO: Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment

FROM: Yvonne Smith, Technical Committee Administrator

DATE: June 30, 2020

SUBJECT: NFPA 1851 Proposed TIA No. 1512 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA **HAS** achieved the ¾ majority vote needed on both Ballot Item No. 1 (**Technical Merit**) and Ballot Item No. 2 (**Emergency Nature**).

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
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<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>27 Agree</td>
<td>27 Agree (w/comment: Newsom)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

1. In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
   \[36 \text{ eligible} + 2 = 18 + 1 = (19)\]

2. The number of affirmative votes needed to satisfy the ¾ requirement is 21.
   \[(36 \text{ eligible to vote} - 8 \text{ not returned} - 0 \text{ abstentions} = 28 \times 0.75 = 20.25)\]

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is July 5, 2020.
I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1512 to Revise Section 11.1.5.

Eligible to Vote: 36
Not Returned: 9
Jason L. Allen, Kim Klaren, Dick Weise, Louis V. Ott, George E. Berger, R. Wendell Robison, Tom Hamma, Jay L. Tarley, Anthoney Shawn Deaton

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<td>AGREE</td>
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<td>John M. Karban</td>
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<td>Webster Henry Marshall</td>
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<td>Vince Cinque</td>
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<td>Christopher George Eysser</td>
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<td>Agree</td>
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<td>Agree</td>
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<td>Agree</td>
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<td>Comments</td>
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<tr>
<td>AGREE</td>
<td>27</td>
<td></td>
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<tr>
<td>Patricia A. Freeman</td>
<td></td>
<td>The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or</td>
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<td>Earl Hayden</td>
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<td>D, E</td>
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<td>agree</td>
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<td>Damian L. Owens</td>
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</table>
Amanda H. Newsom

Agree, F: Due to the unanticipated pandemic, and the inability to travel to perform inspections, there has been a significant delay in the completion verification evaluations. The additional 6 months being added by this TIA enables the certification organizations time to adjust to the changing atmosphere while not adversely impacting the current ISP's verification.

Robert D. Tutterow, Jr.

D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

Paul F. Curtis

Agree

Tom Ragan

A

Brian P. Shiels

Agree.

Tim Durby

Agree

Daniel Silvestri

Agree

Harry P. Winer

A

Jim Reidy

Agree

Anthony D. Putorti, Jr.

Agree

Michael F. McKenna

A.

Tim W. Tomlinson

Agree

DISAGREE

0

ABSTAIN

0
MEMORANDUM

TO: Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment

FROM: Yvonne Smith, Technical Committee Administrator

DATE: June 30, 2020

SUBJECT: NFPA 1851 Proposed TIA No. 1512 FINAL CC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

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<tr>
<td>Not Returned</td>
<td>Area, Barker, Fargo, Farley, Hosea, Johnston, Legendre, Szalajda</td>
<td>8</td>
</tr>
<tr>
<td>Abstentions</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Agree</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>0</td>
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</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

   \[
   \text{[27 eligible ÷ 2 = 13.5 = (14)]}
   \]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 15.

   \[
   (27 \text{ eligible to vote} - 8 \text{ not returned} - 0 \text{ abstentions} = 19 \times 0.75 = 14.25)
   \]

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is July 5, 2020.
I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.

Eligible to Vote: 27
Not Returned : 8
Roger L. Barker, Cristine Z. Fargo, Thomas M. Hosea, Jeff Legendre, Jonathan V. Szalajda, James B. Area, Edmund Farley, Ronald Johnston

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Not Returned: 8
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<td>D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.</td>
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William A. Van Lent  D
DISAGREE  0
ABSTAIN  0
1. Revise paragraph 7.1.2.1 to read:

7.1.2.1 Full body or full torso garments including, but not limited to, coveralls, coats, jackets, pants, and overalls, shall be tested for liquidtight integrity as specified in Section 8.2, Liquidtight Integrity Test One, and shall allow no water penetration.

Substantiation: With shortages of protective clothing, especially disposable (single-use) protective clothing used by first responders during the current COVID-19 pandemic, personnel involved in emergency medical operations have limited protective clothing choices for preventing the contamination of their ordinary clothing or station/work uniforms that in turn can become a means of disease transmission. The use of reusable (multiple-use) partial body protective clothing such as sleeved aprons, frontal gowns, or other non-full body clothing offer first responders an option for a more sustainable form for protection that can be subject to use when needed, field disinfection, and repeated washing. The requirement for a mandatory liquid integrity test is impractical for this form of clothing since the test is dependent on evaluating clothing design for liquid integrity on a manikin that is sprayed from different directions. Furthermore, other requirements for protective garments involve testing of garment material and seams for biopenetration resistance demonstrate an rigorous levels of barrier performance.

The proposed changes reflect already in-place language that appears for single-use protective garments in paragraph 7.1.1.1 and appears to correct an error in the revision of NFPA 1999 during the last edition.

Emergency Nature: NFPA 1999 contains an error or an omission that was overlooked during a regular revision process. The proposed TIA further intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation currently being cause by COVID-19 and future pandemics.
MEMORANDUM

TO: Technical Committee on Emergency Medical Services Protective Clothing and Equipment

FROM: Yvonne Smith, Technical Committee Administrator

DATE: June 30, 2020

SUBJECT: NFPA 1999 Proposed TIA No. 1514 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

17 Eligible to Vote
3 Not Returned (Area, J. Davis, Patrick)

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There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[17 \text{ eligible} \div 2 = 8.5 + 1 = 9\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 11.

\[(17 \text{ eligible to vote} - 3 \text{ not returned} - 0 \text{ abstentions} = 14 \times 0.75 = 10.5)\]

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is July 5, 2020.
I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1514 to Revise paragraph 7.1.2.1.

Eligible to Vote: 17
Not Returned : 3
Richard W. Patrick, James E. Davis, James B. Area

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I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 17
Not Returned : 3
Richard W. Patrick, James E. Davis, James B. Area

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William A. Fithian
Todd P. Davis
Jeffrey O. Stull
Beth C. Lancaster
Karen E. Lehtonen
Patricia A. Freeman
Barry L. Hickerson
Jason L. Allen
F. Selcen Kilinc-Balci

The standard contains an error or omission that was overlooked during the standard revision process.

DISAGREE

ABSTAIN
MEMORANDUM

TO: Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment

FROM: Yvonne Smith, Technical Committee Administrator

DATE: June 30, 2020

SUBJECT: NFPA 1999 Proposed TIA No. 1514 FINAL CC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

27 Eligible to Vote
7 Not Returned (Area, Barker, Farley, Hosea, Johnston, Legendre, Weise)

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There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[ 27 \text{ eligible} \div 2 = 13.5 = (14) \]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 15.

\[ 27 \text{ eligible to vote} - 7 \text{ not returned} - 0 \text{ abstentions} = 20 \times 0.75 = 15 \]

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is July 5, 2020.
I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.

Eligible to Vote: 27
Not Returned: 7
Roger L. Barker, Thomas M. Hosea, Jeff Legendre, Dick Weise, James B. Area, Edmund Farley, Ronald Johnston

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Eligible to Vote: 27
Not Returned: 7
Roger L. Barker, Thomas M. Hosea, Jeff Legendre, Dick Weise, James B. Area, Edmund Farley, Ronald Johnston

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NFPA 2112-2018 Edition
Standard on Flame-Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire
TIA Log No: 1513
Reference: Various
Comment Closing Date: June 29, 2020
Submitter: Brian Shiels, ArcWear
www.nfpa.org/2112

1. Revise specific paragraphs in Chapter 1 to read as follows:

   1.1 Scope. The standard shall specify the minimum design, performance, testing, and certification requirements and test methods for flame-resistant garments, shrouds/hoods/balaclavas, and gloves, and cloth face coverings for use in areas at risk from short-duration thermal exposure from fire.

   1.2.1* This standard shall provide minimum requirements for the design, construction, evaluation, and certification of flame-resistant garments, shrouds/hoods/balaclavas, and gloves, and cloth face coverings for use by industrial personnel, with the intent of not contributing to the burn injury of the wearer, providing a degree of protection to the wearer, and reducing the severity of burn injuries resulting during egress from or accidental exposure to short-duration thermal exposure from fire.

   1.3.1 This standard shall apply to the design, manufacturing, and certification of new flame-resistant garments, shrouds/hoods/balaclavas, and gloves and the design and manufacturing of new cloth face coverings.

   1.3.4 The requirements of this standard shall not apply to accessories that might be attached to flame-resistant garments, shrouds/hoods/balaclavas, or gloves, or cloth face coverings unless specifically addressed herein.

   1.4 Retroactivity. This standard shall apply only to garments, shrouds/hoods/balaclavas, or gloves, or cloth face coverings manufactured on or after the effective date of the standard.

2. Add new definition for cloth face covering, and associated annex item to read as follows:

   3.3.X* Cloth Face Covering. An item of clothing, primarily covering the nose and mouth, designed to reduce the community spread of bioaerosols.

   A.3.3.X Cloth Face Covering. Cloth face coverings are not shrouds/hoods/balaclavas because they are not designed to provide primary thermal protection to the wearer’s head or neck, or both. Cloth face coverings provide primary thermal protection to the nose and mouth that is consistent with the performance levels that are applied for shrouds/hoods/balaclavas. These clothing items are primarily intended to attenuate the volume of bioaerosols that are exhaled or released during coughing and sneezing by the individual wearer to aid in lessening the transmission of airborne pathogens such as SARS-CoV-2, the virus responsible for COVID-19. These clothing items are not protective masks or medical masks and are not evaluated for their protective performance in accordance with this standard.

   The selection of materials used in the construction of cloth face coverings should account for the ability of the material to filter bioaerosols and to offer levels of acceptable breathing resistance. Materials that are very porous can have low efficiencies to prevent the passage of
bioaerosols while tightly woven fabrics or multiple layers of fabrics could create resistance to breathing that forces the passage of inhaled and exhaled air around the edges of the cloth face covering rather than through the material. Useful measurements of bioaerosol filtration performance is performed in accordance with ASTM F2101, *Standard Test Method for Evaluating the Bacterial Filtration Efficiency (BFE) of Medical Face Mask Materials, Using a Biological Aerosol of Staphylococcus aureus*. The measurement of breathing resistance is can performed in accordance with Annex C of EN 14683, *Medical face masks—Requirements and test methods*. It is important to note that measurement of cloth face covering performance in accordance with these test methods do not connote that these clothing items are protective masks or medical masks but instead provide useful benchmarks for relevant areas of performance.

3. *Add new reference in Chapter 2 to read as follows:*

   **2.3.X ISEA Publications.** International Safety Equipment Association, 1901 North Moore Street, Suite #808, Arlington, VA 22209-1762.


4. *Revise definitions in 3.3.27 and 3.3.35, and add associated annex items to read as follows:*

   **3.3.27 Product.** The compliant flame-resistant garment, shrouds/hoods/balaclavas, or gloves.

   **A.3.3.27 Product.** Cloth face coverings are intentionally omitted from the definition of product because they are exempt from many requirements that are imposed on products throughout this standard.

   **3.3.35 Shroud/Hood/Balaclava.** An item of clothing designed to provide protection to the wearer’s head or neck, or both, less the face opening.

   **A.3.3.35 Shroud/Hood/Balaclava.** Shrouds/hoods/balaclavas that incorporate mouth and nose coverage that is intended to provide primary thermal protection are still to be considered as shrouds/hoods/balaclavas and not cloth face coverings.

5. *Revise/add new specific paragraphs in Chapter 4, and add associated annex items to read as follows:*

   **4.1.1** All flame-resistant garments, shrouds/hoods/balaclavas, and gloves that are labeled as being compliant with this standard shall meet or exceed all applicable requirements specified in this standard and shall be certified.

   **A.4.1.1** Cloth face coverings are intentionally omitted from several sections pertaining to certification because they are not intended to be certified products. Where applicable, certain language around compliance and components might include reference to cloth face coverings.

   **4.1.1.1** All flame-resistant cloth face coverings that are labeled as compliant with this standard shall be constructed of compliant components that meet or exceed all applicable requirements specified in this standard and in Chapter 4 with the following exceptions:

   (1) Certification program requirements in Section 4.2 shall not apply to flame-resistant cloth face coverings.

   (2) Inspection and testing requirements in Section 4.3 shall not apply to flame-resistant cloth face coverings.

   (3) Manufacturer quality assurance program requirements for third-party audits shall not apply to flame-resistant cloth face coverings.
4.1.1.2* All flame-resistant cloth face coverings that are labeled as compliant with this standard shall be constructed of compliant components that meet the Level 2 conformity assessment requirements specified in Chapter 7 of ANSI/ISEA 125, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment, with the exception of paragraph 7.1.

A.4.1.1.2 Given the nature of the flame-resistant cloth face coverings and their intended widespread use for national health emergencies including pandemics, the conformity assessment approach applied for this clothing is a self-declaration in accordance with the criteria established in ANSI/ISEA 125, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment, that includes conformance testing, corrective and preventive actions, recordkeeping, and the supplier’s Declaration of Conformity.

4.1.2 All test data used to determine compliance of flame-resistant garments, shrouds/hoods/balaclavas, and gloves, and cloth face coverings with this standard shall be provided by an accredited testing laboratory.

4.1.3.1 All flame-resistant cloth face coverings shall be labeled.

4.1.4.1 All flame-resistant cloth face coverings shall have a label that meets the requirements of Section 5.1.

6. Revise/add new specific paragraphs in Chapter 5, and add associated annex items to read as follows:

5.1.1.1* All flame-resistant cloth face coverings shall have a label or labels permanently and conspicuously attached to each flame-resistant cloth face covering.

A.5.1.1.1 By definition, cloth face coverings are excluded from product requirements and are exempted from many product label requirements. Therefore, they should have a label as opposed to a product label.

5.1.4.1 Flame-resistant cloth face coverings shall be exempt from the requirements of 5.1.4.

5.1.5 All worded portions of the required label or product label shall be printed in English. Supplementary languages, in addition to English, shall be permitted.

5.1.6 Symbols and other pictorial graphic representations shall be permitted to be used to supplement worded statements on the label or product label or labels.

5.1.8.1 The following statement shall be printed legibly on the flame-resistant cloth face covering label in letters at least 2.5 mm (0.10 in.) high:

\[
\text{THIS CLOTH FACE COVERING MEETS THE REQUIREMENTS OF NFPA 2112-2018.}
\]

5.1.9.1* At a minimum, the following information shall also be printed legibly on the flame-resistant cloth face covering label in letters at least 1.6 mm (0.063 in.) high:

1. Model name, number, or design
2. Manufacturer’s name, identification, or designation
(3) Manufacturer’s garment identification number, lot number, or serial number
(4) “DO NOT REMOVE”

A.5.1.9.1 The reduced minimum label information for flame-resistant cloth face coverings is intended to minimize the size of the label relative to the inherently small size of the item. Additional label information is permitted if requested by the end-user.

7. Revise title of section 6.1 to read as follows:
   6.1 Garments, Shrouds/Hoods/Balaclavas, and Gloves, and Cloth Face Coverings.

8. Revise paragraph 7.4 and add new paragraph 7.4.1 to read as follows:
   7.4 Label Requirement. Specimen labels used in the construction of flame-resistant clothing items - garments, shrouds/hoods/balaclavas, and gloves shall be tested, as specified in Section 8.7, for printing durability and shall remain legible and in place.
   7.4.1 Specimen labels used in the construction of flame-resistant cloth face coverings shall be exempt from the requirements of Section 7.4.

9. Add new section 7.7 addressing performance requirements for cloth face coverings to read as follows:
   7.7 Cloth Face Covering Requirements.
   7.7.1 Fabric components used in the construction of cloth face coverings shall be compliant with all fabric requirements in Section 7.1.
   7.7.2 Sewing thread components used in the construction of cloth face coverings shall be compliant with the thread requirements in Section 7.2.
   7.7.3 Hardware components used in the construction of cloth face coverings shall be compliant with the hardware requirements in Section 7.3.

10. Revise specific paragraphs in Chapter 8 to read as follows:
    8.2.1 Application. This test method shall apply to flame-resistant garment, shroud/hood/balaclava, and glove, and cloth face covering fabrics.

    8.2.2.1 HTP testing shall be conducted on six specimens — three in the spaced configuration and three in the contact configuration — measuring 150 mm ± 5 mm × 150 mm ± 5 mm (6 in. ± 1/4 in. × 6 in. ± 1/4 in.) and shall consist of all layers representative of the garment, shroud/hood/balaclava, and glove, and cloth face covering to be tested.

    8.2.2.2 Specimens shall consist of all layers used in the construction of the flame-resistant garment, shroud/hood/balaclava, and glove, and cloth face covering excluding any areas with special reinforcements.

     8.2.3 Sample Preparation.
     8.2.3.1 For fabrics that are designated on the flame-resistant garment, shroud/hood/balaclava, and glove, and cloth face covering labels to be washed, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3.

     8.2.3.2 For fabrics that are designated on the flame-resistant garment, shroud/hood/balaclava, and glove, and cloth face covering labels to be dry-cleaned, specimens shall be tested before and after three cycles of dry cleaning as specified in 8.1.4.
8.2.3.3 For fabrics that are designated on the flame-resistant garment, shroud/hood/balaclava, and glove, and cloth face covering labels to be either washed or dry-cleaned, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3, or after three cycles of dry cleaning as specified in 8.1.4.

8.3.1.1 This test method shall apply to each flame-resistant garment, and shroud/hood/balaclava, and cloth face covering fabric layer.

8.3.3.1 For fabrics, cold weather insulation materials, and shroud/hood/balaclava, and cloth face covering materials that are designated on the product label to be washed, specimens shall be tested before and after 100 cycles of washing and drying as specified in 8.1.3.

8.3.3.2 For fabrics, cold weather insulation materials, and shroud/hood/balaclava, and cloth face covering materials that are designated on the product label to be dry-cleaned, specimens shall be tested before and after 100 cycles of dry cleaning as specified in 8.1.4.

8.3.3.3 For fabrics, cold weather insulation materials, and shroud/hood/balaclava, and cloth face covering materials that are designated on the product label to be either washed or dry-cleaned, specimens shall be tested before and after 100 cycles of washing and drying as specified in 8.1.3, or before and after 100 cycles of dry cleaning as specified in 8.1.4.

8.4.1.1 This test method shall apply to flame-resistant garment, shroud/hood/balaclava, and glove, and cloth face covering components, hardware, and cold weather insulation materials.

8.4.2.2 Both heat and thermal shrinkage resistance testing shall be conducted on a minimum of three specimens for each flame-resistant garment, and shroud/hood/balaclava, and cloth face covering fabric.

8.4.3.1 For fabrics, cold weather insulation materials, and shroud/hood/balaclava materials, and cloth face covering fabrics that are designated on the product label to be washed, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3.

8.4.3.2 For fabrics, cold weather insulation materials, and shroud/hood/balaclava materials, and cloth face covering fabrics that are designated on the product label to be dry cleaned, specimens shall be tested before and after three cycles of dry cleaning as specified in 8.1.4.

8.4.3.3 For fabrics, cold weather insulation materials, and shroud/hood/balaclava materials, and cloth face covering fabrics that are designated on the product label to be either washed or dry cleaned, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3, or before and after three cycles of dry cleaning as specified in 8.1.4.

8.4.9 Specific Requirements for Testing Other Flame-Resistant Garments and, Shroud/Hood/Balaclava, Cloth Face Coverings, and Materials (Including Reflective Striping).
8.6.1 Application. The thread heat resistance test method shall apply to each type of thread used in the construction of the flame-resistant garment, shroud/hood/balaclava, and gloves, and cloth face coverings other than embroidery.

11. Add the following new references to Annex C to read as follows:

**C.1.2.X ASTM Publications.** …


**C.1.2.X CENELEC Publications.** CENELEC, European Committee for Electrotechnical Standardization, CEN-CENELEC Management Centre, Avenue Marnix 17, 4th Floor, B-1000 Brussels, Belgium.


**C.1.2.X ISEA Publications.** International Safety Equipment Association, 1901 North Moore Street, Suite #808, Arlington, VA 22209-1762.


**Substantiation:** The current COVID-19 pandemic is changing how the workplace operates. Given the need for industrial workers to potentially wear masks in the performance of their duties as dictated by Federal, state, or local authorities, or as mandated by the organization or employer, it is important the wearing of such masks not contribute to worker hazards faced as part of their normal occupational tasks. The inclusion of flame-resistant cloth face covering is intended to aid in the safe wearing of masks under the circumstances of a national health emergency that includes pandemics involving airborne pathogens. The specific requirements have been written to apply the same criteria that are normally established for shrouds, hoods, and balaclavas. To enable the rapid dissemination of these products, self-declaration is specified in lieu of third party certification but with specific caveats associated for ensuring a high level of data quality by the use of laboratories accredited to ISO 17025 for this testing in addition to other conformity assessment requirements specified in a separate industry standard.

**Emergency Nature:** The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.
MEMORANDUM

TO: Technical Committee on Flash Fire Protective Garments

FROM: Jenny Depew, Technical Committee Administrator

DATE: July 9, 2020

SUBJECT: NFPA 2112 Proposed TIA No. 1513 FINAL BALLOT RESULTS

The public comment circulation period has now passed. According to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

<table>
<thead>
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<td>4</td>
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</table>

(Focht, Reason, Roy, Stanhope)

Technical Merit:  
- 0 Abstentions  
- 16 Agree (w/comment: Addington, Kopko, Moody, Schiffelbein)  
- 0 Disagree

Emergency Nature:  
- 0 Abstentions  
- 16 Agree (w/comment: Addington)

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative ¾ vote]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[16 \text{ eligible} \div 2 = 8 + 1 = (9)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 12.

\[(20 \text{ eligible to vote} - 4 \text{ not returned} - 0 \text{ abstentions} = 16 \times 0.75 = 12)\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is July 14, 2020.
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<tr>
<th>Vote Selection</th>
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<tr>
<td>Agree</td>
<td>16</td>
<td></td>
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<tr>
<td>Diane B. Hess</td>
<td>AGREE</td>
<td></td>
</tr>
<tr>
<td>Bob Kopko</td>
<td>AGREE</td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1513 to revise various sections in the 2018 edition of NFPA 2112. TIA allows for rapid, innovative designs to be implemented quickly on a custom order basis per end user request.</td>
</tr>
<tr>
<td>Steven Addington</td>
<td></td>
<td>This is a subject that has not been previously considered by the committee.</td>
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<tr>
<td>Brian P. Shielis</td>
<td>Agree</td>
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<tr>
<td>Peter Clark</td>
<td>Agree</td>
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<td>William A. Fithian</td>
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<td>James Douglas Dale</td>
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<td>Jason L. Allen</td>
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<tr>
<td>Alec Feldman</td>
<td>Agree</td>
<td></td>
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<tr>
<td>Amanda H. Newsom</td>
<td>Agree</td>
<td>New inclusion of an item that is needed for certain individuals.</td>
</tr>
<tr>
<td>Paul Schiffelbein</td>
<td>Agree</td>
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<tr>
<td>Denise N. Stattham</td>
<td>Agree</td>
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<tr>
<td>Darren D. Hewston</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>John Morton-Adams</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Joshua D. Moody</td>
<td>Agree</td>
<td>I am voting “agree” to aid in passing this TIA, however, I have concerns around the proposed material in A.3.3.X. The proposed A.3.3.X gives the reader additional explanatory material by stating: “The selection of materials used in the construction of cloth face coverings should account for the ability of the material to filter bioaerosols and to offer levels of acceptable breathing resistance.”. Further, two test methods, ASTM F2101 and Annex C of EN 14683, are referenced as “useful measurements”. It is unclear from the text exactly how you can “account for the ability...” of a material as no pass/fail, or discussion/interpretation of the results are given. This will cause more confusion in the marketplace and is unneeded to adequately address the substantiation for the TIA. I believe that the second paragraph of the proposed annex material A.3.3.X should be deleted in its entirety as well as the proposed new references within C.1.2.X for both ASTM F2101 and EN 14683.</td>
</tr>
<tr>
<td>Joel E. Sipe</td>
<td>Agree</td>
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<tr>
<td>Disagree</td>
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<tr>
<td>Abstain</td>
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**QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box. (Note: you must indicate the letter that corresponds with the reason(s) from the selection of EMERGENCY NATURE RESPONSES A through F.)**

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<td>D</td>
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<td>D</td>
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<tr>
<td>Disagree</td>
<td>0</td>
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<tr>
<td>Abstain</td>
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</tbody>
</table>
The distinction between “labels” and “product labels” in 5.1.1.1 & A.5.1.1.1 is not clear

Kevin P. Cavanaugh
Senior Manager Quality and Compliance
3242 Whipple Road, Union City CA 94587

ARIAT
Wording for the 2014 edition:

1. Revise 680.2 Definitions to read as follows:

   **680.2 Definitions. …**

   **Storable Swimming, Wading, or Immersion Pools; or** and **Storable/Portable Spas and Hot Tubs.** Those that are constructed assembled on or above the ground that are intended to be stored when not in use and are designed for ease of relocation and are capable of holding water to a maximum depth of 1.0 m (42 in.), or a pool, spa, or hot tub with nonmetallic, molded polymeric walls or inflatable fabric walls regardless of dimension.

   Informational Note: Historically, a 1.0 m (42 in.) wall height accommodated most storable swimming pools. Modern manufacturing methods have allowed storable pool manufacturers to increase wall heights while still permitting ease of assembly and disassembly of the pool.

Wording for the 2017 edition:

1. Revise 680.2 Definitions to read as follows:

   **680.2 Definitions. …**

   **Storable Swimming, Wading, or Immersion Pools; or** and **Storable/Portable Spas and Hot Tubs.** Swimming, wading, or immersion pools and spas and hot tubs assembled on or above the ground that are intended to be stored when not in use and are designed for ease of relocation, constructed on or above the ground and are capable of holding water to a maximum depth of 1.0 m (42 in.), or a pool, spa, or hot tub with nonmetallic, molded polymeric walls or inflatable fabric walls regardless of dimension.

   Informational Note: Historically, a 1.0 m (42 in.) wall height accommodated most storable swimming pools. Modern manufacturing methods have allowed storable pool manufacturers to increase wall heights while still permitting ease of assembly and disassembly of the pool.

**Substantiation:** This proposed TIA addresses significant issues with a steadfast limit of 42 inches for a storable pool.

It is extremely important to understand the history behind the prescriptive 42-inch limitation. In the 1971 edition of the NEC, no prescriptive wall height existed. In 1978 a prescriptive wall
height of 3-feet was added into the definition. The prescriptive wall height of 42 inches was originally added in the 1981 NEC.

This edition of the NEC includes a prescriptive limitation to a capability “of holding water to a maximum depth of 1.0 m (42 in.).”

The storable pool industry has been manufacturing storable pools with wall heights of 48 inches for over 40 years without any negative impact on electrical safety. In fact, it was Proposal # 13, submitted by the National Swimming Pool Institute to section 680-4 during the 1981 NEC revision process that drove an increase in the pool wall height. It is important to read the submitters substantiation in which he states that: “Approximately 85+% of the above ground pools sold today are greater than 3 feet in depth (usually 42 inches to 48 inches), come in a variety of shapes and may have a maximum dimension of greater than 15 feet.” He was referring to storable pools.

The submitter’s intent was to remove the prescriptive wall height. However, the technical committee took an action to increase the height from 3 feet to 42 inches. This was done without any substantiation as to why they chose 42 inches and not 48 inches. The 42 inch maximum water depth is tied to a wall height of 45 inches. It is typical to see pools that exceed the 42-inch water depth, but qualify in every other way as a storable pool. From an electrical safety standpoint these storable pools are no different than a pool that has a 42-inch water depth. The issue here is safety, it is the practical safeguarding of persons and property. Providing requirements for electrical safety around a storable pool is not impacted if the maximum water depth is above 42 inches. The goal must be to identify requirements for the safe use of products such as a storable pool without focusing on prescriptive limitations such as water height which are not relevant to safe use.

Storable pools are easily identified. They are set on level ground. They come in a complete package, are typically set up in an hour without tools and the instruction manual clearly identifies it as a storable pool. Additionally, pump motors are always double insulated and are equipped with 25 foot cords that have a GFCI device installed within 12 inches of the male cord cap.

For decades there were no code issues for these pools, regardless of how they were classified. Today we have requirements in Part II for permanently installed pools for equipotential bonding.

Today, the AHJ is put in a very tough position when a storable pool with a maximum water depth just over 42 inches is installed. The AHJ understands it is a storable pool, that is easily determined, however, the AHJ understands the defined term limits the maximum water depth to 42 inches. The AHJ knows that: (1) the equipotential bonding cannot be bonded to the pool at four points, (2) the pool water cannot be bonded, (3) the pool pump is double insulated and cannot be bonded and (4) the equipotential bonding cannot be connected to the EGC of the branch circuit supplying the pump motor. This situation needs to be addressed.

This TIA is necessary to address multiple adverse impacts created with a prescriptive limitation of 42-inch water depth. Newer designs allow for such depth and an additional few inches of water has absolutely no impact on electrical safety.

This TIA is necessary to address NEC requirements that create conflict, confusion and hardship for installers, homeowners and enforcers.
These pools are sold as a complete kit and are typically ready for water in 60 minutes. No tools are required. They are simply set up on flat ground on a “ground cloth” which also acts to support the pool wall supports. The ground cloth often includes a loop similar to hanging drapes or curtains to hold the pool support which snaps into the pool wall support which is also designed as if you were hanging drapes or curtains. All of these pieces snap together. These pools are sold as complete kits including the ground cloth, supports, pool wall, ladders, filtration systems and pump.

Adverse Impact #1:
One significant problem with the prescriptive height of not more than 42 inches is that this industry has improved storable designs allowing for slightly deeper water depths.

Adverse Impact #2:
When a storable pool is classified as a permanent pool:
- It violates 680.21(A)(3) which limits cords on the pump to not more than 3 feet in length. These pools come with a 25-foot cord on a double insulated pool pump with GFCI protection within 12-inches of the male cord cap
- Perimeter surfaces require equipotential bonding. It is typical for supports of storable pools to be nonmetallic. Where they are metallic, they act as a support rod for hanging curtains or drapes and do not contact the pool water at any point. If connections are made, there is no benefit to electrical safety as the supports are not in contact with the pool water in any manner and they are removed by the homeowner to store the pool
- The pool walls are typically perforated galvanized steel with nonmetallic coatings/liners on the inside and the outside. There is typically a single corner that gets bolted (no tools) together with short bolts and wing nuts. No way to effectively bond
- There are no locations on the storable pool to properly terminate the solid 8 AWG copper conductor in four locations, in fact you cannot get one location.
- The pool pump motors are double insulated and do not provide a termination point for the equipotential grid. 680.26(A)(6)(a) requires that since there is no termination point for the solid 8 AWG copper, we must connect the equipotential grid to the motor circuit EGC.
  o How does that happen?
    o Does the installer cut the 25 foot cord, install a junction box and enter the solid 8 AWG copper?
    o Does the installer run the 8 AWG copper 20 + feet to enter a JB with the GFCI protected receptacle to connect to the EGC? This is a shock incident waiting to happen.
  o How does the installer bond the pool water? Everything associated with the pumping and filtration is nonmetallic. How does an installer get this done? How does an AHJ enforce this?
  o How does the AHJ enforce things that are not practical, not feasible and quite literally impossible to achieve?

Adverse Impact #3:
These pools have significantly increased in popularity due to the Covid 19 pandemic. Identifying a storable pool as a permanent pool due to a couple of inches in water height has absolutely nothing to do with electrical safety. There are no safety driven NEC requirements for pools that are negatively impacted by a change of a few inches in water height. There is no logical reason to apply Part II of Article 680 to these storable pools.

Adverse Impact #4:
The installation of a solid 8 AWG copper or other equipotential bonding grid was never intended for a storable pool because we cannot bond the pool water, we cannot connect to the pool, and we cannot connect to the pump motor or the pump motor branch circuit. Relief is needed.

**Emergency Nature:** The standard contains an error or an omission that was overlooked during the regular revision process. The NFPA Standard contains a conflict within the NFPA Standards or within another NFPA Standard.

This TIA is necessary to: (1) recognize that the design of storable swimming pools was never addressed when the 42 inch height was included in 1981, (2) address serious issues that arise when a storable pool is classified as a permanent pool because of an inch of water and, (3) provide the AHJ with code requirements that do not base electrical safety on limitations which are not relevant to safe use. Additionally, this TIA must move forward to eliminate the conflicts created within NFPA 70, the NEC where section 680.26 is enforced on a storable pool.
TO: Standards Council
CC: Dawn Michelle Bellis
FROM: Tracy Vecchiarelli, on behalf of the FOM-AAA TC
DATE: July 14, 2020
SUBJECT: NFPA 11 Slip Cycle Request

The TC on FOM-AAA has requested to immediately enter the F2023 cycle. Per their February 2020 meeting minutes, a motion was made by the TC and passed based on the number of ongoing and evolving issues related to the discharge of finished foam on the environment. NFPA 11 has also recently merged with NFPA 16 (now withdrawn) and there is a significant amount of work that still needs to be done. Discussions have been had with Code Ops and they are comfortable with NFPA 11 being moved to the F2023 cycle. As the next edition of NFPA 11 is not going to be published until September/October time frame of 2021 we would request that the PI closing date for this document be extended to February 23, 2022.
TO: Standards Council
CC: Dawn Michelle Bellis
FROM: Baran Ozden, on behalf of the NFPA Technical Committee on Standpipes
DATE: June 19, 2020
SUBJECT: Slip Cycle Request: NFPA 14

Please consider the request of the NFPA Standpipes TC to slip cycle into Fall 2022. The TC’s original pre first draft in person meeting in March was postponed due to travel restrictions related to COVID-19. The TC Chair and staff liaison agreed that due to the First Draft meeting deadline (June 18th) and the substantial workload (task groups and number of public comments), the best option would be to request slipping cycle. It is the intent that the public inputs and additional task work be discussed in the pre-first draft meeting in fall of 2020 and the first draft meeting conducted in person in spring of 2021. The majority of committee members are informed and are in agreement with the slip cycle request. Code ops have approved the cycle change from F2021 to F2022. The document was already out of cycle with the other water based system documents therefore no negative impact is anticipated in terms of coordination with NFPA 13, NFPA 20, and NFPA 22 as these are the most relevant standards to NFPA 14. The change was discussed with Katie Twist, the Portfolio Manager of the document and there are no negative impact from Marketing and Digital Experience Team’s perspective. You may find the correspondence with the Chair below.
Baran:

Yes, this is what we discussed and I concur with this change. We have a very busy cycle and the interruption of our business by the pandemic requires that we use the additional time to address the numerous items on our task list.

Steve Leyton

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Hi Steve,

As we have discussed on the phone previously we are able to and going to slip cycle for NFPA 14 and change the cycle from Fall 2021 to Fall 2022. Do you concur with this change?

Thank you
Best Regards,

Baran

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To NFPA Standards Council:

The Technical Committee on Liquefied Petroleum Gas would like to request a revision cycle change for NFPA 58 *Liquefied Petroleum Gas Code* from their current Annual 2022 Revision Cycle to a Fall 2022 Revision Cycle. This change would be in order to accommodate an in-person meeting as there are over 80 public inputs and several task groups with significant work. This change was discussed with members of the committee and there were no strong objections to the cycle change. The committee is in favor of opening up the document for further public input.

Respectfully Submitted

Alex Ing
Staff Liaison for the Technical Committee on Liquefied Petroleum Gas
To NFPA Standards Council:

The Technical Committee on Liquefied Natural Gas would like to request a revision cycle change for NFPA 59A *Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)* from their current Fall 2021 Revision Cycle to a Fall 2022 Revision Cycle. This change would be in order to accommodate an in-person meeting as there are over 400 editorial and technical changes that must be reviewed for this document. This change was discussed with members of the committee and there were no strong objections to the cycle change. The committee is in favor of opening up the document for further public input.

Respectfully Submitted

Alex Ing
Staff Liaison for the
Technical Committee on
Liquefied Natural Gas
To the members of the NFPA Standards Council,

The task group was formed from Standards Council Action 20-4-20 to review the potential scope overlap of NFPA 855, Energy Storage Systems with other NFPA occupancy standards (namely NFPA 70, 75, 76, 110, 111, 850 and 855), create recommended scope revisions, and report back to the Council at the August 2020 meeting.

During the discussion of the task group, NFPA 853, Standard for the Installation of Stationary Fuel Cell Power Systems was additionally identified as needing to be included in the actions and any future discussions.

The discussion of the group focused on trying to understand the scope of the EPS committee and the relation of 855 relative to the other standards. The key difficulty here has been that the other standards had incorporated portions of energy storage into their content over the years before 855 was created. Now, that content needs to be removed. Overall most of the scopes were correct as they did not specifically call out energy storage as included; however, some guidance is needed on the application of the scopes. In particular, now that there is a specific standard for energy storage system, the other committees need to point to new 855 document to address the basic requirements for energy storage. Toward that end, the Task group identified a need of a correlating committee to oversee the technical details within each standard, and a document from NFPA staff to highlight the relationships (first draft sketch is in the meeting notes). With general support of the task group, recommendation for establishment of a correlating committee is being presented to Council.

Additionally, the group had considerable discussion around NFPA 853, Standard for the Installation of Stationary Fuel Cell Power Systems. This is currently part of ECG- AAA (Power Generation), and could also be used as an energy storage system. The task group recommends that the content/subject matter stay there with the additional directive (through the guidance document in (2)) that 855 should reference 853 for additional general information when the fuel cell is used for energy storage and 855 should continue to point to NFPA 853 and NFPA 2 for Fuel Cells for all other requirements.

The following recommendations are from the task group, though not unanimous.

1) EPS-AAA Committee Scope – remove “standby power” from scope
   This Committee shall have primary responsibility for documents on performance criteria for the selection and assembly of the components for emergency and standby power systems in buildings and facilities, including categories of power supplies, transfer equipment, controls, supervisory equipment, and all related electrical and mechanical auxiliary or accessory equipment needed to supply emergency or standby power to the utilization equipment. The Committee also shall be responsible for criteria on the maintenance and testing of the system. This Committee does not cover requirements for the application of emergency power systems, self-contained emergency lighting units, and electrical wiring, except that wiring that is an integral part of the system up to
the load side of the transfer switch(es). This Committee shall report to Correlating Committee of the National Electrical Code.

2) Direct NFPA Staff to create a guidance document explaining the scopes and responsibilities for the 855, 75, 76, 110, 111, 850, 853. This could include graphics and/or descriptive guidance. This would explain to each of the committees the scope of 855 and the portions of the existing documents that should be removed or updated to point to 855 for energy storage systems.

3) Form a correlating committee for 855, 75, 76, 110, 111, 850, 853 that would use the guidance document created in (2) to clean up the technical parts associated with the individual documents. This will allow for technical review and updates of section as the system standard (855) was put in place after the other standards creating potential gaps between existing current requirements and new ones.

4) It was also discovered that there are two definitions of ESS – one in 855 and one in 72. These need to be reconciled but were out of scope of the current task group.

5) Provide an additional directive (through the guidance document in (2)) that 853 should reference 855 for general information when the fuel cell is used for energy storage and 855 should continue to point to NFPA 853 and NFPA 2 for Fuel Cells.

Jeff Foisel
Energy Storage System Task Group Chair

Attachments – Meeting Summary from 10Jun20 and 24Jun20 Meetings
Also reference – Attachment 20-4-20 from the April 2020 Standards Council Meeting
Notes from Task Group on Scoping of Energy Storage System Committees / Documents

Meeting – 10Jun20 – 1100 to 1400 Boston Time

Attendees:

- Foisel, Jeff (Standards Council, Task Group Chair)
- Gallo, Ernie (70)
- Kasiski, Bob (75)
- Dahl, Dan (76)
- Layegh, Pouyan (110/111)
- Boone, Mark (850)
- Biggins, Jim (855)
- Coache, Chris (NFPA)
- Duffy, Chad (NFPA)

Actions:

- Review the following. Send comments, corrections, new thoughts to the whole group.

Current Recommendations:

1) Committee Scope Update –
EPS-AAA Committee Scope – remove “standby power” from scope
   This Committee shall have primary responsibility for documents on performance criteria for the selection and assembly of the components for emergency and standby power systems in buildings and facilities, including categories of power supplies, transfer equipment, controls, supervisory equipment, and all related electrical and mechanical auxiliary or accessory equipment needed to supply emergency or standby power to the utilization equipment. The Committee also shall be responsible for criteria on the maintenance and testing of the system. This Committee does not cover requirements for the application of emergency power systems, self-contained emergency lighting units, and electrical wiring, except that wiring that is an integral part of the system up to the load side of the transfer switch(es). This Committee shall report to Correlating Committee of the National Electrical Code.

2) Form a correlating committee for 855, 75, 76, 110, 111, 850
   This will allow for review and updates of section as the system standard (855) was put in place after the other standards creating potential gaps between existing current requirements and new ones.

3) Schedule follow up meeting in the next couple weeks to address overlaps of scope between ESS-AAA and ECG-AAA. Both committees have scopes that include aspects of electric generating plants. Key is to provide formal definition to identify generating plant.
   a. Clarifying notes:
i. Electrical Generating Stations have the capability to utilize stored energy as part of the normal generating of electricity (e.g. Hydroelectric, Flywheel, storage associated with wind/solar)

ii. 855 does not have a scope of document. The section is reserved, as it was removed by an action from the Technical Session in 2019 and could not revert to prior edition.

iii. 855 has a broad definition of Energy Storage Systems, and the appendix references intent to not cover energy generation systems; however, there is no definition of energy generation systems.

iv. 855 is a standard while 850 is a recommended practice. Standards can not point to a practice for requirements.

4) Side question – should there be a recommendation to move NFPA 853 (Stationary Fuel Cell Power Systems) from ECG-AAA to ESS-AAA
Appendix 1 – Graphic of Coverage

Normal/Standby

850
Generator

855
Storage

Lead Acid (other older batteries)

Li ion

Emergency/Legally Required

110
Generator

Storage

110/111

110/111 Refer to NFPA 1 for batteries. NFPA 1 points back to 855 with additional testing requirements. Also has a little section on Lead Acid/NiCd, NiX, Li Ion

855
Generator

Storage associated with generating units

Correlating Committee – on systems side
Should 853 move to 855?

Utility (NESC governed)

Occupancy Standards

76
75

Lead Acid (other older batteries)
Appendix 2 – Definition of Energy Storage System from 855

3.3.9* Energy Storage Systems (ESS). One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time to the local power loads, to the utility grid, or for grid support.

A.3.3.9 Energy Storage Systems (ESS). ESS include but are not limited to the following categories:

1. Chemical: hydrogen storage
2. Thermal: thermal energy storage
3. Electrochemical:
   (a) Batteries
   (b) Flow batteries
4. Mechanical:
   (a) Flywheel
   (b) Pumped hydro
   (c) Compressed air energy storage (CAES)
5. Electrical:
   (a) Capacitors
   (b) Superconducting magnetic energy storage (SMES)

These systems can have ac or dc output for utilization and can include inverters and converters to change stored energy into electrical energy. It is not the intention for ESS to include energy generation systems.

Appendix 3 - Scopes of Committees and Documents

NFPA 855, Standard for the Installation of Stationary Energy Storage Systems
ESS-AAA Committee Scope: This committee shall have primary responsibility for documents on the fire prevention, fire protection, design, construction, installation, commissioning, operation, maintenance, and decommissioning of stationary, mobile and temporary energy storage systems.

NFPA 850, Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
ECG-AAA Committee Scope: This Committee shall have primary responsibility for documents on fire protection for electric generating plants and high voltage direct current (HVDC) converter stations, except for electric generating plants using nuclear fuel.
Document Scope: This document provides recommendations for fire prevention and fire protection for electric generating plants and high voltage direct current converter stations, except as follows: Advanced light water reactor electric generating plants are addressed in NFPA 804; nuclear power plants are addressed in NFPA 805; and fuel cells are addressed in NFPA 853.

NFPA 110, Standard for Emergency and Standby Power Systems
EPS-AAA Committee Scope: This Committee shall have primary responsibility for documents on performance criteria for the selection and assembly of the components for emergency and standby power systems in buildings and facilities, including categories of power supplies, transfer equipment, controls, supervisory equipment, and all related electrical and mechanical auxiliary or accessory equipment needed to supply emergency or standby power to the utilization equipment. The Committee also shall be responsible for criteria on the maintenance and testing of the system. This Committee does not cover requirements for the application of emergency power systems, self-contained emergency lighting units, and electrical wiring, except that wiring that is an integral part of the system up to the load side of the transfer switch(es). This Committee shall report to Correlating Committee of the National Electrical Code.
Document Scope: This standard contains requirements covering the performance of emergency and standby power systems providing an alternate source of electrical power to loads in buildings and facilities in the event that the primary power fails.
NFPA 111, Standard on Stored Electrical Energy Emergency and Standby Power Systems
EPS-AAA Committee Scope: This Committee shall have primary responsibility for documents on performance criteria for the selection and assembly of the components for emergency and standby power systems in buildings and facilities, including categories of power supplies, transfer equipment, controls, supervisory equipment, and all related electrical and mechanical auxiliary or accessory equipment needed to supply emergency or standby power to the utilization equipment. The Committee also shall be responsible for criteria on the maintenance and testing of the system. This Committee does not cover requirements for the application of emergency power systems, self-contained emergency lighting units, and electrical wiring, except that wiring that is an integral part of the system up to the load side of the transfer switch(es). This Committee shall report to Correlating Committee of the National Electrical Code.

Document Scope: This standard shall cover performance requirements for stored electrical energy systems providing an alternate source of electrical power in buildings and facilities in the event that the normal electrical power source fails.

Systems covered in this standard shall include power sources, transfer equipment, controls, supervisory equipment, and accessory equipment, including integral accessory equipment, needed to supply electrical power to the selected circuits.

This standard shall cover installation, maintenance, operation, and testing requirements as they pertain to the performance of the stored-energy emergency power supply system (SEPSS).

NFPA 75, Standard for the Fire Protection of Information Technology Equipment
ELT-AAA Committee Scope: This Committee shall have primary responsibility for documents on the protection of electronic computer equipment, components, and associated records.

Document Scope: This standard covers the requirements for the protection of information technology equipment (ITE) and ITE areas.

NFPA 76, Standard for the Fire Protection of Telecommunications Facilities
TEL-AAA Committee Scope: This Committee shall have primary responsibility for documents on fire protection for telecommunication networks.

Document Scope: This standard provides requirements for fire protection of telecommunication facilities, including landline, cable, wireless and satellite telecommunication services such as telephone/voice, voice over internet protocol (VoIP), internet, data and video transmission that are rendered to the public.

NFPA 70, National Electrical Code
Article 706 applies to energy storage systems and Article 480 remains applicable to batteries, in addition to other criteria in the NEC relevant to electrical equipment and installations.

Code-Making Panel 13 (NEC-P13) Scope: This Committee shall have primary responsibility for documents on minimizing the risk of electricity as a source of electric shock and as a potential ignition source of fires and explosions. It shall also be responsible for text to minimize the propagation of fire and explosions due to electrical installations.
Notes from Task Group on Scoping of Energy Storage System Committees / Documents

Meeting – 24Jun20 – 1100 to 12:30 Boston Time

Attendees:

Foisel, Jeff  (Standards Council, Task Group Chair)
Gallo, Ernie (70)
Kasiski, Bob (75)
Dahl, Dan (76)
Layegh, Pouyan (110/111)
Boone, Mark (850)
Biggins, Jim (855)
Coache, Chris (NFPA)
Duffy, Chad (NFPA)
Tracy Vecciarelli (NFPA)

Actions:

Recommend to Standards Council:

1) The Committee Scopes have no further changes. From last meeting:
   EPS-AAA Committee Scope – remove “standby power” from scope
   This Committee shall have primary responsibility for documents on performance
   criteria for the selection and assembly of the components for emergency and standby
   power systems in buildings and facilities, including categories of power supplies,
   transfer equipment, controls, supervisory equipment, and all related electrical and
   mechanical auxiliary or accessory equipment needed to supply emergency or standby
   power to the utilization equipment. The Committee also shall be responsible for criteria
   on the maintenance and testing of the system. This Committee does not cover
   requirements for the application of emergency power systems, self-contained
   emergency lighting units, and electrical wiring, except that wiring that is an integral part
   of the system up to the load side of the transfer switch(es). This Committee shall report
   to Correlating Committee of the National Electrical Code.

2) Need a guidance document explaining the scopes and responsibilities for the for 855, 75,76,
   110, 111, 850. This could include graphics and/or descriptive guidance. To be created after
   Standards Council position in August.

3) Need to form a correlating committee for 855, 75,76, 110, 111, 850 that would use the
   guidance document to clean up the technical parts associated with the individual
   documents. This will allow for review and updates of section as the system standard (855)
   was put in place after the other standards creating potential gaps between existing current
   requirements and new ones.
4) Side questions –
   a. should there be a recommendation to move NFPA 853 (Stationary Fuel Cell Power Systems) from ECG-AAA to ESS-AAA
   b. There are two definitions of ESS – one in 855 and one in 72. These need to be reconciled.
Appendix 1 – Graphic of Coverage

Normal / Standby
- 850 Generator
- Storage associated with generating units

Emergency/Legally Required
- 85S Generator
- Storage
- Lead Acid (other older batteries)
- Li ion

Utility (NESC governed)

Occupancy Standards
- 110
- 111

Correlating Committee – on systems side
Should 853 move to 855?

110 / 111 Refer to NFPA 1 for batteries. NFPA 1 points back to 855 with additional testing requirements. Also has a little section on Lead Acid/ NiCd, NiM, Li Ion.
Appendix 2 – Definition of Energy Storage System from 855

3.3.9 Energy Storage Systems (ESS). One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time to the local power loads, to the utility grid, or for grid support.

A.3.3.9 Energy Storage Systems (ESS). ESS include but are not limited to the following categories:

1. Chemical: hydrogen storage
2. Thermal: thermal energy storage
3. Electrochemical:
   a. Batteries
   b. Flow batteries
4. Mechanical:
   a. Flywheel
   b. Pumped hydro
   c. Compressed air energy storage (CAES)
5. Electrical:
   a. Capacitors
   b. Superconducting magnetic energy storage (SMES)

These systems can have ac or dc output for utilization and can include inverters and converters to change stored energy into electrical energy. It is not the intention for ESS to include energy generation systems.

Appendix 3 - Scopes of Committees and Documents

NFPA 855, Standard for the Installation of Stationary Energy Storage Systems
ESS-AAA Committee Scope: This committee shall have primary responsibility for documents on the fire prevention, fire protection, design, construction, installation, commissioning, operation, maintenance, and decommissioning of stationary, mobile and temporary energy storage systems.

NFPA 850, Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
ECG-AAA Committee Scope: This Committee shall have primary responsibility for documents on fire protection for electric generating plants and high voltage direct current (HVDC) converter stations, except for electric generating plants using nuclear fuel.
Document Scope: This document provides recommendations for fire prevention and fire protection for electric generating plants and high voltage direct current converter stations, except as follows: Advanced light water reactor electric generating plants are addressed in NFPA 804; nuclear power plants are addressed in NFPA 805; and fuel cells are addressed in NFPA 853.

NFPA 110, Standard for Emergency and Standby Power Systems
EPS-AAA Committee Scope: This Committee shall have primary responsibility for documents on performance criteria for the selection and assembly of the components for emergency and standby power systems in buildings and facilities, including categories of power supplies, transfer equipment, controls, supervisory equipment, and all related electrical and mechanical auxiliary or accessory equipment needed to supply emergency or standby power to the utilization equipment. The Committee also shall be responsible for criteria on the maintenance and testing of the system. This Committee does not cover requirements for the application of emergency power systems, self-contained emergency lighting units, and electrical wiring, except that wiring that is an integral part of the system up to the load side of the transfer switch(es). This Committee shall report to Correlating Committee of the National Electrical Code.
Document Scope: This standard contains requirements covering the performance of emergency and standby power systems providing an alternate source of electrical power to loads in buildings and facilities in the event that the primary power fails.
NFPA 111, **Standard on Stored Electrical Energy Emergency and Standby Power Systems**

**EPS-AAA Committee Scope:** This Committee shall have primary responsibility for documents on performance criteria for the selection and assembly of the components for emergency and standby power systems in buildings and facilities, including categories of power supplies, transfer equipment, controls, supervisory equipment, and all related electrical and mechanical auxiliary or accessory equipment needed to supply emergency or standby power to the utilization equipment. The Committee also shall be responsible for criteria on the maintenance and testing of the system. This Committee does not cover requirements for the application of emergency power systems, self-contained emergency lighting units, and electrical wiring, except that wiring that is an integral part of the system up to the load side of the transfer switch(es). This Committee shall report to Correlating Committee of the National Electrical Code.

**Document Scope:** This standard shall cover performance requirements for stored electrical energy systems providing an alternate source of electrical power in buildings and facilities in the event that the normal electrical power source fails.

Systems covered in this standard shall include power sources, transfer equipment, controls, supervisory equipment, and accessory equipment, including integral accessory equipment, needed to supply electrical power to the selected circuits. This standard shall cover installation, maintenance, operation, and testing requirements as they pertain to the performance of the stored-energy emergency power supply system (SEPSS).

**NFPA 75, Standard for the Fire Protection of Information Technology Equipment**

**ELT-AAA Committee Scope:** This Committee shall have primary responsibility for documents on the protection of electronic computer equipment, components, and associated records.

**Document Scope:** This standard covers the requirements for the protection of information technology equipment (ITE) and ITE areas.

**NFPA 76, Standard for the Fire Protection of Telecommunications Facilities**

**TEL-AAA Committee Scope:** This Committee shall have primary responsibility for documents on fire protection for telecommunication networks.

**Document Scope:** This standard provides requirements for fire protection of telecommunication facilities, including landline, cable, wireless and satellite telecommunication services such as telephone/voice, voice over internet protocol (VoIP), internet, data and video transmission that are rendered to the public.

**NFPA 70, National Electrical Code**

**Article 706 applies to energy storage systems and Article 480 remains applicable to batteries, in addition to other criteria in the NEC relevant to electrical equipment and installations.**

**Code-Making Panel 13 (NEC-P13) Scope:** This Committee shall have primary responsibility for documents on minimizing the risk of electricity as a source of electric shock and as a potential ignition source of fires and explosions. It shall also be responsible for text to minimize the propagation of fire and explosions due to electrical installations.

**Appendix D: Summary Note from Jim Biggins (23Jun20)**

*First we need to continue to focus on the Scopes of the various Technical Committee’s for the purpose of this task group. Once the TC scopes are clear, document scopes should and will become clarified, as each TC will have direction from the Standards Council as to what their TC and documents are to cover and what the are to defer to other TCs, and were necessary. Document scopes are not part of the Task Group work and there remains a potential for the group to get sidetracked on this topic.*

*As was pointed out by Jeff, a portion of the current conflict between the TC’s was that TC on Stationary Energy Storage Systems was a new project that was authorized by the Standards Council, and some of the existing TC’s believed that the ESS TC was overstepping their scope by developing requirements for a system (energy storage) that was not previously specifically covered by an NFPA Technical Committee, that is in use in the occupancies covered by their respective Standards, or Recommended Practice as is the case of NFPA 850. Our earlier discussions also brought to light that there was a misunderstanding by many groups and individuals that the ESS TC would only be responsible for developing a document for equipment like a “Tesla Power Wall” for residential and...*
A great example that was discussed is of NFPA 13 being an installation standard for sprinkler systems that all occupancy standards that recommend sprinkler protection defer to for the design and installation of the sprinkler system, rather than the individual Technical Committees developing their own specific design and installation criteria. Although it was brought up that that was because NFPA 13 pre-dated any occupancy standard, it is the basic flow that the NFPA documents follow; standards that address installation of a system, (whether it be a sprinkler system (NFPA 13), fire alarm system (NFPA 72), stationary combustion engines (NFPA 37), boiler and combustion system (NFPA 850) or any other type of system,) set the minimum requirements for the safe design, installation and in many cases maintenance of the system and NFPA standards that cover occupancies refer back to the installation standard for the particular system, rather than creating their own requirements.

This in fact was reinforced by NFPA several years ago when all sprinkler system requirements were essentially removed from the occupancy standards and incorporated into NFPA 13, and currently any sprinkler system design that is referenced in an occupancy standard is directed to be vetted by the NFPA 13 Discharge TC to assure conflicting requirements are not created and the criteria in the occupancy TC meets the minimum requirements set by NFPA 13.

The second point I wish to make is what is still seen as the Scope conflict between the ESS-AAA and ECG-AAA Technical Committees. Again, this is a question of a systems design and installation committee (ESS-AAA) that is charged with having the “primary responsibility for documents on the fire prevention, fire protection, design, construction, installation, commissioning, operation, maintenance, and decommissioning of stationary, mobile and temporary energy storage systems” and an occupancy committee (ECG-AAA) that is charged with the “primary responsibility for documents on fire protection for electric generating plants and high voltage direct current (HVDC) converter stations, except for electric generating plants using nuclear fuel”. So in my mind the question that must be answered is what is an energy storage system and what is an electric generating plant.

There are two definitions of Energy Storage Systems in NFPA documents.

NFPA 855 defines Energy Storage Systems (ESS) as “One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time to the local power loads, to the utility grid, or for grid support.”

Per the NFPA Glossary of Terms, NFPA 72 has the following definition that was introduced in the 2019 edition for Energy Storage Systems (ESS) - “Equipment that receives electrical energy and then provides a means to store that energy in some form for later use in order to supply electrical energy when needed. The energy storage system utilizes the technologies defined in 3.3.99.2 through 3.3.99.4.” For reference these technologies are:
It should be noted, that although the Standards Council will need to determine which TC (ESS-AAA or SIG-AAC) has the responsibility for this definition, and it should be ESS-AAA, it is clear that both definitions are broad, with little to no limitations.

There is however, is no NFPA definition of Electric Generating Plant, so default would be the Merriam-Webster definition. The term “electric generating plant” is not defined by Merriam-Webster, but the term “power plant” is defined as “an electric utility generating station”, which is a very specific definition.

Fundamentally, and to the core of the argument, energy storage systems do not generate power, but store energy for later use. Electrical generating plants produce power by either consuming fuel (coal, oil gas) to generate power, or by harnessing/converting the power inherent in wind and sunlight (neither of which is “stored”) to electrical energy. Attempting to say a large energy storage system is a power plant, regardless of how the energy may be used, just by increasing the size and scale is an correct manner of making the distinction. Furthermore, the size od the energy storage system does not change the how the system must be designed and installed in a safe manner, and it can be argued that increasing the size of the energy storage system increases the hazard, thus increasing the need for the application of the ESS requirements.

And lastly, making a statement like the following in 2020 edition of NFPA 850, that attempts to re-define Compressed Air Energy Storage (CAES) as an electric generating station in an attempt to re-define all energy storage systems of this type as an electric generating plant is inappropriate.

IN summary, and to be clear, the ESS TC has not and does not intend to develop any requirements other than those for specific to the fire prevention, fire protection, design, construction, installation, commissioning, operation, maintenance, and decommissioning of energy storage systems, regardless of the occupancy the systems are installed within.

Thank you for taking the time to review this information and I look forward to discussing and resolving this with the group tomorrow.

Best Regards,
June 16, 2020

National Fire Protection Association

1 Batterymarch Park

Quincy, MA, 02169-7471

RE: NFPA 855, Task Group for Scoping Consideration

We understand that the Standards Council has formed a Task Group to review potential scope overlap of NFPA 855, Energy Storage Systems (ESS) with other NFPA occupancy standards. We would like to share a fire service perspective on this issue. We have closely followed the development of ESS fire safety requirements, based on our concern for public safety and the safety of emergency services personnel who may be called upon to respond to ESS incidents. We are particularly concerned with potential fires and explosions that can occur when large quantities of ESS, in particular those containing lithium-ion battery technologies, are present.

The NFPA 855 committee is scoped to have primary responsibility for the fire prevention, fire protection, design, construction, installation, commissioning, operation, maintenance, and decommissioning of stationary, mobile, and temporary ESS. The NFPA 855 technical committee has the necessary expertise in a wide range of ESS safety areas to develop effective safety requirements.

NFPA 855 includes protection requirements that are commensurate with the risks associated with various ESS installations. For example the requirements for ESS installations in a building only used for energy related operations differ from the requirements for an ESS installation in a mixed occupancy building. The NFPA 855 committee has also listened to input from various stakeholders and included “carve outs” in the standard for certain electric utility, telecom and UPS systems. We do not feel that other NFPA documents such as NFPA 75, 76 and 850 have the technical expertise on their committees to develop effective ESS fire safety requirements, and lithium-ion battery ESS and UPS systems are showing up in those facilities in ever increasing numbers.

We have reviewed the ESS safety provisions in NFPA 75, 76 and 850 (a recommended practice) and find them to be totally inadequate for protecting ESS and other devices containing large quantities of lithium-ion batteries. Also the IEEE C2 National Electrical Safety Code which is used at many electric utilities, includes nonmandatory language and does not offer the same level of protection as NFPA 855.

28 fires and explosions have occurred with electric utility lithium-ion ESS installations in Korea the past two years, although we suspect their safety requirements differ from those in the US. However an electric utility ESS explosion in Surprise, AZ last year injured four fire fighters, and hurled one 75 ft through a chain link fence. Protecting our citizens and emergency responders from ESS fires and explosions is of paramount importance to the fire service.

We request that your Task Group maintain the committee scope for NFPA 855, and not authorize other technical committees to begin developing conflicting or less stringent fire safety provisions for ESS. In addition we recommend the Standards Council direct the NFPA 75, 76 and 850 committees to include requirements in their documents that indicate ESS shall be installed and maintained in accordance with NFPA 855. Thank you for your consideration.

Cordially,

Michael O’Brien, International Director,

IAFC Fire and Life Safety Section
27 April 2020

James B. Biggins  
TUV SUD America Inc./Global Risk Consultants Corporation  
15732 West Barr Road  
Manhattan, Illinois 60442-9012


Dear Jim:

I hope this correspondence finds you well and want to personally thank you for your continued dedication to the NFPA standards development process. I received your new project development request for a Guide on Protection of Stationary Energy Storage Systems and have discussed the proposal at length with NFPA technical staff, as well as touched base with the Chair of Standards Council.

At this time, following review and evaluation for potential standards development on this subject in a stand-alone project, NFPA will not be pursuing this project as such as there is significant potential to address the issues proposed within NFPA 855, Standard for the Installation of Stationary Energy Storage Systems. Given that the current request is to create a guide (i.e. non-mandatory language), creating Annex material within NFPA 855 would accomplish what you seek. This approach has been successful previously for such projects as 101A, Guide on Alternative Approaches to Life Safety, which was introduced as an Annex in NFPA 101, Life Safety Code®, then following two cycles of revisions was pulled out as a stand-alone guide.

As I understand a Task Group is currently working on language to address the protection of stationary energy storage systems; the resulting recommendations could be submitted as Public Input for consideration in the next revision cycle of NFPA 855 (currently open through June 30, 2020) or as a Tentative Interim Amendment. In taking the approach of including as an Annex, stakeholders benefit from having guidance within the shortest timeframe of standards development and the proposals benefit from participation by all of NFPA 855’s stakeholders. I encourage you to continue to work closely with Brian O’Connor, as he can provide strategies and background on NFPA projects which have progressed in this model.

If I can personally be of further assistance on this matter, please let me know. I can be reached at either dbellis@nfpa.org or 617-984-7210. As always, best regards and,

Sincerely,

Dawn Michele Bellis  
Director, Standards Administration  
and NFPA Standards Council Secretary

c: Brian O’Connor, NFPA Staff  Robert Solomon, NFPA Staff  Tracy Vecchiarelli, NFPA Staff  Guy Colonna, NFPA Staff
MEMORANDUM

TO: Technical Committee on Emergency Medical Services Protective Clothing and Equipment

FROM: Yvonne Smith, Technical Committee Administrator

DATE: July 17, 2020


The final results on this Informational ballot indicate that it DID pass the simple majority vote required.

17 Members Eligible to Vote
5 Members Not Returned (Area, J. Davis, T. Davis, Freeman, Patrick)

Attached are the ballot comments received on affirmative, negative, and abstaining votes.

For this Informational ballot to pass, a simple majority of those eligible to vote is required. See Sections 3.3.4.3.(c) and 4.4.10.1 of the Regulations Governing the Development of NFPA Standards.
I am in agreement with the request to the Standards Council from the FAE-EMS and FAE-HAZ Technical Committees for the authority to act on public comments expected on the First Draft of NFPA 1990 to remove NFPA 1999 from the consolidated NFPA 1990 document.

Karen E. Lehtonen

LION fully supports the request to Standards Council for the Technical Committee to have the authority to act on public comments to remove NFPA 1999 from the consolidated NFPA 1990, currently in cycle, for the reasons noted in this request. Pursuant to this action being approved and following the NFPA process, NFPA 1999 should be considered for placement into a more appropriate consolidated document or issued as a stand-alone document. Based on the current pandemic crisis, this standard is becoming increasingly important and should be given higher visibility in an appropriate and compatible document. This change would also allow for better support by industry experts for the revision process of the current NFPA 1999 document. Thank you for your consideration of this critical request and your flexibility in these unprecedented and trying times.

For Simple majority, the affirmative votes needed are 9
TO: Standards Council
CC: Dawn Michele Bellis
FROM: Tracy Vecchiarelli, on behalf of the NFPA Fire Test Committee
DATE: June 3, 2020
SUBJECT: New Project Update– 16’ Parallel Panel Fire Test

The NFPA Fire Test Committee is no longer pursuing the development of the 16 ft. Parallel Panel test.

The NFPA Standards Council approved the new project request from FM Global on the development of a 16’ Parallel Panel test in 2018. A task group was assigned to draft the new document and worked diligently during the last year. The task group presented their draft to the Fire Test Committee during the May 20-22, 2020 First Draft meeting and made a motion to submit the draft to the Standards Council for issuance in a cycle. That motion failed. A follow up motion was made to cease work on the new project. That motion passed. The chair disbanded the task group.
MEMORANDUM

TO: Technical Committee on Fuel Gases Warning Equipment

FROM: Jenny Depew, Technical Committee Administrator

DATE: June 22, 2020

SUBJECT: Ballot to Release NFPA 715 Preliminary Draft - Final Results

According to the final ballot results, the ballot on the release of the preliminary draft of NFPA 715, Standard for the Installation of Fuel Gases Detection and Warning Equipment HAS received the necessary affirmative votes to pass ballot. The Technical Committee recommends that NFPA 715 enter the A2022 Custom cycle. Please see the attached report for results and any comments received.

19  Eligible to Vote
0   Not Returned

The criteria necessary to pass ballot is a simple majority of the Technical Committee and Correlating Committee, if any. See Section 4.3.2.1(b) of the Regulations Governing the Development of NFPA Standards.
Per section 4.3.2.1(b) of the Regs, prior to entering a future revision cycle and approval for public review, a ballot of the committee is required to pass by, at least, a simple majority. Note: This ballot is for formally voting on whether or not you are in agreement with the release of the NFPA 715 draft.

Eligible to Vote: 19
Not Returned: 0

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1.1* Scope.

1.1.1
This standard shall be concerned with life safety and protection of property.

1.1.2*
This standard shall cover the selection, design, application, installation, location, performance, inspection, testing, and maintenance of fuel gas detection and warning equipment in buildings and structures.

1.1.3
This standard shall contain requirements for the selection, installation, operation, and maintenance of equipment that detects concentrations of fuel gases that could pose a life or property safety risk.

1.2* Purpose.

1.2.1
The purpose of this standard shall be to provide requirements for fuel gas detection and warning equipment intended to warn occupants of the presence of fuel gas in time to allow occupants to either escape or take other action and to summon aid where needed.

1.2.2
The requirements provided by this standard shall address the means of signal initiation, transmission, notification, and annunciation; the levels of performance; and the reliability of fuel gas detection and warning equipment.

1.3 Application.

1.3.1
The requirements of this standard shall apply to the installation of fuel gas detection and warning equipment, including the following:

(1) Single- and multiple-station fuel gas alarms
(2) Fuel gas detectors and their related systems and components

1.3.2*
Fuel gas detection and warning equipment shall not be used in lieu of fire or carbon monoxide detection or warning equipment required by NFPA 72, NFPA 101, or NFPA 5000.

1.4 Retroactivity.

1.4.1
Unless otherwise noted, the provisions of this document shall not be applied to facilities, equipment, structures, or installations that were existing or approved for construction or installation prior to the effective date of the document.

1.4.2
In those cases where it is determined by the authority having jurisdiction (AHJ) that the existing situation involves a distinct hazard to life or property, retroactive application of the provisions of this document shall be permitted.

1.5 Equivalency.
Nothing in this standard shall be intended to prevent the use of systems, methods, devices, or appliances of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.5.1
Technical documentation shall be submitted to the AHJ to demonstrate equivalency.

1.5.2
The system, method, device, or appliance shall be approved for the intended purpose by the AHJ.

1.5.3
All alarms or detectors and related equipment having materials or forms different from those detailed in this standard shall be examined and tested in accordance with applicable standards.

1.5.4
If found equivalent, alarms or detectors and related equipment as stated in 1.5.3 shall be permitted to be approved.

1.6 Units of Measure.

1.6.1
The units of measure in this standard shall be presented in U.S. customary units (i.e., inch/pound units).

1.6.2
Where presented, International System (SI) units shall follow the inch/pound units in parentheses.

1.6.3
Where both systems of units are presented, either system shall be acceptable for satisfying the requirements in this standard.

1.6.4
Where both systems of units are presented, both of the following shall apply:

(1) Users of this standard shall apply one set of units consistently.
(2) Users of this standard shall not alternate between units.

1.6.5
The values presented for measurements in this standard shall be expressed with a degree of precision for application and enforcement.

1.6.6
It shall not be the intent that the application or enforcement of the values presented for measurements in this standard be more precise than the precision expressed.

1.6.7*
Where extracted text contains values expressed in only one system of units, the values in the extracted text shall be retained without conversion to preserve the values established by the responsible technical committee in the source document.

Chapter 2 Referenced Publications

2.1 General.
The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.
2.2 NFPA Publications.
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


2.3 Other Publications.

2.3.1 ANSI Publications.
American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.


ANSI S3.41, Audible Emergency Evacuation (E2) And Evacuation Signals With Relocation Instructions (ESRI), 2015.


2.3.2 ASCE Publications.
American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, VA 20191-4400.


2.3.3 IEEE Publications.
Institute of Electrical and Electronics Engineers, 3 Park Avenue, 17th Floor, New York, NY 10016-5997.


2.3.4 ISO Publications.
International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.


2.3.5 UL Publications.
Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.


UL 2075, Gas and Vapor Detectors and Sensors, March 2013.
2.3.6 Other Publications.

2.4 References for Extracts in Mandatory Sections.

Chapter 3 Definitions
3.1 General.
The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. Merriam-Webster’s Collegiate Dictionary, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.
3.2.1* Approved.
Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ).
An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Labeled.
Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* Listed.
Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.5 Shall.
Indicates a mandatory requirement.

3.2.6 Should.
Indicates a recommendation or that which is advised but not required.

3.2.7 Standard.
An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.
3.3.1* Acoustically Distinguishable Space (ADS).
An emergency communications system notification zone, or subdivision thereof, that might be an enclosed or otherwise physically defined space, or that might be distinguished from other spaces because of different acoustical, environmental, or use characteristics, such as reverberation time and ambient sound pressure level. [72, 2019]

3.3.2 Alarm.

3.3.2.1 Fuel Gas Alarm.
A single- or multiple-station fuel gas alarm intended for the purpose of detecting fuel gas and alerting occupants by a distinct audible signal comprising an assembly that incorporates a sensor, control components, and an alarm notification appliance in a single unit operated from a power source either located in the unit or obtained at the point of installation.

3.3.2.2 Multiple-Purpose Alarm.
An alarm that incorporates detection capabilities for more than one hazardous condition, such as fire, fuel gas, or carbon monoxide.

3.3.2.3 Multiple-Station Alarm.
A single-station fuel gas alarm capable of being interconnected to one or more additional alarms so that the actuation of one causes the appropriate alarm signal to operate in all interconnected alarms.

3.3.2.4 Single-Station Alarm.
A fuel gas device comprising an assembly that incorporates a sensor, control components, and an alarm notification appliance in one unit operated from a power source either located in the unit or obtained at the point of installation.

3.3.3 Combination System.
See 3.3.31, System.

3.3.4* Communications Center.
A building or portion of a building that is specifically configured for the primary purpose of providing emergency communications services or public safety answering point (PSAP) services to one or more public safety agencies under the authority or authorities having jurisdiction. [1221, 2019]

3.3.5* Device (Class N).
A supervised component of a life safety system that communicates with other components of a life safety system and that collects environmental data or performs specific input or output functions necessary to the operation of the life safety system. [72, 2019]

3.3.6 Dwelling Unit.
One or more rooms arranged for complete, independent housekeeping purposes, with space for eating, living, and sleeping; facilities for cooking; and provisions for sanitation. [5000, 2018]

3.3.7* Emergency Response Agency (ERA).
Organizations providing law enforcement, emergency medical, fire, rescue, communications and related support services. [1221, 2019]

3.3.8 Emergency Response Plan.
A documented set of actions to address the planning for, management of, and response to natural, technological, and man-made disasters and other emergencies. [72, 2019]

3.3.9 End-of-Life Signal
An audible signal, differing from the alarm signal, intended to indicate that the device has reached the end of its useful life and should be replaced.

3.3.10 Fireplace.
A hearth, fire chamber, or similarly prepared area and a chimney. [211, 2019]

3.3.11 Frequency.
Minimum and maximum time between events. [72, 2019]

3.3.11.1 Weekly Frequency.
Fifty-two times per year, once per calendar week. [72, 2019]

3.3.11.2 Monthly Frequency.
Twelve times per year, once per calendar month. [72, 2019]

3.3.11.3 Quarterly Frequency.
Four times per year with a minimum of 2 months, maximum of 4 months. [72, 2019]

3.3.11.4 Semiannual Frequency.
Twice per year with a minimum of 4 months, maximum of 8 months. [72, 2019]

3.3.11.5 Annual Frequency.
Once per year with a minimum of 9 months, maximum 15 of months. [72, 2019]

3.3.12 Fuel Gas.
Any number of gasses that when combined with an oxidizer (typically air or oxygen) that
could be burned to produce thermal energy, including, but not limited to, natural gas,
methane, propane, butane, or hydrogen.

3.3.13* Fuel-Gas-Burning Appliance.
A device that burns gaseous fuel.

3.3.14* Fuel Gas Control Function Interface Device.
A listed fuel gas detection system component that directly interfaces with the system that
operates the fuel gas control function.

3.3.15 Fuel Gas Control Functions.
Fuel gas control elements or systems that are initiated by the fuel gas detection system and
either increase the level of life safety for occupants or control the spread of the harmful
effects of fuel gas.

3.3.16* Fuel Gas Detection Control Unit (FGDCU).
A component of the fuel gas detection system, provided with primary and secondary power
sources, which receives signals from initiating devices or other fuel gas detection control
units, and processes these signals to determine part or all of the required fuel gas detection
system output function(s).

3.3.17 Fuel Gas Detector.
A device having a sensor that responds to fuel gas that is connected to an alarm control unit

3.3.18 Fuel Gas Warning Equipment.
Any detector, alarm, device, or material related to single- and multiple-station alarms or
household fuel gas detection systems.

3.3.19 Gateway.
A device that is used in the transmission of serial data (digital or analog) from the fuel gas
detection control unit to other building system control units, equipment, or networks and/or
from other building system control units to the fuel gas detection control unit.

3.3.20* Lower Explosive Limit (LEL).
The minimum concentration of a gas in air that, if ignited, will propagate flame throughout the
gas-air mixture independently of continued application of the source of ignition; expressed as a percent by volume of gas in air [also known as the lower flammable limit (LFL)].

3.3.21* Nonrequired.
A system component or group of components that is installed at the option of the owner, and is not installed due to a building or fire code requirement. [72, 2019]
3.3.22 Notification Appliance.
A fuel gas system component such as a bell, horn, loudspeaker, visual notification appliance or text display that provides audible, tactile, or visual outputs, or any combination thereof.

3.3.23 Occupiable.
A room or enclosed space designed for human occupancy. [72, 2019]

3.3.24 Occupiable Area.
An area of a facility occupied by people on a regular basis. [72, 2019]

3.3.25* Off-Premises Monitoring.
Systems requiring transmission of signals to continuously attended locations providing supervising station service monitoring.

3.3.26 Operating Mode.
3.3.26.1 Private Operating Mode.
Audible or visual signaling only to those persons directly concerned with the implementation and direction of emergency action initiation and procedure in the area protected by the fuel gas detection system.

3.3.26.2 Public Operating Mode.
Audible or visual signaling to occupants or inhabitants of the area protected by the fuel gas detection system.

3.3.27 Protected Premises.
The physical location protected by a fuel gas detection system.

3.3.28* Separate Sleeping Area.
The area of a dwelling unit where the bedrooms or sleeping rooms are located. [72, 2019]

3.3.29 Signal.
3.3.29.1 Fuel Gas Alarm Signal.
A signal indicating a concentration of fuel gas at or above the alarm threshold that could pose a risk to the life safety of the occupants and that requires immediate action.

3.3.29.2 Supervisory Signal.
A signal indicating the need for action in connection with a prealarm condition, or in connection with the supervision of protected premises fuel gas safety functions or equipment or the maintenance features of related systems.

3.3.29.3* Trouble Signal.
A signal initiated by a system or device indicative of a fault in a monitored circuit, system, or component.

3.3.30 Supplementary.
As used in this standard, supplementary refers to equipment or operations not required by this standard and designated as such by the authority having jurisdiction. [72, 2019]

3.3.31 System.
3.3.31.1 Combination Fuel Gas Detection System.
A fuel gas detection system in which components are used, in whole or in part, in common with a non–fuel gas signaling system, and in which components are not used as part of a fuel gas detection system.

3.3.31.2* Combination System.
A fire alarm system in which components are used, in whole or in part, in common with a non-fire signaling system. [72, 2019]
3.3.31.3 Fire Alarm System.
A system or portion of a combination system that consists of components and circuits arranged to monitor and annunciate the status of fire alarm or supervisory signal-initiating devices and to initiate the appropriate response to those signals. [72, 2019]

3.3.31.4 Fuel Gas Detection System.
A system or portion of a combination system that consists of a control unit, components, and circuits arranged to monitor and annunciate the status of fuel gas alarm initiating devices and to initiate the appropriate response to those signals.

3.3.31.5 Household Fuel Gas Detection System.
A system of devices that uses a control unit to produce an alarm signal in the household for the purpose of notifying the occupants of the presence of concentrations of fuel gas that could pose a life safety risk.

3.3.32 Zone.
A defined area within the protected premises. A zone can define an area from which a signal can be received, an area to which a signal can be sent, or an area in which a form of control can be executed. [72, 2019]

Chapter 4 Fundamentals of Fuel Gas Detection Systems

4.1 Application.
4.1.1
The basic functions of a complete fuel gas detection system shall comply with the requirements of this chapter.

4.1.2
The requirements of this chapter shall apply to fuel gas detection systems, equipment, and components addressed in 5 through 8 of this document.

4.2 Purpose.
The purpose of fuel gas detection systems shall be primarily to provide notification of predetermined exposure levels of fuel gas.

4.3 Equipment.
4.3.1
Equipment constructed and installed in conformity with this standard shall be listed for the purpose for which it is used. [72:10.3.1]

4.3.2 Components.
4.3.2.1
System components shall be installed, tested, inspected, and maintained in accordance with the listing, the manufacturer’s published instructions and this standard. [72:10.3.2]

4.3.2.2
In cases where the manufacturer’s published instructions conflict with this standard, the requirements of this standard shall prevail.

4.3.3
All devices and appliances that receive their power from the initiating device circuit or signaling line circuit of a control unit shall be listed for use with the control unit. [72:10.3.3]

4.3.4
Where no fuel gas detection product listing standard exists, products listed for fire alarm service shall be permitted provided all the requirements of this standard are met.

4.4 Personnel Qualifications.
4.4.1 System Designer.
4.4.1.1 Fuel gas detection system plans and specifications shall be developed in accordance with this standard by persons who are knowledgeable and experienced in the design, application, installation, and testing of the systems.

4.4.1.2 Where available, state or local licensure regulations shall be followed to determine qualified personnel.

4.4.1.3 Depending on state or local licensure regulations, qualified personnel shall be permitted to include, but not be limited to, one or more of the following:

(1) Personnel who are factory trained and certified for fuel gas detection system design of the specific type and brand of system being designed and who are acceptable to the AHJ

(2) Personnel with expertise in the design of fuel gas detection systems that are registered, licensed, or certified by state or local authority

4.4.1.4 The system designer shall be identified on the system design documents. [72:10.5.1.4]

4.4.1.5 The system designer shall provide evidence of their qualifications and/or certifications when required by the AHJ. [72:10.5.1.6]

4.4.2 System Installer.

4.4.2.1 Fuel gas detection system installation personnel shall be either qualified supervised by persons who are qualified in the installation, inspection, and testing of the systems.

4.4.2.2 Where available, state or local licensure regulations shall be followed to determine qualified personnel.

4.4.2.3 Depending on state or local licensure regulations, qualified personnel shall be permitted to include, but not be limited to, one or more of the following:

(1) Personnel who are factory trained and certified for fuel gas detection system installation of the specific type and brand of system being designed and who are acceptable to the AHJ

(2) Personnel with expertise in the installation of fuel gas detection systems that are registered, licensed, or certified by a state or local authority

4.4.2.4 The system installer shall provide evidence of their qualifications and/or certifications when requested by the AHJ. [72:10.5.2.5]

4.4.3* Inspection, Testing, and Service Personnel.

4.4.3.1* Inspection Personnel.

Inspections shall be performed by personnel who have developed competence through training and experience that are acceptable to the AHJ or meet the requirement of 4.4.3.4. [72:10.5.3.1]

4.4.3.2* Testing Personnel.

Testing personnel shall have knowledge and experience of the testing requirements contained in this standard, of the equipment being tested, and of the test methods. That knowledge and experience shall be acceptable to the AHJ or meet the requirement of 4.4.3.4. [72:10.5.3.2]
4.4.3.3 Service Personnel.

Service personnel shall have knowledge and experience of the maintenance and servicing requirements contained in this standard, of the equipment being serviced or maintained, and of the servicing or maintenance methods. That knowledge and experience shall be acceptable to the AHJ or meet the requirement of 4.4.3.4. [72:10.5.3.3]

4.4.3.4 Means of Qualification.

Qualified personnel shall include, but not be limited to, one or more of the following:

(1) Personnel who are factory trained and certified for the specific type and brand of systems being serviced

(2) Personnel who are certified by a nationally recognized certification organization acceptable to the AHJ

(3) Personnel who are registered, licensed, or certified by a state or local authority to perform service on systems addressed within the scope of this standard, either individually or through their affiliation with an organization

(4) Personnel who are employed and qualified by an organization listed by a nationally recognized testing laboratory for the servicing of systems within the scope of this standard

[72:10.5.3.4]

4.4.3.5* Programming Personnel.

4.4.3.5.1 Personnel programming a system shall be certified by the system manufacturer. [72:10.5.3.5.1]

4.4.3.5.2 System installation personnel shall be permitted to configure systems in the field per manufacturers’ published instructions. [72:10.5.3.5.2]

4.4.3.5.3 System end users shall be permitted to manage system operation per manufacturers’ published instructions or training. [72:10.5.3.5.3]

4.4.3.6 Evidence of Qualification.

Evidence of qualifications shall be provided to the AHJ upon request. [72:10.5.3.6]

4.5 Power Supplies.

4.5.1 Scope.

The provisions of this section shall apply to power supplies used for fuel gas detection systems.

4.5.2 Code Conformance.

All power supplies shall be installed in accordance with the applicable requirements of NFPA 70. [72:10.6.2]

4.5.3 Power Supply Sources.

4.5.3.1 Power shall be supplied in compliance with either 4.5.3.2 or 4.5.4. [72:10.6.3.1]

4.5.3.2 Unless configured in compliance with 4.5.4, at least two independent and reliable power supplies shall be provided, one primary and one secondary. [72:10.6.3.2]

4.5.3.3 Each power supply shall be of adequate capacity for the application. [72:10.6.3.3]

4.5.3.4 Monitoring the integrity of power supplies shall be in accordance with 4.13.16. [72:10.6.3.4]
4.5.4 Energy Storage Systems (ESS).

4.5.4.1 The ESS device shall be configured in compliance with NFPA 111 for a Type O, Class 24, Level 1 system. [72:10.6.4.1]

4.5.4.2 The ESS device shall comply with the requirements of 4.5.5. [72:10.6.4.3]

4.5.4.3 Failure of the ESS shall result in the initiation of a trouble signal in accordance with Section 4.9. [72:10.6.4.4]

4.5.5 Primary Power Supply.

4.5.5.1 Branch Circuit.
The branch circuit supplying the fuel gas detection system equipment(s) shall be supplied by one of the following:

(1) Commercial light and power
(2) An engine-driven generator or equivalent in accordance with 4.5.10.2, where a person specifically trained in its operation is on duty at all times
(3) An engine-driven generator or equivalent arranged for cogeneration with commercial light and power in accordance with 4.5.10.2, where a person specifically trained in its operation is on duty at all times

4.5.5.2* The branch circuit supplying the equipment shall supply no other loads. [72:10.6.5.1.2]

4.5.5.3 Circuit Identification and Accessibility.

4.5.5.3.1 The location of the branch circuit disconnecting means shall be permanently identified at the control unit. [72:10.6.5.2.1]

4.5.5.3.2 The circuit disconnecting means shall be both of the following:

(1) Clearly marked
(2) Accessible only to authorized personnel

4.5.5.4 Mechanical Protection.
The branch circuit(s) and connections shall be protected against physical damage. [72:10.6.5.3]

4.5.5.5 Circuit Breaker Lock.
Where a circuit breaker is the disconnecting means, an approved breaker locking device shall be installed. [72:10.6.5.4]

4.5.5.6 Overcurrent Protection.
An overcurrent protective device shall be provided in accordance with NFPA 70. [72:10.6.5.5]

4.5.6 Secondary Power Supply.

4.5.6.1* Secondary Power Supply for Protected Premises Fuel Gas Detection Systems
4.5.6.1.1
The secondary power supply shall consist of one of the following:

1. A storage battery dedicated to the fuel gas detection system arranged in accordance with 4.13.16
2. An automatic-starting, engine-driven generator serving the branch circuit specified in 4.5.5.1 and arranged in accordance with 4.5.10.3, and storage batteries dedicated to the fuel gas detection system with 4 hours of capacity arranged in accordance with 4.5.9

4.5.6.1.2
Secondary circuits that provide power to the control unit and are not integral to the unit shall be protected against physical damage. [72:10.6.7.3.2]

4.5.6.2 Capacity.
4.5.6.2.1*
Where a combination (fire) system is used, the secondary power supply capacity requirements shall comply with 4.5.6.2.3 and with those of NFPA 72.

4.5.6.2.2*
Where a combination fuel gas detection system is used, the secondary power supply capacity requirements shall comply with 4.5.6.2.3 and with the provisions of the applicable NFPA code or standard.

4.5.6.2.3
The secondary power supply shall comply with both of the following:

1. Have sufficient capacity to operate the fuel gas detection system under quiescent load (i.e., system operating in a nonalarm condition) for a minimum of 24 hours
2. At the end of the 24-hour period, be capable of operating the fuel gas detection system and all notification appliances for 12 hours, unless otherwise permitted or required by 4.5.6.2.3.1 through 4.5.6.2.4.

4.5.6.2.3.1*
Battery calculations shall include a minimum 20 percent safety margin above the calculated amp-hour capacity required. [72:10.6.7.2.1.1]

4.5.6.2.3.2
The secondary power supply for in-building fuel gas detection system emergency voice/alarm communications service shall comply with both of the following:

1. Be capable of operating the system under quiescent load for a minimum of 24 hours
2. At the end of the 24-hour period, be capable of operating the system during a fire or other emergency condition for a period of 15 minutes at maximum connected load

4.5.6.2.3.3
The secondary power supply capacity for supervising station facilities and equipment shall be capable of supporting operations for a minimum of 24 hours. [72:10.6.7.2.1.3]

4.5.6.2.3.4 Reduction.
(A)
The 12-hour requirement shall be permitted to be reduced to 5 minutes where the system is monitored by a supervising station and emergency response in accordance with Chapter 7.
(B)
It shall not be permitted to utilize the 5-minute provision where 7.1.2 is utilized.

4.5.6.2.4
For systems not addressed by 4.5.6.2.3.1 through 4.5.6.2.4, the secondary power supply capacity required shall include all power supply loads that are not automatically disconnected upon the transfer to the secondary power supply.
4.5.6.3 Secondary Power Operation.
Operation on secondary power shall not affect the required performance of a fuel gas detection system.

4.5.7* Continuity of Power Supplies.

4.5.7.1
The secondary power supply shall automatically provide power to the protected premises system within 10 seconds whenever the primary power supply voltage is insufficient for required system operation. [72:10.6.6.1]

4.5.7.2
The secondary power supply shall automatically provide power to the supervising station facility and equipment within 60 seconds whenever the primary power supply voltage is insufficient for required system operation. [72:10.6.6.2]

4.5.7.3
Required signals shall not be lost, interrupted, or delayed by more than 10 seconds as a result of the primary power failure. [72:10.6.6.3]

4.5.7.3.1
Storage batteries dedicated to the fuel gas detection system or an ESS arranged in accordance with the provisions of NFPA 111 shall be permitted to supplement the secondary power supply to ensure required operation during the transfer period.

4.5.7.3.2
Where an ESS is employed in 4.5.7.3.1, a positive means for disconnecting the input and output of the ESS system while maintaining continuity of power supply to the load shall be provided. [72:10.6.6.3.2]

4.5.8 Power Supply for Remotely Located Control Equipment.

4.5.8.1*
Additional power supplies shall be comprised of a primary and secondary power supply that meet the same requirements as those required for system operation with 4.5.1 through 4.5.7 and 4.13.16.

4.5.8.2
The location of any remotely located power supply shall be identified at the master control unit. [72:10.6.8.2]

4.5.8.3
The master control unit display shall be permitted to satisfy the requirement of 4.5.8.2. [72:10.6.8.3]

4.5.8.4
The location of any remotely located power supply shall be identified on the record drawings [72:10.6.8.4]

4.5.9 Storage Batteries.

4.5.9.1 Marking.

4.5.9.1.1
Batteries shall be marked with the month and year of manufacture using the month/year format. [72:10.6.10.1.1]

4.5.9.1.2
Where the battery is not marked with the month/year by the manufacturer, the installer shall obtain the date-code and mark the battery with the month/year of battery manufacture. [72:10.6.10.1.2]

4.5.9.2 Arrangement.
4.5.9.2.1
Storage batteries shall comply with the requirements of Article 480 of NFPA 70. [72:10.6.10.2.1]  

4.5.9.2.2
Storage batteries shall be located so that the fuel gas detection equipment, including overcurrent devices, is not adversely affected by battery gases.  

4.5.9.2.3
Batteries shall be insulated against ground-faults. [72:10.6.10.2.3]  

4.5.9.2.4
Batteries shall be insulated to prevent short circuits between multiple cells. [72:10.6.10.2.4]  

4.5.9.2.5
Batteries shall be protected from physical damage. [72:10.6.10.2.5]  

4.5.9.2.6
Battery racks shall be protected against corrosion. [72:10.6.10.2.6]  

4.5.9.2.7
If not located in or adjacent to the fuel gas detection control unit, the batteries and their charger location shall be permanently identified at the control unit.  

4.5.9.3 Battery Charging.  

4.5.9.3.1
Battery charging equipment shall be provided to keep the battery fully charged under all conditions of normal operation.  

4.5.9.3.2
Battery charging equipment shall be provided to recharge batteries within 48 hours after fully charged batteries have been subject to a single discharge cycle as specified in 4.5.6.2. [72:10.6.10.3.2]  

4.5.9.3.3
The battery charging equipment operation shall not damage the battery. [72:10.6.10.3.3]  

4.5.9.3.4*
Batteries shall be charged by listed means. [72:10.6.10.3.4]  

4.5.9.3.5
Provisions for repair or replacement of failed battery charger equipment shall be maintained at supervising stations and used to restore operation prior to depletion of one-half of the battery capacity. [72:10.6.10.3.5]  

4.5.9.4 Overcurrent Protection.  

Overcurrent devices shall be provided to protect the batteries from excessive load current. [72:10.6.10.4]  

4.5.9.5 Metering.  

The battery charging equipment shall include integral meters or readily accessible terminals so that portable meters can be used to determine battery voltage and charging current. [72:10.6.10.5]  

4.5.9.6 Monitoring Integrity of Battery Charging Equipment.  

4.5.9.6.1
Means shall be provided to detect the failure of a battery charger. [72:10.6.10.6.1]  

4.5.9.6.2
Failure of the battery charger shall result in a trouble signal in accordance with Section 4.9. [72:10.6.10.6.2]
4.5.10 Engine-Driven Generators.

4.5.10.1 Application and Installation.

The application and installation of engine-driven generators shall be as specified in 4.5.10.2 through 4.5.10.7. [72:10.6.11.1]

4.5.10.2 Primary Power Supply.

4.5.10.2.1

Engine-driven generators arranged as the primary supply shall be designed in an approved manner. [72:10.6.11.2.1]

4.5.10.2.2

Engine-driven generators arranged as the primary supply shall be installed in an approved manner. [72:10.6.11.2.2]

4.5.10.3 Secondary Power Supplies.

4.5.10.3.1

Engine-driven generators used to provide secondary power for a protected fuel gas detection system shall comply with NFPA 110, Chapter 4, requirements for a Type 10, Class 24, Level 1 System.

4.5.10.3.2

Installation of engine-driven generators used to provide secondary power for a fuel gas detection system shall be in accordance with NFPA 70, Article 700.

4.5.10.4 Performance, Operation, Testing, and Maintenance.

The requirements for performance, operation, testing, and maintenance of engine-driven generators shall conform to the applicable provisions of NFPA 110. [72:10.6.11.4]

4.5.10.5 Capacity.

The unit shall be of a capacity that is sufficient to operate the system under the maximum normal load conditions in addition to all other demands placed upon the unit. [72:10.6.11.5]

4.5.10.6 Fuel.

Unless otherwise required or permitted in 4.5.10.6.1 and 4.5.10.6.2, fuel shall be available in storage sufficient for 6 months of testing plus the capacity specified in 4.5.6. [72:10.6.11.6]

4.5.10.6.1

If a reliable source of supply is available at any time on a 2-hour notice, it shall be permitted to have fuel in storage sufficient for 12 hours of operation at full load. [72:10.6.11.6.2]

4.5.10.6.2

Fuel systems using natural or manufactured gas supplied through reliable utility mains shall not be required to have fuel storage tanks unless located in seismic risk zone 3 or greater as defined in ASCE-7, Building Code Requirements for Minimum Design Loads in Buildings and Other Structures. [72:10.6.11.6.3]

4.5.10.7 Battery and Charger.

4.5.10.7.1

A separate storage battery and separate automatic charger shall be provided for starting the engine-driven generator and shall not be used for any other purpose. [72:10.6.11.7.1]

4.5.10.7.2

The battery shall be sized in accordance with 5.6.4 of NFPA 110. [72:10.6.11.7.2]

4.6 Distinctive Signals.

4.6.1

Fuel gas alarm signals and fuel gas detection system supervisory and trouble signals shall be distinctively and descriptively annunciated.
4.6.2
Audible alarm notification appliances for a fuel gas detection system shall produce signals that are distinctive from other similar appliances used for other purposes in the same area that are not part of the fuel gas detection system.

4.6.3*
An audible notification appliance on a control unit, or on multiple control units that are interconnected to form a system, or at a remote location, shall be permitted to have the same audible characteristics for all alerting functions including, but not limited to, alarm, trouble, and supervisory, provided that the distinction between signals shall be by other means. [72:10.10.4]

4.6.4*
Supervisory signals shall be distinctive in sound from other signals, and their sound shall not be used for any other purpose except as permitted in 4.6.3. [72:10.10.5]

4.6.5
Trouble signals required to indicate at the protected premises shall be indicated by distinctive audible signals, which shall be distinctive from alarm signals except as permitted in 4.6.3. [72:10.10.6]

4.6.6
Where a fuel gas detection system is combined with either a fire alarm system or an intrusion detection system, trouble signals from each system shall be permitted to use a common audible signal.

4.7 Alarm Signals.

4.7.1
Fuel gas alarm signals shall comply with 5.8.6.5.

4.7.2
An alarm signal that has been deactivated at the protected premises shall comply with 4.7.2.1 and 4.7.2.2. [72:10.11.8]

4.7.2.1
The audible and visible alarm signal at the control unit only shall automatically reactivate every 24 hours or less until alarm signal conditions are restored to normal. [72:10.11.8.1]

4.7.2.2
The audible and visible alarm signal shall operate until it is manually silenced or acknowledged. [72:10.11.8.2]

4.7.3 Fuel Gas Alarm Notification Appliance Deactivation.

4.7.3.1*
When an occupant notification alarm signal deactivation means is actuated, both audible and visual notification appliances shall be simultaneously deactivated. [72:10.12.2]

4.7.3.2
The fuel gas alarm notification deactivation means shall be key-operated or located within a locked cabinet, or arranged to provide equivalent protection against unauthorized use.

4.7.3.3
The means shall comply with the requirements of 4.12.1. [72:10.12.4]

4.7.3.4
Subsequent activation of addressable alarm initiating devices of a different type in the same room or addressable alarm initiating devices in a different room on signaling line circuits shall cause the notification appliances to reactivate. [72:10.12.5.2]
4.7.3.5
A fuel gas alarm notification deactivation means that remains in deactivation position when there is no alarm condition shall operate an audible trouble notification appliance until the means is restored to normal.

4.7.3.6*
Resetting of alarm signals shall comply with 5.8.2.2. [72:10.11.6]

4.8 Supervisory Signals.

4.8.1 Latching Supervisory Signal Indication.
Visible and audible indication of latching supervisory signals and visible indication of their restoration to normal shall be indicated within 90 seconds at the following locations:
(1) Control unit for local fuel gas detection alarm systems
(2) Building command center for in-building emergency voice/alarm communications systems
(3) Supervising station location for systems installed in compliance with Chapter 7

4.8.2 Self-Restoring Supervisory Signal Indication.
Visible and audible indication of self-restoring supervisory signals and visible indication of their restoration to normal shall be automatically indicated within 90 seconds at the following locations:
(1) Control unit for local fuel gas detection alarm systems
(2) Building command center for in-building emergency voice/alarm communications systems
(3) Supervising station location for systems installed in compliance with Chapter 7

4.8.3 Self-Restoring Signal.
A supervisory signal initiating device shall be permitted to be self-restoring provided the control unit continues to indicate the supervisory condition.

4.8.4 Supervisory Notification Appliance Location.
The audible supervisory notification appliances shall be located in an area where they are likely to be heard. [72:10.14.5]

4.8.5 Supervisory Signal Reactivation.
A supervisory signal that has been deactivated at the protected premises shall comply with 4.8.5.1 and 4.8.5.2. [72:10.14.6]

4.8.5.1
The audible and visible supervisory signal at the control unit only shall automatically reactivate every 24 hours or less until supervisory signal conditions are restored to normal. [72:10.14.6.1]

4.8.5.2
The audible and visible supervisory signal shall operate until it is manually silenced or acknowledged. [72:10.14.6.2]

4.8.6 Supervisory Notification Appliance Deactivation.

4.8.6.1
A means for deactivating a supervisory notification appliance(s) shall be permitted only if it complies with 4.8.6.2 through 4.8.6.5.

4.8.6.2
The means shall be key-operated or located within a locked cabinet, or arranged to provide equivalent protection against unauthorized use. [72:10.14.7.2]
4.8.6.3
The means for deactivating supervisory notification appliances shall comply with the requirements of 4.12.2. [72:10.14.7.3]

4.8.6.4
Subsequent activation of supervisory initiating devices in other building zones shall cause supervisory notification appliances to activate as required by the system input/output matrix. [72:10.14.7.4]

4.8.6.5
A means for deactivating supervisory notification appliances that remain in the deactivated position when there is no supervisory condition shall operate an audible trouble notification appliance until the means is restored to normal. [72:10.14.7.5]

4.9 Trouble Signals.

4.9.1
Trouble signals and their restoration to normal shall be indicated within 200 seconds at the locations identified in 4.9.7 and 4.9.8. [72:10.15.1]

4.9.2
Indication of primary power failure trouble signals transmitted to a supervising station shall be in accordance with 4.13.16.4. [72:10.15.2]

4.9.3
An audible trouble signal shall be permitted to be intermittent provided it sounds at least once every 10 seconds, with a minimum duration of \( \frac{1}{2} \) second. [72:10.15.3]

4.9.4
A single audible trouble signal shall be permitted to annunciate multiple fault conditions. [72:10.15.4]

4.9.5
The audible trouble notification appliance shall be located in an area where they are to be heard. [72:10.15.5]

4.9.6
Activated notification appliances at the protected premises shall continue to operate unless they are manually silenced as permitted 4.9.9.1. [72:10.15.6]

4.9.7
Visible and audible trouble signals and visible indication of their restoration to normal shall be indicated at the following locations:

(1) Control unit for fuel gas detection systems
(2) Building command center for in-building emergency voice/alarm communications systems
(3) Supervising stations for systems installed in compliance with Chapter 7

4.9.8
Trouble signals and their restoration to normal shall be visibly and audibly indicated at the proprietary supervising station for systems installed in compliance with Chapter 7. [72:10.15.8]

4.9.8.1
A trouble signal that has been deactivated at the protected premises shall comply with 4.9.8.2 and 4.9.8.3. [72:10.15.9]

4.9.8.2
The audible and visible trouble signal shall automatically reactivate at the control unit every 24 hours or less until trouble signal conditions are restored to normal. [72:10.15.9.1]
4.9.8.3
The audible and visible trouble signal associated with signaling the depletion or failure of the primary battery of a wireless system as required by 5.12.2.1(3) and (4) and shall automatically resound every 4 hours or less until the depletion signal is restored to normal. [72:10.15.9.2]

4.9.9 Trouble Notification Appliances Deactivation.

4.9.9.1
A means for deactivating trouble notification appliance(s) shall be permitted only if it complies with 4.9.9.2 through 4.9.9.7.

4.9.9.2
The means shall be key-operated or located with a lock cabinet, or arranged to provide equivalent protection against unauthorized use. [72:10.15.10.2]

4.9.9.3
The means for deactivating trouble notification appliances shall comply with the requirements of 4.12.2. [72:10.15.10.3]

4.9.9.4
If an audible trouble notification appliance is also used to indicate a supervisory condition, as permitted by 4.6.3, a trouble notification appliance deactivation means shall not prevent subsequent actuation of supervisory notification appliances. [72:10.15.10.4]

4.9.9.5
Subsequent trouble signals shall cause trouble notification appliances to activate as required by the system input/output matrix. [72:10.15.10.5]

4.9.9.6
A means for deactivating trouble notification appliances that remains in the deactivated position when there is no trouble condition shall operate an audible trouble notification appliance until the means is restored to normal. [72:10.15.10.6]

4.9.9.7*
Unless otherwise permitted by the AHJ, trouble notification appliances at the protected premises of a supervising station alarm system arranged in accordance with Chapter 7, that have been silenced at the protected premises shall automatically reactivate every 24 hours or less until the fault conditions are restored to normal.

4.10 Fuel Gas Control Function Status Indicators.

4.10.1
All controls provided specifically for the purpose of manually overriding any automatic fuel gas control function shall provide visible indication of the status of the associated control circuits.

4.10.2*
Where status indicators are provided for emergency equipment or fuel gas control functions, they shall be arranged to reflect the actual status of the associated equipment or function.

4.11 Performance and Limitations.

4.11.1 Voltage, Temperature, and Humidity Variation.

Equipment other than that addressed by 4.11.2.4 shall be designed so that it is capable of performing its intended functions under the following conditions:

(1) At 85 percent and at 110 percent of the nameplate primary (main) and secondary (standby) input voltage(s)

(2) At ambient temperatures of 32°F (0°C) and 120°F (49°C)

(3) At a relative humidity of 85 percent and an ambient temperature of 86°F (30°C)

4.11.2 Design and Installation.
4.11.2.1* All systems shall be installed in accordance with the manufacturer's published installation instructions and applicable codes and standards.

4.11.2.2 All apparatus requiring resetting to maintain normal operation shall be restored to normal after each abnormal condition.

4.11.2.3 Devices and appliances shall be located and mounted so that accidental operation or failure is not caused by vibration or jarring. [72:10.4.2]

4.11.2.4 Equipment shall be installed in locations where conditions do not exceed the voltage, temperature, and humidity limits specified in the manufacturer's published instructions. [72:10.4.3]

4.12 Annunciation and Annunciation Zoning.

4.12.1 Alarm Annunciation.

4.12.1.1 The location of an actuated initiating device shall be annunciated by visible means.

4.12.1.2 Visible annunciation of the location of an operated initiating device shall be by an indicator lamp, alphanumeric display, printout, or other approved means. [72:10.18.1.1.1]

4.12.1.3 The visible annunciation of the location of operated initiating devices shall not be canceled by the means used to deactivate alarm notification appliances. [72:10.18.1.1.2]

4.12.2 Supervisory and Trouble Annunciation.

4.12.2.1 Supervisory or trouble annunciation shall be annunciated by visible means.

4.12.2.2 Visible annunciation shall be by an indicator lamp, an alphanumeric display, a printout, or other means. [72:10.18.2.1.1]

4.12.2.3 The visible annunciation of supervisory and/or trouble conditions shall not be canceled by the means used to deactivate supervisory or trouble notification appliances. [72:10.18.2.1.2]

4.12.3* Annunciator Access and Location.

4.12.3.1 All required annunciation means shall be readily accessible to responding personnel. [72:10.18.3.1]

4.12.3.2 All required annunciation means shall be located as required by the AHJ to facilitate an efficient response to the situation. [72:10.18.3.2]

4.12.4 Alarm Annunciation Display.

Visible annunciators shall be capable of displaying all zones in alarm. [72:10.18.4]

4.12.4.1 If all zones in alarm are not displayed simultaneously, the zone of origin shall be displayed. [72:10.18.4.1]
4.12.4.2
If all zones in alarm are not displayed simultaneously, there shall be an indication that other zones are in alarm. [72:10.18.4.2]

4.12.5 Annunciation Zoning.

4.12.5.1
For the purpose of alarm annunciation, each floor of the building shall be considered as a separate zone. [72:10.18.5.1]

4.12.5.2
Where the system serves more than one building, each building shall be annunciated separately. [72:10.18.5.3]

4.13* Monitoring Integrity and Circuit Performance of Installation Conductors and Other Signaling Channels.

4.13.1
Unless otherwise permitted or required by 5.4.3.1 through 5.4.3.7 and 4.13.3 through 4.13.10, all means of interconnecting equipment, devices, and appliances and wiring connections shall be monitored for the integrity of the interconnecting conductors or equivalent path so that the occurrence of a single open or a single ground-fault condition in the installation conductors or other signaling channels is automatically indicated within 200 seconds. [72:12.6.1]

4.13.2
Unless otherwise permitted or required by 5.4.3.1 through 5.4.3.7 and 4.13.3 through 4.13.10, all means of interconnecting equipment, devices, and appliances and wiring connections shall be monitored for the integrity of the interconnecting conductors or equivalent path so that the restoration to normal of a single open or a single ground-fault condition in the installation conductors or other signaling channels is automatically indicated within 200 seconds. [72:12.6.2]

4.13.3
Shorts between conductors shall not be required to be monitored for integrity, unless required by 4.13.12 or 4.13.13. [72:12.6.3]

4.13.4
Monitoring for integrity shall not be required for connections to and between supplementary system components, provided that single open, ground-fault, or short-circuit conditions of the supplementary equipment or interconnecting means, or both, do not affect the required operation of the fuel gas detection system.

4.13.5
Monitoring for integrity shall not be required for the circuit of an alarm notification appliance installed in the same room with the central control equipment, provided that the notification appliance circuit conductors are installed in conduit or are equivalently protected against mechanical injury. [72:12.6.6]

4.13.6
Monitoring for integrity shall not be required for a trouble notification appliance circuit. [72:12.6.7]

4.13.7*
Monitoring for integrity shall not be required for the interconnection between listed equipment within a common enclosure. [72:12.6.8]

4.13.8
Monitoring for integrity shall not be required for the interconnection between enclosures containing control equipment located within 20 ft (6 m) of each other where the conductors are installed in conduit or equivalently protected against mechanical injury. [72:12.6.9]
4.13.9
Monitoring for integrity shall not be required for the conductors for ground–fault detection where a single ground does not prevent the required normal operation of the system. [72:12.6.10]

4.13.10
Monitoring for integrity shall not be required for the interconnecting wiring of a stationary computer and the computer’s keyboard, video monitor, mouse-type device, or touch screen, as long as the interconnecting wiring does not exceed 8 ft (2.4 m) in length; is a listed computer/data processing cable as permitted by NFPA 70; and failure of cable does not cause the failure of the required system functions not initiated from the keyboard, mouse, or touch screen. [72:12.6.12]

4.13.11
Interconnection means shall be arranged so that a single break or single ground–fault does not cause an alarm signal. [72:12.6.14]

4.13.12
A wire-to-wire short-circuit fault on any alarm notification appliance circuit shall result in a trouble signal in accordance with Section 4.9, except as permitted by 4.13.4 or 4.13.5. [72:12.6.15]

4.13.13
Where two or more systems are interconnected, the systems shall be connected using Class A, B, N, or X circuits as described in 5.4.3. [72:12.6.16]

4.13.14
The subsequent occurrence of a fault on an initiating device circuit or a signaling line circuit used for other than the interconnection of control units shall not affect previously transmitted unacknowledged alarm signals. [72:10.11.7]

4.13.15
An open, ground-fault, or short-circuit fault on the installation conductors of one alarm notification appliance circuit shall not affect the operation of any other alarm notification circuit for more than 200 seconds regardless of whether the short-circuit fault is present during normal or activated circuit state. [72:10.17.1]

4.13.15.1
Notification alarm circuits that do not have notification appliances connected directly to the circuit shall be considered control circuits.

4.13.15.2
Control circuits used for the purpose of controlling NAC extender panels shall comply with all of the following:
(1) The NAC extender panel(s) connected to the control circuit shall not serve more than one notification zone.
(2) The control circuit shall be monitored for integrity in accordance with Section 4.13.
(3) A fault in the control circuit installation conductors shall result in a trouble signal in accordance with Section 4.9.

[72:10.17.3]

4.13.16 Monitoring Integrity of Power Supplies.

4.13.16.1
Unless otherwise permitted or required by 4.13.16.1.3 through 4.13.16.1.6, all primary and secondary power supplies shall be monitored for the presence of voltage at the point of connection to the system. [72:10.6.9.1]
4.13.16.1.1
Failure of either the primary or secondary power supply shall result in a trouble signal in accordance with Section 4.9. \[72:10.6.9.1.1\]

4.13.16.1.2
Where the digital alarm communicator transmitter (DACT) is powered from a protected premises fuel gas detection control unit, power failure indication shall be in accordance with 4.13.16.1.

4.13.16.1.3
Monitoring shall not be required for a power supply for supplementary equipment. \[72:10.6.9.1.3\]

4.13.16.1.4
Monitoring shall not be required for the neutral of a three-, four-, or five-wire alternating current (ac) or direct current (dc) supply source. \[72:10.6.9.1.4\]

4.13.16.1.5
Monitoring shall not be required for the main power supply in a supervising station, provided the fault condition is otherwise indicated so as to be obvious to the operator on duty.

4.13.16.1.6
Monitoring shall not be required for the output of an engine-driven generator that is part of the secondary power supply, provided that the generator is tested weekly in accordance with Chapter 8. \[72:10.6.9.1.6\]

4.13.16.2*
Power supply sources and electrical supervision for digital alarm communications systems shall be in accordance with Sections 4.5 and 4.13. \[72:10.6.9.2\]

4.13.16.3
Power supervisory devices shall be arranged so as not to impair the receipt of fuel gas alarm or supervisory signals.

4.13.16.4*
Unless prohibited by the AHJ, where fuel gas detection systems are connected to a supervising station, the system shall be arranged to delay transmission of primary power failure signals for a period ranging from 60 to 180 minutes.

4.14 Documentation.

4.14.1 Approval and Acceptance.

4.14.1.1
The AHJ shall be notified prior to installation or alteration of equipment or wiring. \[72:10.20.2\]

4.14.1.2
At the AHJ’s request, complete information regarding the system or system alterations, including specifications, type of system or service, shop drawings, input/output matrix, batter calculations, and notification appliance circuit voltage drop calculations, shall be submitted for approval.

4.14.1.3
Before requesting final approval of the installation, if required by the AHJ, the installing contractor shall furnish a written statement stating that the system has been installed in accordance with approved plans and tested in accordance with the manufacturer’s published instructions and the appropriate NFPA requirements. \[72:7.5.2\]
The fuel gas detection system record of completion form, Figure 4.14.1.4, shall be permitted to be a part of the written statement required in 4.14.1.3.

**Figure 4.14.1.4 Fuel Gas Detection System Record of Completion.**

<table>
<thead>
<tr>
<th>1. PROPERTY INFORMATION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of property</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td></td>
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<tr>
<td>Description of property</td>
<td></td>
</tr>
<tr>
<td>Occupant type</td>
<td></td>
</tr>
<tr>
<td>Name of property representative</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td>Fax</td>
</tr>
<tr>
<td>Notice for having an accident over this property</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td>Fax</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. INSTALLATION, SERVICE, AND TESTING CONTRACTOR INFORMATION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor name and the equipment</td>
<td></td>
</tr>
<tr>
<td>Location or verification number</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td>Fax</td>
</tr>
<tr>
<td>Service equipment for the equipment</td>
<td></td>
</tr>
<tr>
<td>Location or verification number</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td>Fax</td>
</tr>
<tr>
<td>A contract for the contract in accordance with NSF/ANSI standards to be fulfilled</td>
<td></td>
</tr>
<tr>
<td>Service equipment for the equipment</td>
<td></td>
</tr>
<tr>
<td>Location or verification number</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td>Fax</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. DESCRIPTION OF SYSTEM OR SERVICE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A fuel gas detection system</td>
<td></td>
</tr>
<tr>
<td>Fuel gas emergency response communication system (FCN)</td>
<td></td>
</tr>
<tr>
<td>Combination fuel gas detection systems, with the following system, respectively</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4. DESCRIPTION OF SYSTEM OR SERVICE (continued)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Control Unit</td>
<td></td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Model number</td>
</tr>
<tr>
<td>4.2 System Description</td>
<td></td>
</tr>
<tr>
<td>An event that includes the manufacturer's instructions, a written response of operation, and a copy of the original system's drawings and schematics</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td></td>
</tr>
<tr>
<td>4.3 Alarm Software</td>
<td></td>
</tr>
<tr>
<td>Prepare an alarm system</td>
<td></td>
</tr>
<tr>
<td>Design, including software, in accordance with the following</td>
<td></td>
</tr>
<tr>
<td>Service equipment for the equipment</td>
<td></td>
</tr>
<tr>
<td>Location or verification number</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td>Fax</td>
</tr>
<tr>
<td>A copy of the software is stored at the location</td>
<td></td>
</tr>
<tr>
<td>Service equipment for the equipment</td>
<td></td>
</tr>
<tr>
<td>Location or verification number</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td>Fax</td>
</tr>
<tr>
<td>A system does not have at least one transmitted</td>
<td></td>
</tr>
<tr>
<td>Name of system</td>
<td></td>
</tr>
<tr>
<td>Transmitting alarm signals with phone number</td>
<td></td>
</tr>
<tr>
<td>Alarms</td>
<td></td>
</tr>
<tr>
<td>Supervisor</td>
<td>Phone</td>
</tr>
<tr>
<td>Field</td>
<td>Phone</td>
</tr>
<tr>
<td>Part of the system</td>
<td></td>
</tr>
<tr>
<td>By means of a transmitted</td>
<td></td>
</tr>
<tr>
<td>Method of transmission</td>
<td></td>
</tr>
<tr>
<td>Specify the means of transmission from the protected premises to the supervisory station or receiving station</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. CIRCUITS AND PATHWAYS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 Signaling Line Pathways</td>
<td></td>
</tr>
<tr>
<td>Pathway</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5.2 Pathway Using Two or More Pathways</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity</td>
<td>Description</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5.3 Alarm Device Pathways</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>An expense panel pathway from the signaling line path</td>
<td></td>
</tr>
<tr>
<td>Power pathway is separate of the pathway classification from the signaling line path</td>
<td></td>
</tr>
<tr>
<td>Power pathways are separate of the pathway classification from the signaling line path</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5.4 Other Pathways</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity</td>
<td></td>
</tr>
</tbody>
</table>

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4. CIRCUITRY AND PATHWAYS (continued)

4.2 Alarm Initiating Device Pathways

<table>
<thead>
<tr>
<th>Pathway Class</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3 Pathways Utilizing Two or More Media

<table>
<thead>
<tr>
<th>Pathway Class</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. ALARM INITIATING DEVICES

5.1.1 Fuel Gas Detectors

Type and number of devices: Addressable: ________________
Number of devices: ________________

5.1.2 Other Smoke Detection

Type: ________________
Number of devices: ________________

5.1.3 Other Monitoring Devices

Type: ________________
Number of devices: ________________

6. SUPPLEMENTARY SMOKE-INITIATING DEVICES

6.1.1 Smoke Detectors

Type and number of devices: Addressable: ________________
Number of devices: ________________

7. ANNUNCIATORS

7.1.1 Annunciators and Description of Annunciators

<table>
<thead>
<tr>
<th>Location 1</th>
<th>Location 2</th>
<th>Location 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. ALARM NOTIFICATION APPLIANCES

8.0.1.1 Emergency Voice-Alert Communications Systems

Number of single voice channels: ________________
Number of multi-channel voice channels: ________________
Number of speakers: ________________
Number of speaker circuits: ________________

8.0.1.2 Smoke-Alert Appliances

Type: ________________
Model: ________________

8.0.1.3 Notification Appliance Power Failure Permits

Type: ________________
Number of devices: ________________

9. PULL-NAR SAFETY FUNCTIONS

9.1.1 PULL-NAR SAFETY FUNCTIONS

Type: ________________
Number of devices: ________________

10. SYSTEM POWER

10.1.1 Central Uplift

<table>
<thead>
<tr>
<th>Central Power</th>
<th>Controller Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>________________</td>
<td>________________</td>
</tr>
</tbody>
</table>

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## 10. SYSTEM POWER (continued)

### 10.1. Engine-Driven Generator

- **Location of generator:**
- **Location of fuel storage:**
- **Type of fuel:**

### 10.2. Engine-Driven Generator

- **Location of generator:**
- **Location of fuel storage:**
- **Type of fuel:**

### 10.3. Emergency Diesel-Driven Generator

- **Location of diesel storage:**
- **Type of fuel:**

### 10.4. Batteries

- **Location:**
- **Type:**
- **Normal voltage:**
- **Amperage rating:**
- **Date manufactured:**
- **Battery calculations are attached:**

---

## 11. RECORD OF SYSTEM INSTALLATION

- **Inspection:**
- **Date tested:**
- **Name:**
- **Address:**
- **Phone:**

---

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4.14.1.5*
The record of completion documentation shall be completed by the installing contractor and submitted to the AHJ and the owner at the conclusion of the job. The record of completion documentation shall be permitted to be part of the written statement required in 4.14.1.3 and part of the documents that support the requirements of 4.14.1.3. When more than one contractor has been responsible for the installation, each contractor shall complete the portions of the documentation for which that contractor has responsibility. [72:7.5.6.2]

4.14.2 Shop Drawings (Installation Documentation).

4.14.2.1
The requirements of 4.14.2 shall apply only where required by other governing laws, codes, or standards; by other parts of this standard; or by project specifications or drawings. [72:7.4.1]

4.14.2.2*
Shop drawings shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor. [72:7.4.2]
4.14.2.3
Shop drawings for fuel gas detection systems shall provide both basic information and the basis for the record (as-built) drawings required in accordance with 4.14.1.3.

4.14.2.4
Shop drawings shall include the following information:

(1) Name of protected premises, owner, and occupant (where applicable)
(2) Name of installer or contractor
(3) Location of protected premises
(4) Device legend and symbols in accordance with NFPA 170, or other symbols acceptable to the AHJ
(5) Date of issue and any revision dates

4.14.2.5 Floor Plans.

4.14.2.5.1
Floor plan drawings shall be drawn to an indicated scale.

4.14.2.5.2
Floor plan drawings shall include the following information, where applicable for the particular system:

(1) Floor or level identification
(2) Point of compass (indication of North)
(3) Graphic scale
(4) All walls and doors
(5) All partitions extending to within 15 percent of the ceiling height (where applicable and when known)
(6) Room and area descriptions
(7) System devices/component locations
(8) Locations of fuel gas alarm primary power disconnecting means
(9) Locations of monitor/control interfaces to other systems
(10) System riser locations
(11) Type and number of system components/devices on each circuit, on each floor or level
(12) Type and quantity of conductors and conduit (if used) for each circuit
(13) Identification of any ceiling over 10 ft (3.0 m) in height where automatic fuel gas detection is being proposed
(14) Details of ceiling geometries, including beams and solid joists, where automatic fuel gas detection is being proposed
(15) Where known, acoustic properties of spaces
4.14.2.6

System riser diagrams shall be coordinated with the floor plans and shall include the following information:

1. General arrangement of the system in building cross section
2. Number of risers
3. Type and number of circuits in each riser
4. Type and number of system components/devices on each circuit, on each floor or level
5. Number of conductors for each circuit

4.14.2.7

Control unit diagrams shall be provided for all control equipment (i.e., equipment listed as either a control unit or control unit accessory), power supplies, battery chargers, and annunciators and shall include the following information:

1. Identification of the control equipment depicted
2. Location(s) of control equipment
3. All field wiring terminals and terminal identifications
4. All circuits connected to field wiring terminals and circuit identifications
5. All indicators and manual controls
6. Field connections to supervising station signaling equipment, releasing equipment, or emergency safety control interfaces, where provided

4.14.2.8

Typical wiring diagrams shall be provided for all initiating devices, notification appliances, remote indicators, annunciators, remote test stations, and end-of-line and power supervisory devices.

4.14.2.9

A narrative description or input/output matrix of operation shall be provided to describe the sequence of operation.

4.14.2.10

System calculations shall be included as follows:

1. Battery calculations
2. Notification appliance circuit voltage drop calculations
3. Other required calculations, such as line resistance calculations, where required

4.14.3 Completion Documents.

4.14.3.1 Preparation.

4.14.3.1.1*

The preparation of the fuel gas detection system record of completion documentation (see Figure 4.14.1.4) shall be the responsibility of the qualified and experienced person described in 4.4.2.

4.14.3.1.2

The preparation of a fuel gas detection system record of completion (see Figure 4.14.1.4) shall be in accordance with 4.14.3.1.2.1 through 4.14.3.1.2.5.
4.14.3.1.2.1
Parts 1 through 11 of the record of completion shall be completed after the system is installed and the installation wiring has been checked.

4.14.3.1.2.2
Parts 12 and 13 of the record of completion shall be completed after the operational acceptance tests have been completed.

4.14.3.1.2.3
A preliminary copy of the record of completion shall be given to the system owner and, if requested, to other AHJs after completion of the installation wiring tests.

4.14.3.1.2.4
A final copy of the record of completion shall be provided after completion of the operational acceptance tests.

4.14.3.1.2.5
One copy of the record of completion shall be stored at the fuel gas detection control unit or other approved location.

4.14.3.1.2.6
The copy as stated in 4.14.3.1.2.5 shall be updated to reflect all system additions or modifications and maintained in a current condition at all times.

4.14.3.1.2.7
Where not stored at the main fuel gas detection control unit, the location of the documents listed in 4.14.3.1.2.1 through 4.14.3.1.2.6 shall be identified at the main fuel gas detection control unit.

4.14.3.1.2.8
If the documents listed in 4.14.3.1.2.1 through 4.14.3.1.2.6 are located in a separate enclosure or cabinet, the separate enclosure or cabinet shall be labeled FUEL GAS DETECTION DOCUMENTS.

4.14.4 Revisions
Fuel gas detection system modifications made after the initial installation shall be recorded on a revised version of the original record of completion.

4.14.4.1
All changes from the original information shall be shown.

4.14.4.2
The revised record of completion shall include a revision date.

4.14.4.3 Documentation Required.

4.14.4.3.1
Every system shall include the following documentation:

(1)* Owner’s manual and manufacturer’s published instructions covering all system equipment

(2) Record drawings

(3) For software-based systems, record copy of the site-specific software

(4) Written sequence of operation

4.14.4.3.2
The documentation listed in 4.14.4.3.1 shall be delivered to the owner or the owner’s representative upon final acceptance of the system.

Chapter 5 Protected Premises Fuel Gas Detection Systems

5.1 Application.
5.1.1
The application, installation, and performance of fuel gas detection systems within protected premises, including fuel gas alarm, supervisory, and trouble signals, shall comply with the requirements of this chapter.

5.1.2
The requirements of Chapters 4, 6, and 7 shall also apply, unless they are in conflict with this chapter.

5.1.3
The requirements of Chapter 8 shall apply.

5.1.4
The requirements of this chapter shall not apply to fuel gas alarms and household fuel gas detection systems addressed in 9 unless otherwise noted.

5.2 General.

5.2.1 Purpose.
The systems covered in Chapter 5 shall be for the protection of life or property by indicating the existence of fuel gas impacting the protected premises.

5.2.2 Software and Firmware Control.

5.2.2.1 A record of installed software and firmware version numbers shall be prepared and maintained in accordance with 4.14.3. [72:23.2.2.1]

5.2.2.1.1 Software and firmware within the fuel gas detection system that interfaces to other required software or firmware shall be functionally compatible.

5.2.2.1.2 The compatible software or firmware versions shall be documented at the initial acceptance test and at any reacceptance tests. [72:23.2.2.1.2]

5.2.2.2 All software and firmware shall be protected from unauthorized changes. [72:23.2.2.2]

5.2.2.3 All changes shall be tested in accordance with 8.4.2. [72:23.2.2.3]

5.2.3 Separate Systems.
The requirements of this chapter shall not preclude the use of separate fire, life safety, and fuel gas detection systems, provided that the systems do not generate simultaneous conflicting notification to building occupants or conflicting activation of safety functions.

5.3 System Features.
The features required for a protected premises fuel gas detection system shall be both of the following:

(1) Documented as a part of the system design

(2) Determined in accordance with 5.3.1 through 5.3.3

5.3.1 Required Systems.
Features for required systems shall be based on the requirements of other applicable codes or statutes that have been adopted by the enforcing jurisdiction. [72:23.3.1]

5.3.2 Nonrequired (Voluntary) Systems and Components.
The features for a nonrequired system shall be established by the system designer on the basis of the goals and objectives intended by the system owner. [72:23.3.2]
5.3.2.1
Nonrequired systems and components shall meet the requirements of this standard.

5.3.2.2
Nonrequired systems and components shall be identified on the record drawings required in 8.6.1.1. [72:23.3.2.2]

5.3.3 Required Features.
Protected premises fuel gas detection systems that serve the general fuel gas alarm needs of a building or buildings shall include one or more of the following systems or functions:

(1) Automatic alarm signal initiation
(2) Activation of fuel gas safety functions
(3) Activation of alarm notification appliances
(4) Emergency voice/alarm communications
(5) Activation of off-premises signals
(6) Combination fuel gas detection systems
(7) Integrated systems

5.4 System Performance and Integrity.

5.4.1 General.
The performance and integrity of fuel gas detection systems shall comply with the applicable requirements of 5.4.2 through Section 5.7.

5.4.2 Circuits and Pathways.

5.4.2.1
Performance and survivability characteristics of signaling pathways (interconnections) shall comply with the defined designations of 5.4.2 and 5.4.3. [72:12.2.1]

5.4.2.2
A pathway (interconnection) class designation shall be dependent on the pathway (interconnection) capability to continue to operate during abnormal conditions. [72:12.2.2]

5.4.2.3
The installation of all pathway wiring, cable, and equipment shall be in accordance with NFPA 70, and the applicable requirements of 5.4.2.3.1 and 5.4.2.3.2. [72:12.2.3]

5.4.2.3.1
Optical fiber cables installed as part of the fuel gas detection system shall meet the requirements of NFPA 70, Article 770, and be protected against physical damage in accordance with NFPA 70, Article 760.

5.4.2.3.2
Fuel gas detection system wiring and equipment, including all circuits controlled and powered by the fuel gas detection system, shall be installed in accordance with the requirements of this standard and of NFPA 70, Article 760.

5.4.2.3.3 Ground Connections.

5.4.2.3.3.1
Unless otherwise permitted by 5.4.2.3.3.2, all fuel gas detection systems shall test free of grounds.

5.4.2.3.3.2
If permitted by the manufacturer’s installation instructions, the requirements of 5.4.2.3.3.1 shall not be required where parts of circuits or equipment are intentionally and permanently grounded in order to provide ground-fault detection, noise suppression, emergency ground signals, and circuit protection grounding.
5.4.2.3.3
On conductive pathways, operational capability shall be maintained during the application of a signal ground connection. [72:12.2.4.3]

5.4.3* Pathway Class Designations.
Pathways shall be designated as Class A, Class B, Class C, Class D, Class E, Class N, or Class X, depending on their performance. [72:12.3]

5.4.3.1* Class A.
A pathway shall be designated as Class A when it performs as follows:
(1) It includes a redundant path.
(2) Operational capability continues past a single open, and the single open fault results in the annunciation of a trouble signal.
(3) Conditions that affect the intended operation of the path are annunciated as a trouble signal.
(4) Operational capability on metallic conductors is maintained during the application of a single ground fault.
(5) A single ground condition on metallic conductors results in the annunciation of a trouble signal.

[72:12.3.1]

5.4.3.2 Class B.
A pathway shall be designated as Class B when it performs as follows:
(1) It does not include a redundant path.
(2) Operational capability stops at a single open.
(3) Conditions that affect the intended operation of the path are annunciated as a trouble signal.
(4) Operational capability on metallic conductors is maintained during the application of a single ground fault.
(5) A single ground condition on metallic conductors results in the annunciation of a trouble signal.

[72:12.3.2]

5.4.3.3* Class C.
A pathway shall be designated as Class C when it performs as follows:
(1) It includes one or more pathways where operational capability is verified via end-to-end communication, but the integrity of individual paths is not monitored.
(2) A loss of end-to-end communication is annunciated.

[72:12.3.3]

5.4.3.4* Class D.
A pathway shall be designated as Class D when it has fail-safe operation, where no fault is annunciated, but the intended operation is performed in the event of a pathway failure.

[72:12.3.4]

5.4.3.5* Class E.
A pathway shall be designated as Class E when it is not monitored for integrity. [72:12.3.5]
5.4.3.6 Class N.
A pathway shall be designated as Class N when it performs as follows:

(1) It includes two or more pathways where operational capability of the primary pathway and a redundant pathway to each device shall be verified through end-to-end communication.

   Exception: When only one device is served, only one pathway shall be required.

(2) A loss of intended communications between endpoints shall be annunciated as a trouble signal.

(3) A single open, ground, short, or combination of faults on one pathway shall not affect any other pathway.

(4) Conditions that affect the operation of the primary pathway(s) and redundant pathway(s) shall be annunciated as a trouble signal when the system's minimal operational requirements cannot be met.

(5) Primary and redundant pathways shall not be permitted to share traffic over the same physical segment.

[72:12.3.6]

5.4.3.7 Class X.
A pathway shall be designated as Class X when it performs as follows:

(1) It includes a redundant path.

(2) Operational capability continues past a single open, and the single open fault results in the annunciation of a trouble signal.

(3) Operational capability on metallic conductors continues past a single short-circuit, and the single short-circuit fault results in the annunciation of a trouble signal.

(4) Operational capability on metallic conductors continues past a combination open fault and ground fault.

(5) Conditions that affect the intended operation of the path are annunciated as a trouble signal.

(6) Operational capability on metallic conductors is maintained during the application of a single ground fault.

(7) A single ground condition on metallic conductors results in the annunciation of a trouble signal.

[72:12.3.7]

5.4.4 Circuit Designations.
Initiating device circuits, notification appliance circuits, and signaling line circuits shall be designated by class, depending on the circuit's capability to continue to operate during specified fault conditions as indicated in Sections 5.5 through 5.7. [72:23.4.2]

5.4.4.1 Specified fault conditions shall result in the annunciation of a trouble signal at the protected premises within 200 seconds as required in Section 4.13. [72:23.4.2.1]

5.4.4.2*
Where the power to a device is supplied over a separate circuit from the signaling line circuit or initiating device circuit, the operation of the power circuit shall meet the performance requirements of the initiating device circuit or signaling line circuit, unless different performance requirements are established in accordance with the evaluation in 5.4.5 and approved by the AHJ. [72:23.4.2.2]

5.4.4.3*
Class A, Class N, and Class X circuits using physical conductors (e.g., metallic, optical fiber) shall be installed such that the outgoing and return conductors, exiting from and returning to the control unit, respectively, are routed separately.
5.4.4.4
The outgoing and return (redundant) circuit conductors shall be permitted in the same cable assembly (i.e., multiconductor cable), enclosure, or raceway only under the following conditions:

1. For a distance not to exceed 10 ft (3.0 m) where the outgoing and return conductors enter or exit the initiating device, notification appliance, or control unit enclosures
2. Single drops installed in the raceway to individual devices or appliances
3. In a single room not exceeding 1000 ft² (93 m²) in area, a drop installed in the raceway to multiple devices or appliances that does not include any emergency control function devices

[72:12.3.8.1]

5.4.5 Pathway Classification.

5.4.5.1
The class of pathways shall be determined from an evaluation based on the path performance as required by governing laws, codes, standards, and a site-specific engineering analysis. [72:23.4.3.1]

5.4.5.2
When determining the integrity and reliability of the interconnecting signaling paths (circuits) installed within the protected premises, the following influences shall be considered:

1. Transmission media used
2. Length of the circuit conductors
3. Total building area covered by, and the quantity of initiating devices and notification appliances connected to, a single circuit
4. Effect of a fault in the fuel gas detection system that would hinder the performance objectives of the system that protects the occupants and mission of the protected premises
5. Nature of hazards present within the protected premises
6. Functional requirements of the system necessary to provide the level of protection required for the system
7. Size and nature of the population of the protected premises

5.4.5.3
Results of the evaluation required by 5.4.5.1 shall be included with the documentation required by 4.14.1.2. [72:23.4.3.3]

5.5 Performance of Initiating Device Circuits (IDCs).

The assignment of class designations to initiating device circuits shall be based on their performance capabilities under abnormal (fault) conditions in accordance with the requirements for Class A or Class B pathways specified in 5.4.3. [72:23.5]

5.6 Performance of Signaling Line Circuits (SLCs).

The assignment of class designations to signaling line circuits shall be based on their performance capabilities under abnormal (fault) conditions in accordance with the requirements for Class A, Class B, Class N, or Class X pathways specified in 5.4.3. [72:23.6]

5.6.1* SLC Zones.

A single fault on a pathway connected to the addressable devices shall not cause the loss of the devices in more than one zone. [72:23.6.1]

5.6.1.1
For the purpose of this section, each floor of the building shall be considered a separate zone. [72:23.6.1.1]
5.6.1.2
For the purpose of this section, if a floor of the building is subdivided into multiple zones by
fire or smoke barriers and the fire plan for the protected premises allows relocation of
occupants from the zone of origin to another zone on the same floor, each zone on the floor
shall be considered a separate zone. [72:23.6.1.2]

5.6.1.3*
The requirements in 5.6.1 shall not apply to the following:

(1) Circuits between enclosures containing transponders and control units regardless of the
number of initiating devices, notification appliances, or control relays that might be
connected to those control units

(2) Circuits connecting short-circuit fault isolation modules to enclosures containing
transponders and control units where the conductors are installed in metallic raceway or
equivalently protected against mechanical injury and where the circuit does not exceed
ft (0.9 m) in length

(3) Alterations or modifications made to an existing SLC not required to comply with 5.6.1
when originally installed

[72:23.6.1.3]

5.6.1.4
The loss of more than one zone shall be permitted on a documented performance-based
design approach. [72:23.6.1.4]

5.6.1.5*
Performance-based designs submitted to the AHJ for review and approval shall include
documentation, in an approved format, of each performance objective and applicable
scenario, together with technical substantiation used in establishing the proposed zone
performance. [72:23.6.1.5]

5.6.1.6
Performance-based design documentation for signaling line circuit zoning shall be in
accordance with 5.6.1.4 and 5.6.1.5. [72:7.3.7.5]

5.6.2* Class N Devices.

Unless permitted in 5.6.2.1 or 5.6.2.2, no area or zone shall be served solely by a single
device where Class N pathways are deployed, such that a single device failure resulting from
a multiple ground-fault pathway failure would render an area or zone incapable of initiating
input signals or receiving output signals. [72:23.6.2]

5.6.2.1
Where a risk analysis shows that only one device is required and where acceptable to the
AHJ, the requirements of 5.6.2 shall not apply. [72:23.6.2.1]

5.6.2.2
Multiple devices shall not be required in areas served by pathways not susceptible to ground
faults, such as fiber or wireless pathways. [72:23.6.2.2]

5.6.2.3*
Where a device as referenced by 5.6.2 is serviced by only a single pathway, it shall terminati
that pathway with no ability to connect additional endpoint devices to the pathway.
[72:23.6.2.3]

5.6.2.4*
A single fault on a Class N pathway shall not cause the loss of more than one addressable
device. [72:23.6.2.4]

5.6.3 Class N Shared Pathways.
Class N pathways shall be required to use shared pathway Level 3 as specified in 5.6.3.9.4
except as permitted by 5.6.3.2. [72:23.6.3]
5.6.3.1 Accessibility.
Class N pathways shall not be accessible to the general public or building occupants for any purpose other than specified in the network design analysis, maintenance, and deployment plans. [72:23.6.3.1]

5.6.3.2 Level 1 and Level 2.
Shared pathways Levels 1 and 2 shall be permitted subject to approval of the AHJ, based on documentation of the deployment, change control, maintenance plans, management organization, network design analysis, and a risk analysis as identified in 5.6.3.3 through 5.6.3.8. [72:23.6.3.2]

5.6.3.3* Deployment Plan.

5.6.3.3.1 All equipment connected to shared pathways shall be documented in the deployment plan. [72:23.6.3.3.1]

5.6.3.3.1.1 The documentation shall include manufacturer, model, listings, and intended purpose and reason for inclusion on the shared network. [72:23.6.3.3.1.1]

5.6.3.3.1.2* The deployment plan shall identify how and where each piece of equipment is connected. [72:23.6.3.3.1.2]

5.6.3.3.2* All connection ports, used or spare, where any unauthorized or unintended equipment could be added to the shared network, shall be identified as for use only by equipment consistent with the deployment plan. [72:23.6.3.3.2]

5.6.3.3.3 Equipment Location:

5.6.3.3.3.1 The requirements of 5.6.3.3.3.2 through 5.6.3.3.3.4 shall apply to all equipment rooms, equipment closets, telecommunication rooms, telecommunication enclosures, or the like, for which both Class N life safety network infrastructure and non–life safety network equipment resides. [72:23.6.3.3.3.1]

5.6.3.3.3.2* Equipment rooms or enclosures shall be permitted to contain both Class N life safety networking cable, equipment, and associated infrastructure provided the deployment satisfies 5.6.3.3.3 through 5.6.3.3.4. [72:23.6.3.3.3.2]

5.6.3.3.3.3 Class N life safety network cabling, equipment, and infrastructure shall be clearly segregate and identified as “Life Safety Network.” [72:23.6.3.3.3.3]

5.6.3.3.3.4 Equipment rooms or enclosures shall be accessible to only authorized personnel via a locke-access or via an enclosure requiring the use of tools to open, as acceptable by the AHJ. [72:23.6.3.3.3.4]

5.6.3.4 Change Control Plan.
Configuration upgrades and updates shall be governed by a change control plan that determines the policy and procedure of the change and ensures that all documentation is correspondingly updated. [72:23.6.3.4]

5.6.3.5 Management Organization.
5.6.3.5.1*
An organization shall be established and maintained to manage the life safety network and shall perform the following:

1. Contain members appropriately certified by each manufacturer of the equipment and devices deployed on shared pathways to maintain such a network
2. Service and maintain all shared Class N pathways
3. Maintain the deployment and shared pathways plan for the lifetime of the shared pathways

[72:23.6.3.5.1]

5.6.3.5.2*
Other service personnel, even when certified to service a specific system (i.e., fire alarm or MNS), shall be authorized and managed by this organization to ensure any outages of any system are planned, managed, and documented and appropriate steps are taken during outages to provide alternate protection of life and property. [72:23.6.3.5.2]

5.6.3.6 Network Design Analysis.

5.6.3.6.1*
The analysis shall be performed to determine and document communications capability as follows:

1. Calculation of minimum required bandwidth such that all life safety systems can be guaranteed to operate simultaneously and within required time limits
2. Total bandwidth provided by the network
3. Future bandwidth requirements
4. Method of providing and maintaining the prioritization of life safety traffic over non–life safety traffic

[72:23.6.3.6.1]

5.6.3.6.2*
The analysis shall determine and document the power distribution capability as follows:

1. The methods provided to maintain power to all shared pathway equipment
2. A calculation of power requirements of all connected equipment
3. Secondary power capacities provided to maintain all life safety equipment with minimum operational capacity in accordance with 4.5.6.2.3.2
4. Methods to disengage any non–life safety equipment in the event of emergency operation if required to support the minimum operational capacity requirements

[72:23.6.3.6.2]

5.6.3.7 Maintenance Plan.

5.6.3.7.1*
The maintenance plan shall identify policy and procedures to monitor, maintain, test, and control change of the shared pathways. [72:23.6.3.7.1]
5.6.3.7.2* Written procedures shall be presented in maintenance plans to govern the following:

(1) Physical access to all parts of the Class N network equipment (i.e., switches, ports, server, controllers, devices, or components)
(2) Electronic access to all parts of the Class N network (i.e., passwords, addresses)
(3) Service outage impairment process with notices of impairment and contingency plans for affected systems
(4) Upgrade procedures
(5) Change control procedures, with consideration given to require an updated risk analysis if necessary
(6) Prioritization and/or segregation configuration information for life safety traffic
(7) Maintenance and testing plans to ensure the minimum operational capacity with respect to secondary power is maintained
(8) Other service, maintenance, or reconfiguration plans for any connected equipment

5.6.3.8* Network Risk Analysis for Class N.
5.6.3.8.1 Each application of a Class N deployment shall be specific to the nature and anticipated risk of each facility for which it is designed.

5.6.3.8.2 The risk analysis shall address both fire and non-fire emergencies when determining risk tolerances for the survivability of the network and the systems and devices it serves.

5.6.3.8.3 The detail and complexity of the risk analysis shall be commensurate with the complexity of the facility for which the network is to be installed.

5.6.3.8.4 The risk analysis shall be permitted to be limited in scope to address the requirements of an existing emergency response plan.

5.6.3.8.5 The risk analysis shall consider characteristics of the buildings, areas, spaces, campuses or regions, equipment, and operations that are not inherent in the design specifications.

5.6.3.8.6 Those elements that are not inherent in the design specifications, but that affect occupant behavior or the rate of hazard development, shall be explicitly identified and included in the risk analysis.

5.6.3.8.7 The risk analysis shall consider the following types of potential events, which are not all-inclusive but reflect the general categories that shall be considered in the risk analysis:

(1) Natural hazards—geological events
(2) Natural hazards—meteorological events
(3) Human caused—accidental events
(4) Human caused—intentional events
(5) Technological—caused events
5.6.3.8.8
All other identified risks as required by the AHJ shall be discussed and addressed in the analysis and maintenance plans. [72:23.6.3.8.8]

5.6.3.9* Shared Pathway Designations.
Shared pathways shall be designed as level 0, Level 1, Level 2, or Level 3, depending on their performance. [72:12.5]

5.6.3.9.1 Shared Pathway Level 0.
Level 0 pathways shall not be required to segregate or prioritize life safety data from non–life safety data. [72:12.5.1]

5.6.3.9.2 Shared Pathway Level 1.
Level 1 pathways shall not be required to segregate life safety data from non–life safety data but shall prioritize all life safety data over non–life safety data. [72:12.5.2]

5.6.3.9.3 Shared Pathway Level 2.
Level 2 pathways shall segregate all life safety data from non–life safety data. [72:12.5.3]

5.6.3.9.4 Shared Pathway Level 3.
Level 3 pathways shall use equipment that is dedicated to the life safety system. [72:12.5.4]

5.7 Performance of Notification Appliance Circuits (NACs).
The assignment of class designations to notification appliance circuits shall be based on the performance capabilities under abnormal (fault) conditions in accordance with the requirements for Class A, Class B, or Class X pathways specified in 5.4.3. [72:23.7]

5.8 System Requirements.

5.8.1* Actuation Time.
Actuation of alarm notification appliances or emergency voice communications, fuel gas detection control function interface devices, and annunciation at the protected premises shall occur within 10 seconds after the activation of an initiating device.

5.8.2* Fuel Gas Detection Control Units.

5.8.2.1
Fuel gas detection systems shall be permitted to combine all detection, notification, and auxiliary functions in a single system or be a combination of component subsystems.

5.8.2.2 Arrangement.

5.8.2.2.1
Fuel gas detection system components shall be either of the following:

(1) Permitted to share control equipment
(2) Able to operate as stand-alone subsystems

5.8.2.2.2
Fuel gas detection system components shall be arranged to function as a single system for both 5.8.2.2.1(1) and 5.8.2.2.1(2).

5.8.2.3
All component subsystems shall be capable of simultaneous, full-load operation without degradation of the required overall system performance. [72:23.8.2.4]

5.8.2.4 Interconnection.

5.8.2.4.1
The method of interconnection of fuel gas detection control units shall meet the monitoring requirements of Section 4.13 and NFPA 70, Article 725.
5.8.2.4.2
The method of interconnection of fuel gas detection control units shall be achieved by the following recognized means:

(1) Electrical contacts listed for the connected load
(2) Data communications over signaling line circuit(s) dedicated to the fuel gas detection system or shared with other premises operating systems
(3) Other listed methods

5.8.2.5
Where the signaling line circuit is shared by other premises operating systems, operation shall be in accordance with 5.8.4. [72:23.8.2.6]

5.8.2.5.1
All signal control and transport equipment (such as routers and servers) located in a critical fuel gas control function interface device signaling path shall comply with the following conditions:

(1) The equipment meets the performance requirements of 4.11.1.
(2) The equipment is provided with primary and secondary power and monitored for integrity as required in Section 4.5 and Section 4.13.
(3) All programming and configuration ensure a fuel gas detection system actuation time as required in 5.8.1.
(4) System bandwidth is monitored to confirm that all communications between equipment that is critical to the operation of the fuel gas detection system or fuel gas control function interface devices take place within 10 seconds; failure shall be indicated within 200 seconds.
(5) Failure of any equipment that is critical to the operation of the fuel gas detection system or fuel gas control function interface devices is indicated at the master fuel gas detection control unit within 200 seconds.

5.8.2.5.2
A listed barrier gateway, integral with or attached to each control unit or group of control units, shall be provided to prevent the other systems from interfering with or controlling the fuel gas detection system.

5.8.2.6
Each interconnected fuel gas detection control unit shall be separately monitored for alarm, supervisory, and trouble conditions with supervised pathways that are in accordance with the manufacturers’ published instructions.

5.8.2.7
Interconnected fuel gas detection control unit alarm signals shall be permitted to be monitored by zone or by combined common signals.

5.8.2.8
Protected premises fuel gas detection control units shall be capable of silencing building-wide notification from the alarm control unit at the protected premises unless otherwise permitted by 5.8.2.9 and the emergency response plan.

5.8.2.9
An initiating device with integral sounder shall be permitted to be silenced locally, provided the control unit continues to indicate an alarm function.

5.8.2.10
If the fuel gas dissipates, the initiating device shall not return to normal mode automatically but require manual intervention.

5.8.3.1
A protected premises fuel gas detection system shall be permitted to be interconnected to a household fuel gas detection system(s) for the purpose of activating the notification appliances connected to the household fuel gas detection system(s).

5.8.3.2
The status of dwelling unit fuel gas detectors shall be permitted to be displayed at the protected premises fuel gas detection system control unit and annunciators.

5.8.3.3
If interconnected, an alarm condition at the protected premises system shall cause the alarm notification appliance(s) within the family living unit of the dwelling unit warning equipment to become energized and remain energized until the protected premises system is silenced or reset. [72:23.8.3.3]

5.8.3.4
The interconnection circuit or path from the protected premises system to the dwelling unit warning equipment shall be monitored for integrity by the protected premises system in accordance with Section 4.13. [72:23.8.3.4]

5.8.3.5
An alarm condition occurring at the dwelling unit fire warning equipment or the operation of any test switches provided as part of the dwelling unit warning equipment shall not cause an alarm condition at the protected premises system. [72:23.8.3.5]

5.8.4 Combination Fuel Gas Detection Systems.

5.8.4.1*
Fuel gas detection systems shall be permitted to share components, equipment, circuitry, an installation wiring with non–fuel gas detection systems.

5.8.4.2
Operation of non–fuel gas detection system function(s) originating within a connected non–fuel gas detection system shall not interfere with the required operation of the fuel gas detection system, unless otherwise required by applicable codes or standards.

5.8.4.3
For non–fuel gas detection system equipment listed to the performance requirements specified in 4.11.1, the requirements of 5.8.4.3.1 through 5.8.4.3.3 shall apply.

5.8.4.3.1
The equipment shall be permitted to be attached to a fuel gas detection system circuit, either among the fuel gas detection system devices or as a branch or extension of the fuel gas detection system pathways, when the following requirements are met:

(1) All the equipment and pathways shall meet the monitoring for integrity requirements of Section 4.13.

(2) All the equipment and pathways shall be maintained by a single service organization.

(3) All the equipment and pathways shall be installed in accordance with the requirements of this standard.

(4) All the equipment shall be either listed as compatible with the fuel gas detection system equipment or equipped with an interface listed as compatible with the fuel gas detection system equipment.

5.8.4.3.2
If the equipment is attached to the fuel gas detection system via separate pathways, then short circuits or open circuits in this equipment, or between this equipment and the fuel gas detection system pathways, shall not impede or impair the monitoring for integrity of the fuel gas detection system or prevent alarm, supervisory, or safety control signal transmissions.
5.8.4.3.3
Grounds in this equipment, or between this equipment and the fuel gas detection system pathways, shall be reported, annunciated, and corrected in the same manner as grounds in the rest of the fuel gas detection system.

5.8.4.4
For non–fuel gas detection system equipment not listed to the performance requirements specified in 4.11.1, the requirements of 5.8.4.4.1 through 5.8.4.4.3 shall apply.

5.8.4.4.1
Short circuits or open circuits in the equipment, or between the equipment and the fuel gas detection system pathways, shall not impede or impair the monitoring for integrity of the fuel gas detection system or prevent alarm, supervisory, or safety control signal transmissions.

5.8.4.4.2
Grounds in this equipment, or between this equipment and the fuel gas detection system pathways, shall be reported, annunciated, and corrected in the same manner as grounds in the rest of the fuel gas detection system.

5.8.4.4.3
Removal, replacement, failure, maintenance procedures, or ground on this hardware, software, or circuits shall not impair the required operation of the fuel gas detection system.

5.8.4.5
Loudspeakers used as mass notification or emergency communications systems installed in accordance with the requirements of NFPA 72 shall also be permitted to be used as alarm notification appliances for fuel gas detection systems.

5.8.4.6*
In combination fuel gas detection systems, fuel gas alarm signals shall be distinctive, recognizable, and take priority over signals associated with property protection.

5.8.4.7
Signals from fuel gas detectors and fuel gas detection systems transmitted to another alarm system shall be as a distinct fuel gas alarm signal unless otherwise required by the AHJ.

5.8.5 Fuel Gas Detection System Inputs.

5.8.5.1 General.
All initiating devices shall be installed in accordance with 5.8.5 and tested in accordance with Chapter 8. [72:23.8.5.1.1]

5.8.5.1.1
Initiating devices subject to mechanical damage shall be protected. [72:17.4.2.1]

5.8.5.1.2
If guards or covers are employed, they shall be listed for use with the initiating device. [72:17.4.2.2]

5.8.5.1.3
Initiating devices shall be supported independently of their attachment to the circuit conductors.

5.8.5.1.4
Initiating devices shall be installed in a manner that provides accessibility for periodic inspection, testing, and maintenance. [72:17.4.3]

5.8.5.1.5*
Duplicate terminals, leads, or connectors that provide for the connection of installation wiring shall be provided on each initiating device for the express purpose of connecting into the fuel gas detection system to monitor the integrity of the signaling and power wiring unless the initiating devices are connected to a system that provides the required monitoring.
5.8.5.1.6
The requirements of 5.8.5.1.5 shall not apply to initiating devices connected to a system that provides the required monitoring.

5.8.5.1.7
Initiating devices shall not be located in areas where environmental conditions cause an adverse effect on the initiating devices’ ability to detect the targeted hazardous gas.

5.8.5.2 Alarm Signal Initiation—Initiating Devices with Separate Power and Signaling Wiring.

5.8.5.2.1
Automatic fuel gas alarm signal initiating devices that have integral trouble signal contacts shall be connected to the initiating device circuit so that a trouble condition within a device does not impair alarm transmission from any other initiating device, unless the trouble condition is caused by electrical disconnection of the device or by removing the initiating device from its plug-in base.

5.8.5.2.2
The requirements of 5.8.5.2.1 shall not apply where the trouble condition is caused by electrical disconnection of the device or by removing the initiating device from its plug-in base.

5.8.5.2.3*
Automatic fuel gas alarm signal initiating devices that use a nonintegral device to monitor the integrity of the power supply wiring to the individual initiating devices shall have the nonintegral device connected to the initiating device circuit so that a fault on the power supply wiring does not impair alarm transmission from any operational initiating device.

5.8.5.3 Requirements for Fuel Gas Detectors.

5.8.5.3.1
Fuel gas detectors shall be installed as specified in the manufacturer’s published instructions in accordance with 5.8.5.3.1(1) or 5.8.5.3.1(2), and with 5.8.5.3.1(3) through 5.8.5.3.1(4) or with 5.8.5.3.1(5):

(1) For natural gas, on the wall within 18 in. (0.46 m) from the ceiling in the same room as permanently installed fuel-gas-burning appliances

(2)* For propane, within 18 in. (0.46 m) from the floor in the same room as permanently installed fuel-gas-burning appliances

(3) In proximity to or in free air communication with gas-fired appliances, equipment, and piping systems

(4) In basements or other sub-grade rooms which have foundation penetrations that might convey migrating fuel gas leaks from outside the occupancy

(5) A performance-based design in accordance with 5.8.5.3.2

5.8.5.3.2 Performance-Based Design.

5.8.5.3.2.1
Performance-based designs submitted to the AHJ for review and approval shall include documentation, in an approved format, of each performance objective and applicable scenario, together with any calculations, modeling, or other technical substantiation used in establishing the proposed design’s life safety and property protection performance.

5.8.5.3.2.2
The AHJ shall determine whether such identified performance objectives are appropriate and have been met. [72:17.3.2]

5.8.5.3.2.3
The AHJ shall approve modifications to or variations from the approved design or design basis in advance. [72:17.3.3]
5.8.5.3.3* Twenty-five Percent Threshold.

5.8.5.3.3.1
Each fuel gas detector designed to alarm at a concentration threshold of 25 percent LEL or lower shall be in compliance with UL 2075, *Gas and Vapor Detectors and Sensors*.

5.8.5.3.3.2
Each fuel gas detector designed to alarm at a concentration threshold of 25 percent LEL or lower shall meet the sensitivity testing and alarm thresholds of UL 1484, *Residential Gas Detectors*.

5.8.5.3.3.3
The upper detection threshold shall be as follows:
1. The upper detection threshold shall be 25 percent or less of the LEL.
2. The upper detection threshold shall be determined by the following:

\[ U = \frac{K + 1}{2} \]  

where:
- \( U \) = upper detection threshold
- \( K = 25 \)
- \( I \) = initial detection threshold the detector is intended to detect

5.8.5.3.3.4
Fuel gas detectors shall be marked in accordance with their listing.

5.8.5.3.4* Ten Percent Threshold.

5.8.5.3.4.1
Each fuel gas detector designed to alarm at a concentration threshold at or below 10 percent LEL shall be in compliance with UL 2075, *Gas and Vapor Detectors and Sensors*.

5.8.5.3.4.2
Each fuel gas detector designed to alarm at a concentration threshold at or below 10 percent LEL shall meet the sensitivity testing and alarm thresholds of UL 1484, *Residential Gas Detectors*.

5.8.5.3.4.3
The upper detection threshold shall be as follows:
1. The upper detection threshold shall be 10 percent or less of the lower explosion limit.
2. The upper detection threshold shall be determined by the following:

\[ U = \frac{K + 1}{2} \]  

where:
- \( U \) = upper detection threshold
- \( K = 20 \)
- \( I \) = initial detection threshold the detector is intended to detect

5.8.5.3.4.4
Fuel gas detectors shall be marked in accordance with their listing.

5.8.5.3.5
All fuel gas detectors shall be located and mounted so that accidental operation will not be caused by jarring or vibration.
5.8.5.3.6
The selection and placement of fuel gas detectors shall take into account both the performance characteristics of the detector and the areas into which the detectors are to be installed to prevent nuisance and unintentional alarms or improper operation after installation.

5.8.5.3.7*
Unless specifically designed and listed for the expected conditions, fuel gas detectors shall not be installed if any of the following ambient conditions exist:

1. Temperature below 32°F (0°C)
2. Temperature above 100°F (38°C)
3. Relative humidity above 93 percent

5.8.5.3.8*
The location of fuel gas detectors shall be based on an evaluation of potential ambient sources and flows of fuel gas, moisture, temperature, dust, or fumes, and electrical or mechanical influences to minimize nuisance alarms.

5.8.5.3.9
Unless tested and listed for recessed mounting, fuel gas detectors shall not be recessed into the mounting surface.

5.8.5.3.10 Protection During Construction.

5.8.5.3.10.1
Where detectors are installed for signal initiation during construction, they shall be replaced prior to the final commissioning of the system.

5.8.5.3.10.2
Where detection is not required during construction, detectors shall not be installed until after all other construction trades have completed cleanup. [72:17.7.1.12.3]

5.8.5.4 Fuel Gas Detectors for Control of Fuel Gas Spread.

5.8.5.4.1
System designers shall consider the spread of fuel gas through an occupancy through the HVAC system.

5.8.5.4.2
Interaction with smoke control systems, if such is provided, shall be coordinated. [72:17.12.9.2]

5.8.5.5* Nonrequired Coverage.

5.8.5.5.1
Detection installed for reasons of achieving specific fire safety objectives, but not required by any laws, codes, or standards, shall meet all of the requirements of this standard, with the exception of the prescriptive spacing criteria of Chapter 5. [72:17.5.3.3.1]

5.8.5.5.2
Where nonrequired detectors are installed for achieving specific fire safety objectives, additional detectors not necessary to achieve the objectives shall not be required. [72:17.5.3.2]

5.8.6 Fuel Gas Detection Alarm System Notification Outputs.

5.8.6.1 General.
The performance, location, and mounting of notification appliances used to initiate or direct action, evacuation, or relocation of the occupants, or for providing information to occupants or staff, shall comply with Chapter 6.

5.8.6.2 Occupant Notification.
5.8.6.2.1
Except as permitted in 5.8.6.2.2, occupant notification shall be throughout the protected premises.

5.8.6.2.2
Where fuel gas alarm signals are transmitted to a constantly attended on-site location or off-premises location in accordance with Chapter 7, selective public mode occupant notification shall be permitted to be limited to the notification zone encompassing the area where the fuel gas alarm signal was initiated.

5.8.6.3 Notification Zones.

5.8.6.3.1 Notification zones shall be consistent with the emergency response or evacuation plan for the protected premises. [72:23.8.6.3.1]

5.8.6.3.2* The boundaries of notification zones shall be coincident with the area where the alarm initiation originated and other signaling zones in accordance with the building’s emergency response plan.

5.8.6.4 Circuits for Addressable Notification Appliances.

5.8.6.4.1 Circuit configuration for addressable notification appliances shall comply with the applicable performance requirements for notification zones. [72:23.8.6.4.1]

5.8.6.4.2 Where there are addressable notification appliances on a signaling line circuit that serves different notification zones, a single open, short-circuit, or ground on that signaling line circuit shall not affect operation of more than one notification zone. [72:23.8.6.4.2]

5.8.6.5 Distinctive Signal.

5.8.6.5.1* The audible fuel gas alarm signal shall be a five-pulse temporal pattern and comply with the following:

(1) Signals shall be a pattern consisting of five cycles of 100 milliseconds ± 10 percent “on” and 100 milliseconds ± 10 percent “off,” followed by 5 seconds ± 10 percent “off.”

(2) After the initial 4 minutes of alarm, the 5-second “off” time shall be permitted to be changed to 60 seconds.

(3) The alarm signal shall be repeated in compliance with 5.8.6.5.1(1) and 5.8.6.5.1(2) until the alarm resets or the alarm signal is manually silenced.

5.8.6.5.2* The audible alarm signal shall be synchronized within a notification zone.

5.8.7 Emergency Voice/Alarm Communications.

Where a voice/alarm communications system is installed for the purpose of occupant notification related to fuel gas detection, it shall meet the requirements of Section 24.4 of NFPA 72 excluding the requirements of 24.4.8.6.

5.9 Signal Annunciation.

5.9.1 Protected premises fuel gas detection systems shall be arranged to annunciate fuel gas alarm, supervisory, and trouble signals in accordance with Section 4.12.

5.9.2* If a remote alarm indicator is provided, the location of the fuel gas detector and the area protected by the detector shall be prominently indicated at the remote alarm indicator by a permanently attached placard or by other approved means.
5.10 Off-Premises Signals.

5.10.1
Systems requiring transmission of signals to continuously attended locations providing supervising station service (e.g., central station, proprietary supervising station, remote supervising station) shall also comply with the applicable requirements of Chapter 7.[72:23.12.1]

5.10.2
Relays or modules providing transmission of trouble signals to a supervising station shall be arranged to provide fail-safe operation.[72:23.12.2]

5.10.3
Means provided to transmit trouble signals to supervising stations shall be arranged so as to transmit a trouble signal to the supervising station for any trouble condition received at the protected premises control unit, including loss of primary or secondary power.[72:23.12.3]

5.10.4*
It shall be permitted to provide supplementary transmission of real-time data from the fuel gas detection system to off-premises equipment.

5.10.4.1
Transmission of real-time data off-premises shall not affect the operation or response of the fuel gas detection control unit.

5.10.4.2
Any data transmitted shall be consistent with the data generated by the system.[72:23.12.4.2]

5.11 Protected Premises Fuel Gas Control Functions.

Where provided, the interconnection of control functions shall comply with the requirements of 5.11.1 through 5.11.9.

5.11.1
Fuel gas control functions shall be permitted to be performed automatically.

5.11.2*
A fuel gas control function interface device shall be located within 3 ft (0.9 m) of the component controlling the fuel gas control function where the control circuit is not configured as a Class D circuit.

5.11.3
The fuel gas control function interface device shall function within the voltage and current limitations of the fuel gas detection control unit.

5.11.4
The installation wiring between the fuel gas detection control unit and the fuel gas control function interface device shall be Class A, Class B, Class D, Class N, or Class X in accordance with 5.4.3.

5.11.5
Fuel gas control functions shall not interfere with other operations of the fuel gas detection system.

5.11.6
The method(s) of interconnection between the fuel gas detection system and fuel gas control function interface device shall be monitored for integrity in accordance with Section 4.13.

5.11.7
The method(s) of interconnection between the fuel gas control function interface device and the component controlling the fuel gas control function shall comply with the applicable provisions of NFPA 70.
5.11.8
The method(s) of interconnection between the fuel gas control function interface device and the component controlling the fuel gas control function shall be achieved by one of the following recognized means:

1. Electrical contacts listed for the connected load
2. Data communications over a signaling line circuit(s) dedicated to the fuel gas detection or shared with other premises operating systems
3. Other listed methods

5.11.9
If a fuel gas detection system is a component of a life safety network and it communicates data to other systems providing life safety functions, or it receives data from such systems, the following shall apply:

1. The path used for communicating data shall be monitored for integrity, including monitoring the physical communications media and the ability to maintain intelligible communications.
2. Data received from the network shall not affect the operation of the fuel gas detection system in any way other than to display the status of life safety network components.
3. Where non–fuel gas detection systems are interconnected to the fuel gas detection system using a network or other digital communications technique, a signal (e.g., heartbeat, poll, ping, query) shall be generated between the fuel gas detection system and the non–fuel gas detection system.
4. Failure of the fuel gas detection system to receive confirmation of the transmission described in 5.11.9(3) shall cause a trouble signal to indicate within 200 seconds.

5.12* Special Requirements for Low-Power Radio (Wireless) Systems.

5.12.1* Listing Requirements.
Compliance with Section 5.12 shall require the use of low-power radio equipment specifically listed for the purpose. [72:23.16.1]

5.12.2* Power Supplies.
A primary battery(s) (dry cell) that meets the requirements of 5.12.2.1 or 5.12.2.2 shall be permitted to be used as the sole power source for devices incorporating a low-power radio transmitter/transceiver. [72:23.16.2]
5.12.2.1
The following conditions shall be met when one or more primary batteries are utilized and a catastrophic (open or short) single battery failure affects the alarm operation of the device:

1. Each transmitter/transceiver shall comply with both of the following:
2. Serve only one device
3. Be individually identified at the fuel gas detection system control unit
4. The battery(s) shall be capable of operating the low-power radio transmitter/transceiver and its associated device for not less than 1 year before the battery depletion threshold is reached.
5. A low battery signal shall be transmitted before the device is no longer capable of providing 7 days of trouble signal operation followed by the signaling of a single nontrouble response.
6. The low battery signal shall comply with all of the following:
7. Be distinctive from alarm, supervisory, tamper, and trouble signals
8. Visibly identify the affected low-power radio transmitter/transceiver
9. When silenced, automatically resound at least once every 4 hours
10. Catastrophic (open or short) battery failure shall cause both of the following:
11. A trouble signal identifying the affected low-power radio transmitter/transceiver at the fuel gas detection system control unit
12. When silenced, the trouble signal automatically resounds at least once every 4 hours
13. Any mode of failure of a primary battery in a low-power radio transmitter/transceiver shall not affect any other low-power radio transmitter/transceiver.
5.12.2.2
The following conditions shall be met when multiple batteries are utilized and a catastrophic (open or short) single battery failure does not affect the alarm operation of the device:

(1) Two or more batteries shall be provided.
(2) The combined batteries shall be capable of operating the low-power radio transmitter/transceiver and its associated device for not less than 1 year before the battery depletion threshold in 5.12.2.2(3) is reached.
(3) A low battery signal shall be transmitted before the device is no longer capable of providing 7 days of trouble signal operation followed by the signaling of a single nontrouble response.
(4) Each individual battery, primary and secondary, shall comply with both of the following:
   (a) Each battery shall be separately monitored for the battery depletion threshold.
   (b) A low-battery signal shall be transmitted when an individual battery has reached the battery depletion threshold.
(5) Following the failure of a single battery, the remaining battery(s) shall be capable of operating the low-power radio transmitter/transceiver and its associated device for not less than 7 days when the battery depletion threshold in 5.12.2.2(3) is reached.
(6) The low-battery signal shall comply with all of the following:
   (a) Be distinctive from alarm, supervisory, tamper, and trouble signals
   (b) Visibly identify the affected low-power radio transmitter/transceiver
   (c) When silenced, automatically resound at least once every 4 hours
(7) Catastrophic (open or short) failure of any individual battery shall cause both of the following:
   (a) A trouble signal identifying the affected low-power radio transmitter/transceiver at the fuel gas detection system control unit
   (b) When silenced, the trouble signal shall automatically resounds at least once every 4 hours
(8) Each transmitter/transceiver shall be both of the following:
   (a) Permitted to serve more than one device
   (b) Individually identified at the fuel gas detection system control unit

5.12.3 Fuel Gas Alarm Signals.

5.12.3.1* When a wireless initiating device is actuated, its low-power radio transmitter/transceiver shall comply with 5.12.3.1.1 through 5.12.3.1.4. [72:23.16.3.1

5.12.3.1.1 The low-power radio transmitter/transceiver shall automatically transmit an alarm signal and be identified at the fuel gas detection system.

5.12.3.1.2 To ensure the receipt of an alarm signal by the fuel gas detection control unit, the low-power radio transmitter/transceiver shall automatically repeat alarm transmissions at intervals not exceeding 60 seconds until the transmitter/transceiver receives a signal confirming receipt of the alarm signal by the fuel gas detection control unit.

5.12.3.1.3* Signals shall have priority in accordance with 5.8.4.6. [72:23.16.3.1.3

5.12.3.1.4 Response time shall be in accordance with 5.8.1. [72:23.16.3.1.4]
5.12.3.2*
An alarm signal from a low-power radio transmitter/transceiver shall both latch at the fuel gas detection control unit until manually reset and identify the particular initiating device in alarm.

5.12.4 Monitoring for Integrity.
5.12.4.1
The low-power radio transmitter/transceiver shall be specifically listed as using a transmission method that is highly resistant to misinterpretation of simultaneous transmissions and to interference (e.g., impulse noise and adjacent channel interference). [72:23.16.4.1]

5.12.4.2
The occurrence of any single fault that disables communication between any low-power radio transmitter/transceiver and the receiver/transceiver fuel gas detection control unit shall cause a latching trouble signal within 200 seconds at the system control unit that individually identifies the affected device.

5.12.4.3
A single fault on the signaling channel shall not cause a fuel gas alarm signal.

5.12.4.4
The periodic communication required to comply with 5.12.4.2 shall ensure successful alarm transmission. [72:23.16.4.4]

5.12.4.5
Removal of a low-power radio transmitter/transceiver from its installed location shall cause immediate transmission of a distinctive trouble signal that indicates its removal and individually identifies the affected device. [72:23.16.4.5]

5.12.4.6
Reception of any unwanted (interfering) transmission by a retransmission device (repeater) or by the main receiver/control unit, for a continuous period of 20 seconds or more, shall cause an audible and visible trouble indication at the main receiver/control unit to identify the specific trouble condition as an interfering signal.

5.12.5 Output Signals from a Wireless Receiver/Transceiver of a Control Unit.
When the receiver/control is used to actuate remote appliances, such as notification appliances and relays, by wireless means, the remote appliances shall meet the following requirements:
(1) Power supplies shall comply with Chapter 4 or the requirements of 5.12.2.
(2) All supervision requirements of Chapter 4 and Chapter 5 shall apply.
(3) The maximum allowable response delay from activation of an initiating device to activation of required fuel gas detection functions shall be 10 seconds.
(4) Each receiver/control shall automatically repeat fuel gas alarm signal transmission at intervals not exceeding 60 seconds or until confirmation that the output appliance has received the fuel gas alarm signal.

Chapter 6 Notification Appliances for Fuel Gas Detection Systems
6.1* Application.
6.1.1
The requirements of this chapter shall apply where required by the AHJ governing laws, codes, or standards; or other parts of this standard. [72:18.1.1]

6.1.2
The requirements of this chapter shall address the reception of a notification signal and not the signal’s information content. [72:18.1.2]
6.1.3
The performance, location, and mounting of notification appliances used to initiate or direct evacuation or relocation of the occupants, or for providing information to occupants or staff, shall comply with this chapter. [72:18.1.3]

6.1.4
The performance, location, and mounting of annunciators, displays, and printers used to display or record information for use by occupants, staff, responding emergency personnel, or supervising station personnel shall comply with this chapter. [72:18.1.4]

6.1.5*
The requirements of this chapter shall apply to the areas, spaces, or system functions where required by the AHJ governing laws, codes, or standards; or other parts of this standard requiring compliance with this chapter. [72:18.1.5]

6.1.6
Notification appliances shall be permitted to be used within buildings or outdoors and to target the general building, area, or space, or only specific parts of a building, area, or space designated in specific zones and subzones. [72:18.1.6]

6.1.7
The requirements of Chapters 4, 5, and 8 shall apply to the interconnection of notification appliances, the control configurations, the power supplies, and the use of the information provided by notification appliances. [72:18.1.7]

6.2 Purpose.
Notification appliances shall provide stimuli for initiating emergency action and provide information to users, emergency response personnel, and occupants. [72:18.2]

6.3 General.
6.3.1 Listing.
All notification appliances installed in conformity with Chapter 6 shall be listed for the purpose for which they are used. [72:18.3.1]

6.3.2 Nameplates.
6.3.2.1 Notification appliances shall include on their nameplates reference to electrical requirements and rated audible or visual performance, or both, as defined by the listing authority. [72:18.3.2.1]

6.3.2.2 Audible appliances shall include on their nameplates reference to their parameters or reference to installation documents (supplied with the appliance) that include the parameters in accordance with 6.4.2 or 6.4.3. [72:18.3.2.2]

6.3.2.3 Visual notification appliances shall include on their nameplates reference to their parameters or reference to installation documents (supplied with the appliance) that include the parameters in accordance with 6.5.3.1 or Section 6.6. [72:18.3.2.3]

6.3.3 Physical Construction.
6.3.3.1 Appliances intended for use in special environments, such as outdoors versus indoors, high or low temperatures, high humidity, dusty conditions, and hazardous locations, or where subject to tampering, shall be listed for the intended application. [72:18.3.3.1]

6.3.3.2* Notification appliances used solely for signaling other than fuel gas detection shall not have the word FUEL GAS, or any fuel gas symbol, in any form (i.e., stamped, imprinted, etc.) on the appliance visible to the public.
6.3.3.3
Multipurpose notification appliances with multiple visible elements used for signaling other than fire shall be permitted to have fire markings only on those visible elements used for fire signaling.

6.3.4* Mechanical Protection.

6.3.4.1
Appliances subject to mechanical damage shall be suitably protected. [72:18.3.4.1]

6.3.4.2
If guards, covers, or lenses are employed, they shall be listed for use with the appliance. [72:18.3.4.2]

6.3.4.3
The effect of guards, covers, or lenses on the appliance’s field performance shall be in accordance with the listing requirements. [72:18.3.4.3]

6.3.5 Mounting.

6.3.5.1
Appliances shall be supported independently of their attachments to the circuit conductors. [72:18.3.5.1]

6.3.5.2
Appliances shall be mounted in accordance with the manufacturer’s published instructions. [72:18.3.5.2]

6.3.6* Connections.

Terminals, leads, or addressable communication that provide for monitoring the integrity of the notification appliance connections shall be provided. [72:18.3.6]

6.4 Audible Characteristics.

6.4.1 General Requirements.

6.4.1.1
An average ambient sound level greater than 105 dBA shall require the use of a visual notification appliance(s) in accordance with Section 6.5 where the application is public mode or Section 6.6 where the application is private mode. [72:18.4.1.1]

6.4.1.2
The total sound pressure level produced by combining the ambient sound pressure level with all audible notification appliances operating shall not exceed 110 dBA at the minimum hearing distance. [72:18.4.1.2]

6.4.1.3*
Sound from normal or permanent sources, having a duration greater than 60 seconds, shall be included when measuring maximum ambient sound level. [72:18.4.1.3]

6.4.1.4
Sound from temporary or abnormal sources lasting less than 60 seconds shall not be required to be included when measuring maximum ambient sound level. [72:18.4.1.4]

6.4.1.5
Audible alert and evacuation signal tones, including those that precede or follow voice messages, shall meet the requirements of 6.4.2, 6.4.3, 6.4.4, or 6.4.5, as applicable. [72:18.4.1.5]

6.4.1.5.1*
The designer of the audible notification system shall identify the rooms and spaces that will have audible notification and those where audible notification will not be provided [72:18.4.1.5.1]
6.4.1.5.2*

Unless otherwise required by other sections of this standard, the coverage area for audible occupant notification shall be as required by other governing laws, codes, or standards. [72:18.4.1.5.2]

6.4.1.5.3

Where the other governing laws, codes, or standards require audible occupant notification to all or part of an area or space, coverage shall only be required in occupiable area as defined in 3.3.24. [72:18.4.1.5.3]

6.4.1.5.4

The sound pressure levels that must be produced by audible appliances in the coverage areas to meet the requirements of this standard shall be documented by the system designer during the planning and design of the notification system. [72:18.4.1.5.4]

6.4.1.5.5

The greater of the expected average ambient sound pressure level or expected maximum sound pressure level having a duration of at least 60 seconds shall also be documented for the coverage area by the system designer to ensure compliance with 6.4.2, 6.4.3, 6.4.4, or 6.4.5 for the coverage area.

6.4.1.5.6

The design sound pressure levels to be produced by the notification appliances for the various coverage areas shall be documented for use during acceptance testing of the system. [72:18.4.1.5.6]

6.4.1.5.7

Where required by the AHJ, documentation of the design sound pressure levels for the various coverage areas shall be submitted for review and approval. [72:18.4.1.5.7]

6.4.1.6

Voice messages shall not be required to meet the audibility requirements of 6.4.2, 6.4.3, 6.4.4, or 6.4.5, but shall meet the intelligibility requirements of 6.4.8 where voice intelligibility is required. [72:18.4.1.6]

6.4.2* Public Mode Audible Requirements.

6.4.2.1

To ensure that audible public mode signals are clearly heard, unless otherwise permitted by 6.4.2.2 through 6.4.2.5, they shall have a sound level at least 15 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds, whichever is greater, measured 5 ft (1.5 m) above the floor in the area required to be served by the system using the A-weighted scale (dBA). [72:18.4.4.1]

6.4.2.2

Where approved by the AHJ or other governing codes or standards, the requirements for audible signaling shall be permitted to be reduced or eliminated when visual signaling is provided in accordance with Section 6.5. [72:18.4.4.2]

6.4.2.3

Audible notification appliances installed in elevator cars shall be permitted to use the audibility criteria for private mode appliances detailed in 6.4.3.1. [72:18.4.4.3]

6.4.2.4

If approved by the AHJ, audible notification appliances installed in restrooms shall be permitted to use the audibility criteria for private mode appliances detailed in 6.4.3.1. [72:18.4.4.4]

6.4.2.5

A fuel gas detection system arranged to stop or reduce ambient noise shall comply with 6.4.2.5.1 through 6.4.2.5.3.
6.4.2.5.1
A fuel gas detection system arranged to stop or reduce ambient noise shall produce a sound level at least 15 dB above the reduced average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds after reduction of the ambient noise level, whichever is greater, measured 5 ft (1.5 m) above the floor in the area required to be served by the system using the A-weighted scale (dBA).

6.4.2.5.2
Visual notification appliances shall be installed in the affected areas in accordance with Sections 6.5 or 6.6. [72:18.4.4.5.2]

6.4.2.5.3
Relays, circuits, or interfaces necessary to stop or reduce ambient noise shall meet the requirements of Chapter 4 and Chapter 5. [72:18.4.4.5.3]

6.4.3 Private Mode Audible Requirements.

6.4.3.1
To ensure that audible private mode signals are clearly heard, they shall have a sound level at least 10 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds, whichever is greater, measured 5 ft (1.5 m) above the floor in the area required to be served by the system using the A-weighted scale (dBA). [72:18.4.5.1]

6.4.3.2*
Where approved by the AHJ or other governing codes or standards, the requirements for audible signaling shall be permitted to be reduced or eliminated when visual signaling is provided in accordance with Section 6.5. [72:18.4.5.2]

6.4.3.3
A system arranged to stop or reduce ambient noise shall comply with 6.4.3.3.1 through 6.4.3.3.3. [72:18.4.5.3]

6.4.3.3.1
A system arranged to stop or reduce ambient noise shall be permitted to produce a sound level at least 10 dB above the reduced average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds after reduction of the ambient noise level, whichever is greater, measured 5 ft (1.5 m) above the floor, using the A-weighted scale (dBA). [72:18.4.5.3.1]

6.4.3.3.2
Visual notification appliances shall be installed in the affected areas in accordance with Sections 6.5 or 6.6. [72:18.4.5.3.2]

6.4.3.3.3
Relays, circuits, or interfaces necessary to stop or reduce ambient noise shall meet the requirements of Chapter 4 and Chapter 5. [72:18.4.5.3.3]

6.4.4 Sleeping Area Requirements.

6.4.4.1
Where audible appliances are installed to provide signals for sleeping areas, they shall have a sound level of at least 15 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds or a sound level of at least 75 dBA, whichever is greater, measured at the pillow level in the area required to be served by the system using the A-weighted scale (dBA). [72:18.4.6.1]

6.4.4.2
If any barrier, such as a door, curtain, or retractable partition, is located between the notification appliance and the pillow, the sound pressure level shall be measured with the barrier placed between the appliance and the pillow. [72:18.4.6.2]
6.4.4.3* Audible appliances provided for the sleeping areas to awaken occupants shall produce a low frequency alarm signal that complies with the following:

1. The waveform shall have a fundamental frequency of 520 Hz ± 10 percent.
2. The notification equipment shall be listed for producing the low frequency waveform.

[72:18.4.6.3]

6.4.5* Narrow Band Tone Signaling for Exceeding Masked Thresholds.

6.4.5.1 Masked Threshold Allowance.

Audible tone signaling shall be permitted to comply with the masked threshold requirements in this subsection in lieu of the A-weighted signaling requirements in 6.4.2 and 6.4.3.

[72:18.4.7.1]

6.4.5.2* Calculation Method.

The effective masked threshold shall be calculated in accordance with ISO 7731, Ergonomics - Danger signals for public and work areas — Auditory danger signals.

[72:18.4.7.2]

6.4.5.3 Noise Data.

Noise data for calculating the effective masked threshold shall be the peak value of noise lasting 60 seconds or more for each octave or one-third octave band. [72:18.4.7.3]

6.4.5.4 Documentation.

Analysis and design documentation shall be submitted to the AHJ and shall contain the following information:

1. Frequency data for the ambient noise, including the date, time, and location where measurements were taken for existing environments, or projected data for environments not yet constructed.
2. Frequency data of the audible notification appliance.
3. Calculations of the effective masked threshold for each set of noise data.
4. A statement of the sound pressure level that would be required by 6.4.2 or 6.4.3 if masked threshold signaling had not been done.

[72:18.4.7.4]

6.4.5.5 Sound Pressure Level.

For masked threshold signaling, the audible signal tone shall meet the requirements of either 6.4.5.5.1 or 6.4.5.5.2 but not for the reproduction of prerecorded, synthesized, or live messages.

[72:18.4.7.5]

6.4.5.5.1 The sound pressure level of the audible tone signal shall exceed the masked threshold in one or more octave bands by at least 10 dB in the octave band under consideration.

[72:18.4.7.5.1]

6.4.5.5.2 The sound pressure level of the audible tone signal shall exceed the masked threshold in one or more one-third octave bands by at least 13 dB in the one-third octave band under consideration.

[72:18.4.7.5.2]

6.4.6 Location of Audible Notification Appliances for a Building or Structure.

6.4.6.1 If ceiling heights allow, and unless otherwise permitted by 6.4.6.2 through 6.4.6.7, wall-mounted appliances shall have their tops above the finished floors at heights of not less than 90 in. (2.29 m) and below the finished ceilings at distances of not less than 6 in. (150 mm).

[72:18.4.9.1]
6.4.6.2*  
For notification appliances installed in the same space with fuel gas detectors, for lighter than air fuel gases, the detector shall be installed above the notification appliance horizontal plane location and in accordance with 5.8.5.3.1.

6.4.6.3  
Ceiling-mounted or recessed appliances shall be permitted. [72:18.4.9.2]

6.4.6.4  
Where ceiling-mounted or recessed appliances are utilized in the same space with fuel gas detectors, detectors installed in accordance with 5.8.5.3.1 shall also be ceiling-mounted or recessed.

6.4.6.5  
If combination audible/visual appliances are installed, the location of the installed appliance shall be determined by the requirements of 6.5.5. [72:18.4.9.3]

6.4.6.6  
Appliances that are an integral part of a fuel gas detector, fuel gas alarm, or other initiating device shall be located in accordance with the requirements for that device.

6.4.6.7  
Mounting heights other than required by 6.4.6.1 and 6.4.6.3 shall be permitted, provided that the sound pressure level requirements of 6.4.2 for public mode or 6.4.3 for private mode, or 6.4.4 for sleeping areas, based on the application, are met. [72:18.4.9.5]

6.4.7 Location of Audible Notification Appliances for Wide–Area Signaling.  
Audible notification appliances for wide-area signaling shall be installed in accordance with the requirements of the AHJ, approved design documents, and the manufacturer's installation instruction to achieve the required performance. [72:18.4.10]

6.4.8* Voice Intelligibility  
Within the acoustically distinguishable spaces (ADS) where voice intelligibility is required, voice communications systems shall reproduce prerecorded, synthesized, or live (e.g., microphone, telephone handset, and radio) messages with voice intelligibility. [72:18.4.11]

6.4.8.1*  
ADSs shall be determined by the system designer during the planning and design of all emergency communications systems. [72:18.4.11.1]

6.4.8.2  
Each ADS shall be identified as requiring or not requiring voice intelligibility. [72:18.4.11.2]

6.4.8.3*  
Unless specifically required by other governing laws, codes or standards, or by other parts of this standard, intelligibility shall not be required in all ADSs. [72:18.4.11.3]

6.4.8.4*  
Where required by the AHJ; governing laws, codes, or standards; or by other parts of this standard, ADS assignments shall be submitted for review and approval. [72:18.4.11.4]

6.4.8.5  
Quantitative measurements shall not be required. [72:18.4.11.5]

6.4.8.6  
Quantitative measurements shall be permitted.

6.5* Visual Characteristics—Public Mode.  
6.5.1* Visual Signaling.
6.5.1.1
Public mode visible signaling shall meet the requirements of Section 6.5 using visual notification appliances. [72:18.5.1.1]

6.5.1.2*
The coverage area for visual notification shall be as required by other governing laws, codes, or standards. [72:18.5.1.2]

6.5.1.3
Where other governing laws, codes, or standards require visual notification for all or part of an area or space, coverage shall only be required in occupiable areas as defined in 3.3.24. [72:18.5.1.3]

6.5.2 Area of Coverage.

6.5.2.1
The designer of the visual notification system shall document the rooms and spaces that will have visible notification and those where visible notification will not be provided. [72:18.5.2.1]

6.5.2.2*
Unless otherwise specified or required by other sections of this standard, the required coverage area for visual occupant notification shall be as required by other governing laws, codes, or standards. [72:18.5.2.2]

6.5.2.3
Where required by the AHJ, documentation of the effective intensity (cd) of the visual notification appliances for the area of coverage shall be submitted for review and approval. [72:18.5.2.3]

6.5.3 Light, Color, and Pulse Characteristics.

6.5.3.1
The flash rate shall not exceed two flashes per second (2 Hz) nor be less than one flash every second (1 Hz) throughout the listed voltage range of the appliance. [72:18.5.3.1]

6.5.3.2
The maximum light pulse duration shall be 20 milliseconds, except as permitted in 6.5.3.3. [72:18.5.3.2]

6.5.3.3
Light pulse durations greater than 20 milliseconds, but not greater than 100 milliseconds, shall be permitted where the alerting capability of the visual notification appliance is demonstrated to be equal to or greater than visual notification appliances with a 20-millisecond pulse duration. [72:18.5.3.3]

6.5.3.4
The pulse duration shall be defined as the time interval between initial and final points of 10 percent of maximum signal. [72:18.5.3.4]

6.5.3.5
Visual notification appliances used for fuel gas alarm signaling only or to signal the intent for complete evacuation shall be both of the following:

(1) Clear or nominal white
(2) Less than 1000 cd (effective intensity)

6.5.3.6
Visual notification appliances used to signal occupants to seek information or instructions shall be clear, nominal white, or other color as required by the emergency response plan and the AHJ for the area or building.
6.5.3.7
The visual synchronization requirements of this chapter shall not apply where the visible notification appliances located inside the building are viewed from outside of the building. [72:18.5.3.7]

6.5.4 Appliance Photometrics.
The light output shall comply with the polar dispersion requirements for public mode signaling as described in UL 1971, *Signaling Devices for the Hearing Impaired*, UL 1638, *Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories*, or equivalent. [72:18.5.4]

6.5.5 Appliance Location.
6.5.5.1
Wall-mounted appliances shall be mounted such that the entire lens is not less than 80 in. (2.03 m) and not greater than 96 in. (2.44 m) above the finished floor or at the mounting height specified using the performance-based alternative of 6.5.5.7. [72:18.5.5.1]

6.5.5.2
Where low ceiling heights do not permit wall mounting at a minimum of 80 in. (2.03 m), wall mounted visual notification appliances shall be mounted within 6 in. (150 mm) of the ceiling. [72:18.5.5.2]

6.5.5.3
Where low ceiling heights do not permit wall mounting at a minimum of 80 in. (2.03 m), the room size covered by a visual notification appliance of a given value shall be reduced by twice the difference between the minimum mounting height of 80 in. (2.03 m) and the actual lower mounting height. [72:18.5.5.3]

6.5.5.4*
Visual notification appliances listed for mounting parallel to the floor shall be permitted to be located on the ceiling or suspended below the ceiling. [72:18.5.5.4]

6.5.5.5* Spacing in Rooms.
Spacing shall be in accordance with either Table 6.5.5.5.1(a) and Figure 6.5.5.5.1 or Table 6.5.5.5.1(b). [72:18.5.5.5.1]

Table 6.5.5.5.1(a) Room Spacing for Wall-Mounted Visual Notification Appliances [72:Table 18.5.5.5.1(a)]

<table>
<thead>
<tr>
<th>Maximum Room Size</th>
<th>Minimum Required Light Output. [Effective Intensity (cd)]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One Visual Notification Appliance per Room</td>
</tr>
<tr>
<td>ft</td>
<td>m</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>20 x</td>
<td>6.10 x</td>
</tr>
<tr>
<td>20</td>
<td>6.10</td>
</tr>
<tr>
<td>28 x</td>
<td>8.53 x</td>
</tr>
<tr>
<td>28</td>
<td>8.53</td>
</tr>
<tr>
<td>30 x</td>
<td>9.14 x</td>
</tr>
<tr>
<td>30</td>
<td>9.14</td>
</tr>
<tr>
<td>40 x</td>
<td>12.2 x</td>
</tr>
<tr>
<td>40</td>
<td>12.2</td>
</tr>
<tr>
<td>45 x</td>
<td>13.7 x</td>
</tr>
<tr>
<td>45</td>
<td>13.7</td>
</tr>
<tr>
<td>50 x</td>
<td>15.2 x</td>
</tr>
<tr>
<td>50</td>
<td>15.2</td>
</tr>
<tr>
<td>54 x</td>
<td>16.5 x</td>
</tr>
<tr>
<td>54</td>
<td>16.5</td>
</tr>
<tr>
<td>55 x</td>
<td>16.8 x</td>
</tr>
<tr>
<td>55</td>
<td>16.8</td>
</tr>
<tr>
<td>60 x</td>
<td>18.3 x</td>
</tr>
<tr>
<td>60</td>
<td>18.3</td>
</tr>
<tr>
<td>63 x</td>
<td>19.2 x</td>
</tr>
<tr>
<td>63</td>
<td>19.2</td>
</tr>
<tr>
<td>68 x</td>
<td>20.7 x</td>
</tr>
<tr>
<td>68</td>
<td>20.7</td>
</tr>
<tr>
<td>70 x</td>
<td>21.3 x</td>
</tr>
<tr>
<td>70</td>
<td>21.3</td>
</tr>
<tr>
<td>80 x</td>
<td>24.4 x</td>
</tr>
<tr>
<td>80</td>
<td>24.4</td>
</tr>
<tr>
<td>90 x</td>
<td>27.4 x</td>
</tr>
<tr>
<td>90</td>
<td>27.4</td>
</tr>
<tr>
<td>100 x</td>
<td>30.5 x</td>
</tr>
<tr>
<td>100</td>
<td>30.5</td>
</tr>
<tr>
<td>110 x</td>
<td>33.5 x</td>
</tr>
<tr>
<td>110</td>
<td>33.5</td>
</tr>
<tr>
<td>120 x</td>
<td>36.6 x</td>
</tr>
<tr>
<td>120</td>
<td>36.6</td>
</tr>
<tr>
<td>130 x</td>
<td>39.6 x</td>
</tr>
<tr>
<td>130</td>
<td>39.6</td>
</tr>
</tbody>
</table>

NA: Not allowable.

Table 6.5.5.5.1(b) Room Spacing for Ceiling-Mounted Visual Notification Appliances [72:Table 18.5.5.5.1(b)]
<table>
<thead>
<tr>
<th>Maximum Room Size</th>
<th>Maximum Lens Height*</th>
<th>Minimum Required Light Output (Effective Intensity); One Visual Notification Appliance (cd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 × 20</td>
<td>6.1 × 6.1</td>
<td>10 3.0</td>
</tr>
<tr>
<td>30 × 30</td>
<td>9.1 × 9.1</td>
<td>10 3.0</td>
</tr>
<tr>
<td>40 × 40</td>
<td>12.2 × 12.2</td>
<td>10 3.0</td>
</tr>
<tr>
<td>44 × 44</td>
<td>13.4 × 13.4</td>
<td>10 3.0</td>
</tr>
<tr>
<td>20 × 20</td>
<td>6.1 × 6.1</td>
<td>20 6.1</td>
</tr>
<tr>
<td>30 × 30</td>
<td>9.1 × 9.1</td>
<td>20 6.1</td>
</tr>
<tr>
<td>44 × 44</td>
<td>13.4 × 13.4</td>
<td>20 6.1</td>
</tr>
<tr>
<td>46 × 46</td>
<td>14.0 × 14.0</td>
<td>20 6.1</td>
</tr>
<tr>
<td>20 × 20</td>
<td>6.1 × 6.1</td>
<td>30 9.1</td>
</tr>
<tr>
<td>30 × 30</td>
<td>9.1 × 9.1</td>
<td>30 9.1</td>
</tr>
<tr>
<td>50 × 50</td>
<td>15.2 × 15.2</td>
<td>30 9.1</td>
</tr>
<tr>
<td>53 × 53</td>
<td>16.2 × 16.2</td>
<td>30 9.1</td>
</tr>
<tr>
<td>55 × 55</td>
<td>16.8 × 16.8</td>
<td>30 9.1</td>
</tr>
<tr>
<td>59 × 59</td>
<td>18.0 × 18.0</td>
<td>30 9.1</td>
</tr>
<tr>
<td>63 × 63</td>
<td>19.2 × 19.2</td>
<td>30 9.1</td>
</tr>
<tr>
<td>68 × 68</td>
<td>20.7 × 20.7</td>
<td>30 9.1</td>
</tr>
<tr>
<td>70 × 70</td>
<td>21.3 × 21.3</td>
<td>30 9.1</td>
</tr>
</tbody>
</table>

*This does not preclude mounting lens at lower heights

Figure 6.5.5.5.1 Room Spacing for Wall-Mounted Visual Notification Appliances.
[72:Figure 18.5.5.5.1]
6.5.5.5.2
Visual notification appliances shall be installed in accordance with Table 6.5.5.5.1(a) or Table 6.5.5.5.1(b) using one of the following:

(1) A single visual notification appliance.
(2) Two groups of visual notification appliances, where visual notification appliances of each group are synchronized, in the same room or adjacent space within the field of view. This shall include synchronization of visual appliances operated by separate systems.
(3) More than two visual notification appliances or groups of synchronized appliances in the same room or adjacent space within the field of view that flash in synchronization.

72:18.5.5.5.2

6.5.5.5.3
Room spacing in accordance with Table 6.5.5.5.1(a) and Figure 6.5.5.5.1 for wall-mounted appliances shall be based on locating the visual notification appliance at the halfway distance of the wall. [72:18.5.5.5.3]

6.5.5.5.4
In square rooms with appliances not centered or in nonsquare room configurations that are not square rooms, the effective intensity (cd) from one visual wall-mounted notification appliance shall be determined by maximum room size dimensions obtained either by measuring the distance to the farthest wall or by doubling the distance to the farthest adjacent wall, whichever is greater, as required by Table 6.5.5.5.1(a) and Figure 6.5.5.1.

6.5.5.5.5
If a room configuration is not square, the square room size that allows the entire room to be encompassed or allows the room to be subdivided into multiple squares shall be used. [72:18.5.5.5.5]

6.5.5.5.6*
If ceiling heights exceed 30 ft (9.14 m), ceiling-mounted visual notification appliances shall be suspended at or below 30 ft (9.14 m) or at the mounting height determined using the performance-based alternative of 6.5.5.7, or wall-mounted visible notification appliances shall be installed in accordance with Table 6.5.5.5.1(a). [72:18.5.5.5.6]

6.5.5.5.7
Table 6.5.5.5.1(b) shall be used if the ceiling-mounted visual notification appliance is at the center of the room. [72:18.5.5.5.7]
6.5.5.8
If the ceiling-mounted visual notification appliance is not located at the center of the room, the effective intensity (cd) shall be determined by doubling the distance from the appliance to the farthest wall to obtain the maximum room size. [72:18.5.5.5.8]

6.5.5.6* Spacing in Corridors.

6.5.5.6.1
The installation of visual notification appliances in corridors 20 ft (6.1 m) or less in width shall be in accordance with the requirements of either 6.5.5.5 or 6.5.5.6. [72:18.5.5.6.1]

6.5.5.6.2
Paragraph 6.5.5.6 shall apply to corridors not exceeding 20 ft (6.1 m) in width. [72:18.5.5.6.2]

6.5.5.6.3
In a corridor application, visual notification appliances shall be rated not less than 15 cd. [72:18.5.5.6.3]

6.5.5.6.4
Corridors greater than 20 ft (6.1 m) wide shall comply with the spacing requirements for rooms in accordance with 6.5.5.5. [72:18.5.5.6.4]

6.5.5.6.5*
Visual notification appliances shall be located not more than 15 ft (4.57 m) from the end of the corridor with a separation not greater than 100 ft (30.5 m) between appliances.

6.5.5.6.6
If there is an interruption of the concentrated viewing path, such as a fire door, an elevation change, or any other obstruction, the area shall be treated as a separate corridor. [72:18.5.5.6.6]

6.5.5.6.7
In corridors where more than two visual notification appliances are in any field of view, they shall flash in synchronization. [72:18.5.5.6.7]

6.5.5.6.8
Wall-mounted visual notification appliances in corridors shall be permitted to be mounted on either the end wall or the side wall of the corridor in accordance with spacing requirements of 6.5.5.5. [72:18.5.5.6.8]

6.5.5.7 Performance-Based Alternative.

6.5.5.7.1
Any design that provides a minimum of 0.0375 lumens/ft² (0.4036 lumens/m²) of illuminator at any point within the covered area at all angles specified by the polar dispersion planes for wall- or ceiling-mounted public mode visual notification appliances in UL 1971, Signaling Devices for the Hearing Impaired; UL 1638, Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories, or equivalent, as calculated for the maximum distance from the nearest visual notification appliance, shall be permitted in lieu of the requirements of 6.5.5, excluding 6.5.5.8. [72:18.5.5.7.1]
6.5.5.7.2
Documentation provided to the AHJ shall include the following:

(1) Inverse square law calculations using each of the vertical and horizontal polar distribution angles in UL 1971, *Signaling Devices for the Hearing Impaired*, or equivalent.

(2) The calculations shall account for the effects of polar distribution using one of the following:

   (a) The percentages from the applicable table(s) in UL 1971, *Signaling Devices for the Hearing Impaired*, or equivalent

   (b) The actual results of laboratory tests of the specific appliance to be used as recorded by the listing organization

6.5.5.8 Sleeping Areas.
6.5.5.8.1
Combination fuel gas detectors and visual notification appliances or combination fuel gas alarms and visual notification appliances shall be installed in accordance with the applicable requirements of Chapter 5, Chapter 6, and Chapter 9.
6.5.5.8.2
For rooms with a linear dimension greater than 16 ft (4.87 m), the visual notification appliance shall be located within 16 ft (4.87 m) of the pillow.

6.5.6 Location of Visible Notification Appliances for Wide Area Signaling.
Visual notification appliances for wide-area signaling shall be installed in accordance with the requirements of the AHJ, approved design documents, and the manufacturer’s published instructions to achieve the required performance. [72:18.5.6]

6.6* Visible Characteristics—Private Mode.
Visual notification appliances used in the private mode shall be of a sufficient quantity and intensity and located so as to meet the intent of the user and the AHJ. [72:18.6]

6.7 Supplementary Visible Signaling Methods.
6.7.1
A supplementary visual notification appliance shall be intended to augment an audible or visual signal. [72:18.7]
6.7.2
Supplementary visual notification appliances shall be permitted to be located less than 80 in. (2.03 m) above the floor. [72:18.7.2]

6.8 Textual Audible Appliances.
6.8.1 Loudspeaker appliances.
Loudspeaker appliances shall comply with Section 6.4. [72:18.8.1.1]
6.8.2*
The sound pressure level, in dBA, of the tone produced by a signaling loudspeaker shall comply with all the requirements in 6.4.2 (public), 6.4.3 (private), or 6.4.4 (sleeping) for the intended mode or shall comply with the requirements of 6.4.5 (narrow band tone signaling). [72:18.8.1.2]

6.9* Textual and Graphical Visible Appliances.
6.9.1 Application
6.9.1.1
Textual and graphical visual appliances shall be permitted to be used to signal information about fuel gases or other emergency conditions or to direct intended responses to those conditions.
6.9.1.2
This section does not apply to means of egress signs, room identification signs, and other signage that could be required by other governing laws, codes, or standards. [72:18.9.1.2]

6.9.1.3
Textual visual appliance messages shall be permitted to be static, flashing, or scrolling. [72:18.9.1.3]

6.9.2 Location.

6.9.2.1 Private Mode.
Unless otherwise permitted or required by other governing laws, codes, or standards, or by other parts of this standard or by the AHJ, all textual and graphical visual notification appliances in the private mode shall be located in rooms that are accessible only to those persons directly concerned with the implementation and direction of emergency response in the areas protected by the system. [72:18.9.2.1]

6.9.2.2 Public Mode.
Textual and graphical visual notification appliances used in the public mode shall be located to ensure visibility to the occupants of the protected area or to the intended recipients. [72:18.9.2.2]

6.9.2.3 Mounting.
Desktop and surface-mounted textual and graphical visual notification appliances shall be permitted. [72:18.9.2.3]

6.9.3 Performance.
The information produced by textual and graphical visual appliances shall be clear and legible at the intended viewing distance. [72:18.9.3]

6.9.4* Character and Symbol Requirements and Viewing Distance.

6.9.4.1
This section applies to visual characters and graphic elements and does not address raised characters or braille that could be required by other governing laws, codes, or standards [72:18.9.4.1]

6.9.4.2*
Characters and symbols shall contrast with their background using either positive contrast (light on a dark background) or negative contrast (dark on a light background). [72:18.9.4.2]

6.9.4.3
Characters and symbols and their background shall have a nonglare finish. [72:18.9.4.3]

6.9.4.4*
Characters shall be permitted to be uppercase or lowercase, or a combination of both. [72:18.9.4.4]

6.9.4.5
Characters shall be conventional in form and not italic, oblique, script, highly decorative, or other unusual form and shall use sans serif fonts. [72:18.9.4.5]

6.9.4.6
Characters shall be selected from fonts where the width of the uppercase letter "O" is 55 percent minimum and 110 percent maximum of the height of the uppercase letter "I". [72:18.9.4.6]
Character and symbol height for appliances other than desktop monitors or displays shall meet all of the following criteria:

1. Minimum character height shall comply with Table 6.9.4.7.
2. Viewing distance shall be measured as the horizontal distance between the character and an obstruction preventing further approach towards the appliance.
3. Character height shall be based on the uppercase letter “I.”

Table 6.9.4.7 Visual Character and Graphic Symbol Heights Based on Height and Distance [72:Table 18.9.4.7]

<table>
<thead>
<tr>
<th>Horizontal Viewing Distance</th>
<th>At 40 in. to 70 in. (1.0 m to 1.8 m) Above the Floor</th>
<th>At Greater Than 70 in. to 120 in. (1.8 m to 3.1 m) Above the Floor</th>
<th>At Greater Than 120 in. (3.0 m) Above the Floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ft</td>
<td>m</td>
<td>in.</td>
<td>mm</td>
</tr>
<tr>
<td>1</td>
<td>0.3</td>
<td>½</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>0.6</td>
<td>½</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>0.9</td>
<td>½</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>1.2</td>
<td>½</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>1.5</td>
<td>½</td>
<td>16</td>
</tr>
<tr>
<td>6</td>
<td>1.8</td>
<td>¾</td>
<td>18</td>
</tr>
<tr>
<td>7</td>
<td>2.1</td>
<td>¾</td>
<td>19</td>
</tr>
<tr>
<td>8</td>
<td>2.4</td>
<td>¾</td>
<td>22</td>
</tr>
<tr>
<td>9</td>
<td>2.7</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>1½</td>
<td>29</td>
</tr>
<tr>
<td>11</td>
<td>3.4</td>
<td>1¼</td>
<td>32</td>
</tr>
<tr>
<td>12</td>
<td>3.7</td>
<td>1½</td>
<td>35</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>1½</td>
<td>38</td>
</tr>
<tr>
<td>14</td>
<td>4.3</td>
<td>1½</td>
<td>41</td>
</tr>
<tr>
<td>15</td>
<td>4.6</td>
<td>1½</td>
<td>44</td>
</tr>
<tr>
<td>16</td>
<td>4.9</td>
<td>1¾</td>
<td>48</td>
</tr>
<tr>
<td>17</td>
<td>5.2</td>
<td>2</td>
<td>51</td>
</tr>
<tr>
<td>18</td>
<td>5.5</td>
<td>2½</td>
<td>54</td>
</tr>
<tr>
<td>19</td>
<td>5.8</td>
<td>2½</td>
<td>57</td>
</tr>
<tr>
<td>20</td>
<td>6.1</td>
<td>2½</td>
<td>60</td>
</tr>
<tr>
<td>21</td>
<td>6.4</td>
<td>2½</td>
<td>64</td>
</tr>
<tr>
<td>22</td>
<td>6.7</td>
<td>2½</td>
<td>67</td>
</tr>
<tr>
<td>23</td>
<td>7</td>
<td>2½</td>
<td>70</td>
</tr>
<tr>
<td>24</td>
<td>7.3</td>
<td>2½</td>
<td>73</td>
</tr>
<tr>
<td>25</td>
<td>7.6</td>
<td>3</td>
<td>76</td>
</tr>
</tbody>
</table>

For each foot of horizontal viewing distance greater than 25 ft (7.6 m), add 1⁄8 in. (3 mm) to...
the character or symbol height.

6.9.4.8*

All characters and symbols displayed by textual and graphical visual notification appliances shall be a minimum of 40 in. (1.02 m) above the ground or finished floor. [72:18.9.4.8]

6.9.4.9

Stroke thickness of the uppercase letter “I” shall be minimum 10 percent and maximum 30 percent of the height of the character. [72:18.9.4.9]

6.9.4.10

Character spacing shall be measured between the two closest points of adjacent characters, excluding word spaces. Spacing between individual characters shall be minimum 10 percent and maximum 35 percent of character height. [72:18.9.4.10]

6.9.4.11

Spacing between the baselines of separate lines of characters within a message shall be 13 percent minimum and 170 percent maximum of the character height. [72:18.9.4.11]

6.10 Tactile Appliances.

6.10.1 Application.

Tactile appliances shall be permitted if used in addition to audible and/or visual notification appliances. [72:18.10.1]

6.10.2* Performance.

Tactile appliances shall meet the performance requirements of UL 1971, Signaling Devices for the Hearing Impaired, or equivalent. [72:18.10.2]

6.11* Standard Emergency Service Interface.

Where required by the enforcing authority; governing laws, codes, or standards; or other parts of this standard, annunciators, information display systems, and controls for portions of a system provided for use by emergency service personnel shall be designed, arranged, and located in accordance with the requirements of the organizations intended to use the equipment. [72:18.11]

Chapter 7 Off-Premises Signal Transmission

7.1 Application.

7.1.1

The performance, installation, and operation of fuel gas detection systems at a continuously attended supervising station or a communications center and between the protected premises and the receiving station shall comply with the requirements of this chapter.

7.1.2*

Communication from the fuel gas detection system equipment to a receiving location other than as required by 7.1.1 shall be both of the following:

(1) Permitted
(2) Not required to comply with the requirements of this chapter

7.1.3

The requirements of Chapters 4, 5, and 8 shall also apply unless they are in conflict with this chapter.

7.2 General.

Connections to supervising stations or communications centers shall be in accordance with this chapter.

7.2.1 Signals.

7.2.1.1 Alarm Signal Priority and Disposition.

A fuel gas alarm signal shall take precedence over supervisory or trouble signals.
7.2.1.1 The actuation of a fuel gas detector or system shall be distinctively indicated as a fuel gas alarm signal.

7.2.1.1.2 Servicing of a system in alarm that cannot be reset shall comply with both of the following:

(1) Be in accordance with Chapter 8
(2) Occur within 4 hours of the fuel gas alarm signal

7.2.1.2 Fuel Gas Detection System Trouble Signal Disposition.

7.2.1.2.1 Upon receipt of a fuel gas detection system trouble signal, the responsible party(ies) shall be notified.

7.2.1.2.2 Servicing of a system in trouble shall comply with both of the following:

(1) Be in accordance with Chapter 8
(2) Occur within 4 hours of the trouble indication

7.2.2* Supervising Station.

Upon receipt of a fuel gas alarm signal, supervising station personnel shall perform the following actions in the order listed:

(1) Immediately retransmit indication of the fuel gas alarm signal to the communications center
(2) Contact the responsible party(ies) in accordance with the notification plan

7.2.3* Emergency Response Agency (ERA).

Where a fuel gas alarm signal is transmitted directly to a communications center, communications center personnel shall perform the following actions in the order listed:

(1) Follow standard operating procedures
(2) Contact the responsible party(ies) in accordance with the notification plan

7.3 Prearranged Testing.

Where the signal results from a prearranged test, the action required by 7.2.2 and 7.2.3 shall not be required.

7.4 Operation and Record Keeping.

7.4.1 The operation, staffing, and recordkeeping for a supervising station shall be in accordance with NFPA 72.

7.4.2 The operation, staffing, and recordkeeping for a communications center shall be in accordance with NFPA 1221.

Chapter 8 Inspection, Testing, and Maintenance

8.1 Application.

This chapter covers the requirements for the inspection, testing, and maintenance of fuel gas: alarms, detectors, systems, and their components.

8.1.1 More stringent inspection, testing, or maintenance procedures shall be permitted.
8.1.2
Inspection testing and maintenance programs shall encompass all of the following:

(1) Compliance with the requirements of this chapter
(2) Conformity with the equipment manufacturers' published instructions
(3) Verification of operation of the fuel gas alarms, detectors, systems, and their components

8.1.3
The use of alternative test methods or testing devices shall be permitted, provided such methods or devices are equivalent in effectiveness and safety and meet the intent of the requirements of this chapter.

8.2 General.

8.2.1 Responsibilities.

8.2.1.1 The property or building or system owner or the owner's designated representative shall be responsible for inspection, testing, and maintenance of the system and for alterations or additions to this system. [72:14.2.3.1]

8.2.1.2 Where the property owner is not the occupant, the property owner shall be permitted to delegate the authority and responsibility for inspecting, testing, and maintaining the fuel gas detection systems to the occupant, management firm, or managing individual through specific provisions in the lease, written use agreement, or management contract.

8.2.1.3 Inspection, testing, or maintenance shall be permitted to be done by the building or system owner or a person or organization other than the building or system owner if conducted under a written contract. [72:14.2.3.3]

8.2.1.4 Where the building or system owner has delegated any responsibilities for inspecting, testing, or maintenance, a copy of the written delegation required by 8.2.1.3 shall be provided to the AHJ upon request. [72:14.2.3.4]

8.2.1.5* Service Personnel Qualifications and Experience.
Service personnel shall be qualified and experienced in accordance with the requirements of 4.4.3. [72:14.2.3.6]

8.2.2* Notification.

8.2.2.1 Before proceeding with any testing, all persons and facilities receiving alarm, supervisory, or trouble signals and all building occupants shall be notified of the testing to prevent unnecessary response. [72:14.2.4.1]

8.2.2.2 The owner or the owner's designated representative and service personnel shall coordinate system testing to prevent interruption of critical building systems or equipment. [72:14.2.4.3]

8.2.3 System Documentation.
Prior to system maintenance or testing, the record of completion and the information regarding the system and system alterations, including specifications, wiring diagrams, and floor plans, shall be provided by the owner or a designated representative to the service personnel upon request.

8.2.4* Test Plan.
8.2.4.1
A test plan shall be developed to clearly establish the scope of the testing for the fire alarm signaling system. [72:14.2.10.1]

8.2.4.2
The test plan and results shall be documented with the testing records. [72:14.2.10.2]

8.3 Inspection.
Unless otherwise permitted by 8.3.2, visual inspections shall be performed in accordance with the schedules in Table 8.3.1 or more often if required by the AHJ. [72:14.3.1]

### Table 8.3.1 Visual Inspection Frequencies

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Acceptance</th>
<th>Periodic Frequency</th>
<th>Method</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>All equipment</td>
<td>X</td>
<td>Annual</td>
<td>Ensure there are no changes that affect equipment performance. Inspect for building modifications, occupancy changes, changes in environmental conditions, device location, physical obstructions, device orientation, physical damage, and degree of cleanliness.</td>
<td>8.3.4</td>
</tr>
</tbody>
</table>

2. Control equipment:
   - (1) Fuel gas detection systems monitored for alarm, supervisory, and trouble signals
     - (a) Fuses | X | Annual |
     - (b) Interfaced equipment | X | Annual |
     - (c) Lamps and LEDs | X | Annual |
     - (d) Primary (main) power supply | X | Annual |
     - (e) Trouble signals | X | Annual |
   - (2) Fuel gas detection systems unmonitored for alarm, supervisory, and trouble signals
     - (a) Fuses | X | Weekly |
     - (b) Interfaced equipment | X | Weekly |
     - (c) Lamps and LEDs | X | Weekly |
     - (d) Primary (main) power supply | X | Weekly |
     - (e) Trouble signals | X | Weekly |

3. Reserved

4. Emergency voice/alarm communications equipment | X | Semiannual | Verify location and condition. |

5. Reserved
<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Acceptance</th>
<th>Periodic Frequency</th>
<th>Method</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Reserved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Reserved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Batteries</td>
<td></td>
<td></td>
<td></td>
<td>4.5.9</td>
</tr>
<tr>
<td>(1) Valve-regulated lead-acid (VRLA) batteries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensure month and year of manufacture is marked in the month/year format on each battery cell/unit. Verify tightness of battery connections. Inspect terminals for corrosion, excessive container/cover distortion, cracks in cell/unit or leakage of electrolyte. Replace any battery cell/unit if corrosion, distortion, or leakage is observed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) General</td>
<td>X</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Marking</td>
<td>N/A</td>
<td>Semiannual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Primary (dry cell) other than those used in low-power radio (wireless) systems in accordance with Chapter 5</td>
<td>X</td>
<td>Semiannual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Notification appliance circuit power extenders</td>
<td>X</td>
<td>Annual</td>
<td>Verify proper fuse ratings, if any. Verify that lamps and LEDs indicate normal operating status of the equipment.</td>
<td>Section 4.5</td>
</tr>
<tr>
<td>Component</td>
<td>Initial Acceptance</td>
<td>Periodic Frequency</td>
<td>Method</td>
<td>Reference</td>
</tr>
<tr>
<td>-----------------------------------</td>
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<td>------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>11. Remote power supplies</td>
<td>X</td>
<td>Semiannual</td>
<td>Verify proper fuse ratings, if any. Verify that lamps and LEDs indicate normal operating status of the equipment.</td>
<td>Section 4.5</td>
</tr>
<tr>
<td>12. Transientsuppressors</td>
<td>X</td>
<td>Semiannual</td>
<td>Verify location and condition.</td>
<td></td>
</tr>
<tr>
<td>13. Reserved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Initiating devices</td>
<td></td>
<td></td>
<td>Verify location and condition (all devices).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1) Fuel gas air sampling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) General</td>
<td>X</td>
<td>Semiannual</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b) Sampling system piping and sampling ports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2) Fuel gas duct detectors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) General</td>
<td>X</td>
<td>Semiannual</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b) Sampling tube</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3) Electromechanical releasing devices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4) Supervisory signal devices</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 8.3 Initial Acceptance and Reacceptance

#### 8.3.1 Initial Acceptance

Initial and reacceptance inspections shall be made to ensure compliance with approved design documents and to ensure installation in accordance with this standard and other required installation standards. [72:14.3.4]

#### 8.3.2 Devices or Equipment Inaccessible for Safety Considerations

Devices or equipment that is inaccessible for safety considerations (e.g., continuous process operations, energized electrical equipment, radiation, and excessive height) shall be permitted to be inspected during scheduled shutdowns if approved by the AHJ. [72:14.3.2]

#### 8.3.3 Extended Intervals

Extended intervals shall not exceed 18 months. [72:14.3.3]

#### 8.3.4 Periodic Visual Inspections

Periodic visual inspections in accordance with Table 8.3.1 shall be made to assure that there are no changes that affect equipment performance. [72:14.3.5]

### 8.4 Testing

#### 8.4.1 Initial Acceptance Testing

**8.4.1.1**

All new systems shall be inspected and tested in accordance with the requirements of Chapter 8. [72:14.4.1.1]

**8.4.1.2**

The AHJ shall be notified prior to the initial acceptance test. [72:14.4.1.2]

#### 8.4.2 Reacceptance Testing

**8.4.2.1**

When an initiating device, notification, appliance, or control relay is added, it shall be functionally tested. [72:14.4.2.1]
8.4.2.2
When an initiating device, notification appliance, or control relay is deleted, another device, appliance, or control relay on the circuit shall be operated. [72:14.4.2.2]

8.4.2.3
When modifications or repairs to control equipment hardware are made, the control equipment shall be tested in accordance with Table 8.4.3, items 2(1) and 2(4). [72:14.4.2.3]

8.4.2.4
When changes are made to site-specific software, the following shall apply:

1. All functions known to be affected by the change, or identified by a means that indicates changes, shall be tested end to end from the affected sensor(s) to final action(s). (See 8.2.4.)

2. In addition, 10 percent of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, also shall be both of the following:
   (a) Tested
   (b) Verified for correct system operation

3. A revised record of completion in accordance with 4.14.1.4 shall be prepared to reflect these changes.

8.4.2.5*
Changes to the system executive software shall require at least a 10 percent functional test of the system, including a test of at least one device on each input and output circuit to verify critical system functions such as notification appliances, control functions, and off-premises reporting.
8.4.3 Test Methods.
Fuel gas detection systems and associated equipment shall be tested according to Table 8.4.3.

Table 8.4.3 Testing

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Acceptance</th>
<th>Periodic Frequency</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. All equipment</td>
<td>X</td>
<td>See Table 8.3.1.</td>
<td></td>
</tr>
<tr>
<td>2. Control equipment and transponder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Functions</td>
<td>X</td>
<td>Annually</td>
<td>Verify correct receipt of alarm, supervisory, and trouble signals (inputs); operation of evacuation signals and auxiliary functions (outputs); circuit supervision, including detection of open circuits and ground faults; and power supply supervision for detection of loss of ac power and disconnection of secondary batteries.</td>
</tr>
<tr>
<td>(2) Fuses</td>
<td>X</td>
<td>Annually</td>
<td>Verify rating and supervision.</td>
</tr>
<tr>
<td>(3) Interfaced equipment</td>
<td></td>
<td>Annually</td>
<td>Verify integrity of single or multiple circuits providing interface between two or more control units. Test interfaced equipment connections by operating or simulating operation of the equipment being supervised. Verify signals required to be transmitted at the control unit.</td>
</tr>
<tr>
<td>(4) Lamps and LEDs</td>
<td>X</td>
<td>Annually</td>
<td>Illuminate lamps and LEDs.</td>
</tr>
<tr>
<td>(5) Primary (main) power supply</td>
<td>X</td>
<td>Annually</td>
<td>Disconnect and test all secondary (standby) power under maximum load, including all alarm appliances requiring simultaneous operation. Reconnect all secondary (standby) power at end of test. Test redundant power supplies separately.</td>
</tr>
<tr>
<td>3. Fuel gas detection control unit trouble signals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Audible and visual</td>
<td>X</td>
<td>Annually</td>
<td>Verify operation of control unit trouble signals. Verify ring-back feature for systems using a trouble-silencing switch that requires resetting. If control unit has disconnect or isolating switches, verify performance of intended function of each switch. Verify receipt of trouble signal when a supervised function is disconnected.</td>
</tr>
<tr>
<td>(2) Disconnect switches</td>
<td>X</td>
<td>Annually</td>
<td></td>
</tr>
<tr>
<td>Component</td>
<td>Initial Acceptance</td>
<td>Periodic Frequency</td>
<td>Method</td>
</tr>
<tr>
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</tr>
<tr>
<td>(3) Ground-fault monitoring circuit</td>
<td>X</td>
<td>Annually</td>
<td>If the system has a ground detection feature, verify the occurrence of ground-fault indication whenever any installation conductor is grounded.</td>
</tr>
<tr>
<td>(4) Transmission of signals to off-premises location</td>
<td>X</td>
<td>Annually</td>
<td>Actuate an initiating device and verify receipt of alarm signal at the off-premises location. Create a trouble condition and verify receipt of a trouble signal at the off-premises location. Actuate a supervisory device and verify receipt of a supervisory signal at the off-premises location. If a transmission carrier is capable of operation under a single- or multiple-fault condition, activate an initiating device during such fault condition and verify receipt of an alarm signal and a trouble signal at the off-premises location.</td>
</tr>
<tr>
<td>Supervising station alarm – transmitting equipment</td>
<td>X</td>
<td>Annually</td>
<td>aTest all system functions and features in accordance with the equipment manufacturer’s published instructions for correct operation in conformance with the applicable sections of Chapter 7. Except for DACT, actuate initiating device and verify receipt of the correct initiating device signal at the supervising station within 90 seconds. Upon completion of the test, restore the system to its functional operating condition. If test jacks are used, conduct the first and last tests without the use of the test jack.</td>
</tr>
<tr>
<td>Engine-driven generator</td>
<td>X</td>
<td>Monthly</td>
<td>If an engine-driven generator dedicated to the system is used as a required power source, verify operation of the generator in accordance with NFPA 110 by the building owner.</td>
</tr>
<tr>
<td>Secondary (standby) power supply</td>
<td>X</td>
<td>Annually</td>
<td>Disconnect all primary (main) power supplies and verify the occurrence of required trouble indication for loss of primary power. Measure or verify the system’s standby and alarm current demand and verify the ability of batteries to meet standby and alarm requirements using manufacturer’s data. Operate general alarm systems a minimum of 5 minutes and emergency/voice communications systems for a</td>
</tr>
<tr>
<td>Component</td>
<td>Initial Acceptance</td>
<td>Periodic Frequency</td>
<td>Method</td>
</tr>
<tr>
<td>---------------------------------</td>
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<tr>
<td>minimum of 15 minutes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reconnect primary (main) power supply at end of test.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Emergency storage system (ESS)</td>
<td>X</td>
<td>Annually</td>
<td>If an ESS dedicated to the system is used as a required power source, verify by the building owner operation of the UPS system in accordance with NFPA 111.</td>
</tr>
<tr>
<td>VRLA battery and chargerb</td>
<td></td>
<td></td>
<td>Prior to conducting any battery testing, verify by the person conducting the test, that all system software stored in volatile memory is protected from loss.</td>
</tr>
<tr>
<td>(1) Temperature test</td>
<td>X</td>
<td>Semiannually</td>
<td>Upon initially opening the cabinet door, measure and record the temperature of each battery cell/unit at the negative terminal with an infrared thermometer. Replace any battery cell/unit if the temperature is greater than 18°F (10°C) above ambient.</td>
</tr>
<tr>
<td>(2) Charger testc</td>
<td></td>
<td>Semiannually</td>
<td>With the battery fully charged and connected to the charger, measure the voltage across the battery with a voltmeter. Verify the voltage is within the battery/alarm equipment manufacturer’s recommendations. If the voltage is outside of the specified limits, either adjust the charger to within limits or replace the charger.</td>
</tr>
<tr>
<td>(3) Cell/Unit voltage test</td>
<td>X</td>
<td>Semiannually</td>
<td>With the battery fully charged and connected to the charger, measure the voltage of each cell/unit with a voltmeter. Replace the battery when any cell/unit measures a voltage less than 13.26 volts.</td>
</tr>
<tr>
<td>(4) Ohmic testd</td>
<td></td>
<td>N/A</td>
<td>When the battery is installed, establish a baseline ohmic value for each battery cell/unit or where available use baseline ohmic values provided by the battery or test equipment manufacturer. In either case record the base line ohmic value on each battery cell/unit. With the battery fully charged and connected to the charger, measure the internal ohmic value of each battery cell/unit. Record the test date and ohmic value on each cell/unit. Replace the battery when the ohmic measurement of any cell/unit deviates from the established baseline by 30% or</td>
</tr>
<tr>
<td>Component</td>
<td>Initial Acceptance</td>
<td>Periodic Frequency</td>
<td>Method</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------------------</td>
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<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>(5) Replacement/Load test</td>
<td></td>
<td>3 years</td>
<td>Where the battery or test equipment manufacturer’s baseline ohmic values are used, replace the battery when any cell/unit has an internal ohmic value outside of the acceptable range. Replace the battery or conduct a load test of the battery capacity. Load test the battery based on the manufacturer’s specifications for a discharge rate of 3 hours or more by applying the current indicated for the selected hourly discharge rate continuously, until the terminal voltage decreases to the end voltage specified by the manufacturer. Record the test duration and calculate the battery capacity including adjustment for ambient temperature. Replace the battery if capacity is less than or equal to 80% or at the next scheduled test interval if battery capacity is less than 85%.</td>
</tr>
</tbody>
</table>

9. Remote annunciators      | X                   | Annually           | Verify the correct operation and identification of annunciators. If provided, verify the correct operation of annunciator under a fault condition. |

10. Reserved                |                     |                    |                                                                                                                                          |
11. Reserved                |                     |                    |                                                                                                                                          |
12. Reserved                |                     |                    |                                                                                                                                          |
13. Conductors—metallic    |                     |                    | Test all installation conductors with a volt/ohmmeter to verify that there are no stray (unwanted) voltages between installation conductors or between installation conductors and ground. Verify the maximum allowable stray voltage does not exceed 1 volt ac/dc, unless a different threshold is specified in the published manufacturer’s instructions for the installed equipment. Test all installation conductors, other than those intentionally and permanently grounded, for isolation from ground per the installed equipment manufacturer’s published instructions. |

(1) Stray voltage          | X                   | N/A                | Test all installation conductors with a volt/ohmmeter to verify that there are no stray (unwanted) voltages between installation conductors or between installation conductors and ground. Verify the maximum allowable stray voltage does not exceed 1 volt ac/dc, unless a different threshold is specified in the published manufacturer’s instructions for the installed equipment. |

(2) Ground faults           | X                   | N/A                | Test all installation conductors, other than those intentionally and permanently grounded, for isolation from ground per the installed equipment manufacturer’s published instructions. |
<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Acceptance</th>
<th>Periodic Frequency</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3) Short-circuit faults</td>
<td>X</td>
<td>N/A</td>
<td>Test all installation conductors, other than those intentionally connected together, for conductor-to-conductor isolation per the published manufacturer’s instructions for the installed equipment. Also test these same circuits conductor-to-ground. With each initiating and indicating circuit installation conductor pair short-circuited at the far end, measure and record the resistance of each circuit. Verify that the loop resistance does not exceed the limits specified in the published manufacturer’s instructions for the installed equipment. For initial and reacceptance testing, confirm the introduction of a fault in any circuit monitored for integrity results in a trouble indication at the fuel gas detection control unit. Open one connection at not less than 10 percent of the initiating devices, notification appliances, and controlled devices on every initiating device circuit, notification appliance circuit, and signaling line circuit. Confirm all circuits perform as indicated in Sections 5.5, 5.6, and 5.7.</td>
</tr>
<tr>
<td>(4) Loop resistance</td>
<td>X</td>
<td>N/A</td>
<td>Test all installation conductors, other than those intentionally connected together, for conductor-to-conductor isolation per the published manufacturer’s instructions for the installed equipment. Also test these same circuits conductor-to-ground. With each initiating and indicating circuit installation conductor pair short-circuited at the far end, measure and record the resistance of each circuit. Verify that the loop resistance does not exceed the limits specified in the published manufacturer’s instructions for the installed equipment. For initial and reacceptance testing, confirm the introduction of a fault in any circuit monitored for integrity results in a trouble indication at the fuel gas detection control unit. Open one connection at not less than 10 percent of the initiating devices, notification appliances, and controlled devices on every initiating device circuit, notification appliance circuit, and signaling line circuit. Confirm all circuits perform as indicated in Sections 5.5, 5.6, and 5.7.</td>
</tr>
<tr>
<td>(5) Circuit integrity</td>
<td>X</td>
<td>N/A</td>
<td>Test all installation conductors, other than those intentionally connected together, for conductor-to-conductor isolation per the published manufacturer’s instructions for the installed equipment. Also test these same circuits conductor-to-ground. With each initiating and indicating circuit installation conductor pair short-circuited at the far end, measure and record the resistance of each circuit. Verify that the loop resistance does not exceed the limits specified in the published manufacturer’s instructions for the installed equipment. For initial and reacceptance testing, confirm the introduction of a fault in any circuit monitored for integrity results in a trouble indication at the fuel gas detection control unit. Open one connection at not less than 10 percent of the initiating devices, notification appliances, and controlled devices on every initiating device circuit, notification appliance circuit, and signaling line circuit. Confirm all circuits perform as indicated in Sections 5.5, 5.6, and 5.7.</td>
</tr>
</tbody>
</table>

14. Conductors—nonmetallic

Test the fiber-optic transmission line by the use of an optical power meter or by an optical time domain reflectometer used to measure the relative power loss of the line. Test result data must meet or exceed ANSI/TIA 568-C.3, *Optical Fiber Cabling Components Standard*, related to fiber-optic lines and connection/splice losses and the control unit manufacturer’s published specifications. For initial and reacceptance testing, confirm the introduction of a fault in any circuit monitored for integrity results in a trouble indication at the fuel gas detection control unit. Open one connection at not less than 10 percent of the initiating devices, notification appliances, and controlled devices on every initiating device circuit, notification appliance circuit, and
<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Acceptance</th>
<th>Periodic Frequency</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>signaling line circuit. Confirm all circuits perform as indicated in Sections 5.5, 5.6, and 5.7.</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>Annually</td>
<td>For periodic testing, test each initiating device circuit, notification appliance circuit, and signaling line circuit for correct indication at the control unit. Confirm all circuits perform as indicated in Sections 5.5, 5.6, and 5.7.</td>
</tr>
</tbody>
</table>

15. Initiating devices

(1) Fuel gas detectors—functional test

(a) Air sampling | X | Annually |
(b) Duct type | X | Annually |

(2) Fuel gas detectors with control output functions | X | Annually |

16. Interface equipment | X |

17. Alarm notification appliances

(1) Audible | X | N/A |

For initial and reacceptance testing, measure sound pressure levels for signals with a sound level meter meeting ANSI S1.4a, Specifications for Sound Level Meters, Type 2 requirements. Measure sound pressure levels throughout the protected area to confirm that they are in compliance with Chapter 6. Set the sound level...
<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Acceptance</th>
<th>Periodic Frequency</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) Audible textual notification appliances (e.g., speakers and other appliances to convey voice messages)</td>
<td>N/A</td>
<td>Annually</td>
<td>meter in accordance with ANSI S3.41, <em>Audible Emergency Evacuation (E2) And Evacuation Signals With Relocation Instructions (ESRI)</em>, using the time-weighted characteristic F (FAST). For periodic testing, verify the operation of the notification appliances. For initial and reacceptance testing, measure sound pressure levels for signals with a sound level meter meeting ANSI S1.4a, <em>Specifications for Sound Level Meters</em>, Type 2 requirements. Measure sound pressure levels throughout the protected area to confirm that they are in compliance with Chapter 6. Set the sound level meter in accordance with ANSI S3.41, <em>Audible Emergency Evacuation (E2) And Evacuation Signals With Relocation Instructions (ESRI)</em>, using the time-weighted characteristic F (FAST). Verify audible information to be distinguishable and understandable and in compliance with 6.4.8. For periodic testing, verify the operation of the notification appliances. Perform initial and reacceptance testing in accordance with the manufacturer’s published instructions. Verify appliance locations to be per approved layout and confirm that no floor plan changes affect the approved layout. Verify that the candela rating marking agrees with the approved drawing. Confirm that each appliance flashes. For periodic testing, verify that each appliance flashes.</td>
</tr>
<tr>
<td>(3) Visual</td>
<td>X</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>18. Fuel gas control functions&lt;sup&gt;h&lt;/sup&gt;</td>
<td>X</td>
<td>Annually</td>
<td>For initial, reacceptance, and periodic testing, verify fuel gas control function interface device activation. Where a fuel gas control function interface device is disabled or disconnected during initiating device testing, verify that the disabled or disconnected fuel gas control function interface device has been properly restored.</td>
</tr>
<tr>
<td>19. Special procedures</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

<sup>h</sup>For periodic testing, verify that the disabled or disconnected fuel gas control function interface device has been properly restored.
<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Acceptance</th>
<th>Periodic Frequency</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Multiplex systems</td>
<td>X</td>
<td>Annually</td>
<td>Verify communications between sending and receiving units under both primary and secondary power. Verify communications between sending and receiving units under open-circuit and short-circuit trouble conditions. Verify communications between sending and receiving units in all directions where multiple communications pathways are provided. If redundant central control equipment is provided, verify switchover and all required functions and operations of secondary control equipment. Verify all system functions and features in accordance with manufacturer's published instructions.</td>
</tr>
<tr>
<td>20. Low-power radio</td>
<td>X</td>
<td>N/A</td>
<td>The following procedures describe additional acceptance and reacceptance test methods to verify wireless protection system operation: (1) Use the manufacturer's published instructions and the as-built drawings provided by the system supplier to verify correct operation after the initial testing phase has been performed by the supplier or by the supplier's designated representative. (2) Starting from the functional operating condition, initialize the system in accordance with the manufacturer's published instructions. Confirm the alternative communications path exists between the wireless control unit and peripheral devices used to establish initiation, indication, control, and annunciation. Test the system for both alarm and trouble conditions. (3) Check batteries for all components in the system monthly unless the control unit checks all batteries and all components daily.</td>
</tr>
</tbody>
</table>

Notes:

aSome transmission equipment (such as, but not limited to, cable modems, fiber-optic interface nodes, and VoIP interfaces) are typically powered by the building's electrical system using a secondary (standby) power supply that does not meet the requirements of this standard. This is intended to ensure that the testing authority verifies full secondary (standby...
power as required by Chapter 4. Additionally, refer to Table 8.4.3, items 7 and 8, for secondary (standby) power supply testing.

bThe battery tests in Table 8.3.2, Item 8, are based on VRLA batteries and it is the intent that the tests specified in (1) through (4) be performed in order. For other secondary battery types, refer to the battery manufacturer’s published instructions or IEEE 450, Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications, for vented lead-acid batteries; and IEEE 1106, Recommended Practice for Installation, Maintenance, Testing, and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications, for nickel-cadmium batteries.

cIf the charger is adjustable, adjust the output voltage to 2.265 volts per cell ±0.015 volts at 77°F (25°C) or as specified by the alarm equipment manufacturer.

dSee A.8.4.3 Item 8(4). A load test per Item 8(5) is permitted in lieu of an ohmic test.

eSee A.8.4.3 Item 8(5).

Chapter 6 would require 15 dB over average ambient sound for public mode spaces. Sometimes the ambient sound levels are different from what the design was based upon. Private operating mode would require 10 dB over average ambient at the location of the device.

fWhere building, system, or occupancy changes have been observed, the owner should be notified of the changes. New devices might need to be installed and tested per the initial acceptance testing criteria.

hSee A.8.3.2 and Table 8.3.2, Item 18.

8.4.4* Testing Frequency.

Unless otherwise permitted by other sections of this standard, testing shall be performed in accordance with the schedules in Table 8.4.3, or more often if required by the AHJ.

8.4.4.1

Devices or equipment that are inaccessible for safety considerations (e.g., continuous process operations, energized electrical equipment, radiation, and excessive height) shall be permitted to be tested during scheduled shutdowns if approved by the AHJ. Extended intervals shall not exceed 18 months.

8.4.4.2

If automatic testing is performed at least weekly by a remotely monitored fuel gas detection control unit specifically listed for the application, both of the following shall apply:

(1) The manual testing frequency shall be permitted to be extended to annually.

(2) Table 8.4.3 shall apply.

8.4.5 Functional Test of Fuel Gas Detectors.

8.4.5.1

Fuel gas detector tests shall be performed at initial acceptance and annually by the introduction of fuel gas into the sensing chamber or element.

8.4.5.2

An electronic check (e.g., magnets, analog values, etc.) shall not be sufficient to comply with this requirement.

8.4.5.3

The functional test shall be performed in accordance with the manufacturer’s published instructions.

8.4.5.4*

The result of each fuel gas detector test shall be confirmed through indication at the detector and the control unit.
8.4.5.5
All tests and results shall be recorded.

8.5 Maintenance.
8.5.1
Fuel gas detection system equipment shall be maintained in accordance with the manufacturer’s published instructions.

8.5.2 Resetting.
8.5.2.1
Fuel gas apparatus that require resetting to maintain normal operation shall be restored to normal as promptly as possible after each test and alarm and kept in normal condition for operation.

8.5.2.2
All test signals received shall be recorded to indicate date and time.

8.6 Records.
8.6.1 Permanent Records.
After successful completion of acceptance tests approved by the AHJ, the requirements in 8.6.1.1 and 8.6.1.2 shall apply. [72:14.6.1]

8.6.1.1
A set of reproducible as-built installation drawings, operation and maintenance manuals, and a written sequence of operation shall be provided to the building owner or the owner’s designated representative. [72:14.6.1.1]

8.6.1.2
The system owner shall be responsible for maintaining these records for the life of the system for examination by any AHJ. Paper or electronic media shall be permitted. [72:14.6.1.3]

8.6.2 Maintenance, Inspection, and Testing Records.
8.6.2.1
Records shall be retained until the next test and for 1 year thereafter. [72:14.6.2.1]
A record of all inspections, testing, and maintenance shall be provided in accordance with Figure 8.6.2.2. [72:14.6.2.4]

Figure 8.6.2.2 System Record of Inspection and Testing.
### 4. SYSTEM POWER (continued)

**4.3.3** Energy Storage System:

- Type: **Battery**
- Location: **Emergency power source**
- Calculated capacity: **600 kWh**
- Battery bank:
  - Nominal voltage: **120V**
  - Ampere rating: **600A**
- Batteries are marked with data of manufacture

**4.3.4** Notification Appliances-Power Extension Panels:

- Type: **Battery**
- Location: **Emergency power source**
- Calculated capacity: **600 kWh**
- Batteries are marked with data of manufacture

**4.3.5** Primary Power:

- Type: **Battery**
- Location: **Emergency power source**
- Calculated capacity: **600 kWh**
- Batteries are marked with data of manufacture

### 5. ANNUNCIATORS

- **Annunciation 1**
- **Annunciation 2**
- **Annunciation 3**

---

### 5. NOTIFICATIONS BASED PRIOR TO TESTING

<table>
<thead>
<tr>
<th>Description</th>
<th>Visual Inspection</th>
<th>Functional Test</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control unit</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Test switches</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Transient switches</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Supervising switch</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Supervising box monitoring</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Expressions</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Local communicator</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Remote communicator</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Power switcher panel</td>
<td>✔️</td>
<td>✔️</td>
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</tr>
<tr>
<td>Isolation modules</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Other switches</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
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</table>

---

### 7.2 Control Unit Power Supplies

<table>
<thead>
<tr>
<th>Description</th>
<th>Visual Inspection</th>
<th>Functional Test</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>100V power</td>
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</tr>
<tr>
<td>Generator</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Local control</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Recloser</td>
<td>✔️</td>
<td>✔️</td>
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</tr>
<tr>
<td>Change box</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Other feeds</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
</tbody>
</table>

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### 7. TESTING RESULTS (continued)

#### 7.3 Emergency Voice/Alarm Communications Equipment

<table>
<thead>
<tr>
<th>Description</th>
<th>Visual</th>
<th>Audible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central unit</td>
<td></td>
<td></td>
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<tr>
<td>Loupe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary power supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trouble signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Movement detector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground fault protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel supervision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>System performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sound pressure levels</td>
<td></td>
<td></td>
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<tr>
<td>Speech intelligibility</td>
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<td></td>
</tr>
<tr>
<td>Acoustics</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 7.4 Notification Appliance/Power Extension Devices

<table>
<thead>
<tr>
<th>Description</th>
<th>Visual</th>
<th>Audible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary power supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trouble signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground fault protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel supervision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>System performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 7. TESTING RESULTS (continued)

#### 7.5 Combination Heat Detector/Sensor Systems

<table>
<thead>
<tr>
<th>Description</th>
<th>Visual</th>
<th>Audible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 7.6 Manned Systems

<table>
<thead>
<tr>
<th>Description</th>
<th>Visual</th>
<th>Audible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel supervision</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 7.7 Alarm Functions

<table>
<thead>
<tr>
<th>Description</th>
<th>Visual</th>
<th>Audible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 7.8 Alarm Initiating Device

* Device test results about attached listing all devices tested and the results of the testing

#### 7.9 Supervisory Alarm Initiating Device

* Device test results about attached listing all devices tested and the results of the testing

#### 7.10 Alarm Indication Appliance

* Appliance test results about attached listing all appliances tested and the results of the testing

#### 7.11 Supervisory Station Monitoring

<table>
<thead>
<tr>
<th>Description</th>
<th>Visual</th>
<th>Audible</th>
<th>Test</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm signal</td>
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<td></td>
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</tr>
<tr>
<td>Alarm verification</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trouble signal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trouble verification</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervisory signal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervisory verification</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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MPR 75, p. 4-475
8.6.2.3
The system shall be identified by a placard, sticker, or other means to indicate the next regularly scheduled inspection period in accordance with Figure 8.6.2.2.

8.6.2.4
The existing means of indicating the next regularly scheduled inspection period shall be permitted, instead of the requirements of 8.6.2.3, if the devices have been tested as part of the normal fuel gas alarm testing.

8.6.2.5
If off-premises monitoring is provided, records of signals, tests, and operations recorded at the monitoring center shall be maintained for not less than 12 months.

8.6.2.6
Upon request, a hard copy record shall be available for examination by the AHJ.

8.6.2.7
Paper or electronic media shall be permitted.

8.7 Single- and Multiple-Station Fuel Gas Alarms.

8.7.1
Single- and multiple-station fuel gas alarms and all connected appliances shall be inspected and tested in accordance with the manufacturer's published instructions at least monthly.

8.7.2
Alarms shall be replaced in the following instances:

(1) When either the end-of-life signal is activated or the manufacturer's replacement date is reached

(2) When they fail to respond to operability tests

8.7.3
Any combination of smoke/carbon monoxide/fuel gas alarms shall be replaced when the end-of-life signal activates or 10 years from the date of manufacture, whichever comes first, unless otherwise provided by the manufacturer's published instructions.
8.7.4
Where batteries are used as a source of energy for alarms, the batteries shall be replaced in accordance with the alarm equipment manufacturer's published instructions.

8.8 Household Fuel Gas Detection Systems.


8.8.1.1*
Household fuel gas detection systems shall be tested by a qualified service technician at least every 3 years according to the methods in Table 8.4.3.

8.8.1.2
Fuel gas detectors used in household fuel gas detection systems shall be tested in accordance with the manufacturer's published instructions.

8.8.1.3
Fuel gas detectors shall be replaced when the end-of-life signal is actuated, the manufacturer's replacement date is reached, or when they fail to respond to operability tests.

Maintenance of household fuel gas detection systems shall be conducted according to the manufacturer's published instructions.

Chapter 9 Single- and Multiple-Station Alarms and Household Fuel Gas Detection

9.1 Application.

9.1.1* General.

9.1.1.1
The performance, selection, installation, operation, and use of single- and multiple-station alarms and household fuel gas detection systems shall be in accordance with the listing, the manufacturer's published instructions and the requirements of this chapter.

9.1.1.2
In cases where the manufacturer’s published instructions conflict with this standard, the requirements of this standard shall prevail.

9.1.2
Fuel gas detectors or systems shall be installed in all occupancies where required by applicable laws, codes, or standards.

9.1.3
The requirements of Chapter 4 through Chapter 6 shall not apply unless otherwise indicated.

9.1.4
The installation of fire or carbon monoxide alarms and detectors shall comply with the requirements of NFPA 72.

9.2 Purpose.

Fuel gas warning equipment for residential, and mixed-use occupancies that include residential, shall provide a reliable means to notify the occupants of the presence of levels of fuel gases that constitute a potential life safety or property risk and the need for action as a consequence of those levels.

9.3 Basic Requirements.

9.3.1
All devices, combinations of devices, and equipment to be installed in conformity with this chapter shall be listed for the purposes for which they are intended.

9.3.2
Fuel gas warning equipment shall be installed in accordance with the listing and manufacturer’s published instructions.
9.3.3* Installation Arrangement.

9.3.3.1

The installation of fuel gas alarms or fuel gas detectors, systems, or combinations of these, shall comply with the requirements of this chapter.

9.3.3.2

The installation of fuel gas alarms or fuel gas detectors, systems, or combinations of these, shall satisfy the minimum requirements for number and location of fuel gas alarms or fuel gas detectors by one of the following arrangements:

(1) The first arrangement shall be as follows:
   (a) The required minimum number and location of fuel gas detection devices shall be satisfied (independently) through the installation of fuel gas alarms.
   (b) The installation of additional fuel gas alarms shall be permitted.
   (c) The installation of additional system-based fuel gas detectors, including partial or complete duplication of the fuel gas alarms satisfying the required minimum, shall be permitted.

(2) The second arrangement shall be as follows:
   (a) The required minimum number and location of fuel gas detection devices shall be satisfied (independently) through the installation of system fuel gas detectors.
   (b) The installation of additional fuel gas detectors shall be permitted.
   (c) The installation of additional fuel gas alarms, including partial or complete duplication of the fuel gas detectors satisfying the required minimum, shall be permitted.

9.3.4

Supplementary functions, including the extension of an alarm beyond the residential occupancy, shall be permitted and shall not interfere with the performance requirements of this chapter. [72:29.3.4]

9.4 Required Protection.

9.4.1* Fuel Gas Alarms and Detectors.

The warning functions intended in this standard shall be performed by single- or multiple-station alarms or by detectors connected to a control unit and associated equipment, in accordance with 9.3.3.

9.4.1.1*

Fuel gas alarms or detectors shall be installed as follows:

(1) In proximity to or in free air communication with gas-fired appliances, equipment, and piping systems
(2) In basements or other subgrade rooms which have foundation penetrations that might convey migrating fuel gas leaks from outside the occupancy
(3) Where interconnection of alarms is required by 9.6.4, alarms located outside of each separate sleeping area in the immediate vicinity of the bedroom
(4) Other locations where required by applicable laws, codes, or standards
9.4.1.2*  
Each fuel gas alarm or detector shall be located on the wall, ceiling, or other location as specified in the manufacturer’s published instructions that accompany the unit as follows:

(1) Natural gas sensors or detectors shall be installed within 18 in. (460 mm) of ceiling.
(2) Propane gas sensors or detectors shall be installed within 18 in. (460 mm) of floor.
(3) Combination fuel gas/carbon monoxide alarms and detectors that are an integral part of a carbon monoxide detector or carbon monoxide alarm shall be located in accordance with the requirements for the fuel gases alarm or detector.

9.4.2 Alarm Notification Appliances.

9.4.2.1 General.

Each fuel gas alarm or detector shall cause the operation of an alarm notification appliance that meets the performance requirements of 6.4.2, 6.4.6.2, 6.4.6.4 and, if applicable, 9.4.2.4.

9.4.2.2 Signals from notification appliances shall not be required to be synchronized. [72:29.5.11]

9.4.2.3* Distinctive Signal.

The audible fuel gas alarm signal shall be both a five-pulse temporal pattern and in compliance with the following:

(1) Signals shall be a pattern consisting of five cycles of 100 milliseconds ± 10 percent “on” and 100 milliseconds ± 10 percent “off,” followed by 5 seconds ± 10 percent “off.”
(2) After the initial 4 minutes of alarm, the 5-second “off” time shall be permitted to be changed to 60 seconds.
(3) The alarm signal shall be repeated in compliance with 9.4.2.3(1) and 9.4.2.3(2) until the alarm resets or the alarm signal is manually silenced.

9.4.2.4* Alarm Notification Appliances for the Hearing Impaired.

9.4.2.4.1 Notification appliances provided in sleeping rooms and guest rooms for those with hearing loss shall comply with 9.4.2.4.1.1 and 9.4.2.4.1.2, as applicable. [72:29.5.10]

9.4.2.4.1.1* Mild to Severe Hearing Loss.

Notification appliances provided for those with mild to severe hearing loss shall comply with the following:

(1) An audible notification appliance producing a low frequency alarm signal shall be installed in the following situations:
   (a) Where required by governing laws, codes, or standards for people with hearing loss
   (b) Where provided voluntarily for those with hearing loss
(2) The low frequency alarm signal output shall have a waveform with a fundamental frequency of 520 Hz ± 10 percent.

9.4.2.4.1.2* Moderately Severe to Profound Hearing Loss.

Visual notification appliances in accordance with the requirements of 6.5.5.8 and tactile notification appliances in accordance with the requirements of Section 6.10 shall be required for those with moderately severe to profound hearing loss in the following situations:

(1) Where required by governing laws, codes, or standards for people with hearing loss
(2) Where provided voluntarily for those with hearing loss

[72:29.5.10.2]

9.4.2.4.2  
Where visual appliances are provided, they shall meet the requirements of Section 6.5. [72:29.5.8]
9.4.2.4.3
Since hearing deficits are often not apparent, the responsibility for advising the appropriate person(s) of the existence of this deficit shall be that of the party with hearing loss. [72:29.5.9]

9.4.2.4.4
Visible notification appliances used with single- or multiple-station fuel gas alarms shall be permitted to operate in accordance with 9.5.5.

9.5 Power Supplies.

9.5.1 General.

9.5.1.1
Power supplies shall have the capacity to continuously operate the alarm signal(s) for not less than 12 hours.

9.5.1.2
Electrically powered fuel gas warning equipment shall be provided with a primary ac power source in accordance with 9.5.2.1 and a secondary power source in accordance with 9.5.4, unless otherwise permitted by the following:

1) Detectors shall be permitted to be powered by a monitored dc circuit of a control unit where power for the control unit meets the requirements of Section 9.5 and the circuit remains operable upon loss of primary ac power.

2) A detector and a wireless transmitter that serves only that detector shall be permitted to be powered from a monitored battery primary source where part of a listed, monitored, low-power radio wireless system.

3) In existing construction, a monitored battery primary power source, in accordance with 9.5.3, shall be permitted.

9.5.2 Primary Power Supply—ac.

9.5.2.1
An ac primary power source shall be a commercial light and power supply or other dependable source.

9.5.2.2
A visible "power on" indicator shall be provided.

9.5.2.3
Primary ac power shall be supplied from either a dedicated branch circuit or the unswitched portion of a branch circuit also used for power and lighting.

9.5.2.4
Electrical systems designed to be installed by other than a qualified electrician shall be powered from a source not in excess of 30 volts that meets the requirements for Class 2 circuits as defined in Article 725 of NFPA 70.

9.5.2.5*
A restraining means shall be provided for the plug of any cord-and-plug-connected installation.

9.5.2.6 Loss of Power.

9.5.2.6.1
Operation of a switch, other than a circuit breaker, ground fault circuit interrupter (GFCI), or arc-fault circuit interrupter (AFCI), shall not cause loss of primary ac power alarms powered by branch circuits protected by arc-fault circuit interrupters or ground-fault circuit-interrupters.

9.5.2.6.2
Primary ac power alarms powered by branch circuits protected by arc-fault circuit interrupters or ground-fault circuit-interrupters shall have a secondary power source.
9.5.2.7
The requirement of 9.5.2.6 shall not apply to branch circuit overcurrent devices of other than GFCl and AFCI types.

9.5.2.8
Neither loss nor restoration of primary ac power shall cause an alarm signal exceeding 2 seconds.

9.5.2.9
The primary ac power supply shall be of sufficient capacity to operate the system under all conditions of loading with any secondary battery disconnected or fully discharged.

9.5.3 Primary Power Supply—Monitored Battery.

9.5.3.1
Fuel gas warning equipment shall be permitted to be powered by a battery, provided that the battery is monitored to ensure that all of the following conditions are met:

(1) The power requirements are met for not less than 1 year of battery life, including monthly testing.

(2) A distinctive audible trouble signal sounds before the battery is incapable of operating the device(s) for alarm purposes from causes such as aging or terminal corrosion.

(3) Automatic transfer is provided from alarm to a trouble condition for a unit employing a lock-in alarm feature.

(4) The unit is capable of producing an alarm signal for not less than 12 hours at the battery voltage at which a trouble signal is normally obtained, followed by not less than 7 days of trouble signal operation.

(5) After the initial 4 minutes of alarm, the 5-second “off” time of the alarm signal can be changed to not greater than 60 seconds.

(6) The audible trouble signal is produced not less than once every minute for 7 consecutive days.

(7) Acceptable replacement batteries are identified by the manufacturer’s name and model number on the unit near the battery compartment.

(8) A visible indication is displayed when a primary battery is removed from the unit.

(9) A visible “power on” indicator is provided.

9.5.3.2
If an alarm uses a nonrechargeable, nonreplaceable battery as a primary power supply, both of the following shall apply:

(1) The battery shall be capable of powering the unit for its service life, including testing.

(2) The battery shall meet the requirements of 9.5.3.1.

9.5.4 Secondary Power Supply.

9.5.4.1
A secondary power supply shall have the capacity to power the unit for 24 hours, followed by not less than 12 hours of alarm, followed by not less than 7 consecutive days of trouble signals.

9.5.4.2
After the initial 4 minutes of alarm, the 5-second “off” time of the alarm signal shall be permitted to be changed to not greater than 60 seconds.

9.5.4.3
Removal or disconnection of a battery used as a secondary power source shall cause an audible or visual trouble signal.
9.5.4.4
Replacement batteries shall be specified by the manufacturer's name and model number on the unit near the battery compartment.

9.5.4.5
Where required by law for disposal reasons, rechargeable batteries shall be removable.

9.5.4.6
An audible trouble signal shall sound before the battery is incapable of operating the device(s) for alarm purposes from causes such as aging, discharge, or terminal corrosion.

9.5.4.7
Automatic recharging shall be provided where a rechargeable battery is used as a secondary supply.

9.5.4.8
Where automatic recharging is provided, the battery shall be recharged within one of the following time periods:

(1) Within 4 hours where power is provided from a circuit that can be switched on or off by means other than a circuit breaker

(2) Within 48 hours where power is provided from a circuit that cannot be switched on or off by means other than a circuit breaker

9.5.5*
Visible notification appliances used with single- or multiple-station fuel gases alarms shall not be required to operate upon loss of primary ac power.

9.6 Equipment Performance.

9.6.1 Fuel Gas Alarms and Detectors.

9.6.1.1
Each fuel gas alarm shall be in compliance with UL 1484, Residential Gas Detectors.

9.6.1.2* Twenty-five Percent Threshold.

9.6.1.2.1
Each fuel gas alarm or detector designed to alarm at a concentration threshold of 25 percent LEL or lower shall be in compliance with UL 2075, Gas and Vapor Detectors and Sensors.

9.6.1.2.2
Each fuel gas alarm or detector designed to alarm at a concentration threshold of 25 percent LEL or lower shall meet the sensitivity testing and alarm thresholds of UL 1484, Residential Gas Detectors.

9.6.1.2.3
The upper detection threshold shall be as follows:

(1) The upper detection threshold shall be 25 percent or less of the LEL

(2) The upper detection threshold shall be determined by the following formula:

\[ U = \frac{K + 1}{2} \]

where:

- \( U \) = upper detection threshold
- \( K = 25 \)
- \( I \) = initial detection threshold the detector is intended to detect
9.6.1.2.4 Fuel gas detectors shall be marked in accordance with their listing.

9.6.1.3* Ten Percent Threshold.

9.6.1.3.1 Each fuel gas alarm or detector designed to alarm at a concentration threshold at or below 10 percent LEL shall be in compliance with UL 2075, *Gas and Vapor Detectors and Sensors*

9.6.1.3.2 Each fuel gas alarm or detector designed to alarm at a concentration threshold at or below 10 percent LEL shall meet the sensitivity testing and alarm thresholds of UL 1484, *Residential Gas Detectors*.

9.6.1.3.3 The upper detection threshold shall be as follows:

(1) The upper detection threshold shall be 10 percent or less of the LEL

(2) The upper detection threshold shall be determined by the following formula:

\[ U = \frac{K + 1}{2} \]  

where:

- \( U \) = upper detection threshold
- \( K = 20 \)
- \( I \) = initial detection threshold the detector is intended to detect

9.6.1.3.4 Fuel gas detectors shall be marked in accordance with their listing.

9.6.1.4* Fuel gas alarms or detectors shall not exhibit false alarms in the presence of acetone and ethanol at a concentration resulting from a spill in a typical household room.

9.6.1.5 All signals produced from periodic testing of fuel gas alarms or detectors shall be identical to the signal produced when the unit is in alarm.

9.6.1.6 Trouble signals shall be distinctive from alarm signals. [72:29.10.3.4]

9.6.1.7 Unless otherwise recommended by the manufacturer’s published instructions, fuel gas alarms and detectors shall be replaced when they fail to respond to tests.

9.6.1.8 Fuel gas alarms shall be replaced when either the end-of-life signal is actuated or the manufacturer’s replacement date is reached.

9.6.1.9* Combination fuel gas, smoke, or carbon monoxide alarms shall be replaced when the end-of-life signal activates or 10 years from the date of manufacture, whichever comes first.

9.6.1.10 Combination fuel gas, smoke, or carbon monoxide alarms shall be replaced when either the end-of-life signal is actuated or the manufacturer’s replacement date is reached.

9.6.2 Audible Alarm Signals.
9.6.2.1
All alarm-sounding appliances shall have a minimum rating of 85 dBA at 10 ft (3 m).

9.6.2.2
The audible alarm signal for fuel gas alarms shall comply with the requirements of 5.8.6.5.1.

9.6.3 Multiple-Purpose Alarms.
9.6.3.1
A fire alarm signal shall take precedence and be recognizable over any other signal, even when the nonfire signal is initiated first.

9.6.3.2
Different audible alarm signals shall be provided for each of the following:
(1) Fire alarms
(2) Fuel gas alarms
(3) Carbon monoxide alarms
(4) Other alarms

9.6.4 Interconnection of Alarms.
Where two or more alarms are installed within a dwelling unit, suite of rooms, or similar area they shall be arranged so that the operation of any alarm causes all alarms within these locations to sound.

9.6.4.1
In existing occupancies, alarms shall not be required to cause all alarms to sound.

9.6.4.2*
The interconnection of alarms shall comply with the following:
(1) Alarms shall not be interconnected in numbers that exceed the manufacturer's published instructions.
(2) In no case shall more than 18 initiating devices be interconnected (of which 12 can be smoke alarms) where the interconnecting means is not supervised.
(3) In no case shall more than 64 initiating devices be interconnected (of which 42 can be smoke alarms) where the interconnecting means is supervised.
(4) Alarms of different manufacturers shall not be interconnected unless listed as being compatible with the specific model.
(5) When alarms of different types are interconnected, all interconnected alarms shall produce the appropriate audible response for the phenomena being detected or remain silent.

9.6.4.3
Auxiliary components, such as, but not limited to, relay modules or notification appliances, listed for use with fuel gas alarms shall be permitted, provided that an open or short circuit of the wiring leading to these components does not prevent normal operation of the interconnected alarm.

9.6.4.4
Fuel gas alarms shall not be interconnected with alarms from other manufacturers unless listed as being compatible with those specific models.

9.6.4.5
A single fault on the wiring connecting the alarms shall not prevent the independent operation of any of the interconnected alarms.
9.6.4.6
The test feature on any alarm device shall cause all interconnected alarms to activate the alarm signal.

9.6.5 Control Equipment.

9.6.5.1
Control equipment shall be automatically restored upon restoration of electrical power.

9.6.5.2
The control equipment shall be of a type that latches on an alarm condition.

9.6.5.3
Where a reset switch is provided, it shall be of a self-restoring type.

9.6.5.4
An alarm-silencing switch shall not be provided unless one of the following criteria applies:

(1) The silenced position is indicated by a distinctive signal.
(2) The switch is a momentary or self-restoring switch.

9.6.5.5
Each electrical fuel gas detection system shall have an integral test means to allow testing of the system operation.

9.6.6 Combination Systems.

9.6.6.1
Where common wiring is employed for a combination system, the equipment for other than a fire warning signaling system shall be permitted to be connected to the common wiring of the system provided that the following conditions are met:

(1) Short circuits, open circuits, or any other ground fault in equipment or interconnection between this equipment and the fire warning system does not interfere with the monitoring for integrity of the fire warning system.
(2) Short circuits, open circuits, or any other ground fault in this equipment or interconnection between this equipment and the fire warning system does not prevent alarm or trouble signal transmissions.

9.6.6.2
In a combination system, the operation shall be as follows:

(1) A fire alarm signal shall take precedence or be annunciated over any other signal, even when the nonfire or fuel gas signal is initiated first.
(2) Different audible alarm signals shall be provided for each of the following:
   (a) Fire alarms
   (b) Fuel gas alarms
   (c) Carbon monoxide alarms
   (d) Other alarms
(3) The use of a common audible notification appliance shall be permitted if distinctive signals are obtained.

9.6.6.3
Single- or multiple-station fuel gas alarms shall be permitted to be connected to system control equipment located within the dwelling unit.

9.6.6.4
When connected, the actuation of a single- or multiple-station fuel gas alarm shall initiate an alarm signal at the system control equipment located within the dwelling unit.
9.6.7 Interconnection to Fire Alarm or Combination Control Units.

9.6.7.1
Operation of fuel gas alarms or detectors shall not cause fire alarm or combination control units to activate either protected premises or supervising station fuel gas signals.

9.6.7.2
Where fuel gas warning equipment is connected to a protected premises fire alarm system, receipt of signals shall initiate the signal required by 9.6.2.

9.6.8 Supervising Station Systems.

9.6.8.1*
Unless as permitted by 9.6.8.2, fuel gas warning equipment signals that are transmitted off-premises shall comply with the requirements of Chapter 7 and the following:

(1) Where required, immediately retransmit indication of the fuel gas alarm signal to the communications center
(2) Contact the responsible party(s) in accordance with the notification plan

9.6.8.2
The immediate retransmission of the signals described in 9.6.8.1 shall be permitted to be delayed by not more than 90 seconds where the jurisdiction permits the supervising station to first contact the protected premises to determine if the alarm was initiated by the activation of a test.

9.6.8.3
Once contacted, the subscriber shall be one of the following:

(1) Informed to take action in accordance with the manufacturer’s published instructions
(2) Advised to take the following actions where manufacturer’s published instructions are not available:
   (a) SMELL GAS ACT FAST, leave the building immediately. If an odor is present or gas alarm is activated, take others with you. If you are outside when you smell the gas, leave the area immediately.
   (b) Avoid causing a spark or operating any electrical system component, which might cause the gas to ignite, such as the following:
      i. Do not create a source of flames, including matches and lighters, and do not smoke or vape
      ii. Do not turn on/off anything electrically powered, appliances or lights
      iii. Do not use a flashlight
      iv. Do not start a car or any vehicle
      v. Do not use a telephone, cell phone, or other communication device
      vi. Do not ring doorbells
   (c) Use a phone/cellphone or other communication device away from the area and immediately call 911 or your gas utility. Always call to report the gas odor or alarm. Do not assume someone else will do it.
   (d) Do not reenter the area until the area is deemed to be safe. Follow directions from utility employees or emergency responders who are on site.

9.6.8.4 Supervising Stations.

9.6.8.4.1
Transmission of signals from single- and multiple station alarms to a constantly attended supervising station shall be processed by a household alarm system or as permitted by 7.1.2
9.6.8.4.2
Where a digital alarm communicator transmitter (DACT) is used, the DACT serving the protected premises shall only require a single telephone line and shall only require a call to a single digital alarm communicator receiver (DACR) number. [72:29.10.9.10.1]

9.6.8.4.3
Where a DACT is used, the DACT test signals shall be transmitted at least monthly. [72:29.10.9.10.2]

9.6.8.4.4*
Requirements for indication of central station service shall not be required.

9.6.8.4.5
Where a communication or transmission means other than DACT is used, only a single communication technology and path shall be required to serve the protected premises. [72:29.10.9.10.3]

9.6.8.4.6
Where a communication or transmission means other than DACT is used, all equipment necessary to transmit an alarm signal shall be provided with a minimum of 24 hours of secondary power capacity and shall report a trouble condition indicating loss of primary power. [72:29.10.9.10.4]

9.6.8.4.7
Failure of the communication path referenced in 9.6.8.4.5 shall be annunciated at the supervising station and at the protected premises within not more than 7 days of the failure. [72:29.10.9.10.5]

9.6.8.4.8
A dedicated cellular telephone connection shall be permitted to be used as a single means to transmit alarms to a constantly attended remote monitoring location. [72:29.10.9.10.6]

9.6.8.5
Household alarm systems shall be programmed by the manufacturer to generate at least a monthly test of the communication or transmission means.


9.6.9.1
Low-power radio (i.e., wireless) systems shall comply with the requirements of Section 5.12.

9.6.9.2
The requirements of 5.12.4.5 shall not apply to dwelling units.

9.6.10 Nonsupervised Wireless Interconnected Alarms.

9.6.10.1
Fire alarm signals shall have priority over all other signals. [72:29.10.8.2.2]

9.6.10.2
The maximum allowable response delay from activation of an initiating device to receipt and alarm/display by the receiver/control unit shall be 20 seconds. [72:29.10.8.2.3]

9.6.10.3*
Wireless interconnected fuel gas alarms—in receive mode—shall remain in alarm as long as the originating unit (i.e., transmitter) remains in alarm.

9.6.10.4
The occurrence of any single fault that disables a transceiver shall not prevent other transceivers in the system from operating. [72:29.10.8.2.5]

9.7 Installation.

9.7.1 General Provisions.
9.7.1.1
All fuel gas alarms or detectors shall be installed in accordance with the manufacturer's published instructions.

9.7.1.2
All fuel gas alarms or detectors shall be located and mounted so that accidental operation will not be caused by jarring or vibration.

9.7.1.3
All fuel gas alarms or detectors shall be supported independently of their attachment to wires.

9.7.1.4
All fuel gas alarms or detectors shall be tested in accordance with the instructions provided by the supplier or installing contractor to ensure operation after installation. (See 9.9.2 and 9.9.3.)

9.7.1.5
The supplier or installing contractor shall provide the owner with the instructions required in 9.9.3.

9.7.2 Multiple-Station Alarms.

9.7.2.1*
Interconnection that causes the other multiple-station alarms or the fuel gas notification signal of multiple-purpose alarms within an individual dwelling unit to produce an alarm signal shall be permitted.

9.7.2.2
Remote annunciation from single- and multiple-station alarms shall be permitted provided the devices comply with 9.4.2 and 9.6.4.

9.7.2.3
Remote annunciation shall be permitted provided the signal is identifiable for the hazard it annunciates.

9.8 Inspection, Testing, and Maintenance.

9.8.1
Single- and multiple-station fuel gas alarms shall be maintained and tested in accordance with Section 8.7.

9.8.2
All fuel gas alarms or detectors shall be restored to their normal mode of operation after each alarm or test.

9.8.3
Household fuel gas detection systems shall be maintained and tested in accordance with Section 8.8.

9.9 Markings and Instructions.

9.9.1 General.
Fuel gas alarms or detectors shall be provided with the information specified in 9.9.2 and 9.9.3.
9.9.2 Markings.
The following information shall be both marked on the alarms and detectors and provided in the instructions:

1. Identification of the sensitivity level at which the unit is designed to sense fuel gas
2. Statement that indicates the unit is not suitable as a fire detector
3. Name and address of the manufacturer or listee
4. Model number
5. Mark or certification that the unit has been listed by a nationally recognized testing laboratory
6. Electrical rating, if applicable
7. Explanation of signal indicators
8. Warning that fuel gas is colorless and tasteless
9. Emergency actions to be taken
10. Manufacturing date or date code
11. Recommended replacement date

9.9.3 Instructions.
The following information shall be included in the printed instructions provided with fuel gas alarms and detectors:

1. Installation instructions
2. Operating instructions
3. Testing instructions
4. Maintenance instructions
5. Replacement and service instructions
6. Statement indicating that odor might not be present during a fuel gas alarm condition
7. Information on the actions to be taken in case of an alarm or a gas odor
8. Minimum and recommended distances from fuel-gas-burning appliances

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1
This document does not attempt to cover all equipment, methods, and requirements that might be necessary or advantageous for the protection of life and property from fuel gas releases.
A.1.1.2

The requirements in this standard specifically address fuel gas alarm and fuel gas detection systems in residential and commercial mixed occupancies. The requirements also have applicability to other occupancies (e.g., industrial facilities, power plants) if deemed necessary by applicable laws, codes, and standards for a specific type of occupancy.

Additionally, see NFPA 1192 for equipment for use in recreational vehicles.

See UL 2075, Safety Gas and Vapor Detectors, and UL 1484, Residential Gas Detectors.

UL 2075 is intended to address toxic and combustible gas and vapor detectors and sensors, which includes an assembly of electrical components coupled with a sensing means inside a chamber, or by separate components to detect toxic or combustible gases or vapors. Detectors in UL 2075 cover a broad spectrum of applications, including residential, industrial and commercial use. Detectors are intended for monitoring the environment for open area protection and for connection to a compatible power supply or control unit for operation as part of gas detection or emergency signaling systems. In addition, UL 2075 addresses detectors solely for control of ventilation or shut-off devices such as fans or control valves as provided by the listing. UL 2075 also covers equipment intended for use in hazardous locations.

The scope of UL 1484 is specifically intended to address requirements for electrically operated gas alarms intended for residential and recreational vehicle occupancies to detect fuel gases such as propane and natural gas. Devices are intended to be factory built as a complete assembly and to function as a self-contained alarm device that consists of an assembly of electrical components including an element to detect gas concentration, an alarm sounding appliance, and a provision for connection to a power supply source. Devices are specifically not intended for use in hazardous locations as defined in NFPA 70, for industrial or commercial use, or for use as smoke and fire detectors or alarms.

While UL 2075 in itself does not cover self-contained and single- and multiple-station residential fuel gas alarms otherwise covered in UL 1484, sensors, detectors, or alarms covered in UL 2075 must operate within the sensitivity parameters defined by the manufacturer but must not exceed alarm limits defined in UL 1484 (e.g., a detector must produce an alarm signal at or below 25 percent of the lower explosive limit).

A.1.2

Fuel gas alarms and detectors are intended to alarm at fuel gas concentrations below those that are known to be dangerous or explosive. (See also Table B.1.)

A.1.3.2

Although fuel gas detection and warning equipment might respond to gases produced by unwanted fires or carbon monoxide releases, it is not intended to be fire or carbon monoxide detection or warning equipment.

A.1.6.7

Where dimensions are expressed in inches, it is intended that the precision of the measurement be 1 in., thus plus or minus \( \frac{1}{2} \) in. The conversion and presentation of dimensions in millimeters would then have a precision of 25 mm, thus plus or minus 13 mm.

A.3.2.1 Approved.

The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA codes and other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.
A.3.2.2 Authority Having Jurisdiction (AHJ).

The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.4 Listed.

The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.
A.3.3.1 Acoustically Distinguishable Space (ADS).
All parts of a building or area intended to have occupant notification are subdivided into ADSs as defined. Some ADSs might be designated to have voice communications capability and require that those communications be intelligible. Other spaces might not require voice intelligibility or might not be capable of reliable voice intelligibility. An ADS might have acoustical design features that are conducive for voice intelligibility, or it might be a space where voice intelligibility could be difficult or impossible to achieve. Each is still referred to as an ADS. [72:A.3.3.6]

In smaller areas, such as those under 400 ft² (37 m²), walls alone will define the ADS. In larger areas, other factors might have to be considered. In spaces that might be subdivided by temporary or movable partitions, such as ballrooms and meeting rooms, each individual configuration should be considered a separate ADS. Physical characteristics, such as a change in ceiling height of more than 20 percent, or a change in acoustical finish, such as carpet in one area and tile in another, would require those areas to be treated as separate ADSs. In larger areas, there might be noise sources that require a section to be treated as a separate ADS. Any significant change in ambient noise level or frequency might necessitate an area be considered a separate ADS.

In areas of 85 dBA or greater ambient sound pressure level, meeting the pass/fail criteria for intelligibility might not be possible, and other means of communications might be necessary. So, for example, the space immediately surrounding a printing press or other high-noise machine might be designated as a separate ADS, and the design might call for some form of effective notification but not necessarily require the ability to have intelligible voice communications. The aisles or operator’s control stations might be separate ADSs where intelligible voice communication might be desired. [72:A.3.3.6]

Significant differences in furnishings — for example, an area with tables, desks, or low dividers adjacent to an area with high shelving — would require separate consideration. The entire desk area could be a single acoustic zone, whereas each area between shelving could be a unique zone. Essentially, any noteworthy change in the acoustical environment within an area will mandate consideration of that portion of the area to be treated as an acoustic zone. Hallways and stairwells will typically be considered as individual acoustic zones. [72:A.3.3.6]

Spaces confined by walls with carpeting and acoustical ceilings can be deemed to be one ADS. An ADS should be an area of consistent size and material. A change of materials from carpet to hard tile, the existence of sound sources, such as decorative waterfalls, large expanses of glass, and changes in ceiling height, are all factors that might separate one ADS from another. [72:A.3.3.6]

Each ADS might require different components and design features to achieve intelligible voice communication. For example, two ADSs with similar acoustical treatments and noise levels might have different ceiling heights. The ADS with the lower ceiling height might require more ceiling-mounted loudspeakers to ensure that all listeners are in a direct sound field (see Figure A.3.3.1). Other ADSs might benefit from the use of alternate loudspeaker technologies, such as line arrays, to achieve intelligibility. [72:A.3.3.6]

An ADS that differs from another because of the frequency and level of ambient noise might require the use of loudspeakers and system components that have a wider frequency bandwidth than conventional emergency communications equipment. However, designers should not use higher bandwidth loudspeakers in all locations, unless needed to overcome certain acoustic and ambient conditions. This is because the higher bandwidth appliance will require more energy to perform properly. This increases amplifier and wire size and power supply requirements. [72:A.3.3.6]

In some spaces, it might be impractical to achieve intelligibility, and, in such a case, alternatives to voice evacuation might be required within such areas. [72:A.3.3.6]

Figure A.3.3.1 Illustration Demonstrating the Effect of Ceiling Height. (Source: R. P. Schifiliti Associates, Inc.) [72:Figure A.3.3.6]
A.3.3.4 Communications Center.

Examples of functions of a communications center are as follows:

1. Communications between the public and the communications center
2. Communications between the communications centers, the emergency response agency (ERA), and emergency response facilities (ERFs)
3. Communications within the ERA and between different ERAs

A.3.3.5 Device (Class N).

Class N devices include components connected to a Class N network that monitor the environment (e.g., smoke, heat, contact closure, manual "in case of fire" pull) and/or provide some output(s) (e.g., dry contact, audible/visual alert/notification, addressable loudspeaker) that are required to provide the real-time functionality necessary for the protection of life and property. In this way, a component connected to the network used for noncritical functions (i.e., maintenance) can be differentiated and excluded from the monitoring for integrity requirements of Class N.

Also in this way, transport equipment (e.g., switches, routers, hubs, media converters) and other equipment (e.g., printers, storage devices) can be differentiated from the requirements applied to Class N devices if they do not provide life safety-specific environmental monitoring, inputs, or outputs for the life safety system. This is not to say that this equipment is not important to the overall operation of the system, just that this equipment is not considered a “device” in the context of Class N. Equipment that does not meet the definition of a device cannot be specifically supervised but rather generally supervised as they are part of the supervised pathways that service the Class N devices themselves.

A.3.3.7 Emergency Response Agency (ERA).

An ERA includes any public, governmental, private, industrial, or military organization that engages in the operations specified in the definition.

A.3.3.13 Fuel-Gas-Burning Appliance.

Fuel-gas-burning appliances include, but are not limited to, devices used for cooking, heating, lighting, or decorative purposes. Examples are stoves, portable space heaters, ranges, furnaces, water heaters, clothes dryers, gas refrigerators, gas lamps, and fuel-gas-burning fireplaces.

A.3.3.14 Fuel Gas Control Function Interface Device.

The fuel gas control function interface device is a listed relay or other listed appliance that is part of the fuel gas detection system. An example of a fuel gas control function interface device is the fuel gas detection system control relay that removes power to a fan control unit (i.e., closes a valve shutting off the supply gas).

A.3.3.16 Fuel Gas Detection Control Unit.

In addition to the functions identified in the definition, a fuel gas control unit might have an integral operator interface, and supply power to detection devices, notification appliances, transponder(s), or off-premises transmitter(s) or any combination of these. The control unit might also provide transfer of condition to relay or devices connected to the control unit. There can be multiple fuel gas control units in a fuel gas alarm system.
A.3.3.20 Lower Explosive Limit (LEL).

The LEL of fuel gas mixtures is often estimated to be the LEL of the primary fuel gas constituent, for example, with natural gas the LEL is based on methane (5 percent by volume gas in air). However, the actual LEL for natural gas depends on the gas composition and is generally less than 5 percent gas in air considering other mixed gas components such as ethane and other hydrocarbons that might be present. The actual LEL of a combustible gas mixture ($L_{ELMIX}$) can be calculated using the Le Chatelier’s mixing rule. $L_{ELMIX}$ is calculated using the gas composition (in mol percent) from a complete gas analysis of the combustible gas and the LELs of the constituents as follows:

$$L_{ELMIX} = \frac{100}{\sum x_i / LEL_i} \text{[A.3.3.2]}$$

where:

- $x_i$ = mole percentage hydrocarbon component $i$ in the gas mixture
- $LEL_i$ = component $i$’s LEL

The gas composition is typically determined with gas chromatography, per analytical methods per ASTM D1945, *Standard Test Method for Analysis of Natural Gas by Gas Chromatography*; GPA 2261, *Analysis for Natural Gas and Similar Gaseous Mixtures by Gas Chromatography*; or GPA 2286, *Method for the Extended Analysis of Hydrocarbon Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Temperature Programmed Gas Chromatography*. These methods provide the composition of natural gas in mol percent, which is equivalent to volume percent.

For example, calculate the LEL of a mixture of 90 percent methane (LEL 5 percent per Table B.1) and 10 percent ethane (LEL 3 percent per Table B.1):

$$L_{ELMIX} = \frac{100}{\left(\frac{90}{5} + \frac{10}{3}\right)} = 4.7\% \text{ gas in air} \text{[A.3.3.2]}$$

A.3.3.21 Nonrequired.

There are situations where the applicable building or fuel gas code does not require the installation of a fuel gas detection system or specific fuel gas detection system components, but the building owner wants to install a fuel gas detection system or component to meet site specific needs or objectives. A building owner always has the option of installing protection that is above the minimum requirements of the standard. It is the intent of the standard that any fuel gas detection system, or fuel gas detection system components installed voluntarily by a building owner, meet the requirements of the applicable portions of the standard. However, it is not the intent of the standard that the installation of a nonrequired fuel gas detection system, or fuel gas detection system components, trigger requirements for the installation of additional fuel gas detection system components or features. For example, the installation of a fuel gas detection control unit and fuel gas detectors to service a specific area, such as a computer room or flammable liquid storage room, does not trigger a requirement for audible or visual notification appliances, manual alarm boxes, or other fuel gas detection system features in other parts of the building.

A.3.3.25 Off-Premises Monitoring.

Examples of supervising station service are central station, proprietary supervising station, and remote supervising station monitoring.

A.3.3.28 Separate Sleeping Area.

Bedrooms (or sleeping rooms) separated by other use areas, such as kitchens or living rooms (but not bathrooms), are considered separate sleeping areas. [72:3.3.258]

A.3.3.29.3 Trouble Signal.

Examples include off-normal outputs from integrity monitoring circuits, the light and sound from activated trouble notification appliances, trouble data transmission to a supervising station, and so forth. [72:A.3.3.263.10]
A.3.3.3.2 Combination System.

Examples of non-fire systems are security, card access control, closed circuit television, sound reinforcement, background music, paging, sound masking, building automation, time, and attendance. [72:A.3.3.111.1]

A.4.3.2

The manufacturer’s published instructions are intended to provide device- or system-specific installation, operation, and maintenance requirements. These requirements could vary based on the fuel gas or gases the detector/system is intended to detect, the sensor technology utilized, and other device- or system-specific installation, operation, and maintenance variables.

A.4.3.3

This requirement does not apply to notification appliance circuits. [72:A.10.3.3]

A.4.3.4

A relay used for fuel gas safety functions is one possible example of such a situation.

A.4.4.3

It is not the intent to require personnel performing simple inspections or operational tests of initiating devices to require factory training or special certification, provided such personnel can demonstrate knowledge in these areas. [72:A.10.5.3]

A.4.4.3.1

The requirements for inspection personnel can vary depending on the type of inspection being performed. The purpose for initial and reacceptance inspections is to ensure compliance with approved design documents and to ensure installation in accordance with this standard and other required installation standards. Therefore, the acceptance inspector should be performed by someone who is familiar with the specific requirements, the design documents, and the applicable codes and standards. This implies that acceptance inspections should be performed by the persons or entities responsible for the system design and by authorities having jurisdiction. [72:A.10.5.3.1]

Once a system or a change to a system has been accepted, the inspection needs also change. The purpose for periodic inspections is to assure that obvious damages or changes that might affect the system operability are visually identified. Those persons performing periodic system inspections might or might not be familiar with all the specific system design goals and requirements. While many periodic inspections could uncover design faults, the intent of this standard is for such problems to be discovered at the acceptance inspection. The standard does not intend to require persons performing periodic inspections necessarily to be knowledgeable or qualified for inspecting and verifying the design of a system. [72:A.10.5.3.1]

A.4.4.3.2

Testing personnel knowledge should include equipment selection, placement, and installation requirements of this standard and the manufacturer’s published documentation. [72:A.10.5.3.2]

A.4.4.3.4(1)

Factory training and certification is intended to allow an individual to service equipment only for which he or she has specific brand and model training. [72:A.10.5.3.4(1)]

A.4.4.3.4(2)

Nationally recognized certification programs might include those programs offered by the International Municipal Signal Association (IMSA), National Institute for Certification in Engineering Technologies (NICET), and the Electronic Security Association (ESA). NOTE: These organizations and the products or services offered by them have not been independently verified by the NFPA, nor have the products or services been endorsed or certified by the NFPA or any of its technical committees.
A.4.4.3.4(3)

Licenses and certifications offered at a state or local level are intended to recognize those individuals who have demonstrated a minimum level of technical competency in the area of fuel gas alarm servicing.

A.4.4.3.5

This is not intended to require certification where it is not offered or required by the manufacturer. [72:A.10.5.3.5]

A.4.5.5.2

Multiple pieces of system equipment can be connected to a branch circuit, subject to the current capacity of the circuit. It is not intended that a branch circuit be limited to a single piece of equipment. It is not intended that the circuit supply power to other than system equipment. For example, a branch circuit could power both an alarm control unit and an NAC power supply, but it could not power both an alarm control unit and a sprinkler system air compressor.

A.4.5.6.1

The secondary power supply is not required to supply power to the fuel gas detection system through parallel distribution paths. Automatic transfer switches are commonly used to allow secondary power to be supplied over the same distribution system as the primary power.

The generator does not need to be dedicated to the fuel gas detection system.

A.4.5.6.2.1

A combination system is a fire alarm system and is required to comply with NFPA 72.

A.4.5.6.2.2

An example of another standard is NFPA 731.

A.4.5.6.2.3.1

The 20-percent safety margin is intended to address normal aging effects on battery capacity. As a battery ages, rated capacity will decrease to 80 percent, which is considered the end of service life. As a minimum, a 20-percent correction factor should be applied for aging to ensure the battery can meet its current demand at the end of service life. At initial installation battery capacity can be as low as 90 percent and should gradually increase when it is subjected to several deep discharge/charging cycles or when it remains on float-charge for several weeks. For additional information on battery sizing considerations refer to IEEE 485, Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications. [72:A.10.6.7.2.1.1]

A.4.5.7

Where a computer system of any kind is used to receive and process alarm or supervisory signals, an ESS with sufficient capacity to operate the system until the secondary supply is capable of operating the fuel gas detection system might be required in order to prevent signal loss or a greater than 10-second signal delay.

ESS equipment often contains an internal bypass arrangement to supply the load directly from the line. These internal bypass arrangements are a potential source of failure. ESS equipment also requires periodic maintenance. It is, therefore, necessary to provide a means of promptly and safely bypassing and isolating the ESS equipment from all power sources while maintaining continuity of power supply to the equipment normally supplied by the ESS. [72:A.10.6.6]

A.4.5.8.1

Examples include the following:

(1) A notification appliance circuit power supply located remotely

(2) A power supply for transmitter required to transmit signals off premises

(3) Power over ethernet (PoE), where provided for control units, circuit interfaces, or other equipment essential to system operation, and located remotely from the main control unit
A.4.5.9.3.4

The circuitry and methods for charging batteries of various types are to be evaluated by a nationally recognized testing laboratory to ensure they are appropriate for the purpose. During primary power use, batteries are trickle charged if they are off-line and waiting to be put under load in the event of a loss of power. [72:A.10.6.10.3.4]

Float-charged batteries are fully charged and connected across the output of the rectifiers to smooth the output and to serve as a standby source of power in the event of a loss of line power. Other charging methods are used to restore capacity to a battery after it has been utilized during a loss of primary power. [72:A.10.6.10.3.4]

A.4.6.3

Control unit signals can be audible, visual, or both for any particular function. Some older systems used only audible indicators that had to be coded for users to know what the signal meant. Where a control unit uses both audible and visual indicators, the purpose of the audible signal is to get someone’s attention. In large system configurations, there might be multiple control units with audible signals. Also, there might be several different functions requiring an audible alert as a part of the whole signal. Thus, there could be several different audible signals. It is not the intent of this standard to have separate and distinct audible signals where clear visual distinction provides the user with the needed information. Visual signals, whether a lamp with a text label, an LCD screen, a computer monitor, or other textural visual appliances, are better forms of human interface. [72:A.10.10.4]

A.4.6.4

A valve supervisory, a low-pressure switch, or another device intended to cause a supervisory signal when activated should not be connected in series with the end-of-line supervisory device of initiating device circuits, unless a distinctive signal, different from a trouble signal, is indicated. [72:A.10.10.5]

A.4.7.3.1

Where it is desired to deactivate the notification appliances for fire service operations inside the building and signal evacuated occupants that an alarm is still present, it is recommended that a separate non-silenceable notification zone be provided on the exterior of the building. The audible and visual notification appliances located at the building entrances could serve as a warning to prevent occupant reentry. [72:A.10.12.2]

A.4.7.3.6

Resetting of alarm signals should not require the simultaneous operation of multiple reset switches or the disconnection of any wiring or equipment to reset the alarm condition. [72:A.10.11.6]

A.4.9.8.1

The purpose of automatic trouble re-sound is to remind owners, or those responsible for the system, that the system remains in a fault condition. A secondary benefit is to possibly alert occupants of the building that the fuel gas detection system is in a fault condition.

A.4.9.9.7

In large, campus-style arrangements with proprietary supervising stations monitoring protected premises systems, and in other situations where off-premises monitoring achieves the desired result, the authority having jurisdiction is permitted to allow the reactivation to occur only at the supervising station. Approval by the authority having jurisdiction is required so it can consider all fuel gas safety issues and make a determination that there are procedures in place to ensure that the intent is met; in other words, someone is available to take action to correct the problem.

A.4.10.2

The operability of controlled mechanical equipment should be verified by periodic testing. Failure to test and properly maintain controlled mechanical equipment can result in operational failure during an emergency, with potential consequences up to and including loss of life.
A.4.11.1(1)
The requirement of 4.11.1(1) does not preclude transfer to secondary supply at less than 85 percent of nominal primary voltage, provided the requirements of 4.5.6 are met. [72:A.10.3.5(1)]

A.4.11.2.1
Fuel gas alarm specifications can include some or all of the following:

1. Address of the protected premises
2. Owner of the protected premises
3. Authority having jurisdiction
4. Applicable codes, standards, and other design criteria to which the system is required to comply
5. Type of building construction and occupancy
6. Emergency forces response point(s) and annunciator location(s)
7. Type of fuel gas detection system to be provided
8. Calculations (e.g., secondary supply and voltage drop calculations)
9. Type(s) of fuel gas alarm–initiating devices, supervisory alarm–initiating devices, and notification appliances to be provided
10. Intended area(s) of coverage
11. Complete list of detection, signaling, and annunciator zones
12. Complete list of fuel gas safety control functions
13. Complete sequence of operations detailing all inputs and outputs

A.4.12.3
The primary purpose of annunciation is to enable responding personnel to quickly and accurately determine the status of equipment or fuel gas control functions that might affect the safety of occupants.

A.4.13
The provision of a double loop or other multiple path conductor or circuit to avoid electrical monitoring is not acceptable. [72:A.12.6]

A.4.13.7
This standard does not have jurisdiction over the monitoring integrity of conductors within equipment, devices, or appliances. [72:A.12.6.8]

A.4.13.16.2
Because digital alarm communicator systems establish communications channels between the protected premises and the central station via the public switched telephone network, the requirement to supervise circuits between the protected premises and the central station (see 4.13.1 and 4.13.2) is considered to be met if the communications channel is periodically tested in accordance with 26.6.4.1.5 of NFPA 72. [72:A.10.6.9.2]

A.4.13.16.4
This requirement is intended to prevent all of the supervising station alarm systems in a geographic area from transmitting simultaneous trouble signals (and overwhelming the associated supervising stations) in the event of a widespread power failure. A trouble signal is not intended to be transmitted if primary power is restored within the time delay. [72:A.10.6.9.3]
A.4.14.1.4
Fuel gas detection systems are often installed under construction or remodeling contracts and subsequently connected to a supervising station alarm system under a separate contract. All contractors should complete the portions of the record of completion documentation for the portions of the connected systems for which they are responsible. Several partially completed documents might be accepted by the authority having jurisdiction provided that all portions of the connected systems are covered in the set of documents.

A.4.14.1.5
Protected premises fuel gas detection systems are often installed under construction or remodeling contracts and subsequently connected to a supervising station alarm system under a separate contract. All contractors should complete the portions of the record of completion documentation for the portions of the connected systems for which they are responsible. Several partially completed documents might be accepted by the AHJ provided that all portions of the connected systems are covered in the set of documents.

A.4.14.2.2
It is important to note that shop drawings and particularly the word “sheets” do not necessarily mean physical paper sheets, but could be on electronic media. [72:A.7.4.2]

A.4.14.3.1.1
The requirements of Chapter 8 should be used to perform the installation wiring and operational acceptance tests required when completing the record of completion. [72:A.7.5.6.3]
The record of completion form is permitted to be used to record decisions reached prior to installation regarding intended system type(s), circuit designations, device types, notification appliance type, power sources, and the means of transmission to the supervising station.

A.4.14.4.3.1(1)
An owner’s manual should contain the following documentation:

(1) A detailed narrative description of the system inputs, evacuation signaling, ancillary functions, annunciation, intended sequence of operations, expansion capability, application considerations, and limitations
(2) A written sequence of operation in matrix or narrative form
(3) Operator instructions for basic system operations, including alarm acknowledgment, system reset, interpretation of system output (LEDs, CRT display, and printout), ancillary function controls, and change of printer paper
(4) A detailed description of routine maintenance and testing as required and recommended and as would be provided under a maintenance contract, including testing and maintenance instructions for each type of device installed. This information should include the following:
   (a) Listing of the individual system components that require periodic testing and maintenance
   (b) Step-by-step instructions detailing the requisite testing and maintenance procedures, and the intervals at which these procedures are to be performed, for each type of device installed
   (c) A schedule that correlates the testing and maintenance procedures
(5) A service directory, including a list of names and telephone numbers of those who provide service for the system.
A.5.2.2.1.1
Compatibility between software systems is necessary to ensure that the systems can communicate correctly and that the overall system can function as intended. Unfortunately, software that is compatible can become incompatible when the software is updated. Newer revisions of software might not maintain compatibility with older revisions. This paragraph requires that the fuel gas detection software or firmware that interfaces with software or firmware in another system is compatible. The term "required" indicates that this compatibility requirement is intended for required functions and not for supplemental functions that are not part of the required operation of the system. An example of a supplemental function might be an RS-232 port that connects to a terminal emulator program used for maintenance purposes. The term "functionally" is intended to ensure that the intended functionality is maintained by the software. It is trying to avoid a situation where a change in software revision might still be compatible but changes the available functionality so that the two systems no longer perform the intended functions, even though the software communicates correctly.

A.5.2.2.1.2
Compatibility between systems will be documented in one or the other (or both) of the manufacturer's installation documents for the compatible products and controlled by the listings agencies. This documentation will be referenced in the marking on the product. The documentation might be paper copy or electronic media (disk, web site, etc.). When a software revision changes, the documentation can be consulted to ensure that it is still compatible with the software or firmware on the other side of the interface.

A.5.2.2.2
A commonly used method of protecting against unauthorized changes can be described as follows (in ascending levels of access):

1. **Access Level 1.** Access by persons who have a general responsibility for safety supervision, and who might be expected to investigate and initially respond to a fuel gas alarm or trouble signal.
2. **Access Level 2.** Access by persons who have a specific responsibility for safety, and who are trained to operate the control unit.
3. **Access Level 3.** Access by persons who are trained and authorized to do the following:
   a. Reconfigure the site-specific data held within the control unit, or controlled by it.
   b. Maintain the control unit in accordance with the manufacturer's published instructions and data.
4. **Access Level 4.** Access by persons who are trained and authorized either to repair the control unit or to alter its site-specific data or operating system program, thereby changing its basic mode of operation.

A.5.3.2
Nonrequired fuel gas detection features are defined in 3.3.21. These are fuel gas detection systems or components that are not required by the building codes and are installed voluntarily by a building owner to meet site-specific fuel gas detection safety objectives. There is a need to properly document the nonrequired system and components. Nonrequired components must be operationally compatible in harmony with other required components and must not be detrimental to the overall system performance. It is for this reason that 5.3.2.1 mandates that nonrequired (voluntary) systems and components meet the applicable installation, testing, and maintenance requirements of this standard. It is not the intent of the standard to have the installation of nonrequired (voluntary) systems or components trigger a requirement for the installation of additional fuel gas detection components or features in the building. For example, if a building owner voluntarily installs a fuel gas detection control unit, that does not trigger a requirement to install other fuel gas detection system components or features. See also A.5.8.5.5 and A.6.1.5.

A.5.4.3
The intent of the circuit designations is not to create a hierarchal ranking; rather it is to provide guidance on the levels of performance.
A.5.4.3.1
Fiber-optic or wireless pathways are examples of Class A circuitry not impaired by earth ground connection or short-circuits and therefore do not annunciate those conditions as a fault. [72:A.12.3.1]

A.5.4.3.3
Class C is intended to describe technologies that supervise the communication pathway by polling or continuous communication “handshaking,” such as the following:

(1) Fuel gas detection control unit or supervising station connections to a wired LAN, WAN, or Internet
(2) Fuel gas detection control unit or supervising station connections to a wireless LAN, WAN, and Internet
(3) Fuel gas detection control unit digital alarm communicator transmitter or supervising station digital alarm communicator receiver connections to the public switched telephone network

Individual pathway segments are not required to be monitored. Supervision is accomplished by end-to-end communications. [72:A.12.3.3]

A.5.4.3.4
Class D is intended to describe pathways that are not supervised but have a fail-safe operation that performs the intended function when the connection is lost. Examples of such pathways include the following:

(1) Power to door holders where interruption of the power results in the door closing
(2) Power to locking hardware that release upon an open circuit or fuel gas detection operation

A.5.4.3.5
Class E is intended to describe pathways that do not require supervision as described in Section 4.13. [72:A.12.3.5]
A.5.4.3.6(1)
The Class N pathway designation is added to specifically address the use of modern network infrastructure when used in fire alarm or fuel gas detection and emergency communication systems.

Class N networks can be specified for ancillary functions but are not required for supplemental reporting described in 5.10.4. [See Figure A.5.10.4.] [72:A.12.3.6(1)]

Ethernet network devices are addressable but with an important distinction from device addresses on a traditional SLC multi-drop loop. A device with an Ethernet address is, in most cases, a physical endpoint connected to a dedicated cable. Traditional SLC devices are all wired on the same communication line (in parallel), similar to an old party-line telephone system. By comparison, Ethernet’s network switches direct each data packet to its intended recipient device like our modern phone systems. [72:A.12.3.6(1)]

Class N uses redundant paths as a means to compensate for Ethernet wiring that does not report a single connection to ground, a basic requirement of Class B. Thus, the physical separation of Class A and Class X, and equipment redundancy described in 5.4.3.7, is not inherently required of Class N. In other words, failure of a single switch is permitted taken down a class N segment and is only required to report the loss of communication. Where redundant path segments are intended to have survivability similar to Class A or Class X, the physical separation requirements and overall equipment redundancy must be specified in addition to the Class N designation. [72:A.12.3.6(1)]

As a visual model, Class N could be likened to a redundant pathway backbone, allowed to have Class C branch paths to single endpoint devices. Therefore, every effort is made in this section to clearly distinguish the single endpoint device from the transport equipment required to have redundant paths. [72:A.12.3.6(1)]

Class N requires redundant, monitored pathway segments to and from control equipment (fire or fuel gas alarm control units, ACUs, or ECCUs) where any interruption in communications could potentially affect multiple endpoint devices. Typically, interconnected communications equipment such as Ethernet switches, wireless repeaters, or media converters are used in combination to create pathways. Chapter 5 describes the required behavior of Class N pathways. All equipment must meet the requirements of other chapters in NFPA 715 (such as, but not limited to, requirements pertaining to secondary power supplies, equipment listings, and environment conditions).

Redundant pathways, isolated from ground, are actually common practice in robust Ethernet designs. Managed network switches commonly have specific uplink ports that are intended for load sharing and allow two parallel connections. For compliance with Class N, a trouble must be reported if either of these connections fails. [See Figure A.5.4.3.6(1)(a) and Figure A.5.4.3.6(1)(b).] [72:A.12.3.6(1)]

Class N pathways can use metallic conductor communications cable, such as a 100 ohm balanced twisted pair (e.g., Category 5E), including single-pair or multi-pair cable, or other communications media, such as optical fiber cable or wireless transmission, or a combination of two or more such transport mediums. [72:A.12.3.6(1)]

Where a conductor-based media is used for Class N, the intention is not to monitor faults on individual conductors but rather to monitor the operational capability and performance of the pathway as a whole. Similar to Class C, end-to-end verification is used in Class N. [72:A.12.3.6(1)]

Primary and required redundant pathways are independently and continuously verified for their ability to support end-to-end communications to and from each endpoint device and its associated control equipment. Pathway segments that service more than one device must have at least one verified redundant pathway segment. Should any primary pathway segment fail, communication is supported by the redundant pathway segment(s.) Failure of either a primary or redundant pathway will indicate a trouble. [72:A.12.3.6(1)]

Redundant pathway segments are generally independent and do not normally share media with the primary pathways. However, there are exceptions, such as different frequencies for wireless components, or ring topologies. [See Figure A.5.4.3.6(5).] [72:A.12.3.6(1)]

A Class N network can be made more reliable with physically distinct pathway segments (i.e., an alternate conduit, or cable tray route, or wireless transmission frequency range, or a combination of distinct media). In addition to the required primary segments and redundant segments, a Class N pathway is permitted to have nonrequired segments. [See Figure
A.5.4.3.6(1)(c) Additional nonrequired pathway segments are allowed to be connected and not independently monitored for integrity as long as two paths are monitored to meet the redundancy requirement of Class N. [72:A.12.3.6(1)]

Traditionally, NFPA has used the word device for input components and the term appliance for components used in notification. With respect to Class N, the term device includes appliances and other intelligent, addressable components that perform a programmable input or output function. Examples of Class N devices include the following:

1. Input components such as alarm initiating modules, switches, and sensors
2. Output components such as output modules, Ethernet loudspeakers (i.e., IEEE 802.3af PoE loudspeakers), intelligent visual notification appliances (strobes), textual signage, and intelligent audio amplifiers

Transmission equipment components (e.g., media converters, Ethernet switches, patch panels, cross-connects) are connected to the Class N pathway merely to transport instructions between other equipment. As such, they are not considered devices with respect to Class N pathways. [72:A.12.3.6(1)]

The audio amplifier listed above is an example of an addressable device that can receive a digital audio input from the Class N pathway and then provide a notification appliance circuit (NAC) output with Class A, B, or X pathways. Other endpoint devices can similarly provide alternate class pathways for visual notification appliances (strobes) or initiating devices. From the perspective of the Class N pathway, communications terminate at this endpoint. However, since these types of endpoints can support multiple notification appliance devices or initiating devices, path segments are subject to the redundant pathway requirement unless protected in an enclosure or raceway less than 20 ft (6 m) in length. (See 4.13.8.) [See Figure A.5.4.3.6(1)(c).] [72:A.12.3.6(1)]

Class N connections between control equipment are required to have redundant monitored pathway segments if a failure of a primary pathway segment in between control equipment could impair the operation of the control equipment. [See Figure A.5.4.3.6(1)(d).] [72:A.12.3.6(1)]

Class N is also permitted to include dual port devices that provide both transmission and input/output functions. Endpoint devices can have multiple connection ports and support dual pathway segment connections; thus the term endpoint device is not intended to prohibit more than one connection to a device. Even with dual connections, where other devices depend on the path, primary and redundant paths are required. But, where an endpoint device has two connection ports, and when a secondary nonrequired connection is added, there is no requirement to separately supervise the nonrequired redundant pathway segment. [See Figure A.5.4.3.6(1)(e).] [72:A.12.3.6(1)]

Figure A.5.4.3.6(1)(a) Class N Pathway Block Diagram – Example 1. [72:Figure A.12.3.6(1)(a)]

Figure A.5.4.3.6(1)(b) Class N Pathway Block Diagram – Example 2. [72:Figure A.12.3.6(1)(b)]
A.5.4.3.6(4)

Operational conditions of the pathway include factors such as latency, throughput, response time, arrival rate, utilization, bandwidth, and loss. Life and property safety equipment connected to a Class N network actively monitors some or all of the pathway’s operational conditions so that an improperly installed or configured pathway or a subsequently degraded pathway or segment is detected by the life and property safety equipment and reported as a trouble. The trouble condition is reported when operational conditions of the pathway(s) have deteriorated to the point where the equipment is no longer capable of meeting its minimum performance requirements, even if some level of communication to devices is still maintained. Performance requirements include the activation of an alarm within 10 seconds, the reporting of a trouble signal within 200 seconds, and delivery of audio messages with required intelligibility. End-to-end communications might be operational under system idle conditions, but in the event of an alarm, the increased load on a degraded pathway could cause a partial or complete failure to deliver required life safety signals. Such predictable failure must be actively detected and reported.
A.5.4.3.6(5)

Devices with dual path connections are permitted to be connected in a daisy-chain of device on a ring. Again, where Class N pathway segments support multiple devices, verified redundant pathway segment(s) are required. This can be accomplished with a ring topology, as long as each segment of the ring is verified as functional, and the failure of any one segment does not result in the loss of functionality of more than one device. In this arrangement, primary and redundant pathway segments share the same media, and provide two possible directions of communications in a ring topology [see Figure A.5.4.3.6(5)]. This daisy-chain configuration is also permitted between multiple control units that require verified primary and redundant pathway segments. [72:A.12.3.6(5)]

Figure A.5.4.3.6(5) Class N Pathway Block Diagram with Daisy-Chained Devices with Dual Pathway Connection. [72:Figure A.12.3.6(5)]

A.5.4.4.2

The intent of this paragraph is to prevent situations where the signaling line circuit to a device is required to be one class of operation, while the power circuits, running in the same raceways and subject to the same threats, are wired to a lower class of operation. This means that it is possible to have power wiring connected to a device that is of a different class than the signaling line or initiating device circuits. One example of where meeting the same minimum performance requirements would still allow different classes of wiring is where the performance requirements are based on distance or the number of devices attached to the wires. For example, if the signaling line circuit supplies 200 devices and the performance requirement is that not more than 10 devices be lost to a wiring fault, then the class of wiring on the signaling line circuit will be Class A, with isolators to protect against shorts. Where the power wires never supply more than 10 devices, the power wires could be wired as Class B. [72:A.23.4.2.2]

A.5.4.4.3

A goal of 5.4.4.3 is to provide adequate separation between the outgoing and return cables. This separation is required to help ensure protection of the cables from physical damage. The recommended minimum separation to prevent physical damage is 12 in. (300 mm) where the cable is installed vertically and 48 in. (1.22 m) where the cable is installed horizontally. [72:A.12.3.8]
The intent of 5.6.1 applies to both short-circuit faults and open-circuit faults. [72:A.23.6.1]

Fuel gas detection technologies have evolved to the point that SLCs are now the prevalent means of monitoring initiation devices, controlling output devices, and communicating between panels, annunciators, and controllers.

The extent of coverage of traditional IDCs is inherently limited based on the quantity of powered initiation devices or code limitations. Similarly, the extent and coverage of NACs also are limited by the power required to operate the devices. SLCs, unlike IDCs and NACs, have few limitations, and it is now common that a single SLC can monitor and control more than 250 devices. In addition, a single SLC can be the only pathway by which alarms are initiated, emergency control functions are controlled, and audible and visual notification appliances are actuated. [72:A.23.6.1]

A total catastrophic failure of a fuel gas detection system due to a single open or short on an SLC can negate most, if not all, of this standard’s requirements for specifying an acceptable minimum level of performance and reliability for the protection of life and property from fuel gas leak.

Designers should carefully consider the potential that a single SLC short or open caused by fire or inadvertent damage to the SLC could disable an entire SLC prior to the activation of an alarm condition along with the subsequent alarm signaling and emergency control functions. [72:A.23.6.1]

With traditional IDCs and NACs, a single open, ground, or short fault on one circuit could not affect the performance of other IDCs, NACs, and emergency control circuits. As such, the occurrence of a single short or open could limit the extent of the failure to a particular zone or area. [72:A.23.6.1]

One method for providing an acceptable level of performance and reliability of SLCs is to limit the potential catastrophic failure to one zone, in a way similar to how traditional IDCs and NACs have been and are now required to do. [72:A.23.6.1]

A single zone could be designated in the following ways:

1. By floor where an SLC would not span multiple floors
2. By floor area, where a large floor would be split into multiple zones based on a maximum floor area size (e.g., 22,500 ft²)
3. By fire barrier or smoke barrier compartment boundaries, which an SLC would not cross
4. By maximum length or circuit, where an SLC would not be longer than a predetermined length (e.g., 300 ft)

[72:A.23.6.1]

See the definition of zone (3.3.32) and Figure A.5.6.1(a) through Figure A.5.6.1(d) for additional clarification. [72:A.23.6.1]

Figure A.5.6.1(a) depicts a Class B SLC with four zones. Wiring of more zones would require one isolator for each additional zone. The isolator can be integrated into the device or a separate component. If a single short or open occurs beyond the isolators, only one zone will be affected. [72:A.23.6.1]

Figure A.5.6.1(b) depicts a Class A SLC with four zones. Wiring of more zones would require one isolator for each additional zone. The isolator can be integrated into the device or a separate component. If a single short or open occurs, only one zone will be affected. If a single open occurs, no devices will be affected. [72:A.23.6.1]

Figure A.5.6.1(c) depicts a hybrid Class A SLC loop with Class B SLC branches serving four zones that is designated as a Class B SLC. Wiring of more zones would require one isolator for each additional zone. The isolator can be integrated into the device or a separate component. If a single short occurs, only one zone will be affected. If a single open occurs, it might affect only one zone. [72:A.23.6.1]

Figure A.5.6.1(d) depicts an incorrect Class B SLC configuration with four zones. If a single short or open occurs, one or more zones could be affected depending on the location of the single short. [72:A.23.6.1]

Figure A.5.6.1(a) Class B Isolation Method. [72:Figure A.23.6.1(a)]
Figure A.5.6.1(b) Class A Isolation Method. [72:Figure A.23.6.1(b)]

Figure A.5.6.1(c) Hybrid Isolation Method. [72:Figure A.23.6.1(c)]
A.5.6.1.3

The intent is to clarify that the requirement identified in 5.6.1 applies only to SLCs that connect to addressable devices and not to SLCs that interconnect fire alarm control units (FACU) or transponders. [72:A.23.6.1.3]

A.5.6.1.3(3)

In many cases, existing systems are partially modified with addressable devices being added as a part of the scope of work. In this case the SLC might not have been installed in a manner that could be easily modified to accommodate isolation modules and/or keep a single SLC loop confined to a single zone. This condition makes it clear that the requirements of SLC zones do not apply to existing systems that were not required to meet the zoning requirements of 5.6.1 when originally installed. [72:A.23.6.1.3(3)]
A.5.6.1.5

Possible scenarios in which a designer might choose to permit loss of more than one zone include a multistory building with a small floor plan footprint where a limited number of addressable devices are located on the floor (e.g., two fuel gas detection devices). In this scenario, the designer might choose to include multiple floors of devices on the same signaling line circuit because the loss of such devices due to a single SLC short or open would disable a limited number of devices.

Another scenario could include buildings with a small vestibule at the top of a stair that exits onto the roof of a building. The vestibule might contain one fuel gas detection device that could be connected to the signaling line circuit on the floor below and considered the same zone.

Designers providing documents for upgrades to an existing building where the control units and all fuel gas detection devices are being replaced but some portion of the existing circuits are being reused might, because of constructability reasons, opt for combining zones and the associated risk of the loss of those devices due to a single SLC short or open.

The intent of 5.6.1.5 is not to impose an unnecessary burden on building owners with existin systems undergoing renovations, upgrades, or replacements. In these scenarios as well as others, the designer would be required to provide a documented, performance-based design approach to justify why the loss of more than one zone is acceptable. Documentation must be composed in accordance with 5.6.2.4 and be submitted in accordance with 5.6.1.6. [72:A.23.6.1.5]
A.5.6.2

Class N systems should mitigate risk that could be present when a zone or area is serviced by a single Class N device. However, 5.6.2 is not intended to automatically require the installation of twice as many (or more) Class N devices as compared to a design based on Class A, B, or X pathways. The risks inherent to Class N are different from the risks inherent to Class A, B, or X. [72:A.23.6.2]

Class A and B pathways are permitted to lose devices in a zone (see Section 5.6) upon a multiple ground-fault pathway failure. Class A and B pathways require a single ground to be annunciated as a trouble signal. The requirement is to annunciate the first ground fault and alert the user so that the ground fault can be addressed before a possible second ground fault occurs. Note that a second ground fault is also annunciated at the systems operator interface because communication is lost. [72:A.23.6.2]

Class X pathways are not permitted to lose devices in a zone (see Section 5.6) upon a multiple ground-fault pathway failure that results in a short circuit across the pathway. Class X pathways require a single ground to be annunciated as a trouble signal. The requirement is to annunciate the first ground fault and alert the user so that the ground fault can be addressed before a possible second ground fault occurs. [72:A.23.6.2]

By contrast, Class N is not required to report a trouble condition at the occurrence of the first ground fault because it limits the loss to a single device if another ground occurs. A second ground fault in the Class N pathway, like Class A and B pathways, annunciates a trouble condition at the systems operator interface because communication is lost. [72:A.23.6.2]

In summary, the potential risk of a loss of fire alarm function in an area must be considered in Class N network design. Multiple ground faults might cause such a loss in an area, especially after no one was alerted of a trouble condition at the first ground fault. [72:A.23.6.2]

The term "device" in this context should be understood in conjunction with the definition of Device (Class N) 3.3.5 and the associated annex material A.3.3.5. An area is a separated space within a zone where initiating devices or notification appliances are required. Examples include an office, conference rooms, or temporary partitioned banquet rooms where alarm notification is required. Factors to consider when determining the need for multiple Class N devices within an area or zone include the following: whether the space is acoustically and/or visually isolated; specific audible and visual indication of trouble to the occupants in that area for a related ground fault pathway failure of any device/appliance in that area; the pathways to devices in the area are not susceptible to ground faults such as fiber or wireless pathways. [72:A.23.6.2]

Also, multiple devices are not required when devices/appliances are connected by redundant pathways. For example, consider the dual port devices deployed as per A.5.4.3.6(5). For example, the failure of a sole Class N initiating device might delay or prevent the timely initiation of an alarm. [72:A.23.6.2]

Depending on the facility and the risks for that occupancy, areas serviced by single devices, without redundant pathways, that are susceptible to ground faults should be established by the system designer and approved by the authority having jurisdiction. [72:A.23.6.2]
A.5.6.2.3

This requirement is to ensure that devices without redundant pathways are not used to terminate additional equipment such that a loss of the pathway would result in more than one device failure to communicate and operate as intended. This stipulation does not apply to dual port devices as described in A.5.4.3.6(5), because these devices support redundant pathways. A dual port device that is used to daisy-chain additional devices without a redundant pathway would be prohibited. [72:A.23.6.2.3]

The term “device” in this context should be understood in conjunction with the definition of Device (Class N) 3.3.5 and the associated annex material A.3.3.5. [72:A.23.6.2.3]

A network-based audio amplifier is an example of an addressable device that can receive a digital audio input from the Class N pathway and then provide a notification appliance circuit (NAC) output with Class A, B, or X pathways. Other endpoint devices can similarly provide alternate class pathways for visual notification appliances (strobes) (NACs) or initiating devices (IDCs). From the perspective of the Class N pathway, communication terminates at this endpoint device. However, since these types of endpoints can support multiple notification appliance devices or initiating devices, Class N path segments are still subject to the redundant pathway requirement unless protected in an enclosure or raceway less than 20 ft (6 m) in length. [See Figure A.5.4.3.6(1)(c).] [72:A.23.6.2.3]

A.5.6.2.4

This clause is a consequence of the definition of Class N, which permits a single pathway to be used when only one device is served. [See 5.4.3.6(1).] This exception to the requirement of redundant pathways allows for the loss of operational capability to a single device. Unplugging, grounding, or cutting any single Ethernet cable or conductor cannot affect more than one Ethernet device and cannot affect additional devices, Ethernet or otherwise, in the system. [72:A.23.6.2.4]

A.5.6.3.3

All shared pathways defined as Class N should be documented, including all equipment connected to the shared pathways, interconnecting methods identifying required redundant communication pathways, endpoints, techniques used for proper supervision, and possible risk due to shared pathway failures. As an example, for wired Ethernet, the designer might want to use cabling techniques identified in standards such as ISO/IEC 14763-3, Information technology — Implementation and operation of customer premises cabling — Part 3: Testing of optical fibre cabling, to satisfy the requirements of the authority having jurisdiction. [72:A.23.6.3.3]
A.5.6.3.3.1.2

Cable installations should be tested with appropriate field test measurement equipment in accordance with applicable standards such as TIA 526, *Standard Test Procedures for Fiber Optic Systems*, or other standards acceptable to the authority having jurisdiction. For example, testing requirements for Category 5 or higher balanced twisted-pair cabling should include the following:

1. Wire map (e.g., continuity, pairing)
2. Length
3. Insertion loss
4. NEXT loss
5. ACR-F (formerly called ELFEXT)
6. Propagation delay and delay skew
7. Return loss
8. Power sum near-end crosstalk (PSNEXT) loss
9. PSACR-F (formerly called PSELFEXT)

Testing requirements for optical fiber cabling should include the following:

1. Attenuation
2. Optical bandwidth
3. Length

A.5.6.3.3.2

All ports need to be properly identified and labeled. For example, Class N switches should be permanently labeled "LIFE SAFETY EQUIPMENT – NO UNAUTHORIZED USE," or plugs should be used to prevent access.

A.5.6.3.3.3.2

Life safety Class N network cabling, equipment, and infrastructure might include (but is not limited to) Ethernet switches, media converters, uninterruptible power supplies, separate life safety network dedicated branch circuit power, cabling cross connects, and both copper and fiber cabling.

A.5.6.3.5.1

Regular inspection, testing, and maintenance are conducted on life safety systems. In traditional systems a single certified entity was typically capable of servicing the fire alarm control unit, transport equipment, and/or wiring associated with it. Class N systems will often use modern network infrastructure that might fall outside the expertise of the life safety--certified entity, or other building systems could share the infrastructure used to create the Class N network. The property owner or building owner or the owner’s designated representative has responsibility to maintain a list of certified entities that are capable of servicing and maintaining the life safety system and the Class N network. This is what NFPA 72 refers to as a management organization. For example, if the Class N network runs through Ethernet switches and routers, the premises IT infrastructure should be maintained by service personnel as referenced in 4.4.3.3.

A.5.6.3.5.2

During inspection, testing, or maintenance it could be necessary to temporarily disable or test part of a life safety system. The management organization is responsible to ensure that other affected entities are notified and action plans put in place to ensure appropriate life safety coverage is maintained and appropriate notification is given to other entities such as the fire or security monitoring services.
A.5.6.3.6.1
When shared pathway Level 1 or Level 2 is employed, care should be taken to ensure that the life safety system(s) traffic has priority over other systems sharing the Class N network to maintain the required bandwidth. Other systems might have unspecified or unpredictable bandwidth usage (such as a manually controlled security camera); therefore, the analysis should specify the method(s) used to ensure the required life safety bandwidth is maintained under all circumstances. The network design analysis should show this and be signed by the property or building or system owner or the owner’s designated representative responsible for the design for the authority having jurisdiction to review. [72:A.23.6.3.6.1]

A.5.6.3.6.2
Primary and backup power should meet the requirements of NFPA 715. Life safety equipment and their connected equipment (Class N transport devices when not powered by the FGDCU) should utilize dedicated branch circuits for primary power. This is to prevent other loads from tripping a circuit breaker connected to the FGDCU and to prevent inadvertent disconnecting of primary power to the FGDCU.

The branch circuit disconnecting means (circuit breakers) should be clearly labeled and made only accessible to authorized personnel. [72:A.23.6.3.6.2]

FGDCUs are required to have a secondary power source that must last for 24 hours of standby (nonalarm) power followed by either 5 (non-voice systems) or 15 (voice systems) minutes of alarm power. This is typically accomplished by backup batteries or by an emergency generator. All transport equipment not powered by the FGDCU has the same requirement. The analysis should document the calculation of all power requirements (standby and alarm) of the FGDCU and transport equipment to ensure that the system can meet this requirement. To meet this requirement, non–life safety systems could be disconnected from the secondary power source.

A.5.6.3.7.1
Maintenance is a critical aspect of fuel gas detection systems, and a plan needs to be in place to empower continued operation of the fuel gas detection system. Shared Class N pathways present a unique concern in that non–fuel gas detection technicians could perform maintenance or changes to the Class N equipment or pathways. For example, routine updates to software in the routers and switches or upgrades to address new non–fuel gas detection needs. This could result in outages of the portions of the fuel gas detection system or affect the subsequent operation of the fuel gas detection system. It is crucial that the maintenance plan address policy and procedure to monitor, maintain, and test per Chapter 8 and control change of the shared pathways to contribute to continued intended operation of the fuel gas detection system. For example, 8.4.2.5 states that changes to system executive software require a 10 percent functional test of the system, including typical network infrastructure such as routers and switches that now need consideration as part of the life safety network maintenance plan.

A.5.6.3.7.2
Written procedures should address who can access the Class N network; how the procedures will be implemented; the level of retesting of the system needed when software updates to the Class N network infrastructure such as routers and switches are made; and the effect of changes on system response times to ensure required time limits are maintained. [72:A.23.6.3.7.2]
A.5.6.3.7.2(3)

The planned impairment process is used to control change in the system and inform stakeholders. Any activities that can affect the performance of the network or impact conclusions of a risk analysis should be presented to the organization referred to in 5.6.3.5 for approval. The organization should have a name (e.g., Life Safety Network Management Group). All stakeholders who could be affected by network outages should have representation in the organization. [72:A.23.6.3.7.2(3)]

A committee made up of members of the organization should meet on a regular basis and report to the organization. All planned impairments should have 7 days' notice. An emergency impairment (one with less than 7 days' notice) should meet very stringent standards for urgency. Outages and repair operations are dealt with on a case by case basis with the fire marshal's office, and the Department of Public Safety is included based on the operational impact. [72:A.23.6.3.7.2(3)]

All proposed changes and outages are to be presented to the organization for authorization, scheduling, and coordination. Once a change has been authorized and scheduled, an impairment notification is issued notifying all affected users. If specific mitigation actions, such as fire watch, are required, they are to be included in the impairment notification. [72:A.23.6.3.7.2(3)]

Impairment notifications are issued through the fire marshal's office, the Department of Public Safety, the Power Outages Group, or other groups depending on the systems affected. [72:A.23.6.3.7.2(3)]

A "login banner" is a programmable option for network switches and routers. This banner is the first thing that comes up on the screen when you log into the equipment. Where practical network equipment used in life safety systems should have a login banner to notify service personnel that the network is a part of an active life safety system and any impairment should be coordinated with the named organization. [72:A.23.6.3.7.2(3)]
A.5.6.3.8

Although this section outlines some specific criteria and/or limitations, each application should be based on recognized performance-based design practices and the emergency response plan developed for the specific facility. Here are the general categories of question that might be presented to the stakeholders responsible for Class N shared network design decisions. The actual questions for each project must be tailored to the area, the building, the campus, and the culture of the user organization and the nature of how the network is being shared. The requirements for the life safety network should be evaluated with respect to the types of emergency events and emergency response plan. The potential impact of these events upon the life safety network also should be evaluated. [72:A.23.6.3.8]

1. What types of emergency events could affect the life safety network (e.g., fire, security, safety, health, environmental, geological, meteorological, utility service disruption, or other types of events)?

2. What is the anticipated or expected severity of the emergency events, that is, how will they impact the facility and its functions? Are they expected to be extreme, severe, and so forth?

3. What is the certainty of the emergency event, that is, is it happening now, is it very likely to occur, is it likely to occur, is it possible that it will occur in the future, is it unlikely to occur, or is its occurrence unknown?

4. Natural hazards: What are the network risks to the implementation of the emergency response plan in response to natural hazard events? What are the types of emergency events that could be predicted to result from natural hazard events? For example, if flooding is possible in the surrounding area, how would a flood affect the life safety network while operating in its normal, monitored state? What would happen if a fire alarm occurred during a flood? How likely is it that a flood could damage the life safety network? What related events might impact the life safety network and equipment, such as a power outage?

5. Human caused: What are the network risks to the implementation of the emergency response plan in response to accidents or intentional acts? What are the types of emergency events that could be predicted from both within and outside the protected premises? What type of related damage might be expected to impact the life safety network and equipment, such as explosions?

6. Technological caused: What are the network risks to the implementation of the emergency response plan in response to technologically caused events or failures and the types of emergency events that could be predicted to result from a technologically caused event both within and outside the protected premises. What type of related damage might be expected to impact the life safety network and equipment, such as a network attack?

7. Network maintenance risks: What are the network risks to the implementation of the emergency response plan in response to a degradation of network software performance (e.g., an unintended degradation of performance due to software updates) or a degradation of physical network performance or implementation (e.g., physical damage, system modifications)? What types of emergency events could be predicted to result from a degradation of the life safety network? What type of related impairments might be expected to impact the components of the life safety network and equipment, such as environmental controls?

[72:A.23.6.3.8]

The questions suggested in items (1) through (7) are offered for consideration, and not all of them might be appropriate for every life safety network installation. [72:A.23.6.3.8]

A.5.6.3.9

Shared pathway designations propose a list of shared pathways, some of which are only allowable for nonrequired functions. Other sections of this standard determine which of the shared pathways are allowed to be used as paths for required fire alarm signaling. Refer to 5.8.2.5 for shared communications requirements. [72:A.12.5]
A.5.8.1

Actuation of an initiating device is usually the instant at which a complete digital signal is achieved at the device, such as a contact closure. Some initiating devices involve signal processing and analysis by the device or by the control unit software. In these cases, actuation means the instant when the signal analysis requirements are completed by the device or control unit software.

It is not the intent of 5.8.1 to dictate the time frame for the local safety devices to complete their function.

A.5.8.2

This standard addresses field installations that interconnect two or more listed control units, possibly from different manufacturers, that together fulfill the requirements of this standard. [72:A.23.8.2]

Such an arrangement should preserve the reliability, adequacy, and integrity of all alarm, supervisory, and trouble signals and interconnecting circuits intended to be in accordance with the provisions of this standard. [72:A.23.8.2]

Where interconnected control units are in separate buildings, consideration should be given to protecting the interconnecting wiring from electrical and radio frequency interference. [72:A.23.8.2]

A.5.8.4.1

The provisions of 5.8.4.1 apply to types of equipment used in common with fuel gas detection systems, such as burglar alarm or coded paging systems, and to methods of circuit wiring common to both types of systems.

A.5.8.4.6

A combination fuel gas detection system, defined in 3.3.31.1, excludes fire alarm and mass notification systems. Priority requirements for fire alarm and mass notification systems, including combination fire alarm systems that incorporate fuel gas detection, are established in NFPA 72.
A.5.8.5.1.5

The monitoring of circuit integrity relies on the interruption of the wiring continuity when the connection to the initiating device is lost. Terminals and leads, as illustrated in Figure A.5.8.5.1.5(a) and Figure A.5.8.5.1.5(b), monitor the presence of the device on the initiating device circuit. [72:A.17.4.5]

Figure A.5.8.5.1.5(a) Correct (and Incorrect) Wiring Methods. [72:Figure A.17.4.5(a)]

Figure A.5.8.5.1.5(b) Wiring Arrangements for Four-Wire Detectors. [72:Figure A.17.4.5(b)]

A.5.8.5.2.3

Where power is supplied separately to the individual initiating device(s), multiple initiating circuits are not prohibited from being monitored for integrity by a single power supervision device. [72:A.23.8.5.3.2]

A.5.8.5.3.1(1)

For natural gas detectors located on a wall, they should be located 18 in. (0.46 m) from the ceiling in the same room as permanently installed fuel-gas-burning appliances. Detectors should be located as close as practical to the permanently installed fuel gas-burning appliance consistent with considerations of detector accessibility, sources of detector contamination, and nuisance sources. Siting considerations can include transient backdrafting spillage of flue gases during startup and ventilation supply or exhaust vents.

A.5.8.5.3.1(2)

For propane detectors located on a wall, they should be 18 in. (0.46 m) from the floor, in the same room as permanently installed fuel-gas-burning appliances. Detectors should be located as close as practical to the permanently installed fuel-gas-burning appliance consistent with considerations of detector accessibility, sources of detector contamination, and nuisance sources. Siting considerations can include transient backdrafting spillage of flue gases during startup and ventilation supply or exhaust vents.
A.5.8.5.3.1(3)

The purpose of detectors in proximity to or in free air communication with gas-fired appliances, equipment, and piping systems is to detect the migration of fuel gas from permanently installed fuel-gas-burning appliances and other sources of fuel gas. Detector location and spacing should be based on an engineering evaluation that considers potential sources and migration of fuel gases. HVAC systems should be considered in the locating of fuel gas detectors because the HVAC systems provide a good means of mixing and the migration of fuel gas. Other considerations when locating fuel gas detectors are areas with closed doors and rated demising walls, which can isolate or separate areas within HVAC zones.

A.5.8.5.3.1(4)

The purpose of detectors in basements or other subgrade rooms which have foundation penetrations that might convey migrating fuel gas leaks from outside the occupancy is to detect the fuel gasses from sources outside the structure migrating to and through the subgrade outer surfaces. Detector location and spacing should be based on an engineering evaluation that considers potential sources and migration of fuel gases. Fuel gas lines outside the structure should be considered in the engineering evaluation because damaged pipelines are a potential source of the migrating fuel gas. Other considerations when locating fuel gas detectors are the permeability of the wall, permeability of the floor, manmade penetrations (pipe passthroughs), and naturally occurring penetrations such as cracks.

A.5.8.5.3.3

UL 2075, Standard for Gas and Vapor Detectors and Sensors, is intended to address toxic and combustible gas and vapor detectors as well as sensors that include an assembly of electrical components coupled with a sensing means inside a chamber, or by separate components, to detect toxic or combustible gases or vapors. Detectors in UL 2075 cover a broad spectrum of applications, including residential, industrial, and commercial use. Detectors are intended for monitoring the environment for open-area protection and for connection to a compatible power supply or control unit for operation as part of gas detection or emergency signaling systems. In addition, UL 2075 addresses detectors solely for control of ventilation or shut-off devices such as fans or control valves as provided by the listing. UL 2075 also covers equipment intended for use in hazardous locations.

The scope of UL 1484, Residential Gas Detectors, is specifically intended to address requirements for electrically operated fuel gas alarms intended for residential and recreational vehicle occupancies to detect fuel gases such as propane and natural gas. Devices are intended to be factory-built as a complete assembly and to function as a self-contained alarm device that consists of an assembly of electrical components, including an element to detect gas concentration, an alarm sounding appliance, and provision for connection to a power supply source. Devices are specifically not intended for use in hazardous locations as defined in NFPA 70, for industrial or commercial use, or for use as smoke and fire detectors or alarms.

While UL 2075 in itself does not cover self-contained and single- and multiple-station residential fuel gas alarms otherwise covered in UL 1484, sensors, detectors, or alarms covered in UL 2075 must operate within the sensitivity parameters defined by the manufacturer but must not exceed alarm limits defined in UL 1484 (e.g., a detector must produce an alarm signal at or below 25 percent of the lower explosive limit).
The addition of odorants to natural gas to provide a warning agent in case of leaks capitalizes on the ability of the human nose and olfactory system (i.e., sense of smell) to detect and recognize low parts per billion amounts of mercaptans. Natural gas odorants are usually two or more sulfur-containing compounds that are classified into three groups—mercaptans, cyclic sulfides, and alkyl sulfides. Odorants must not be harmful to people, pipe, or materials in which combustion occurs. Additional factors considered prior to choosing an odorant blend include the following:

(1) Gas composition and gas quality
(2) Presence and interaction of naturally occurring mercaptans and other odorants
(3) Soil penetration capability
(4) Odor impact ("gassy odor")
(5) Odorization injection equipment
(6) Freeze point
(7) Water solubility
(8) Odor stability, fading, absorption, and adsorption

In summary, industry research from the mid 1940s identified tertiary butyl mercaptan (TBM) as one of the most effective odorant blends for pipeline natural gas. While each of the aforementioned factors are described and discussed in the literature, the overall characteristics of TBM are highlighted as follows:

(1) Most common component in odorant blends today
(2) Low odor threshold (approximately 0.5 parts per billion)
(3) Most resistant mercaptan to oxidation
(4) Superior soil penetrability
(5) "Gassy odor" most recognized with pipeline natural gas
(6) Typically blended with lower molecular weight mercaptans due to high freezing point

Current federal code requires natural gas contain a natural odorant or be odorized so that a person with an average sense of smell can readily detect it at a concentration in air of one-fifth of the lower explosive limit (approximately 1 percent gas-in-air or 20 percent LEL). Since methane is the principal component of natural gas and reaches its one-fifth flammability limit first, it is assumed that the warning level for natural gas is determined by the warning level of its methane content. Therefore, the lower flammability limit of natural gas is 5 percent gas-in-air and the public must be warned at one-fifth that level or 1 percent gas-in-air otherwise expressed as 20 percent LEL. The alarm concentration range of 10 percent LEL and 20 percent LEL is consistent with 49 CFR § 192.625 and state jurisdiction requirements for natural gas odorization and resulting odor detection thresholds for the detection of a natural gas leak by a person with an average sense of smell. Several states currently require an odor detection threshold of 10 percent LEL. Current UL 1484, Residential Gas Detectors, requirements specify a fuel gas alarm threshold concentration of 25 percent LEL or less. As a result, a range of alarm threshold requirements between 10 percent LEL and 20 percent LEL would align with current odor detection threshold requirements prescribed in federal and state pipeline safety codes, and are consequently within the permitted range of the existing UL standard. Aligning fuel gas alarm detection thresholds with required pipeline safety odor detection thresholds will enable a layers-of-protection approach to further influence human behavior when responding to indications of a potential gas leak.

For natural gas, while the regulatory requirement is that gas must be odorized such that a person with an average sense of smell can recognize the odor of gas at 20 percent LEL, practical industry odorant injection rates, for example, of a common gas odorant tertiary butyl mercaptan (TBM), is typically 0.5 lbs/MMSCF (8g/10^3 m³). This injection rate results in olfactory detection thresholds typically less than 10 percent LEL. As a result, in practice, fuel gas detectors should alarm at a threshold consistent with actual olfactory detection threshold values (or as close as possible) to help drive consistent behavior of consumers to an alert condition by either odor detection or alarm activation. The minimum detection threshold of 1 percent LEL affords first responders the opportunity to respond prior to a building reaching a hazardous gas build-up condition. Fuel gas detectors that alarm at levels that correlate with...
typical industry odorization practices provide a significant opportunity for public safety intervention.
A.5.8.5.3.4.3(1)
The addition of odorants to natural gas to provide a warning agent in case of leaks capitalizes on the ability of the human nose and olfactory system (i.e., sense of smell) to detect and recognize low parts per billion amounts of mercaptans. Natural gas odorants are usually two or more sulfur containing compounds that are classified in three groups, including mercaptans, cyclic sulfides, and alkyl sulfides. Odorants must not be harmful to people, pipe or materials in which combustion occurs. Additional factors considered prior to choosing an odorant blend include the following:

(1) Gas composition and gas quality
(2) Presence and interaction of naturally occurring mercaptans and other odorants
(3) Soil penetration capability
(4) Odor impact (i.e., gassy odor)
(5) Odorization injection equipment
(6) Freeze point
(7) Water solubility
(8) Odor stability, fading, absorption, adsorption

In summary, industry research from the mid 1940s identified tertiary butyl mercaptan (TBM) as one of the most effective odorant blends for pipeline natural gas. While each of the aforementioned factors are described and discussed in the literature, the overall characteristics of TBM are as follows:

(1) Most common component in odorant blends today
(2) Low odor threshold (approximately 0.5 parts per billion)
(3) Most resistant mercaptan to oxidation
(4) Superior soil penetrability
(5) "Gassy odor" most recognized with pipeline natural gas
(6) Typically blended with lower molecular weight mercaptans due to high freezing point

Current federal code requires natural gas contain a natural odorant or be odorized so that a person with an average sense of smell can readily detect it at a concentration in air of one-fifth of the lower explosive limit (approximately 1 percent gas-in-air or 20 percent LEL). Since methane is the principal component of natural gas and reaches its one-fifth flammability limit first, it is assumed that the warning level for natural gas is determined by the warning level of its methane content. Therefore, the lower flammability limit of natural gas is 5 percent gas-in-air and the public must be warned at one-fifth that level or 1 percent gas-in-air otherwise expressed as 20 percent LEL. The alarm concentration range of 10 percent LEL and 20 percent LEL is consistent with 49 CFR § 192.625 and with state jurisdiction requirements for natural gas odorization and resulting odor detection thresholds for the detection of a natural gas leak by a person with an average sense of smell. Several states currently require an odor detection threshold of 10 percent LEL. Current UL 1484 requirements specify a fuel gas alarm threshold concentration of 25 percent LEL or less. As a result, a range of alarm threshold requirements between 10 percent LEL and 20 percent LEL would align with current odor detection threshold requirements prescribed in federal and state pipeline safety codes, and are consequently within the permitted range of the existing UL standard. Aligning fuel gas alarm detection thresholds with required pipeline safety odor detection thresholds will enable a layers-of-protection approach to further influence human behavior when responding to indications of a potential gas leak.

For natural gas, while the regulatory requirement is that gas must be odorized such that a person with an average sense of smell can recognize the odor of gas at 20 percent LEL, practical industry odorant injection rates, for example, of a common gas odorant tertiary butyl mercaptan (TBM), is typically 0.5lbs/MMSCF (8g/10⁵m³). This injection rate results in olfactory detection thresholds typically less than 10 percent LEL. As a result, in practice, fuel gas detectors should alarm at a threshold consistent with actual olfactory detection threshold values (or as close as possible) to help drive consistent behavior of consumers to an alert condition by either odor detection or alarm activation. A minimum detection threshold of 10 percent LEL affords first responders the opportunity to respond prior to a building reaching a hazardous gas build-up condition. Fuel gas detectors that alarm at levels that correlate with
typical industry odorization practices provides a significant opportunity for public safety intervention.

A.5.8.5.3.7

Product-listing standards include tests for temporary excursions beyond normal limits. In addition to temperature, humidity, and velocity variations, fuel gas detectors should operate reliably under such common environmental conditions as mechanical vibration, electrical interference, and other environmental influences. Tests for these conditions are also conducted by the testing laboratories in their listing program.
Fuel gas detectors can be affected by electrical, chemical, and mechanical influences and by household chemicals, aerosols, and particulate matter found in protected spaces. The location of detectors should be such that the influences of household chemicals, aerosols and particulate matter from sources such as those in Table A.5.8.5.3.8(a) are minimized. Some of these sources could cause a false alarm on the sensor, such as acetone or ethanol or other light hydrocarbons found in industrial cleaning solutions. Others such as humidity and particulates might not cause a false alarm but could be detrimental to the detector’s lifespan and ability to reliably detect a fuel gas. Similarly, the influences of electrical and mechanical factors shown in Table A.5.8.5.3.8(b) should be minimized. While it might not be possible to isolate environmental factors totally, an awareness of these factors during system layout and design favorably affects detector performance. Fuel gas detectors should not be installed in environments outside the manufacturers published instructions.

### Table A.5.8.5.3.8(a) Common Sources of Aerosols and Particulate Matter Moisture

<table>
<thead>
<tr>
<th>Moisture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humid outside air</td>
</tr>
<tr>
<td>Humidifiers, including ultrasonic humidifiers</td>
</tr>
<tr>
<td>Live steam</td>
</tr>
<tr>
<td>Showers</td>
</tr>
<tr>
<td>Slop sink</td>
</tr>
<tr>
<td>Steam tables</td>
</tr>
<tr>
<td>Water spray</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical products and fumes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aroma oil diffusers</td>
</tr>
<tr>
<td>Chemical fumes</td>
</tr>
<tr>
<td>Cleaning fluids</td>
</tr>
<tr>
<td>Cooking equipment</td>
</tr>
<tr>
<td>Curing</td>
</tr>
<tr>
<td>Cutting, welding, and brazing</td>
</tr>
<tr>
<td>Dryers</td>
</tr>
<tr>
<td>Exhaust hoods</td>
</tr>
<tr>
<td>Fireplaces</td>
</tr>
<tr>
<td>Household chemicals</td>
</tr>
<tr>
<td>Machining</td>
</tr>
<tr>
<td>Ovens</td>
</tr>
<tr>
<td>Paint spray</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Atmospheric contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrosive atmospheres</td>
</tr>
<tr>
<td>Dust or lint</td>
</tr>
<tr>
<td>Excessive tobacco smoke</td>
</tr>
<tr>
<td>Heat treating</td>
</tr>
<tr>
<td>Linen and bedding handling</td>
</tr>
<tr>
<td>Pneumatic transport</td>
</tr>
<tr>
<td>Sawing, drilling, and grinding</td>
</tr>
<tr>
<td>Sea salt particles (alkalis)</td>
</tr>
<tr>
<td>Silicone vapors</td>
</tr>
<tr>
<td>Textile and agricultural processing</td>
</tr>
<tr>
<td>Volatile organic compounds</td>
</tr>
</tbody>
</table>
Engine exhaust
Diesel trucks and locomotives
Engines not vented to the outside
Gasoline forklift trucks

Heating element with abnormal conditions
Cooking fumes
Dust accumulations
Improper exhaust
Incomplete combustion

Table A.5.8.5.3.8(b) Sources of Electrical and Mechanical Influences on Fuel Gas Detectors [72:Table A.17.7.1.10(b)]

<table>
<thead>
<tr>
<th>Electrical Noise and Transients</th>
<th>Airflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration or shock</td>
<td>Gusts</td>
</tr>
<tr>
<td>Radiation</td>
<td>Excessive velocity</td>
</tr>
<tr>
<td>Radio frequency</td>
<td></td>
</tr>
<tr>
<td>Intense light</td>
<td></td>
</tr>
<tr>
<td>Lightning</td>
<td></td>
</tr>
<tr>
<td>Electrostatic discharge</td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td></td>
</tr>
</tbody>
</table>

A.5.8.5.5
The requirement of 5.8.5.5 recognizes there will be instances where, for example, a facility owner would want to apply detection to meet certain performance goals and to address a particular hazard or need, but that detection is not required. Once installed, of course, acceptance testing, annual testing, and ongoing maintenance in accordance with this [standard] is expected.

A.5.8.6.3.2
The building’s emergency response plan might specify occupant notification only in the area(s) of initiation and at the control panel. Whole building evacuation might not be specified in the emergency response plan. [72:A.23.8.6.3.3]

A.5.8.6.5.1
The five-pulse temporal pattern is illustrated in Figure A.5.8.6.5.1.

Figure A.5.8.6.5.1 Five-Pulse Temporal Pattern. [72:Figure A.29.5.3]

A.5.8.6.5.2
Coordination or synchronization of the audible signal within a notification zone is needed to preserve the temporal pattern. It is unlikely that the audible signal in one evacuation/notification zone will be heard in another at a level that will destroy the temporal pattern. Thus, it would not normally be necessary to provide coordination or synchronization for an entire system. Caution should be used in spaces such as atriums, where the sounds produced in one notification zone can be sufficient to cause confusion regarding the temporal pattern. [72:A.18.4.2.4]
A.5.9.2

Embossed plastic tape, pencil, ink, or crayon should not be considered to be a permanently attached placard. [72:A.17.4.6.1]

A.5.10.4

Off-site logging of fuel gas alarm data can be useful to preserve information in the face of building failure to facilitate accurate reconstruction of the event. It can also be beneficial to send data off-premises to incident command personnel to enhance situational awareness and response decisions and to maintain safe and efficient operations. Figure A.5.10.4 shows an example of a network to accomplish these goals.

Figure A.5.10.4 Supplemental Reporting Network. [72:Figure A.23.12.4]

A.5.11.2

Fuel gas control function interface devices can be located far from the device to be activated such as air-handling units and exhaust fans located on the roof. The requirement for monitoring installation wiring for integrity only applies to the wiring between the fuel gas control unit and the fuel gas control function interface device. For example, it does not apply to the wiring between the fuel gas control function interface device and a motor stop/start control relay, or between the fuel gas control function interface device and the equipment to be controlled (e.g., air-handling units and exhaust fans). The location of the fuel gas control function interface device within 3 ft (910 mm) applies to the point of interface and not to remotely located equipment.

A.5.12

The term wireless has been replaced with the term low-power radio to eliminate potential confusion with other transmission media such as optical fiber cables. [72:A.23.16]

Low-power radio devices are required to comply with the applicable low-power requirements of Title 47, Code of Federal Regulations, Part 15. [72:A.23.16]

A.5.12.1

Equipment listed solely for dwelling unit use would not comply with this requirement. [72:A.23.16.1]

A.5.12.2

This requirement is intended to limit the impact from the failure of a battery-operated receiver/transmitter in a given space. This requirement is not intended to prevent a single device that contains multiple function elements, such as a combination carbon monoxide, fuel gas and smoke detector, a detector with an independently controllable sounder, a notification appliance with visible and audible elements, and so forth. This requirement is intended to limit the number of functional elements to one of each independent type. For example, two manual fire alarm boxes could not rely on a single battery.

A.5.12.3.1

This requirement is not intended to preclude verification and local test intervals prior to fuel gas alarm transmission.
A.5.12.3.1.3
This requirement ensures that an alarm is received in the rare event that the RF channel experiences interference. [72:A.23.16.3.1.3]

A.5.12.3.2
Trouble and supervisory signals are not required to latch. Self-restoring trouble and supervisory signals are acceptable. [72:A.23.16.3.1.5]

A.6.1
Notification appliances should be sufficient in quantity, audibility, intelligibility, and visibility so as to reliably convey the intended information to the intended personnel during an emergency. [72:A.18.1]

Notification appliances in conventional commercial and industrial applications should be installed in accordance with the specific requirements of Sections 6.4 and 6.5. [72:A.18.1]

The standard recognizes that it is not possible to identify specific criteria sufficient to ensure effective occupant notification in every conceivable application. If the specific criteria of Sections 6.4 and 6.5 are determined to be inadequate or inappropriate to provide the performance recommended, approved alternative approaches or methods are permitted to be used. [72:A.18.1]

Designers and AHJs are advised to consider alternative means in occupancies that have individuals with cognitive disabilities. In addition, persons responsible for evacuation planning should consider specific training for individuals with cognitive disabilities to familiarize them with audible and visual signals and what responses are necessary based on their capabilities. [72:A.18.1]

A.6.1.5
Chapter 6 establishes the means, methods, and performance requirements of notification appliances and systems. Chapter 6 does not require the installation of notification appliances or identify where notification signaling is required. Authorities having jurisdiction, other codes, other standards, and chapters of this standard require notification signaling and might specify areas or intended audiences. [72:A.18.1.5]

For example, Chapter 4 requires audible and visible trouble signals at specific locations. A building or fire code might require audible and visual notification throughout all occupiable areas. In contrast, a building or fire code might require complete coverage with audible signaling, but might only require specific areas or spaces to have visual signaling. It is also possible that a referring code or standard might require compliance with mounting and notification appliance performance requirements without requiring complete notification signaling system performance. An example might be where an appliance is specifically located to provide information or notification to a person at a specific desk within a larger room. [72:A.18.1.5]

A.6.3.3.2
The intent is to prohibit labeling that could give an incorrect message. Wording such as “Emergency” would be acceptable for labeling because it is generic enough not to cause confusion. Fuel gas detection systems are often used as emergency notification systems, and therefore attention should be given to this detail.

Combination audible and visual notification appliances are permitted to have multiple visual elements each labeled differently or not labeled at all. [72:A.18.3.3.2]

A.6.3.4
Situations exist where supplemental enclosures are necessary to protect the physical integrity of a notification appliance. Protective enclosures should not interfere with the performance characteristics of the appliance. If the enclosure degrades the performance, methods should be detailed in the manufacturer's published instructions of the enclosure that clearly identify the degradation. For example, where the appliance signal is attenuated, it might be necessary to adjust the appliance spacings or appliance output. [72:A.18.3.4]
A.6.3.6

For hardwired appliances, terminals or leads, as described in 6.3.6, are necessary to ensure that the wire run is broken and that the individual connections are made to the leads or other terminals for signaling and power [72:A.18.3.6]

A common terminal can be used for connection of incoming and outgoing wires. However, the design and construction of the terminal should not permit an uninsulated section of a single conductor to be looped around the terminal and to serve as two separate connections. For example, a notched clamping plate under a single securing screw is acceptable only if separate conductors of a notification circuit are intended to be inserted in each notch. [See Figure A.5.6.5.1.5(a).] [72:A.18.3.6]

Another means to monitor the integrity of a connection is to establish communication between the fuel gas detection control unit. The integrity of the connection is verified by the presence of communication. Monitoring integrity in this fashion might not require multiple terminals or leads, as previously described.

It should be noted that monitoring the integrity of the installation conductors and their connection to an appliance does not guarantee the integrity of the appliance or that it is operational. Appliances can be damaged and become inoperable or a circuit can be overloaded, resulting in failure when the appliances are called upon to work. Presently, only testing can establish the integrity of an appliance. [72:A.18.3.6]

A.6.4.1.3

In determining maximum ambient sound levels, sound sources that should be considered include air-handling equipment and background music in a typical office environment, office cleaning equipment (vacuum cleaner), noisy children in a school auditorium, car engines in an auto shop, conveyor belts in a warehouse, and a running shower and fan in a hotel bathroom. Temporary or abnormal sound sources that can be excluded would include internal or external construction activities (i.e., office rearrangements and construction equipment). [72:A.18.4.1.3]

A.6.4.1.5.1

Audibility of a signal might not be required in all rooms and spaces. For example, a system that is used for general occupant notification should not require audibility of the signal in closets and other spaces that are not considered as occupiable spaces. However, a space of the same size used as a file room would be considered occupiable and should have coverage by notification appliances. Also, signaling intended only for staff or emergency forces might only have to be effective in very specific locations.

A.6.4.1.5.2

See 3.3.23 for the definition of occupiable. [72:A.18.4.1.5.2]
A.6.4.2

The typical average ambient sound level for the occupancies specified in Table A.6.4.2 are intended only for design guidance purposes. The typical average ambient sound levels specified should not be used in lieu of actual sound level measurements. [72:A.18.4.4]

Sound levels can be significantly reduced due to distance and losses through building elements. Every time the distance from the source doubles, the sound level decreases by about 6 decibels (dB). Audible notification appliances are typically rated by manufacturers' and testing agencies at 10 ft (3 m) from the appliance. Subsequently, at a distance of 20 ft (6.1 m) from an audible appliance rated at 84 dBA, the sound level might be reduced to 78 dBA. At a closed door, the loss might be about 10 dB to 24 dB or more depending on construction. If the opening around the door is sealed, this might result in a loss of 22 dB to 34 dB or more. [72:A.18.4.4]

Table A.6.4.2 Average Ambient Sound Level According to Location [72:Table A.18.4.4]

<table>
<thead>
<tr>
<th>Location</th>
<th>Average Ambient Sound Level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business occupancies</td>
<td>54</td>
</tr>
<tr>
<td>Educational occupancies</td>
<td>45</td>
</tr>
<tr>
<td>Industrial occupancies</td>
<td>88</td>
</tr>
<tr>
<td>Institutional occupancies</td>
<td>50</td>
</tr>
<tr>
<td>Mercantile occupancies</td>
<td>40</td>
</tr>
<tr>
<td>Mechanical rooms</td>
<td>91</td>
</tr>
<tr>
<td>Piers and water-surrounded structures</td>
<td>40</td>
</tr>
<tr>
<td>Places of assembly</td>
<td>60</td>
</tr>
<tr>
<td>Residential occupancies</td>
<td>35</td>
</tr>
<tr>
<td>Storage occupancies</td>
<td>30</td>
</tr>
<tr>
<td>Thoroughfares, high-density urban</td>
<td>70</td>
</tr>
<tr>
<td>Thoroughfares, medium-density urban</td>
<td>55</td>
</tr>
<tr>
<td>Thoroughfares, rural and suburban</td>
<td>40</td>
</tr>
<tr>
<td>Tower occupancies</td>
<td>35</td>
</tr>
<tr>
<td>Underground structures and windowless buildings</td>
<td>40</td>
</tr>
<tr>
<td>Vehicles and vessels</td>
<td>50</td>
</tr>
</tbody>
</table>

A.6.4.3.2

For example, in critical care patient areas, it is often desirable to not have an audible notification even at reduced private mode levels. Each case requires consideration by the governing authority. Another example would be high noise work areas where an audible signal needed to overcome background noise at one time of day would be excessively loud and potentially dangerous at another time of lower ambient noise. A sudden increase of more than 30 dB over 0.5 seconds is considered to cause sudden and potentially dangerous fright [72:A.18.4.5.2]
A.6.4.4.3

The intent of this section is to require the use of the low frequency signal in areas intended for sleeping and in areas that might reasonably be used for sleeping. For example, this section requires a low frequency audible signal in a bedroom of an apartment and also in the living room area of an apartment as it might have sleeping occupants. However, it would not be required to use the low frequency signal in the hallways, lobby, and other tenantless spaces. In hotels, the guest rooms would require use of the low frequency signals, but other spaces that might require audible signals could use any listed audible appliances regardless of the frequency content of the signal being produced. This chapter of the standard addresses notification appliances connected to and controlled by a system. This chapter does not address dwelling unit protection such as fuel gas alarms and their audible signal characteristics. Requirements for single and multiple-station alarms and household fuel gas alarm systems can be found in Chapter 9.

It is not the intent of this section to preclude devices that have been demonstrated through peer-reviewed research to awaken occupants with hearing loss as effectively as those using the frequency and amplitude specified in this section. [72:A.18.4.6.3]

Non-voice (e.g., horns) notification appliances should be listed as a “low frequency alarm” alarm appliance. Voice appliances and systems should be capable of 520 Hz ±10 percent with the appropriate harmonics [72:A.18.4.6.3]

For increased protection in the sleeping area, tactile notification in accordance with Section 6.10 might be an effective means of awakening those who have normal hearing, as well as those who are hearing impaired. [72:A.18.4.6.3]

A.6.4.4.3(2)

For the purposes of awakening, the low frequency signal can be produced by a listed stand-alone appliance or by a listed system consisting of a recorded waveform delivered through an amplifier and loudspeaker. [72:18.4.6.3(2)]

A.6.4.5

This subsection permits a more rigorous analysis and design for audible signaling. Acoustic design practice and psychoacoustic research have long recognized that for a signal to be audible, it need only penetrate the background noise in a one-third or a one octave band. The averaging resulting from A-weighted analysis and design is a simplification that often results in systems being overdesigned. This overdesign is not dangerous but can be costly and is certainly not needed for effective system performance. [72:A.18.4.7]

A.6.4.5.2

Noise at a lower frequency can mask a signal at an adjacent higher frequency. Thus, it is necessary to calculate the effective masked level of the noise in accordance with established procedures. Figure A.6.4.5.2 shows an example of an octave band analysis of noise along with the calculated effective masked threshold and the proposed alarm signal. [72:A.18.4.7.2]

Figure A.6.4.5.2 Threshold Masking Level Example. [72:Figure A.18.4.7.2]

A.6.4.6.2

Consideration must be given to the location of notification appliances relative to the location of the fuel gas detector. Where practicable, notification appliances should be located further away than the detector from fuel gas leak sources. For heavier-than-air fuel gases, the detector must be located lower than the notification appliance horizontal plane location.
A.6.4.8
See Annex D, Speech Intelligibility, of NFPA 72. \[72:A.18.4.11\]

A.6.4.8.1
See the definition of acoustically distinguishable space in 3.3.1. \[72:A.18.4.11.1\]

A.6.4.8.3
For example, based on the system design the following locations might not require intelligibility.

(1) Private bathrooms, shower rooms, saunas, and similar rooms/areas
(2) Mechanical, electrical, elevator equipment rooms, and similar rooms/areas
(3) Elevator cars
(4) Individual offices
(5) Kitchens
(6) Storage rooms
(7) Closets
(8) Rooms/areas where intelligibility cannot reasonably be predicted

A.6.4.8.4
ADS assignments should be a part of the original design process. See the discussion in A.3.3.1. The design drawings should be used to plan and show the limits of each ADS where there is more than one. \[72:A.18.4.11.4\]

All areas that are intended to have audible occupant notification, whether by tone only or by voice should be designated as one or more ADSs. Drawings or a table listing all ADSs should be used to indicate which ADSs will require intelligible voice communications and those that will not. The same drawings or table could be used to list audibility requirements where tones are used and to list any forms of visual or other notification or communications methods being employed in the ADS. \[72:A.18.4.11.4\]

A.6.5
The mounting height of the appliances affects the distribution pattern and level of illumination produced by an appliance on adjacent surfaces. It is this pattern, or effect, that provides occupant notification by visual appliances. If mounted too high, the pattern is larger but at a lower level of illumination (measured in lumens per square foot or foot-candles). If mounted too low, the illumination is greater (brighter) but the pattern is smaller and might not overlap correctly with that of adjacent appliances. \[72:A.18.5\]

A qualified designer could choose to present calculations to an authority having jurisdiction showing that it is possible to use a mounting height greater than 96 in. (2.44 m) or less than 80 in. (2.03 m), provided that an equivalent level of illumination is achieved on the adjacent surfaces. This can be accomplished by using listed higher intensity appliances or closer spacing, or both. \[72:A.18.5\]

Engineering calculations should be prepared by qualified persons and should be submitted to the authority having jurisdiction, showing how the proposed variation achieves the same or greater level of illumination provided by the prescriptive requirements of Section 6.5. \[72:A.18.5\]

The calculations require knowledge of calculation methods for high-intensity visual notification appliances. In addition, the calculations require knowledge of the test standards used to evaluate and list the appliance. \[72:A.18.5\]
A.6.5.1

There are two methods of visual signaling. These are methods in which notification of an emergency condition is conveyed by direct viewing of the illuminating appliance or by means of illumination of the surrounding area. [72:A.18.5.1]

Visual notification appliances used in the public mode must be located and must be of a type, size, intensity, and number so that the operating effect of the appliance is seen by the intended viewers regardless of the viewer’s orientation. [72:A.18.5.1]

A.6.5.1.2

Visual notification for emergency signaling might not be required in all rooms or spaces. For example, a system that is used for general occupant notification should not require visual signaling in closets and other spaces that are not considered as occupiable areas. However, a space of the same size used as a file room could be considered occupiable and should have coverage by notification appliances. Also, signaling intended only for staff or emergency forces might only have to be effective in very specific locations.

A.6.5.2.2

Occupant notification by visual signaling is not required by NFPA 715 except in high noise areas (see 6.4.1.1). Just as with audible occupant notification, the requirement to have such signaling originates from other governing laws, codes, or standards. Those other governing laws, codes, or standards specify the areas or spaces that require either audible, visual, or both types of occupant notification. NFPA 715 then provides the standards for those systems [72:A.18.5.2.2]

A.6.5.5.4

Visual notification appliances must be listed for either wall mounting or ceiling mounting. The effectiveness of ceiling-mounted appliances does not depend on them being mounted on a surface. Therefore, the standard permits them to be suspended below the ceiling using proper electrical installation methods. Appliances mounted parallel to the floor, whether on a ceiling or suspended, can sometimes significantly reduce installation costs and provide better coverage. [72:18.5.5.4]

In convention spaces and areas with racking and shelving, wall-mounted appliances are frequently obstructed or subjected to mechanical damage. Ceiling mounting (or suspending) the appliances can prevent problems and increases the ability for the appliance to cover the floor area through direct and indirect signaling.
A.6.5.5.5
The visual notification appliance intensities listed in Table 6.5.5.5.1(a) or Table 6.5.5.5.1(b), 6.5.5.6, or determined in accordance with the performance requirements of 6.5.5.7 are the minimum required intensities. It is acceptable to use a higher intensity visual notification appliance in lieu of the minimum required intensity.

Areas large enough to exceed the rectangular dimensions given in Figure A.6.5.5.5(a) through Figure A.6.5.5.5(c) require additional appliances. Often, proper placement of appliances can be facilitated by breaking down the area into multiple squares and dimensions that fit most appropriately [see Figure A.6.5.5.5(a) through Figure A.6.5.5.5(d)]. An area that is 40 ft (12.2 m) wide and 80 ft (24.4 m) long can be covered with two 60 cd appliances. Irregular areas and areas with dividers or partitions need more careful planning to make certain that at least one 15 cd appliance is installed for each 20 ft × 20 ft (6.1 m × 6.1 m) area and that light from the appliance is not blocked. [72:A.18.5.5.5]

Figure A.6.5.5.5(a) Irregular Area Spacing. [72:Figure A.18.5.5.5(a)]

Figure A.6.5.5.5(b) Spacing of Wall-Mounted Visual Notification Appliances in Rooms. [72:Figure A.18.5.5.5(b)]
A.6.5.5.6

This subsection is also intended to permit ceiling mounted visual notification appliances to be suspended below the ceiling, provided the visual notification appliance height is not below the viewing plane for any ceiling height. [72:18.5.5.5.6]
A.6.5.5.6

Because the occupants are usually alert and moving, and because their vision is focused by the narrowness of the space, corridor signaling is permitted to be by direct viewing of lower-intensity (15 cd) appliances. That is, the alerting is intended to be done by direct viewing of the visual notification appliance, not necessarily by its reflection off of surfaces (indirect viewing) as required for rooms in 6.5.5.5. [72:A.18.5.5.6]

Note that it is acceptable to use 6.5.5.5 (Spacing in Rooms) to determine the number and location of visual notification appliances in corridors. If 6.5.5.5 is used, it is not necessary to have a corridor visual notification appliance within 15 ft (4.6 m) of the end of the corridor. [72:A.18.5.5.6]

See Figure A.6.5.5.6 for corridor spacing for visual notification appliances. [72:A.18.5.5.6]

Figure A.6.5.5.6 Corridor Spacing for Visual Notification. [72:Figure A.18.5.5.6]

A.6.5.5.6.5

Visual notification appliances in corridors are permitted to be mounted on walls or on ceilings in accordance with 6.5.5.6. Where there are more than two appliances in a field of view, they need to be synchronized. [72:A.18.5.5.6.5]

Note that it is acceptable to use 6.5.5.5 (Spacing in Rooms) to determine the number and location of visual notification appliances in corridors. If 6.5.5.5 is used, it is not necessary to have a corridor visual notification appliance within 15 ft (4.5 m) of the end of the corridor. It is not the intent of this section to require visual notification appliances at or near every exit or exit access from a corridor. [72:A.18.5.5.6.5]

A.6.6

Though the number of visual notification appliances might be reduced in private operating mode settings, visual notification appliances might still need to be considered in spaces occupied by the public or the hearing impaired or subject to other laws or codes. [72:A.18.6]

A.6.8.2

The tone signal is used to evaluate the sound pressure level produced by loudspeaker appliances because of the fluctuating sound pressure level of voice or recorded messages. [72:A.18.8.1.2]
A.6.9

Textual and graphical visual appliances are selected and installed to provide temporary text, permanent text, or symbols. Textual and graphical visual appliances are most commonly used in the private mode for fuel gas alarm systems. The use of microprocessors with computer monitors and printers has resulted in the ability to provide detailed information in the form of text and graphics to persons charged with directing emergency response and evacuation. Textual and graphical visual appliances are also used in the public mode to communicate emergency response and evacuation information directly to the occupants or inhabitants of the area protected by the system. For both private mode and public mode signaling, text and graphic annunciators can provide information about prealarm, alarm, trouble, and supervisory conditions. Because textual and graphical visual appliances do not necessarily have the ability to alert, they should only be used to supplement audible or visual notification appliances.

Textual and graphical visual information should be of a size and visual quality that is easily read. Many factors influence the readability of textual visual appliances, including the following:

1. Size and color of the text or graphic
2. Distance from the point of observation
3. Observation time
4. Contrast
5. Background luminance
6. Lighting
7. Stray lighting (glare)
8. Shadows
9. Physiological factors

While many of these factors can be influenced by the equipment manufacturer and by the building designers, there is no readily available method to measure legibility.

A.6.9.4

Parts of this section on text characteristics are based on Section 703.5 of the updated accessibility guidelines in the U.S. Access Board's ADA-ABA-AG.

A.6.9.4.2

Signs are more legible for persons with low vision when characters contrast as much as possible with their background. Additional factors affecting the ease with which the text can be distinguished from its background include shadows cast by lighting sources, surface glare and the uniformity of the text and its background colors and textures.

Stroke width-to-height ratios are an important part of character legibility and are affected by contrast. Ratios for light characters on a dark background and dark characters on a light background differ because light characters or symbols tend to spread or bleed into the adjacent dark background. To accommodate these differences, recommendations for symbol stroke width-to-character height ratios are as follows:

1. Positive image — Dark characters on a light background, ratio of 1:6 to 1:8
2. Negative image — Light characters on a dark background, ratio of 1:8 to 1:10


A.6.9.4.4

The use of all uppercase characters in messages should be avoided as it decreases legibility. The exception is one- or two-word commands or statements such as stop, go, or exit stair.
A.6.9.4.7

Paragraph 6.9.4.7 and the associated table does not apply to text and graphics displayed on desktop monitors. The standard does not list any specific sizing requirements for desktop monitors. However, 6.9.3 does require them to be clear and legible at the intended viewing distance. Other requirements in 6.9.4 such as contrast, sans serif fonts, and so forth should still apply to desktop displays. The specific requirements of Table 6.9.4.7 are taken directly from Section 703.5 of the updated accessibility guidelines in the U.S. Access Board’s ADA-ABA-AG. The table has been reformatted to be consistent with other parts of NFPA 715.

A.6.9.4.8

The minimum height for textual and graphic visual appliances is given as 40 in. (1.02 m) above the ground or finished floor. However, the character or symbol sizes should be based on the height of the highest character or symbol displayed by the appliance.

A.6.10.2

Notification appliances are available for the deaf and hard of hearing. These appliances include, but are not limited to, supplemental tactical notification appliances. Such tactile notification appliances can be capable of awakening people. Tactile appliances can initiate in response to the activation of an audible fuel gas alarm, through hard wiring into the fuel gas alarm system or by wireless methods.

Some tests show that visual notification appliances might not be effective in awakening some sleeping individuals during an emergency. Some tactile devices may be more effective in awakening individuals, regardless of hearing levels, from sleep.

A.6.11

Standard Emergency Service Interface. Annunciators, information display systems, and controls for portions of a system provided for use by emergency service personnel should be designed, arranged, and located in accordance with the needs of the organizations intended to use the equipment.

Where annunciators, information display systems, and controls for portions of the system are provided for use by emergency service personnel, these should have a common design and operation to avoid confusion of users.

A.7.1.2

Some fuel gas utilities utilize remote metering equipment that enables monitoring and communication of gas consumption and other fuel gas delivery variables. In some cases, fuel gas utilities perform operational monitoring of jurisdictional piping systems by use of integrated gas sensors as part of their overall gas safety pipeline integrity management program. In these cases, fuel gas utilities typically monitor these variables remotely. If an indication of a potential fuel gas release or leak is communicated to the utility, the utility will respond and investigate as part of their emergency response plan. Response actions are similar to a situation where a consumer notifies a utility of a potential fuel gas release or leak by detection of a gas odor.

A.7.2.1.1.2

If a fuel gas detector cannot be reset in accordance with Chapter 8, that could indicate that fuel gas is still present in the premises. Until such time that fuel gas can be excluded as the source of the alarm, the assumption should be that fuel gas is present and appropriate life safety precautions should be followed.

A.7.2.2

The supervising station should have a notification plan on file, the manufacturer’s published instructions, and multiple points of contact with the subscriber when the account is added to their system. Once contacted, supervising station personnel should inform the subscriber to take action in accordance with the manufacturer’s published instructions. If the manufacturer’s published instructions are not available, supervising station personnel should inform the subscriber to take action in accordance with 9.6.8.3.
A.7.2.3
The communications center should have a notification plan on file, the manufacturer’s published instructions, and multiple points of contact for the subscriber when the account is added to their system. Once contacted, the communications center should inform the subscriber of the action to take.

A.8.2.1.5
Service personnel should be able to do the following:

1. Understand the requirements contained in this standard, in NFPA 72, and the relevant requirements contained in NFPA 70
2. Understand basic job site safety laws and requirements
3. Apply troubleshooting techniques, and determine the cause of fuel gas detection system trouble conditions
4. Understand equipment specific requirements, such as programming, application, and compatibility
5. Read and interpret fuel gas detection system design documentation and manufacturer’s inspection, testing, and maintenance guidelines
6. Properly use tools and test equipment required for testing and maintenance of fuel gas detection systems and their components
7. Properly apply the test methods required by this standard

A.8.2.2
Prior to any scheduled inspection or testing, the service company should consult with the building or system owner or the owner’s designated representative. Issues of advance notification in certain occupancies, including advance notification time, building posting, systems interruption and restoration, evacuation procedures, accommodation for evacuees, and other related issues, should be agreed upon by all parties prior to any inspection or testing. [72:A.14.2.4]

A.8.2.4
The test plan is intended to clarify exactly what is to be tested and how it is to be tested. Testing of fuel gas alarm and signaling systems is often done in a segmented fashion to accommodate the availability of testing or other personnel or to minimize the interruption of building operations. Where a building owner has contracted the performance of inspection, testing, and maintenance activities to outside entities, the test plan, what will and will not be tested, should be reviewed by those parties. Building operations can be affected by testing of the fuel gas alarm or signaling system itself and by the operation of emergency control functions actuated by the fuel gas alarm or signaling system. The boundary of the fuel gas alarm or signaling system extends up to and includes the emergency control function interface device. The testing requirements prescribed in NFPA 715 for fuel gas alarm and signaling systems end at the emergency control function interface device. The purpose of the test plan is to document what devices will and will not actually be tested.

The testing of emergency control functions, releasing systems, or interfaced equipment is outside the scope of NFPA 715. Requirements for testing other systems are found in other governing laws, codes, or standards. Requirements for integrated testing of combined systems also fall under the authority of other governing laws, codes, standards, or authority having jurisdiction.

Further information on testing associated with emergency control functions can be found in Table 8.4.3, Item 18 and its related annex material in A.8.4.3. [72:A.14.2.10]
A.8.3.1

Equipment performance can be affected by building modifications, occupancy changes, changes in environmental conditions, device location, physical obstructions, device orientation, physical damage, improper installation, degree of cleanliness, or other obvious problems that might not be indicated through electrical supervision. [72:A.14.3.1]

The intent of 8.3.1 is to prevent an inspection being made at intervals exceeding those allowed by Table 8.3.1. Annual inspections should be made every 12 months; monthly inspections should be made every 30 days, and so forth. For example, it is not acceptable to conduct an annual inspection in January of year one, and December of year two (23 month frequency) just because Table 8.3.1 requires an inspection once each year. [72:A.14.3.1]

A.8.4.2

Reacceptance testing is performed to verify the proper operation of added or replaced devices, appliances, [fuel gas safety] control function devices, control equipment, and so forth. It is not the intent of the committee to unduly burden the system owner with increased costs for repeated testing of devices not directly affected by the replacement of devices with like devices. [72:A.14.4.2]

For example, if a 2 amp fuse is replaced with another 2 amp fuse in the fuel gas detection control unit, verification of the circuit(s) served by the fused supply is required, but it would not be necessary to test 10 percent of initiating devices not directly affected by replacing the fuse. Likewise, it is not necessary to test all these initiating devices whenever a fuel gas detector is replaced with a like fuel gas detector.

When wiring changes are made to correct improperly supervised circuits, a test of the affected device or appliance is required, but not a test of 10 percent of initiating devices not directly affected. [72:A.14.4.2]

A.8.4.2.4(2)

The choice of devices chosen for this testing should allow for different locations/units/areas or other appropriate divisions to ensure it can discover any systematic software faults. If these tests discover any systematic software errors, appropriate changes should be made and the entire system should be tested end to end.

A.8.4.2.5

The functional test should be commensurate with the change made and can range from checking part of the system (only portions affected by the change if the change is limited and cannot affect operations of other portions of the overall system) up to the full system.
A.8.4.3 Table 8.4.3, Item 8(4).
Ohmic testing is a means to determine the state of health of a VRLA battery's cells by measuring some form of a cell's internal resistance. Typically ohmic testing equipment uses one of three techniques—conductance, impedance, or resistance—to make these measurements. [72:A.14.4.3.2 Table 14.4.3.2 Item 9(4)]

In simplest technical terms, ohmic technology is based on Ohm's Law, which expresses the relationship between volts, amperes, and ohms in an electrical circuit. Ohmic testing attempts to use voltage and current to determine the resistive characteristic of a battery's cells. As the cells in a battery age and start to lose capacity, the internal components of the battery are undergoing a degradation process. The degradation of these components (plates, grids, internal connection straps) within the battery's cells causes an increased resistance in the conduction paths of the cell, which in turn causes a change in the internal ohmic values. A measured increase in impedance or resistance, or a decrease in conductance, indicates the battery is losing its ability to produce the energy it was designed to deliver when called upon to support the connected loads. [72:A.14.4.3.2 Table 14.4.3.2 Item 9(4)]

The key to effective application of ohmic testing is the appropriate trending of test results over time compared to a baseline or reference value. Studies have demonstrated that an individual battery produces a unique ohmic "signature" and the use of ohmic testing equipment to trend changes in this signature from installation through the life of the battery is the most effective use of the technology. A program that involves ohmic testing on a regular interval to note changes in the battery is a good maintenance practice. [72:A.14.4.3.2 Table 14.4.3.2 Item 9(4)]

An ohmic baseline reference value is a benchmark value based on data collected from known good batteries. Reference values can be determined from site-specific measurement, or from testing a sample of new healthy batteries, or by using a generic baseline value to get started. [72:A.14.4.3.2 Table 14.4.3.2 Item 9(4)]

(1) The best baseline is one established on the installed battery within three to six months after installation and trend accordingly using good record keeping. Ideally the individual ohmic value should be measured at installation and again after the battery has been on float charge for at least 72 hours in order for it to reach a high state of stabilization. These initial "site-specific" values should be recorded and permanently affixed to the battery as a baseline for subsequent tests over the life of the battery. The ohmic value will typically increase for conductance and decrease for resistance and impedance between the initial installation and after being on float-charge for 90 to 180 days (10 percent to 15 percent depending on battery type and size). Six months after installation measure and compare the ohmic readings to the readings taken at installation. Use whichever value is greater for conductance or lower for resistance and impedance as the baseline for that particular battery at that site going forward. [72:A.14.4.3.2 Table 14.4.3.2 Item 9(4)]

(2) A sample of new healthy batteries in a fully charged state can be tested to obtain a baseline value representative of a new battery. A sample size of at least 30 batteries from one manufacturer with the same make, model, amp-hour rating, age (within 6 months), and manufacturing lot is recommended. Record the following information for the batteries:

(a) Battery manufacturer
(b) Model number
(c) Date of manufacture
(d) Manufacturing lot number (if available)
(e) Battery temperature
(f) Whether or not the battery has had a freshening charge
(g) Battery voltage
(h) Ohmic test value

[72:A.14.4.3.2 Table 14.4.3.2 Item 9(4)]

Calculate the average ohmic value of the batteries. Do not include batteries that deviate more than 30 percent from the average because they could be outside of an acceptable range. Use the average value as a baseline starting point for this model battery.
A generic baseline value for a specific battery model can often be found by contacting the ohmic test equipment manufacturer or from the battery manufacturer. While it is important to note that the use of generic reference values might not be as accurate, it is still possible to identify grossly failed batteries and significant changes in battery condition by applying this method. Generic baseline values are typical averages to be used as general guidelines and should only be used when no other data is available. When testing older batteries for which no initial site-specific ohmic value is available, reference values can be obtained in the following ways:

(a) Contact the equipment or battery manufacturer for assistance.
(b) Consult your company documentation to see if reference values were created for the battery you are testing.
(c) Using ohmic readings of recently installed batteries of the same manufacturer and model of the battery, manufacturer and model of the alarm panel/system, charging circuit, and temperature at time of measurements, calculate the average ohmic value of the best 8 to 10 batteries and use this value as a baseline reference.

As a battery ages and loses capacity, the internal ohmic values change. Although the change might not be perfectly consistent over all battery models and sizes, extensive test data shows that a deviation of ohmic values from the established baseline by 30 percent or more for conductance and 40 percent more for resistance or impedance indicates that the actual battery capacity has dropped to 80 percent or lower. (For lead-acid batteries, capacity drops off rapidly once the 80 percent capacity point is reached in the lifetime curve, so this is known as the "knee" of the capacity vs. lifetime curve). This 80 percent capacity is the level at which battery manufacturers recommend battery replacement. Figure A.8.4.3 illustrates an ohmic trend of a 5-year design life battery with an actual expected service life of 3 years. Note that while battery Unit #1 still has good ohmic readings, semiannual measurements show Unit #2 failing prematurely. For this case, it is desirable to replace both units at the same time. If one unit fails at 2 1/2 years, it is likely the second unit will fail in one of the next semiannual tests. Full replacement ensures that all units will "float" together. One exception might be when a unit fails in the first year.

Ohmic testing can be a safe, simple, accurate, and reliable means of determining the state of health of VRLA batteries. It is important however to understand the following basic guidelines in order to maximize the benefits and avoid possible misleading test results:

(1) Follow safety regulations: wear eye protection and remove metal jewelry, and so forth prior to working with batteries.
(2) Conduct a visual inspection prior to testing. A cracked case, leaking terminal or post, or bulging battery should be replaced, not tested.
(3) Temperature changes affect measured ohmic values and battery capacity. Ohmic measurements should be taken at 77°F (25°C) ±13°F (7°C).
(4) For maximum accuracy and consistency, batteries should be tested when in a fully charged state.
(5) Check the battery charging current prior to test. The charging current should be stable and be within the normal float current recommendations of the battery manufacturer for the battery model. If it is not, it is likely that the batteries have recently been discharged and a test is not appropriate until this float current stabilizes.
(6) Whenever possible, ohmic readings should be taken each time with the same instrument, but as a minimum with the same model. Changing models will skew the data and require re-establishing the baseline.
(7) When test equipment is provided with an alert, set the ohmic baseline and/or thresholds prior to beginning the test to provide an indication of any deviations from baseline.
(8) It is essential to take ohmic measurements at the battery terminal or post. For consistency and accuracy, subsequent tests should always have probes or clamps placed at the same point while avoiding battery hardware such as bolt heads or washers. Connecting on the hardware will influence the readings and could cause errors.
replacement of a healthy battery.

(9) Maintain good contact at the test point for the duration of the test. If the probe or clamp slips off during the test, an incorrect reading will result.

(10) For batteries with fully insulated quick disconnect connectors, the battery should be taken offline by removing the quick disconnects from the battery terminals and then measuring and recording the internal ohmic value of the battery.

(11) Do not condemn a battery based upon results of a single test without any trending data or an established baseline for that specific battery.

(12) When one or more units in a battery falls outside the acceptable range from baseline, replace the entire string.

(13) A battery tested online can display a different value than when tested offline due to the charger circuit and load being across the battery. Always test the same way, either online or offline, to have consistent and meaningful results. When ohmic testing is performed online, a change in current occurs due to the ohmic test set signal that could impact battery voltage readings. Because battery float voltage is directly tied to float current, the sum of the voltages of each battery cell/unit have to equal the charger float voltage of the battery string. If a load is applied from the ohmic test set that depresses one cell/unit then the others have to rise somewhat to offset it. As ohmic testing progresses through the battery string, each cell/unit gets pulled down by the ohmic test set somewhat, and the charger must boost the string current to maintain the voltage, raising the voltage of the cells/unit that have not yet been tested. For this reason, voltage readings should be taken with a voltmeter prior to performing ohmic testing online.

[72:A.14.4.3.2 Table 14.4.3.2 Item 9(4)]

Table 8.4.3.2, Item 8(5).

Battery capacity is determined by the mass of active material contained in the battery and is a measure of the battery's stored energy. The rated capacity of small VRLA batteries used in fire alarm and signaling system applications is typically measured in ampere-hours (Ah) where the ampere-hour rating is based on the battery's capability to provide a constant current at the nominal battery voltage for 20 hours. The rated capacity might vary from manufacturer to manufacturer. [72:A.14.4.3.2 Table 14.4.3.2 Item 9(5)]

The actual battery capacity during service life, often referred to as the state of charge (SOC) can vary significantly from rated capacity due to aging, charge and discharge cycles, temperature, and other factors. The unique failure modes of VRLA batteries due to aging and internal degradation are attributed for a high failure rate where the actual battery capacity has degraded to 80 percent of the manufacturer's rated capacity. As a result, battery manufacturers often recommend replacement much sooner than the rated design life for critical systems. [72:A.14.4.3.2 Table 14.4.3.2 Item 9(5)]

A test of battery capacity is designed to determine if the battery is capable of continuing to deliver the voltage level specified by the manufacturer. The results of a capacity test can also be used to estimate where the battery is in its service life. A test of capacity is performed by applying a constant current load to the battery based on the manufacturer's published discharge rates until voltage falls to specified levels. Although discharging the battery for capacity testing concerns some, VRLA batteries are designed to handle numerous discharges within the limits established by the battery manufacturer. [72:A.14.4.3.2 Table 14.4.3.2 Item 9(5)]

The discharge rate selected for testing should be representative of the battery duty cycle. At shorter test times, the test duration has a greater effect on the capacity calculation. For example, a 1-minute difference in actual test time for a 5-minute discharge rate compared to a 3-hour discharge rate will result in a greater deviation of the calculated capacity. The battery is also operating less efficiently at shorter discharge rates and the effects of aging and degradation might not be as prevalent during shorter discharges. [72:A.14.4.3.2 Table 14.4.3.2 Item 9(5)]

Fuel gas detection and signaling system loading is typically insufficient for the practical application of a battery load test because the system load cannot be varied to maintain a constant current equal to the battery manufacturer's published discharge rates. The fixed load applied by the system will result in final voltage levels that are deceptively high. Battery sizing is also a factor. The calculated system loads for the battery duty cycle (e.g., 24 hours
standby followed by 5 minutes in an alarm) will rarely align with published discharge rates necessary for load testing. In many applications where the battery size is large in comparison to the required system current, the system loading could be too small to accurately determine battery capacity. In these cases, a battery near failure could conceivably satisfy the low discharge rate applied by the fire alarm or signaling system.

In order to satisfy the load test requirements of Table 8.4.3, battery capacity testing can be performed in the following manner or in accordance with other methods such as those identified in IEEE Std TM 1188, *Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications*:

1. Referring to the battery manufacturer’s specifications, determine the load current for the 3-hour battery rating to the selected end voltage, typically 1.67 volts per cell (10.2 volts for a 12-volt system or 20.4 volts for a 24-volt system).

2. Record the battery temperature at the negative terminal.

3. Disconnect the charger and connect a load bank to the battery terminals.

4. Apply the constant current specified for the 3-hour rate to the battery. Once the constant current is applied, continue the test until the battery terminal voltage decreases to the specified end voltage.

5. Stop the test when the selected end voltage is reached.

6. Record the actual test duration in minutes.

7. Disconnect the load bank and reconnect the charger.

8. Calculate percent battery capacity as follows:

   \[ \% \text{ Capacity} = \left( \frac{T_{\text{actual}}}{(180 \times K_T)} \right) \times 100 \]

   where:

   \( T_{\text{actual}} \) = the test duration in minutes

   \( K_T \) = the temperature correction factor for the actual battery temperature at the start of the test from Table 8.4.3. Additional temperature correction factors can be obtained from IEEE 1188.

9. Replace the battery if the battery capacity is less than or equal to 80 percent. Replace the battery at the next scheduled test interval if the battery capacity is less than 85 percent. [72:A.14.4.3.2 Table 14.4.3.2 Item 9(5)]

As a good practice, a new battery should be fully charged and then load tested following the battery manufacturer’s recommendations prior to installation. A new fully charged battery should have a capacity of at least 90 percent. [72:A.14.4.3.2 Table 14.4.3.2 Item 9(5)]

Table A.8.4.3 Temperature Correction Factors [72:Table A.14.4.3.2]

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Figure A.8.4.3 Ohmic Trend Analysis for a 24-Volt Battery Made Up of Two 12-Volt Units. [72:Figure A.14.4.3.2]

Table 8.4.3, Item 18.

The extent of testing of a fire alarm or signaling system, including devices that were not tested, should be documented in accordance with the test plan in 8.2.4. NFPA 72 does not require testing of an emergency control function, such as elevator recall, but does require testing of the emergency control function interface device, such as the relay powered by the fire alarm or signaling system. Where the emergency control function is not being tested concurrent with the fire alarm or signaling system testing, measurement of the emergency control function interface device output should be verified using the proper test devices. This might require reading or observing the condition of a relay, a voltage measurement, or the use of another type of test instrument. Once testing is complete, verification that any disabled or disconnected interface devices have been restored to normal is essential, and this verification should be documented in the testing results. [72:Table 8.4.3, Item 24]

Testing of the emergency control functions themselves is outside of the scope of NFPA 715. A complete end-to-end test that demonstrates the performance of emergency control functions actuated by the fire alarm or signaling system might be required by other
governing laws, codes, or standards, or the authority having jurisdiction. In that situation, other applicable installation standards and design documents, not NFPA 715, would address testing and performance of the emergency control functions. [72:Table 8.4.3, Item 24]

A.8.4.4

It is suggested that the annual test be conducted in segments so that all devices are tested annually. [72:A.14.4.4]

The intent of 8.4.4 is to prevent a test from being made at intervals exceeding those allowed by Table 8.4.3. Annual tests should be made every 12 months; monthly tests should be made every 30 days, and so forth. For example, it is not acceptable to conduct an annual test in January of year one, and December of year two (23-month frequency), just because Table 8.4.3 requires a test once each year. See the definition of frequency in 3.3.11 for minimum and maximum time between testing events. [72:A.14.4.4]

A.8.4.5.4

Examples of indication at the detector or the control unit include, but are not limited to, an LED indication or analog output or display.

A.8.8.1.1

Unlike single- and multiple-station fuel gas alarms, fuel gas detection systems often do not have simple test buttons and have an added level of complexity for testing the system. It is considered an industry best practice to have a fuel gas detection system tested every 3 years to ensure proper operating conditions. Due to the added complexity of the system including the presence of the control panel, this requires a qualified service technician.

A.9.1.1

The manufacturer’s published instructions are intended to provide device- or system-specific installation, operation, and maintenance requirements. These requirements could vary based on the fuel gas or gases the detector/system is intended to detect, the sensor technology utilized, and other device- or system-specific installation, operation, and maintenance variables.

A.9.3.3

This standard establishes minimum standards for the use of fuel gas warning equipment. The use of additional alarms or detectors over and above the minimum standard is encouraged. The use of additional devices can result in a combination of equipment (e.g., a combination of single- and multiple-station alarms or a combination of fuel gas alarms or fuel gas detectors that are part of a security/fuel gas detection system and existing multiple-station alarms). Though a combination is allowed, one type of equipment must independently meet the requirements of the standard. Compliance with the requirements of the standard cannot rely on the combination of the following fuel gas warning equipment:

1. Single-station alarms
2. Multiple-station alarms
3. Household fuel gas detection system (includes a security/fuel gas system with fuel gas alarms or fuel gas detectors)

It is encouraged that the highest level of protection be used where possible. For example, if multiple-station alarms are added to an occupancy with compliant single-station alarms, the multiple-station alarms should be installed to replace all of the single-station alarms. Similarly, if a monitored household fuel gas detection system is added to a house that has compliant multiple-station alarms, monitored fuel gas alarms or fuel gas detectors should be installed to replace the multiple-station alarms or be installed to provide the same required coverage.
A.9.4.1

Hazardous concentrations of fuel gas can accumulate in a residence due to leaking or defective piping systems or connections to end-use devices of malfunctioning equipment such as boilers, water heaters, and cooking appliances.

While fuel gas is typically odorized by use of fuel gas odorants to impart a gassy odor, individuals that do not have a normal sense of smell might not detect a leak. Fuel gas alarms meeting the requirements of UL 1484, Residential Gas Detectors, or fuel gas detection systems meeting UL 2075, Standard for Gas and Vapor Detectors and Sensors, and installed in accordance with the applicable standard(s) should provide a significant additional level of protection against fuel-gas-related incidents.

The installation of fuel gas alarms or detection systems could result in a greater degree of protection in addition to gas odorants. Adding alarms to rooms where fuel-burning appliance are located could provide earlier warning of fuel gas hazards caused by those sources. Additional alarms located in rooms normally closed off from the required alarms could increase the escape time, since the fuel gas concentration needed to force the fuel gas out of the closed rooms to the alarms would not be necessary. As a consequence, the installation of additional fuel gas alarms should be considered.

Fuel gas alarms or detectors are not substitutes for properly odorized fuel gases, and proper maintenance, inspection, and testing of fuel-burning equipment. Fuel gas piping systems and fuel-gas-burning equipment and appliances should be used, maintained, tested, and inspected according to the manufacturers' instructions and all applicable standards.

Fuel gas alarms or detectors are cross-sensitive to hydrogen, a combustible gas that can be given off by recharging lead acid batteries. Where households include recharging stations (e.g., for golf carts), the alarm should be located away from the recharging location.

A.9.4.1.1

Where sleeping areas are separated and the audibility of the alarm or detector to occupants within each sleeping area could be seriously impaired, more than one unit could be needed. [72:A.29.7.1.1]

At times, depending on conditions, the audibility of notification appliances could be seriously impaired when occupants are in the bedroom area. For instance, there might be a noisy window air conditioner or room humidifier generating an ambient noise level of 55 dBA or higher. The detection device alarms need to penetrate through the closed doors and be heard over the bedroom's noise levels with sufficient intensity to awaken sleeping occupants. Test data indicate that alarms with ratings of 85 dBA at 3 m (10 ft) that are installed outside the bedrooms can produce about 15 dBA over ambient noise levels of 55 dBA in the bedrooms. This sound pressure is likely to be sufficient to awaken the average sleeping person. [72:A.29.7.1.1]

Alarms or detectors located remote from the bedroom area might not be loud enough to awaken the average person. In such cases, it is recommended that units be interconnected in such a way that the operation of the remotely located detector or alarm causes an alarm of sufficient intensity to penetrate the bedrooms. The interconnection can be accomplished by the following:

1. Installation of a system
2. Wiring together of multiple-station alarms
3. Use of line carrier or radio frequency transmitters/receivers
4. Adding supplemental notification appliances

[72:A.29.7.1.1]

A.9.4.1.1(1)

Rather than requiring fuel gas alarms or detectors with each appliance, “free air communication” is meant to address proximity that would deliver the same functionality.
A.9.4.1.1(2)
The purpose of detectors in basements or other subgrade rooms which have foundation penetrations that might convey migrating fuel gas leaks from outside the occupancy is to detect the fuel gases from sources outside the structure migrating to and through the subgrade outer surfaces. Detector location and spacing should be based on an engineering evaluation that considers potential sources and migration of fuel gases. Fuel gas lines outside the structure should be considered in the engineering evaluation because damaged pipelines are a potential source of the migrating fuel gas. Other considerations when locating fuel gas detectors are the permeability of the wall, permeability of the floor, manmade penetrations (e.g., pipe passthroughs), and naturally occurring penetrations such as cracks.

A.9.4.1.1(3)
The requirements of 9.4.1.1(3) do not pertain to detectors.

A.9.4.1.2
The location for effective performance is dependent on mounting height and the density of the fuel gas being detected relative to air.

A.9.4.2.3 Five-Pulse Temporal Pattern.
The five-pulse temporal pattern is illustrated in Figure A.9.4.2.3. [72:A.29.5.3]

Figure A.9.4.2.3 Five-Pulse Temporal Pattern. [72:Figure A.29.5.3]

A.9.4.2.4
Since hearing deficits are often not apparent, the responsibility for advising the appropriate person(s) of the existence of this deficit should be that of the hearing-impaired party.

A.9.4.2.4.1.1
As an example, governing laws, codes, or standards might require a certain number of accommodations be equipped for those with hearing loss or other disability. [72:A.29.5.10.1]

A.9.4.2.4.1.2
It is not the intent of this section to preclude devices that have been demonstrated through peer reviewed research to awaken occupants with hearing loss as effectively as those using the frequency and amplitude specified in this section. [72:A.29.5.10.1(2)]

A.9.4.2.4.1.2
Tactile notification appliances such as bed shakers have been shown to be effective in waking those with normal hearing to profound hearing loss (Ashley, et al. 2005, UL 1971, 1991). Tactile signaling has been studied and found to be an effective way to alert and notify sleeping persons. However, there are many variables that have not been tested that might affect the reliability of their performance. Some of the appliance variables include the mass of the appliance, frequency of vibration, and the throw or displacement of the vibrating mass. Occupant variables that might affect the reporting of test results and the effectiveness of the appliance include the person’s age, how long a person has lived with their hearing loss, and what sleep stage the person is experiencing when the appliance operates. The type of mattress might also have an effect of the performance of certain tactile appliances. Mattress variables can include thickness, firmness, memory foam, pillow tops, water beds, air beds, and motion isolation mattresses. Users of tactile appliances should be cautioned to test how well they might sense the effect of the appliance. [72:A.29.5.10.2]

The standard requires both visual notification appliances and tactile appliances. Visual notification appliances can awaken sleeping persons, provide verification that there is a fuel gas alarm condition, and serve to alert persons when they are not in contact with a tactile appliance.
A.9.4.2.4.1.2(1)
As an example, governing laws, codes, or standards might require a certain number of accommodations be equipped for those with hearing loss or other disability. [72:A.29.5.10.2(1)]

A.9.5.2.5
Restraining means are not intended to be used where the detector or alarm is designated to be plugged directly into a receptacle without a cord. [72:A.29.9.4(3)]

A.9.5.5
When visible signaling is to be provided, consideration should be given to the use of a household fuel gas detection system that has sufficient secondary (battery) power to support the proper operation of visible notification appliances.

A.9.6.1.2
UL 2075, Standard for Gas and Vapor Detectors and Sensors, is intended to address toxic and combustible gas and vapor detectors as well as sensors that include an assembly of electrical components coupled with a sensing means inside a chamber, or by separate components, to detect toxic or combustible gases or vapors. Detectors in UL 2075 cover a broad spectrum of applications, including residential, industrial, and commercial use. Detectors are intended for monitoring the environment for open-area protection and for connection to a compatible power supply or control unit for operation as part of gas detection or emergency signaling systems. In addition, UL 2075 addresses detectors solely for control of ventilation or shut-off devices such as fans or control valves as provided by the listing. UL 2075 also covers equipment intended for use in hazardous locations.

The scope of UL 1484, Residential Gas Detectors, is specifically intended to address requirements for electrically operated fuel gas alarms intended for residential and recreational vehicle occupancies to detect fuel gases such as propane and natural gas. Devices are intended to be factory-built as a complete assembly and to function as a self-contained alarm device that consists of an assembly of electrical components, including an element to detect gas concentration, an alarm sounding appliance, and provision for connection to a power supply source. Devices are specifically not intended for use in hazardous locations as defined in NFPA 70, for industrial or commercial use, or for use as smoke and fire detectors or alarms.

While UL 2075 in itself does not cover self-contained and single- and multiple-station residential fuel gas alarms otherwise covered in UL 1484, sensors, detectors, or alarms covered in UL 2075 must operate within the sensitivity parameters defined by the manufacturer but must not exceed alarm limits defined in UL 1484 (e.g., a detector must produce an alarm signal at or below 25 percent of the lower explosive limit).
A.9.6.1.3
The addition of odorants to natural gas to provide a warning agent in case of leaks capitalizes on the ability of the human nose and olfactory system (i.e., sense of smell) to detect and recognize low parts per billion amounts of mercaptans. Natural gas odorants are usually two or more sulfur containing compounds that are classified into three groups—mercaptans, cyclic sulfides, and alkyl sulfides. Odorants must not be harmful to people, pipe, or materials in which combustion occurs. Additional factors considered prior to choosing an odorant blend include the following:

1. Gas composition and gas quality
2. Presence and interaction of naturally occurring mercaptans and other odorants
3. Soil penetration capability
4. Odor impact ("gassy odor")
5. Odorization injection equipment
6. Freeze point
7. Water solubility
8. Odor stability, fading, absorption, and adsorption

In summary, industry research from the mid 1940s identified tertiary butyl mercaptan (TBM) as one of the most effective odorant blends for pipeline natural gas. While each of the aforementioned factors are described and discussed in the literature, the overall characteristics of TBM are highlighted as follows:

1. Most common component in odorant blends today
2. Low odor threshold (approximately 0.5 parts per billion)
3. Most resistant mercaptan to oxidation
4. Superior soil penetrability
5. "Gassy odor" most recognized with pipeline natural gas
6. Typically blended with lower molecular weight mercaptans due to high freezing point

Current federal code requires natural gas contain a natural odorant or be odorized so that a person with an average sense of smell can readily detect it at a concentration in air of one-fifth of the lower explosive limit (approximately 1 percent gas-in-air or 20 percent LEL). Since methane is the principal component of natural gas and reaches its one-fifth flammability limit first, it is assumed that the warning level for natural gas is determined by the warning level of its methane content. Therefore, the lower flammability limit of natural gas is 5 percent gas-in-air, and the public must be warned at one-fifth that level or 1 percent gas-in-air otherwise expressed as 20 percent LEL. The alarm concentration range of 10 percent LEL and 20 percent LEL is consistent with 49 CFR § 192.625 and state jurisdiction requirements for natural gas odorization and resulting odor detection thresholds for the detection of a natural gas leak by a person with an average sense of smell. Several states currently require an odor detection threshold of 10 percent LEL. Current UL 1484, Residential Gas Detectors, requirements specify a fuel gas alarm threshold concentration of 25 percent LEL or less. As a result, a range of alarm threshold requirements between 10 percent LEL and 20 percent LEL would align with current odor detection threshold requirements prescribed in federal and state pipeline safety codes, and are consequently within the permitted range of the existing UL standard. Aligning fuel gas alarm detection thresholds with required pipeline safety odor detection thresholds will enable a layers-of-protection approach to further influence human behavior when responding to indications of a potential gas leak.

For natural gas, while the regulatory requirement is that gas must be odorized such that a person with an average sense of smell can recognize the odor of gas at 20 percent LEL, practical industry odorant injection rates, for example, of a common gas odorant tertiary butyl mercaptan (TBM), is typically 0.5lbs/MMSCF (8g/10³m³). This injection rate results in olfactory detection thresholds typically less than 10 percent LEL. As a result, in practice, fuel gas detectors should alarm at a threshold consistent with actual olfactory detection threshold values (or as close as possible) to help drive consistent behavior of consumers to an alert condition by either odor detection or alarm activation. The minimum detection threshold of 1 percent LEL affords first responders the opportunity to respond prior to a building reaching a hazardous gas build-up condition. Fuel gas detectors that alarm at levels that correlate with
typical industry odorization practices provide a significant opportunity for public safety intervention.

**A.9.6.1.4**

Fuel gas alarms or detectors could exhibit a positive response when acetone or ethanol are present. Laboratory interference tests on samples submitted for product performance testing will demonstrate that the alarm or detector does not respond to acetone or ethanol. Laboratory interference tests should consider the following:

1. Typical household spill levels can be estimated from a chemical spill scenario of 20 ml (0.7 oz) in an 810 ft³ (22.9 m³) room (9 ft x 12 ft x 7½ ft) (2.7 m x 3.7 m x 2.3 m).
2. The actual volume of acetone and ethanol tested should be ratioed to the test chamber size. The calculated volume of acetone or ethanol is placed in a shallow pan, 0.5 in. (13 mm) petri dish, or watch glass inside the test chamber.
3. A means to provide air movement in the test chamber to mix the chemical vapors with air must be included in the test setup. For example, a fan should be placed to blow over the liquid volume.
4. The fuel gas detectors should be energized during the exposure testing.
5. The exposure time for each chemical should be 15 minutes.
6. Fuel gas detection threshold measurements are to be made before and after the exposure.
7. Testing conditions are to be (68–77°F (20–25°C) and 40–60 percent relative humidity.
8. All other testing criteria should conform to that specified in UL 1484, *Residential Gas Detectors*.

**A.9.6.1.9**

When combined with smoke or carbon monoxide sensing functionality, fuel gas alarms are required to be replaced after a maximum of 10 years. Smoke alarms are required by NFPA 72 to be replaced after 10 years. This requirement is outlined in a reliability estimation in UL 217, *Standard for Single and Multiple Station Smoke Alarms*, which is based on a specification of 4 failures per million hours from MIL-HDBK 217F, *Military Standardization Handbook*. The specification of 4 failures per million hours is also contained in UL 1484, *Residential Gas Detectors*, for residential fuel gas alarms. The 10-year replacement period in NFPA 72 balances the number of failures in smoke sensing alarms in the field and the cost and effort necessary to replace smoke sensing alarms.

**A.9.6.4.2**

Once these limits have been exceeded, a household fuel gas detection system should be installed.

**A.9.6.8.1**

A means of providing emergency access to all areas of the premises should be considered.

**A.9.6.8.4.4**

Refer to 26.3.4 of NFPA 72 for requirements for indication of central station service.

**A.9.6.10.3**

Receiving units that stay in alarm for 30 seconds or 1 minute longer than the transmitting alarm would provide additional protection if the first alarm is damaged. The persisting alarm signal would provide additional notification to occupants. This option needs to be considered in light of the potential for the longer alarm signals on receiving fuel gas alarms being a potential nuisance to occupants during test and other nuisance alarm events.
A.9.7.2.1
Fuel gas alarms or detectors could be susceptible to unwanted alarm signals triggered by vapors from petroleum, alcohols, or aerosols. Refer to the manufacturer’s installation instructions for additional information. An alarm for such a condition might be anticipated and tolerated by the occupant of a dwelling unit through routine living experience. An alarm would not be acceptable if it also triggered detectors in other dwelling units or resulted in an alarm of detectors located in common-use areas. Unwanted alarms can occur, and inspection authorities should be aware of the ramifications that could result if the coverage is extended beyond the limits of a single dwelling unit.

A.9.9.2(8)
Fuel gas is essentially odorless and an odorant is added before delivery.

A.9.9.3(7)
The information should provide examples of organizations to be contacted for assistance.

Annex B Dangers and Properties of Fuel Gases
This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 Fuel Gases.
Fuel gas is any gas which is intended to be burned to produce thermal energy. If the gas is released and the concentration is allowed to exceed the lower explosive limit (LEL), also called the lower flammable limit (LFL), an explosion risk will exist. If above the LEL and the gas is in the presence of an ignition source and an oxidizer such as air, a fire or explosion could occur. As a result, it is important to warn occupants of the presence of fuel gas before the concentration reaches the LEL. The LEL of fuel gases mixtures is often estimated to be the LEL of the primary fuel gas constituent, for example, with natural gas the LEL is based on methane (5 percent by volume gas in air). However, the actual LEL for natural gas depends on the gas composition and is generally less than 5 percent gas in air considering other mixed gas components such as ethane and other hydrocarbons that might be present. The actual LEL of a combustible gas mixture (LELMIX) can be calculated using the Le Chatelier’s mixing rule. LELMIX is calculated using the gas composition (in mol percent) from a complete gas analysis of the combustible gas and the LELs of the constituents as follows:

\[
LEL_{MIX} = \frac{100}{\sum x_i / LEL_i}
\]  

[B.1a]

where:

\[x_i = \text{mole percentage hydrocarbon component}\]
\[i = \text{gas mixture}\]
\[LEL_i = \text{component } i \text{'s LEL}\]

The gas composition is typically determined with gas chromatography, per analytical methods in ASTM D1945, Standard Test Method for Analysis of Natural Gas by Gas Chromatography; GPA 2261, Analysis for Natural Gas and Similar Gaseous Mixtures by Gas Chromatography; or GPA 2286, Method for the Extended Analysis of Hydrocarbon Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Temperature Programmed Gas Chromatography. These methods provide the composition of natural gas in mol percent, which is equivalent to volume percent.

For example, calculate the LEL of a mixture of 90 percent methane (LEL 5 percent from Table B.1) and 10 percent ethane (LEL 3 percent from Table B.1):

\[
LEL_{MIX} = \frac{100}{\left(\frac{90}{5} + \frac{10}{3}\right)} = 4.7\% \text{ gas in air}
\]  

[B.1b]

The requirements of NFPA 715 will not mitigate the release of gas and keep the concentration below the LEL; it will only serve to warn the occupants of the presence of fuel gas in the building. Gases also have an upper explosive limit (UEL), which, when exceeded, renders the mixture nonflammable. However, it is important to note that whereas a mixture that is below the LEL cannot ignite, a mixture above the UEL can be diluted and fall within the flammable range (between LEL and UEL). As many gases do not have an odor and thus might not be readily detected by smell an odorant is often added to aid in detection. Though rare (1 in 1000), some individuals are insensitive to the odorant added.

Gases will behave differently depending on their specific gravity (SG), which is the ratio of the gas density to that of air.

Table B.1 shows the LEL, UEL, and SG of typical fuel gases.

### Table B.1 Properties of Common Fuel Gases

<table>
<thead>
<tr>
<th>Fuel Gas(^a)</th>
<th>LEL (% vol)</th>
<th>UEL (% vol)</th>
<th>Specific Gravity (@ STP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomethane(^b)</td>
<td>Varies</td>
<td>Varies</td>
<td>Varies</td>
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<tr>
<td>Ethane</td>
<td>3.0</td>
<td>12.4</td>
<td>1.065</td>
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<tr>
<td>Hydrogen</td>
<td>4.0</td>
<td>75.0</td>
<td>0.070</td>
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<tr>
<td>Iso-Butane</td>
<td>1.8</td>
<td>8.4</td>
<td>2.006</td>
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</tbody>
</table>

\(^a\) Typical values for natural gas. \(^b\) Typical values for natural gas with potential variation.
### Fuel Gas Properties

<table>
<thead>
<tr>
<th>Fuel Gas&lt;sup&gt;a&lt;/sup&gt;</th>
<th>LEL (% vol)</th>
<th>UEL (% vol)</th>
<th>Specific Gravity (@ STP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>5.0</td>
<td>15.0</td>
<td>0.554</td>
</tr>
<tr>
<td>Propane</td>
<td>2.1</td>
<td>9.5</td>
<td>1.522</td>
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</table>

**Notes:**

<sup>a</sup> This table includes a broad list of gases that might require special consideration beyond detection requirements detailed in this standard.

<sup>b</sup> This is sometimes referred to as renewable natural gas.

#### B.1.1 Gas Density and Temperature Effects.

Gases that have an SG less than 1 are less dense than air and will naturally rise within a space, thus detector placement must account for the tendency of the gas to rise. Gases that have an SG greater than 1 are denser than air and, absent air movement or thermal convection, will tend to naturally sink within a space, thus detector placement must account for the tendency of the gas to sink and concentrate in low areas.

The temperature of the released gas will also play a part—if a gas temperature is substantially warmer than the ambient air, the released mixture can rise initially, even if the relative density of the mixture at the ambient temperature is higher than that of the air. The converse could also be the case.

#### B.1.2 Gas Mixing.

When a gas is released it will mix with the other gases in the volume, typically air, and the concentration of the gas will decrease. The mixing process occurs most quickly through natural or mechanical ventilation; however, some mixing will also occur through diffusion. Once the gas is mixed it will remain mixed unless it is removed through a chemical process, however continued dilution is possible and will decrease the concentration.

#### Annex C Guidelines for Emergency Responders

This annex is not part of the requirements of this NFPA document but is included for informational purposes.

#### C.1 Guidelines for Occupants.

How occupants respond to a fuel gas incident is essential for their safety. Information on how occupants should respond to a fuel gas incident could be found in several industry sources. References include, but are not limited to, the following:


It is important to note that the primary safety indicator for the presence of fuel gas and the potential of a fuel gas leak is the presence of a “gassy odor.” Odorants are sulfur compounds that impart a gassy odor, typically associated with “rotten eggs” and are added to fuel gases for detection by an average sense of smell since typically fuel gases in their natural state are odorless. Gas odor detection by a person with an average sense of smell could precede fuel gas alarm activation and, as a result, a gas odor or gas alarm indication should trigger identical response actions.
C.2 Guidelines for First Responders.

How public emergency response organizations respond to fuel gas incident calls is essential for the safety of the building occupants and the emergency responders.

The following sources could provide further guidance for first responders:

(2) https://Ngafirstresponder.com

Emergency response organizations should contact the specific utilities in their area.

It is imperative for dispatchers answering a call for a gas odor or gas alarm to inform the fire department and appropriate utility operator as soon as possible. Clear and accurate information must be relayed. Where a utility has both electric and fuel gas service, the proper emergency contact(s) must be made.

Refer to 9.6.8.3 for specific guidance.

Annex D Informational References

D.1 Referenced Publications.

The documents or portions thereof listed in this annex are referenced within the information sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

D.1.1 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


D.1.2 Other Publications.

D.1.2.1 ASTM Publications.

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.


D.1.2.2 GPA Publications.


GPA 2261, Analysis for Natural Gas and Similar Gaseous Mixtures by Gas Chromatography 2000.


D.1.2.3 IEEE Publications.

Institute of Electrical and Electronics Engineers, 3 Park Avenue, 17th Floor, New York, NY 10016-5997.


D.1.2.4 ISO Publications.

D.1.2.5 Military Publications.

D.1.2.6 UL Publications.
Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.
UL 2075, Gas and Vapor Detectors and Sensors, March 2013.

D.1.2.7 U.S. Government Publications.
Title 49, Code of Federal Regulations, Part 192, “Transportation of Natural and Other Gas by Pipeline; Minimum Federal Safety Standards.”

D.1.2.8 Other Publications.
Report of research on emergency signaling devices for use by the hearing impaired (Subject 1971), Underwriters Laboratories, 1991.

D.2 Informational References. (Reserved)

D.3 References for Extracts in Informational Sections.
MEMORANDUM

TO: Technical Committee on Remote Inspections
FROM: Kelly Carey, Technical Committee Administrator
DATE: July 23, 2020
SUBJECT: Ballot to Release NFPA 915 Preliminary Draft - Final Results

According to the final ballot results, the ballot did receive the necessary affirmative votes to pass ballot. The Technical Committee recommends NFPA 915 to enter the A2023 cycle. Please see the attached report for results and any comments received.

25 Eligible to Vote
2 Not Returned (Terricciano, Tubbs)

The criteria necessary to pass ballot is a simple majority of the Technical Committee and Correlating Committee, if any. See Section 4.3.2.1(b) of the Regulations Governing the Development of NFPA Standards.
NFPA 915 TECHNICAL COMMITTEE ON REMOTE INSPECTIONS
PRELIMINARY DRAFT RELEASE BALLOT - FINAL RESULTS

Per section 4.3.2.1(b) of the Regs, prior to entering a future Revision Cycle and approval for public review, a Ballot of the Committee is required to pass by at least, a simple majority. NOTE: This ballot is for formally voting on whether or not you are in agreement with the release of the NFPA 915 draft.

For Simple majority, the affirmative votes needed are 13

Eligible to Vote: 25
Not Returned : 2
Jeffrey S. Tubbs, Paul
John Terricciano

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Total Voted : 23
NFPA 915

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Chapter 1 Administration

1.1 Scope.

1.1.1* This standard shall provide the minimum requirements for the procedures, methods, and documentation associated with remote inspections.

1.1.2* Title. NFPA 915 shall be referred to herein as “this standard” or “the standard.”

1.2 Purpose. The purpose of this standard shall be to provide minimum requirements for remote inspections to deliver an equivalent or improved result as that which would be obtained with other inspection methods.

1.3 Application.

1.3.1* The provisions of the standard shall apply to all types of inspections as allowed by the authority having jurisdiction.

1.3.2* The authority having jurisdiction shall determine applicability of the inspection categories and conditions that will be allowed.

1.3.3* References to Requirements of Other Codes or Standards. Where the requirements of a referenced code or standard differ from the requirements of this standard, the authority having jurisdiction shall determine the applicable code or standard.

1.4 Equivalency. Nothing in this standard is intended to prevent the use of systems, methods, or devices of superior or equivalent effectiveness over those prescribed by this standard.

1.4.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.4.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.5 Units and Formulas.

1.5.1 The units of measure in this standard are presented first in US customary units (inch-pound units). International System (SI) of Units follow the inch-pound units in parentheses.

1.5.2 Either system of units shall be acceptable for satisfying the requirements in the standard.

1.5.3 Users of this standard shall apply one system of units consistently and shall not alternate between units.

1.5.4 The values presented for measurements in this standard are expressed with a degree of precision appropriate for practical application and enforcement. It is not intended that the application or enforcement of these values be more precise than the precision expressed.

1.5.5 Where extracted text contains values expressed in only one system of units, the values in the extracted text have been retained without conversion to preserve the values established by the responsible technical committee in the source document.

1.6 Enforcement. This standard shall be administered and enforced by the authority having jurisdiction designated by the governing authority.

1.6.1* The authority having jurisdiction shall determine whether the provisions of this standard are met.
1.6.2 The authority having jurisdiction shall be permitted to modify requirements of this standard when permitted by the adopted governing laws, codes, regulations, and standards.

1.6.3 Any requirements that are essential for the safety of building occupants and that are not specifically provided for by this standard shall be determined by the authority having jurisdiction. [101:4.6.1.2]

1.6.4* The authority having jurisdiction shall be permitted to perform the remote inspection or to allow or require a remote inspection by an approved independent third party with expertise.

1.7 Liability.

1.7.1 Any officer, employee, or member of the board of appeals charged with the enforcement or interpretation of this standard, acting for the applicable governing body in the discharge of his/her duties, shall not thereby render himself/herself personally liable. Further, all such persons shall be relieved from all personal liability for any damage they accrue to persons or property as a result of any act required or permitted in the discharge of their duties. Any suit brought against any officer or employee because of such act performed in the course of enforcement of any provision of this standard shall be defended by the legal counsel of the jurisdiction until the termination of the proceedings. [5000:1.7.4.1]

1.7.2 This standard shall not be construed to relieve the responsibility of or to lessen the responsibility of, any person owning, operating, or controlling any building or structure for any damages to persons or property caused by defects. Further, the standard enforcement agency or its parent jurisdiction shall not be held as assuming any such liability by reason of the inspections authorized by this standard or any permits or certificates issued under this standard. [5000:1.7.4.2]
Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


2.3 Other Publications.

2.3.1 ASCE Publications. American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, VA 20191-4400.


2.3.3 Other Publications.


2.4 References for Extracts in Mandatory Sections.


Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. Merriam-Webster’s Collegiate Dictionary, 11th edition, is the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that
maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.5 Shall. Indicates a mandatory requirement.

3.2.6 Should. Indicates a recommendation or that which is advised but not required.

3.2.7 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1 Building Manager. The authorized person, formally and officially appointed or designated by the governing body or a responsible party, who is charged with the duties and responsibilities of providing and ensuring the overall management, operation, and maintenance for that facility or institution [914, 2019]

3.3.2 Building Systems. An assembly or set of units made up of components that provide services to spaces in a building [914, 2019]

3.3.3* Buildings. Structures, usually enclosed by walls and a roof, constructed to provide support or shelter for an intended occupancy. [ASCE/SEI 7:1.2.1]

3.3.4 Construction. Work or operations necessary or incidental to land clearing, grading, excavation, and filling; or erection, demolition, assembling, installing, or equipping of buildings or structures; or alterations incidental thereto, or to the finished product of construction operations. [5000, 2018]

3.3.5 Construction Documents. Documents that consist of scaled design drawings and specifications for the purpose of construction of new facilities or modification to existing facilities. [1, 2018]

3.3.6 Contractor. One who contracts on predetermined terms to provide labor and materials and who is responsible for performance of a construction job in accordance with construction documents. [5000, 2018]

3.3.7 Contractor of Work. An individual or company responsible to provide labor and materials and for the performance of an installation in accordance with the construction documents, codes, installation standards, and manufacturer's specifications for the work to be remotely inspected.

3.3.8* Data. Factual information acquired in digital or nondigital format that can be transmitted, stored, or used as a basis for reasoning, discussion, or calculations.

3.3.9* Data Device. Any device that collects and stores data and/or transmits data to and from a remote location.
3.3.10 **Entity Performing Remote Inspection.** An individual or company responsible for the collection and/or transmitting of the data acquired from the inspection.

3.3.11 **Equivalency.** An alternative means of providing an equal or greater degree of safety than that afforded by strict conformance to prescribed codes and standards. [5000, 2018]

3.3.12 **Inspection.** For the purposes of this standard, the examination or witnessing of a product, process, installation, or test to determine conformity with approved construction documents and applicable codes, installation standards, and manufacturer's specifications.

3.3.13 **Inspection Area.** That portion of a structure or site where an organized or formal evaluation will take place.

3.3.14 **Permit.** A document issued by the AHJ for the purpose of authorizing performance of a specified activity. [1, 2018]

3.3.15 **Property Owner.** Any person, agent, firm, entity, or corporation having a legal or equitable interest in a property, building, or structure.

3.3.16 **Qualified.** A competent and capable person who has demonstrated the skills, knowledge, and/or training for a given field acceptable to the AHJ.

3.3.17* **Remote Inspection.** The use of audio/visual devices and/or other technologies to perform an inspection for the purpose of remote verification.

3.3.18 **Remote Inspection Plan.** A procedure that describes the remote inspection and outcomes and describes responsibilities to parties involved in the process.

3.3.19 **Unmanned Aircraft.** An aircraft operated without the possibility of direct human intervention from within or on the aircraft. [14 CFR Part 107, 2016]

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**Chapter 4 General Requirements**

4.1 **Responsibility of the Property Owner or Designated Representative.** It shall be acceptable for the owner to delegate the responsibility for remote inspection activities to a designated representative.

4.1.1 **Access.** The property owner or designated representative shall provide access to appropriate locations as necessary for remote inspection.

4.1.2* The property owner shall also provide appropriate safeguards to prevent the unauthorized recording of video, images, or audio of sensitive or classified subject(s).

4.1.3* **Notification.** The property owner or designated representative shall notify all applicable parties regarding the remote inspection.

4.1.4 The owner or designated representative shall comply with AHJ requirements for remote inspections as applicable.
4.2 Responsibility of the Contractor of Work.

4.2.1 Permission from the Property Owner. The contractor of work shall obtain permission from the property owner or designated representative to plan and perform a remote inspection.

4.2.2 The contractor of work shall be responsible for providing a qualified entity to perform the remote inspections.

4.2.3 The contractor of work shall comply with AHJ requirements for remote inspections as applicable.

4.3* Responsibility of the Entity Performing Remote Inspections.

4.3.1* Permission from the Property Owner. The entity performing the remote inspection shall have permission from the property owner or designated representative to access the property and conduct a remote inspection.

4.3.2* The entity performing remote inspections shall comply with AHJ requirements for remote inspections as indicated in 4.4.1.

4.3.2.1 It shall be the responsibility of the entity performing remote inspections to ensure the accuracy, quality, verification, authentication, and usability of data or information collected.

4.3.2.2 The entity performing remote inspections shall be qualified.

4.3.2.3* A written inspection plan shall be submitted to the AHJ, unless exempt by the AHJ.

4.3.2.3.1 The inspection plan shall be submitted in a manner acceptable to the AHJ.

4.3.2.3.2* The inspection plan shall include pertinent administrative information necessary for the AHJ to perform the remote inspection.

4.3.2.3.3* The inspection plan shall include the procedure in which the remote inspection will be performed.

4.3.3 Identification of Participants.

4.3.3.1 It shall be the responsibility of the entity performing remote inspections to identify all personnel participating in the remote inspection by providing all of the following:

(1) Name of the individual
(2) Company the individual works for
(3) Role the individual is performing as part of the work being done or remote inspection being performed

4.3.3.2 The identification of participants shall be documented within the remote inspection video and/or audio format transmitted to the AHJ.

4.4 Responsibility of the AHJ.

4.4.1* The AHJ shall be responsible for providing the following criteria related to remote inspections:

(1) Suitability of the inspection
(2) Limitations
(3) Acceptance criteria
(4) Inspection requirements
(5) Documentation
(6) Technology
(7) Submission format
4.4.2 Remote Inspection Results. The AHJ shall be responsible for defining the success or failure criteria and determining the results of the remote inspection.

4.4.3 The AHJ shall determine the appropriate time frame to provide remote inspection results to the responsible party.

4.5 Safety. Remote inspection activities shall be conducted in accordance with applicable safety regulations.

4.6 Permits or Approvals. Where required, the property owner or designated representative shall have in place appropriate permits or approvals for the work to be remotely inspected.

4.7 Supporting Documents.

4.7.1 All plan specifications, drawings, details, and records shall be made available for the remote inspection as required.

4.7.2 Documents shall be made available in either hard copy or digital format at the discretion of the AHJ.

Chapter 5 Location and Timestamp Requirements

5.1 General. The owner, or their designated representative, shall be responsible for verifying that the address, structure, inspection areas within a structure, nonstructures, or site work corresponds to the scheduled remote inspection.

5.2 Structures.

5.2.1 Address. The full address shall be verified and/or documented at the time of the remote inspection.

5.2.2 Structure. The type of structure shall be verified and/or documented at the time of the remote inspection.

5.2.3 Inspection Areas Within a Structure. The inspection areas within a structure shall be verified and/or documented at the time of the remote inspection.

5.3 Nonstructures and Site Work. A full address, GIS coordinates, or other approved format shall be verified and/or documented at the time of the remote inspection.

5.4 Timestamp Requirements.

5.4.1 Actual Date. The date that the remote inspection is performed shall be verified and/or documented by the owner, or their designee, and provided to the AHJ.

5.4.2 Actual Local Time. The time of day that the remote inspection is performed shall be verified and/or documented by the owner, or their designee, and provided to the AHJ.
Chapter 6 Data Collection/Transmission Devices

6.1 General.

6.1.1* Devices. Data collection/transmission devices shall be approved for use.

6.1.2* Data Collection Capabilities by Device. (Reserved)

6.2* Wireless Devices.

6.2.1 Wireless Device Types.

All of the following shall be considered wireless devices:

(1) Cellular telephones/smartphones
(2) Satellite telephones
(3) Cellular tablets/pads
(4) *Cellular-connected computers
(5) Devices using any of the following:
    (a) *Wireless local area networks (WLAN)
    (b) *Wireless personal area networks (WPAN)
    (c) *Wireless wide area networks (WWAN)
(6) Other wireless devices in accordance with 6.2.3

6.2.2* Requirements.

6.2.2.1 Wireless devices listed in 6.2.1 shall comply with the applicable governing authority.

6.2.2.2 Wireless devices listed in 6.2.1 shall have minimum requirements as approved.

6.2.3* Other Wireless Devices. Other wireless devices approved by the AHJ shall be permitted.

6.3* Digital Devices.

6.3.1 Digital Device Types

All of the following shall be considered digital devices:

(1) Digital telephones
(2) Digital audio recorders
(3) Digital cameras
(4) Digital video recorders
(5) Computers
(6) Other digital devices in accordance with 6.3.3

6.3.2 Requirements.

6.3.2.1 Digital devices listed in 6.3.1 shall comply with the applicable governing authority.

6.3.2.2 Digital devices listed in 6.3.1 shall have minimum requirements as approved.
6.3.3* Other Digital Devices. Other digital devices shall be subject to approval by the AHJ.

6.4* Nondigital Devices.

6.4.1 Nondigital Device Types.

All of the following shall be considered nondigital devices:

(1) Analog telephones
(2) Audio cassette recorders
(3) *Radios
(4) Film cameras
(5) Video cassette recorders
(6) *Wave detection technologies
(7) Other nondigital devices in accordance with 6.4.3

6.4.2 Requirements.

6.4.2.1 Digital devices listed in 6.4.1 shall comply with the applicable governing authority.

6.4.2.2 Digital devices listed in 6.4.1 shall have minimum requirements as approved.

6.4.3 Other Nondigital Devices. Other nondigital devices shall be subject to approval by the AHJ.

6.5* Vehicles.

6.5.1 Nonaerial Vehicles.

6.5.1.1* Nonaerial Manned Vehicles. Nonaerial manned vehicles shall comply with all of the following:

(1) Used in accordance with all appropriate authorities
(2) Used only by approved operators
(3) Listed, where applicable
(4) Used in accordance with the manufacturer’s written instructions
(5) Used in accordance with any governing codes, standards, or promulgated laws
(6) Used with all proper safety equipment and procedures, where applicable

6.5.1.2* Nonaerial Unmanned Vehicles. Nonaerial unmanned vehicles shall comply with all of the following:

(1) Used in accordance with all appropriate authorities
(2) Used only by approved operators
(3) Listed, where applicable
(4) Used in accordance with the manufacturer’s written instructions
(5) Used in accordance with any governing codes, standards, or promulgated laws

6.5.1.3* Other Nonaerial Unmanned Vehicles. Other nonaerial manned vehicles shall comply with all of the following:

(1) Used in accordance with all appropriate authorities
(2) Used only by approved operators
(3) Listed, where applicable
(4) Used in accordance with the manufacturer’s written instructions
(5) Used in accordance with any governing codes, standards, or promulgated laws
(6) Used with all proper safety equipment and procedures, where applicable
6.5.2 Aerial Vehicles.

6.5.2.1* Manned Aerial Vehicles. Manned aerial vehicles shall comply with all of the following:

   (1) Used in accordance with all appropriate authorities
   (2) Used only by approved operators
   (3) Used in accordance with all governing codes, standards, or promulgated laws
   (4) Used with all proper safety equipment and procedures, where applicable

6.5.2.2* Unmanned Aerial Vehicles.

6.5.2.2.1* Unmanned Aircraft.

6.5.2.2.1.1* Small Unmanned Aircraft Systems (sUAS). The use of small unmanned aircraft (sUAS), and its associated systems, shall be subject to approval by the AHJ.

6.5.2.2.1.2* Compliance (Reserved).

6.5.2.2.1.3* Remote Pilot in Command. All small unmanned aircraft shall have a qualified remote pilot in command.

6.5.2.2.1.4* Public Safety Entities. The use of small unmanned aircraft, when used for public safety operations, shall comply with NFPA 2400.

6.5.2.2.1.5* Requirements. Data collected from small unmanned aircraft (sUAS), and its associated systems, shall comply with the applicable governing authority.

6.6* Other Data Collection/Transmission Devices.

6.6.1* Other Vehicles.

6.6.1.1 Other small unmanned aerial vehicles shall be subject to approval by the AHJ.

6.6.1.2 Such vehicles shall have minimum requirements as approved.
Chapter 7 Data Collection Formats.

7.1* General. The use of specific data collection formats shall be subject to approval by the AHJ.

7.1.1* Sender. For the purposes of this chapter, where the term sender is used, it shall be the entity that submits a format type to a receiver.

7.1.2* Receiver. For the purposes of this chapter, where the term receiver is used, it shall be the entity that receives a format type from a sender.

7.2 Video Formats.

7.2.1 Live Video. Where all of the following apply, the format shall be considered live video:

   (1) * Video signals that are transmitted in real time between the sender and receiver
   (2) The ability for both the sender and receiver to communicate

7.2.1.1 Minimum Requirements. The following minimum requirements for live video shall be observed:

   (1) *Only approved level of interruption of video or audio signals
   (2) *Approved amount of light for viewing
   (3) *Approved quality of live video
   (4) *Approved quality of live audio

7.2.2 Recorded Video. Where all of the following apply, the format shall be considered recorded video:

   (1) * Video and audio signals that were recorded in the chronological past
   (2) Video that is provided by the sender to the receiver after the video was created

7.2.2.1 Minimum Requirements. The following minimum requirements of recorded video shall be observed:

   (1) *Approved amount of light for viewing
   (2) *Approved quality of recorded video
   (3) *Approved quality of recorded audio
   (4) * Location, date, and timestamp requirements in accordance with Chapter 5

7.2.2.2* Manual means of supplying recorded video shall be subject to approval by the AHJ.

7.2.2.3 Other Requirements (Reserved).

7.2.3 Other Video Formats. Other video formats shall be subject to approval by the AHJ.

7.3 Audio Formats.

7.3.1 Live Audio.

7.3.1.1* Live Audio (In Person). Where all of the following apply, the format shall be considered live audio (in person):

   (1) * Audio signals that are transmitted in real time between the sender and receiver with or without the use of data collection/transmission devices
   (2) The ability for both the sender and receiver to communicate
7.3.1.2 Minimum Requirements. The following minimum requirements of live audio (in person) shall be observed:

(1) As approved
(2) In a language that is understood by both the sender and receiver

7.3.2* Live Audio (Data Collection/Transmission Devices). Where all of the following apply, the format shall be considered live audio (data collection/transmission devices):

(1) * Audio signals that are transmitted in real time between the sender and receiver with the use of data collection/transmission devices
(2) The ability for both the sender and receiver to hear adequately
(3) The ability for both the sender and receiver to communicate effectively

7.3.2.1 Minimum Requirements. The following minimum requirements of live audio (data collection/transmission devices) shall be observed:

(1) *Acceptable quality
(2) *Approved format

7.3.2.2 Other Requirements (Reserved).

7.3.3 Recorded Audio. Where all of the following apply, the format shall be considered recorded audio:

(1) *Audio signals that were recorded in the chronological past
(2) Audio that is provided to the receiver after the audio was created

7.3.3.1 Minimum Requirements. The following minimum requirements of recorded audio shall be observed:

(1) *Acceptable quality
(2) *Approved format

7.3.3.2* Manual means of supplying recorded audio shall be approved by the AHJ.

7.3.3.3 Other Audio Formats. Other audio formats shall be subject to approval by the AHJ.

7.4 Photography Formats.

7.4.1 Recorded Digital Photography. Where all of the following apply, the format shall be considered recorded digital photography:

(1) Digital photography that was recorded in the chronological past
(2) Digital photography that is provided to the receiver after the image was created
(3) Digital photography that was created by a wireless device or a digital device

7.4.2 Minimum Requirements. The following minimum requirements of recorded digital photography shall be observed:

(1) *Acceptable quality
(2) *Approved format
(3) *Acceptable photography file size

7.4.3 Recorded Nondigital Photography. Where all of the following apply, the format shall be considered recorded nondigital photography:
7.4.4 Minimum Requirements. The following minimum requirements of recorded nondigital photography shall be observed:

1. Acceptable quality
2. Approved format
3. Acceptable photograph size.

7.5 Written Formats.

7.5.1 Written formats shall be subject to approval by the AHJ.

7.5.2 Written formats shall have minimum requirements as approved.

7.6 Other Data Collection Formats.

7.6.1 Other data collection formats shall be subject to approval by the AHJ.

7.6.2 Such formats shall have minimum requirements as approved.

Chapter 8 Data and Content Protection, Retention, and Ownership.

8.1 General. Data and content shall be administered in accordance with this chapter.

8.1.1 For the purposes of this chapter, content shall be defined as the accumulated data from a data collection/transmission device during a remote inspection.

8.2 Submission of Data and Content.

8.2.1 The collection of data shall be in accordance with Chapter 7.

8.2.2 Remote methods, systems, components, and technologies used for the submission of content and subsequent evaluation shall be subject to approval by the AHJ.

8.2.3 Subject to the approval by the AHJ, collection of content for remote inspections shall be a live submission or submitted as an electronic file.

8.3 Transmission of Content.

8.3.1 The submission of content shall be transmitted by any of the means as approved by the AHJ in accordance with 8.3.2 through 8.3.4.

8.3.2 Digital Transmission. Content shall be transmitted via secured electronic means.
8.3.3 Physical Transmission. Content shall be transmitted in an approved tangible form, which includes the use of postal or carrier operations.

8.3.4* Live Transmission. Content shall be transmitted using real-time means.

8.3.5* Verification of Transmission. An acknowledgement that transmission was received by the AHJ shall be documented.

8.4 Custody of Content.

8.4.1* Custody of the content of a remote inspection shall be subject to the approval of all parties.

8.4.2* Where required, the custody of content shall include the following:

1. The storage and delivery of content in accordance with Section 8.3
2. A secure method that is acceptable to the AHJ
3. Capture and storage of content that is secured from cyber-security threats or physical damage

8.5* Retention of Content. The content of an approved remote inspection shall be retained as required by the AHJ.
ANNEX A

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1.1 Methods for conducting remote inspections can range from handheld devices to other means, including, but not limited to, unmanned aircraft systems (drones), to achieve the stated objectives of the authority having jurisdiction. Requirements for implementation of the procedures, methods, and documentation required by this standard are to be developed by the authority having jurisdiction in order to best respond to their specific needs. Inspection of buildings, structures, systems, and premises, including underground spaces and aerial areas, can include electrical, HVAC, and fire protection, among other disciplines.

A.1.1.2 An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements, is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions of a standard are not considered a part of the requirements of a standard and are, therefore, located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style.

A.1.2 The intent of remote inspection methods is to ensure that a facility, structure, system, site, feature, construction, or process satisfies the applicable project requirements, design, and applicable governing laws, codes, regulations, or standards. Additionally, it is the intent of this standard that these methods should supplement and facilitate inspections.

A.1.3 This standard is written to be compatible with the requirements of any jurisdiction. Requirements can be modified by any jurisdiction based on the needs, technology, and conditions.

A.1.3.1 It is the intent of this section to allow several types of inspections to be conducted, including, but not limited to, routine, scheduled, and special inspections. However, determining the types of inspections allowed should be at the discretion of the authority having jurisdiction.

A.1.3.2 The authority having jurisdiction should take into consideration specific situations and/or conditions that exist at the site when determining the feasibility of remote inspections. Some examples include the following:

(1) Complex systems. Some complex system inspections might require more detail than a remote inspection can gather. Conversely, complex systems or some portions of a complex system might be well served by a remote inspection.

(2) Poor conditions (due to low lighting, low connectivity). Certain conditions can lend themselves to having an inspection witnessed remotely or make it difficult to use remote inspection technologies. For instance, an inspection required in an area with no or low lighting could use a drone or a robot equipped with its own lighting source. Other conditions could make using certain remote inspection technologies prohibitive, such as in areas with low connectivity where a live inspection using an internet connection is not possible.
(3) Access to work. Not being able to access a work area due to height, safety concerns, the inability to shut down a process or a piece of equipment, energized equipment, and so forth, are examples of situations where remote inspections could be performed using a drone, robot, a fixed transmitting device such as a security camera, a portable transmitting device such as an industrial borescope, and so forth.

(4) Availability/understanding of technology. The AHJ should decide if the remote inspection technology is understood well enough by both parties to be effective in obtaining the information needed.

(5) Confined/hazardous locations that need to be physically entered. Remote inspections could be effective in protecting personnel from confined or hazardous locations. However, the AHJ should also ensure that the setup, execution, or completion of a remote inspection does not present additional hazards to inspection personnel.

(6) Mobility or other physical limitations of the inspector.

(7) Any other conditions that are not conducive for a personal inspection such as, but not limited to, the following:

   (a) Private property concerns
   (b) Legality of methods employed, such as entering controlled airspace or environmentally sensitive areas
   (c) Excessive travel time to the site
   (d) Cost concerns
   (e) Exposure to environmental health and safety concerns

A.1.3.3 There is a hierarchy between ordinances and adopted codes and standards that must be considered and followed. The authority having jurisdiction should be consulted where there are conflicting requirements to determine which one takes precedence over the other.

A.1.6.1 See A.3.2.2 for an explanation of how the term authority having jurisdiction (AHJ) is used in a broad sense to include jurisdictions and approval agencies that could be involved in approving the provisions of this standard.

A.1.6.4 An authority having jurisdiction can perform the remote inspection using their own resources, including qualified personnel and approved methods and devices, as long as they meet the requirements of this standard. However, they can also allow or require a third-party entity to perform the remote inspection.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization.
that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.4 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.2 Building Systems. Building systems include all electrical power services; communication and security services; electrical control systems; HVAC systems; water, steam, wastewater, and drainpipes and services; fire suppression systems including water-based and non-water-based systems; oil and piped hydraulic and pneumatic systems. [914, A.3.3.9]

A.3.3.3 Buildings. The term building is to be understood as if followed by the words “or portions thereof.” Each portion of a building that is separated from other portions by a fire wall is considered to be a separate building.

A.3.3.8 Data can include photographic images, video, audio recordings, copies of reports, and other associated items.

A.3.3.9 Data devices are capable of collecting images or other forms of data and storing the data so it can be transferred to an entity at a later time or are capable of transmitting data in real time to an entity through various means. Examples include cameras, video recorders, cell phones, and other smart devices.

A.3.3.17 The following are examples of remote inspections:
(1) Evaluation of objects, materials, or construction from a distance or off-site location
(2) Aerial inspections
(3) Off-site witnessing of fire system testing

A.4.1.2 Sensitive or classified subjects that the property owner should protect include, but are not limited to, personal information of patients protected by HIPAA, proprietary corporate data, and so forth.

A.4.1.3 The property owner should assume that all remote inspections will consist of video, image, and audio recording, and it might be necessary for the property owner to notify the building occupants prior
to a remote inspection to prevent unauthorized photography and sensitive information from being recorded.

A.4.3 The entity performing the remote inspection can be either the property owner, the contractor of work, or a third party, depending on the work being performed.

A.4.3.1 Those conducting remote inspections should always assume that there is a property owner or designated representative. One should never assume that it is permissible to enter vacant land, public property, remote areas, or airspaces without authorization.

A.4.3.2.3 It is the intention of the committee that the written inspection plan augments inspection documentation required by other nationally recognized codes and standards. The committee also recognizes that not every remote inspection will require a narrative description of the anticipated remote inspection process. For example, a written inspection plan for the remote inspection of a hot water heater is most likely not necessary as the inspection of the equipment is self-explanatory. Ultimately, the AHJ will make the determination as to whether the remote inspection requires a written plan or not.

A.4.3.2.3.2 Administrative information should include the identification of participants, the type of inspection, the reason for the inspection, remote inspection method to be used, the exact location of the inspection, and the proposed date and time of the remote inspection.

A.4.3.2.3.3 A narrative description of the inspection process should include the preparation; equipment to be used; qualifications and licenses required; hazards identification and how the hazards will be mitigated; the inspection execution timeline, including major steps and phases of the inspection; general description of data-gathering method; and how the inspection will be ended and the property secured.

A.4.4.1 The following criteria examples are to assist the AHJ in determining the acceptable remote inspection criteria for their jurisdiction:

(1) Suitability of the inspection, which could include the expected success of the inspection; the available site and task safety available, or lack thereof; and size/scope of the work to be inspected
(2) Limitations, which could include weather, trained personnel, privacy constraints, cellular/WIFI connections, and any constraints that will affect safety, health, and the environment
(3) Acceptance criteria, which could include upper and lower limits of data results in accordance with codes, standards, or best practices
(4) Inspection requirements, which could include supervision, inspector qualifications, insurance, contracts, and other risk management requirements
(5) Documentation, which could include the allowance or disallowance of electronic reports, photography, and video
(6) Technology, including the allowable standard for remote testing equipment and systems
(7) Submission format, including electronic data, cloud storage, handwritten reports, and paper reporting
(8) Scheduling requirements, including times, dates, and weather conditions
(9) Dissemination of modifications and current practices to the AHJ required criteria

A.5.1 Alternatively, the contractor of work, or other approved entity, could be designated to provide this information. Other geolocation technologies, such as GPS or Bluetooth, can be considered to help validate the location.

A.5.2.1 The address should be the physical address where the inspection is to take place; for example, 1 Batterymarch Park, Quincy, MA 02169. If no address is provided, the use of other approved markers, such as parcel ID, plot plan designations, GIS coordinates, or other geolocation technologies could be considered.

A.5.2.2 The type of structure could be a one- or two-family dwelling, apartment, or health care, among others. See NFPA 101 for occupancy types as well as the applicable building code for further classifications.

A.5.2.3 The areas within a structure might include a floor and specific location, for example, a 2nd floor bathroom. This area should be able to be verified via any submitted materials.

A.5.4.1 Unless modified by the AHJ, the format to record the date should be month/day/year. For example, 10/1/2019 would indicate October 1st of the year 2019.

A.5.4.2 Unless modified by the AHJ, the format to record time should be hours/minutes/meridiem. For example, 9:05 a.m. would indicate nine hours, five minutes, ante meridiem, and 9:05 p.m. would indicate nine hours, five minutes, post meridiem.

A.6.1.1 The use of data collection/transmission devices could be considered integral to performing remote inspections. The entity performing the remote inspection should also be familiar with the data collection device that has been selected.

The technical committee recognizes the ever-changing technological landscape. The intent of this section is to allow for the consideration of other data collection/transmission devices as appropriate, as they become available and are approved by the AHJ.

Authorities such as the Federal Communications Commission (FCC) often regulate many types of devices.

A.6.1.2 See Table A.6.1.2 for guidance on both devices and formats.
Table A.6.1.2 Data Collection Capabilities by Device

<table>
<thead>
<tr>
<th>Type</th>
<th>Live Video</th>
<th>Recorded Video</th>
<th>Live Audio (In Person)</th>
<th>Live Audio (Data Collection / Transmission Device)</th>
<th>Recorded Audio</th>
<th>Recorded Digital Photography</th>
<th>Recorded Digital Photography</th>
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<tbody>
<tr>
<td>Cellular telephones/smartphones</td>
<td>X</td>
<td>X</td>
<td>x</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>N/A</td>
</tr>
<tr>
<td>Satellite telephones</td>
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<td>n/a</td>
<td>x</td>
<td>x</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Cellular tablets/pads</td>
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<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>n/a</td>
</tr>
<tr>
<td>Wireless/network-connected computers</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>n/a</td>
</tr>
<tr>
<td>Digital telephones</td>
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<td>n/a</td>
<td>x</td>
<td>x</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Digital audio recorders</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>x</td>
<td>x</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Digital cameras</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>x</td>
<td>n/a</td>
</tr>
<tr>
<td>Digital video recorders</td>
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</tr>
<tr>
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<td>x</td>
<td>x</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Audio cassette recorders</td>
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<td>n/a</td>
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<tr>
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<td>x</td>
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<td>n/a</td>
</tr>
<tr>
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<td>n/a</td>
<td>n/a</td>
<td>x</td>
</tr>
<tr>
<td>Video cassette recorders</td>
<td>n/a</td>
<td>x</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Wave detection technologies

| sUAS | x | x | x | x | x | x | n/a |

X: Capable. N/A: Not applicable.

A.6.2 A wireless device is one that is connected to a wireless network, either directly or from a wireless connection, which might or might not be connected to the internet.

A.6.2.1(4) This could include laptops or similar devices.

A.6.2.1(5)(a) Wireless Local Area Network (WLAN). WLAN are wireless networks that use radio waves. The backbone network usually uses cables, with one or more wireless access points connecting the wireless users to the wired network. The range of a WLAN can be anywhere from a single room to an entire campus.

A.6.2.1(5)(b) Wireless Personal Area Network (WPAN). WPANs are short-range networks that use Bluetooth technology. They are commonly used to interconnect compatible devices near a central location, such as a desk. A WPAN has a typical range of about 30 ft (9.1 m). It is a wireless-type device that uses either battery or line voltage. A digital device is digitized to transmit a signal and modulated to be sent out wireless.

A.6.2.1(5)(c) Wireless Wide Area Networks (WWAN). WWANs are created through the use of mobile phone signals typically provided and maintained by specific mobile phone (cellular) service providers. WWANs can provide a way to stay connected even when away from other forms of network access.

A.6.2.2 Authorities such as the Federal Communications Commission (FCC) often regulate many types of devices. Also, see Table A.6.1.2 for further information.

A.6.2.3 Examples of other wireless devices would be certain smart watches or glasses.

A.6.3 A digital device is one that records or transmits in a digital format via a wireless, ethernet, hard-wired, or dial-up connection. Digital devices might or might not be connected to a network or the internet.

A.6.3.3 An example of a different type of digital device not mentioned might be glasses that allow connection to a digital device or cellular network.

A.6.4 A nondigital device is one that uses physical media to transmit or record in a predetermined format that is not capable of being connected to a network.

A.6.4.1(3) Radios are meant to include two-way radio communication devices that can span large distances.

A.6.4.1(6) These could include radar, sonar, laser, x-ray, lidar, or other similar technologies.
A.6.5 A vehicle, for the purposes of this standard, is an apparatus that can transport humans, or be directly controlled by humans, for the purposes of conducting a remote inspection.

A.6.5.1.1 An example of a nonaerial manned vehicle could include, but not be limited to, an underwater sled. These devices provide access to areas within the structure that normally might or might not be accessible otherwise.

A.6.5.1.2 An example of a nonaerial unmanned vehicle could include, but not be limited to, a motorized robotic apparatus used to examine attics, crawl spaces, piping systems, tunnels, or other inaccessible areas.

A.6.5.1.3 An example of another nonaerial unmanned vehicle could include, but not be limited to, a motorized lift apparatus used to examine exterior building components and facades. These devices are not normally accessible. Additionally, while the lift itself is aerial, the base remains on ground level.

A.6.5.2.1 An example of an aerial manned vehicle could include, but not be limited to, an airplane or helicopter used to survey a large site. These devices provide access to areas above a site or a structure that are not normally accessible otherwise.

A.6.5.2.2 The most common example of an unmanned aerial vehicle are drones. While not limited solely to drones, these devices provide access to areas above a site or structure that are not normally accessible. Drones typically provide a more cost-effective and substantive aerial examination than traditional aircraft.

A.6.5.2.2.1 See 3.3.19 for the definition of unmanned aircraft.

A.6.5.2.2.1.1 For example, the AHJ includes the aviation regulatory authority having jurisdiction. In the United States, this is the FAA. Internationally, this is the applicable national civil aviation authority. [2400:A.1.5]

A.6.5.2.2.1.2 Small unmanned aircraft means an unmanned aircraft weighing less than 55 lb on takeoff, including everything that is on board or otherwise attached to the aircraft. The weight limit defining a small unmanned aircraft will vary from country to country and quite often will be determined by the applicable aviation authority. The current definition is based on regulations in the United States developed by the Federal Aviation Administration (FAA), 14 CFR Part 107, often referred to as “the Small Unmanned Aircraft Rule — Part 107” establishes the less than 55-lb (25 kg) weight limit used in this standard for small unmanned aircraft. Public safety entities will need to apply the applicable weight limit, if any, based on the AHJ. [2400:A.1.3.2]

A.6.5.2.2.1.3 This should be a person who has been found to be properly qualified to exercise the privileges of a remote pilot and has the final authority and responsibility for the operation and safety of SUAS operation as determined by the AHJ. See NFPA 2400 for further details.

A.6.5.2.2.1.4 A public safety entity is one that has a mission to protect life, property, or the environment or any combination of these. An example of a public safety operation could be an AHJ conducting an inspection of a bridge.

A.6.5.2.2.1.5 See A.6.5.2.2.1.2. Additionally, see Table A.6.1.2 for further information.
A.6.6 The technical committee recognizes the ever-changing technological landscape. The intent of this section is to allow for the consideration of other data collection/transmission devices as appropriate and as they become available and are subject to approval by the AHJ.

A.6.6.1 The technical committee recognizes the ever-changing technological landscape. The intent of this section is to allow for the consideration of other vehicles as appropriate and as they become available and are subject to approval by the AHJ.

A.7.1 The use of specific data collection formats is an integral consideration when determining applications for remote inspections. Only formats that are approved by the AHJ should be used. The entity performing the remote inspection should also be familiar with the data collection/transmission device that has been selected. Finally, the AHJ should provide consideration for nondigital formats, where appropriate.

A.7.1.1 The sender is most likely the entity performing the remote inspection but might be others as approved.

A.7.1.2 The receiver is most likely the AHJ but might be others as approved.

A.7.2.1(1) These signals would generally be from primarily a wireless device. However, a digital collection device could be used.

A.7.2.1.1(1) Loss of video and/or audio signals can negatively impact the effectiveness of remote inspections. The AHJ will need to determine whether any loss of signal impacts the remote inspection.

A.7.2.1.1(2) Adequate light levels make it possible for the receiver to view the intended area being shown. Great care needs to be taken to provide adequate lighting, which should not be too dim or too bright.

A.7.2.1.1(3) The quality of video needs to be acceptable to the receiver. While video minimum formats change based on signal strength, location, and technological advancement, it is important to provide the highest quality video that the sender’s data collection/transmission device will support. Unless approved by the AHJ live video should not be edited.

A.7.2.1.1(4) The quality of audio needs to be acceptable to the receiver. While audio minimum formats change based on signal strength, location, and technological advancement, it is important to provide the highest quality audio that the sender’s data collection/transmission device will support.

A.7.2.2(1) These signals could be from a wireless device, digital device, or a nondigital device. Generally, a wireless device would provide the video in a digital format. A nondigital device would provide the video via a manual means, such as a tape or some type of magnetic media. Finally, a digital device can provide video by either means.

A.7.2.2.1(1) Adequate light levels make it possible for the receiver to view the intended area being shown. Great care needs to be taken to provide approved exposure.

A.7.2.2.1(2) The quality of video needs to be acceptable to the receiver. While video minimum formats change based on signal strength, location, and technological advancement, it is important to provide the highest quality video that the sender’s data collection/transmission device will support.
A7.2.2.1(3) The quality of audio needs to be acceptable to the receiver. While audio minimum formats change based on signal strength, location, and technological advancement, it is important to provide the highest quality audio that the sender’s data collection/transmission device will support.

A7.2.2.1(4) The AHJ will need to be consulted on the type of recorded video to be presented, whether it is original unedited recorded video or edited for quality.

A7.2.2.2. Manual means of supplying video can include, but not be limited to, physical delivery, mail delivery service, or courier.

A7.3.1.1 During remote inspections, it might be necessary to have in-person conversations. An example of this is an entity performing the remote inspection who is meeting with an AHJ on site. This AHJ, in turn, might be using a phone to relay information to another AHJ at a remote location.

A7.3.1.1(1) These signals would generally be from conversation but could also be from radios. This might also include the use of an interpreter.

A7.3.1.2(2) This could also include the use of an interpreter.

A7.3.2 It might be necessary to use live audio during remote inspections. An example of this would be to provide an audio recording of a mechanical fan running to showcase the decibels generated during startup.

The quality of audio needs to be acceptable to the receiver. While audio minimum formats change based on signal strength, location, and technological advancement, it is important to provide the highest quality audio that the sender’s data collection/transmission devices will support.

A7.3.2(1) These signals could include a variety of data collection/transmission devices, some of which might use video.

A7.3.2.1(1) The quality of audio needs to be acceptable to the receiver. While audio minimum formats change based on signal strength, location, and technological advancement, it is important to provide the highest quality audio that the sender’s data collection/transmission devices will support.

A7.3.2.1(2) The AHJ will need to be consulted on the type of live audio to be presented, whether it is original unedited audio or edited for quality.

A7.3.3(1) These signals could be from a wireless device, digital device, or a nondigital device. Generally, a wireless device would provide the video in a digital format. A nondigital device would provide the video via a manual means, such as a tape or some type of magnetic media. Finally, a digital device can provide video by either means.

A7.3.3.1(1) The quality of audio needs to be acceptable to the receiver. While audio minimum formats change based on signal strength, location, and technological advancement, it is important to provide the highest quality audio that the sender’s data collection/transmission device will support.

A7.3.3.1(2) The AHJ will need to be consulted on the type of audio to be presented, whether it is original unedited audio or edited for quality.

A7.3.3.3 Manual means of supplying video can include, but not be limited to, physical delivery, mail delivery service, or courier.
A.7.4.2(1) The quality of digital photography needs to be acceptable to the receiver. While digital photography minimum formats change based on format, resolution, camera types, and technological advancement, it is important to provide the highest quality photograph that the sender’s data collection/transmission device will support. The AHJ will need to be consulted on the type of photography to be presented, whether it is original unedited photography, or edited for quality.

A.7.4.2(2) The format could include a multitude of computer-based file formats, with .jpg being the most common.

A.7.4.2(3) The storage size of the file being sent is important, as the receiver might not be able to receive large files by methods such as email. The transmission of photographs should be reviewed ahead of time to determine the most effective method.

A.7.4.4(1) The quality of nondigital photography needs to be acceptable to the receiver. As nondigital photography could encompass film photography, it is important that minimum requirements be set to ensure the photograph will be correctly used. In some cases, nondigital photographs could be converted to digital photographs via scanning for use in digital storage. As such, it is important to provide the highest quality photograph that the sender’s data collection/transmission device will support. The AHJ will need to be consulted on the type of photography to be presented, whether it is original unedited photography or edited for quality.

A.7.4.4(2) The format would primarily be on printed paper or other suitable materials as approved.

A.7.4.4(3) The physical size of the nondigital photograph being sent is important. Traditionally sized photographs might not be large enough to accurately show the area being reviewed in the remote inspection. The transmission of photographs should be reviewed ahead of time to determine the most effective method.

A.7.5.1 The technical committee recognizes that, in some cases, a written format could be suitable for remote inspections. The use of a written format should only be with the approval of the AHJ.

A.7.6 The technical committee recognizes the ever-changing technological landscape. The intent of this section is to allow for the consideration of other data collection formats as appropriate and with the approval of the AHJ.

A.8.1.1 Accumulated data could include, but not be limited to, documents, photos, streaming video, and other media collected during the remote inspection.

A.8.2.2 Content for submission could include multiple forms of data obtained in Chapter 7 but could also be in the form of a report.

A.8.2.3 It is not the intent of this section to prohibit or require the recording of a live remote inspection.

A.8.3.2 The submission of content should be transmitted in as secure a method as practicable or as required by the AHJ.
A.8.3.4 The AHJ must oversee the capture of all live content. One example of live transmission could include streaming video. Use of video conferencing or live streaming applications should be approved by the AHJ.

A.8.3.5 The technical committee understands that each jurisdiction has different processes and internal requirements. A procedure to reasonably verify the transmission of content should be developed and shared with relevant stakeholders. An acknowledgement of receipt should not be interpreted as approval by the AHJ.

A.8.4.1 Some content material might not be stored, storable, or retrievable for future use. One example of this is live streaming. There could also be security concerns or contractual agreements that need to be considered.

A.8.4.2 The storage and delivery of content might not be subject to any explicit requirements. Promulgated federal, state, or local laws or capabilities sometimes limit the amount of control that AHJs have to modify specific policies or procedures.

A.8.5 Absent any specific laws or requirements, a recommendation for retention of remote inspection records is 3 years.
Annex B Informational References

B.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

B.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


B.1.2 Other Publications.

B.1.2.1 US Government Publications.


B.2 Informational References (Reserved).

B.3 References for Extracts in Informational Sections.


MEMORANDUM

TO: Technical Committee on Building Fire and Life Safety Directors

FROM: Diane Matthews, Technical Committee Administrator

DATE: March 26, 2020

SUBJECT: Ballot to Release NFPA 2800 Preliminary Draft - Final Results

According to the final ballot results, the ballot did receive the necessary affirmative votes to pass ballot. The Technical Committee recommends NFPA 2800 to enter the F2022 cycle. Please see the attached report for results and any comments received.

30 Eligible to Vote
5 Not Returned (Brown, Day, Faber, Hill and Hospelhorn)

The criteria necessary to pass ballot is a simple majority of the Technical Committee and Correlating Committee, if any. See Section 4.3.2.1(b) of the Regulations Governing the Development of NFPA Standards.
NFPA 2800 Preliminary Draft Release Ballot Final Results

Per section 4.3.2.1(b) of the Regs, prior to entering a future Revision Cycle and approval for public review, a Ballot of the Committee is required to pass by at least, a simple majority. Note: This ballot is for formally voting on whether or not you are in agreement with the release of the NFPA 2800 draft.

Eligible to Vote: 30
Not Returned : 5
Jim Faber, Jerome T. Brown, Richard L. Day, Jason Hospelhorn, Jonathan Whitfield Hill

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
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<tr>
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<td></td>
</tr>
<tr>
<td>Affirmative with Comment</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Vincent Quinterno

4.3.1 #5 list should include the threat of "Social Media". Social media is different from a cyber attack because it can be a "live or in the moment" threat. If there is no monitoring for such a threat, event can escalate to a dangerous situation for all occupants.
Sections Items 2.2 & 2.3 NFPA-1, 72 and 101 are repeated in the 2 sections? 3.3.5 Emergency Command Center (ECC). in lower part of the paragraph ECS should ECC 3.3.14 Definitions. No definition on a deputy floor warden that is mentioned several times in text 4.2.3.4 (1) Fire Warden. Maintaining equipment? What equipment? 4.2.4 Employer. Each employer to assign an employee designated as the floor warden 4.4.2 (5) Emergency Response. Design and conduct of drills. Should be listed under Ch-6 Training 4.6.1.2 Mass Evacuation. No definition. Also does this represent the same a TOTAL facility evacuation? 4.6.2 Remain-in-Place. Know this is a previous NFPA text. But was battle with the HRB-SAC rather they say shelter-in-place. With the current CR-19 events no one has referred to the Remain-in-Place concept. Consideration to be given what is widely accepted by the public at large. 6.3.4.1 Facilitation. Exercises shall be conducted live. Define live? Do not see any indication of face-to-face training Also add to A.6.1.1 6.4.4.2.2 Facilitation. Where stairwell familiarization drills are required, occupants shall enter a facility stairwell and then navigate several levels…. Occupants shall be made aware where the stairwell exit discharges onto a public way and provide a directional indicator. e.g. Jefferson Street, turn left on Jefferson Street (north direction) as you exit. 6.4.5.2 Notification. The AHJ shall be notified……of all drills Total and Partial drills Do not see a need to notify the AHJ for any internal drill not impacting anything external Annex-A Explanatory Material. Deputy Floor Warden A.6.2.1.1(11) Add into floor warden training program the PEEP Program. They should be aware of it and communicate this to any special needs occupants of their floor

Joseph Evangelista

Negative 0
Abstain 0

Total Voted : 25

For Simple majority, the affirmative votes needed are 16
Welcome Claire Stan

Chapter 1 Administration

1.1* Scope.

This standard shall establish minimum requirements for emergency action plans (EAPs) addressing all-hazard emergencies for occupied facilities with an occupant load greater than 500.

1.2 Purpose.

The purpose of this standard shall be to provide requirements for the development of an EAP that will provide procedures for the protection of life for occupants of a facility during emergencies from hazards defined in a risk assessment.

1.3 Application.

This standard shall not apply to facilities or portions of facilities that are classified as industrial occupancies.

1.4 Equivalency.

1.4.1 Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.4.2 Technical documentation shall be submitted to the authority having jurisdiction (AHJ) to demonstrate equivalency.

1.4.3 The system, method, or device shall be approved for the intended purpose by the AHJ.

Chapter 2 Referenced Publications

2.1 General.

The documents or portions of documents listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.
2.2 NFPA Publications.
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

2.3 Other Publications.

2.4 Reference for Extracts in Mandatory Sections.

Chapter 3 Definitions

3.1 General.
The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. Merriam Webster’s Collegiate Dictionary, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1 Approved.
Acceptable to the authority having jurisdiction.
3.2.2* Authority Having Jurisdiction (AHJ).
An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3* Code.
A standard that is an extensive compilation of provision covering broad subject matter or that is suitable for adoption into law independently of other codes and standards.

3.2.4 Standard.
An NFPA Standard, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Non-mandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase "standards development process" or "standards development activities," the term "standards" includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.2.5 Shall.
Indicates a mandatory requirement.

3.3 General Definitions.

3.3.1 Deputy Facilities Fire and Life Safety Director (DFLSD).
A qualified person designated by the owner or the facilities fire and life safety director (FLSD), under the supervision an FLSD, to perform the duties of the position.

3.3.2 Emergency.
A condition or situation in which an individual perceives a need for immediate response.

3.3.2.1 All-Hazard.
An incident or event, natural or human-caused, that warrants action to protect life, property, environment, public health, or safety, and to minimize disruption of government, social, or economic activities.

3.3.3 Emergency Action Plan (EAP).
A written plan of designated actions by employers, employees, and other facility occupants during an emergency.

3.3.4 Emergency Assembly Area (EAA).
A designated area of relative safety inside or outside a facility to which occupants are directed to report as part of an emergency response.

3.3.5 Emergency Command Center (ECC).
The room(s) or area(s) staffed during any emergency event by assigned emergency management staff. The room or area contains system communications and control equipment serving one or more buildings where responsible authorities receive information from premises sources or systems or from (higher level) regional or national sources or systems and then disseminate appropriate information to individuals, a building, multiple buildings, outside campus areas, or a combination of these in accordance with the emergency response plan established for the premises. The room or area contains the controls and indicators from which the ECS systems located in the room or area can be manually controlled as required by the emergency response plan and the emergency management coordinator.

3.3.6 Emergency Resource Materials (ERM).
Documentation, plans, equipment, and so forth prepared and required for the implementation of the EAP or a portion of the EAP.
3.3.7 Emergency Response Agency.
Organizations providing law enforcement, emergency medical, fire, rescue, communications and related support services. [1221, 2019]

3.3.8 Evacuation.
See 3.3.23.3 and 3.3.23.5.

3.3.9* Facility.
All and any portion of buildings, structures, and interior or exterior occupiable areas located on a site under the jurisdiction of a single FLSD.

3.3.10* Facility Emergency Response Team (FERT).
The individuals identified in the EAP as responsible for the implementation of the plan, including the facilities fire and life safety director (FLSD), deputy facilities fire and life safety director (DFLSD), floor wardens, deputy floor wardens, and other members of the response team.

3.3.11* Facilities Fire and Life Safety Director (FLSD).
A qualified person designated to perform the duties of the position as outlined in this document.

3.3.12 Fire Command Center.
The principal attended or unattended room or area where the status of the detection, alarm communications, control systems, and other emergency systems is displayed and from which the system(s) can be manually controlled. [72, 2019]

3.3.13 Fire Protection System.
Any fire alarm device or system or fire extinguishing device or system, or a combination thereof, that is designed and installed for detecting, controlling, or extinguishing a fire or otherwise alerting occupants, or the fire department, or both, that a fire has occurred. [1, 2018]

3.3.14* Floor Warden.
A facility occupant trained to perform assigned duties on a floor, area, or zone in the event of an emergency.

3.3.15 Incident Commander (IC).
The individual responsible for all incident activities, including the development of strategies and tactics and the ordering and release of resources. [472, 2018]

3.3.16 Means of Egress.
A continuous and unobstructed way of exit travel from any point in a building or structure to an area of refuge or embarkation area consisting of three separate and distinct parts: (1) the exit access, (2) the exit, and (3) the exit discharge. [101, 2018]

3.3.16.1 Exit.
That portion of a means of egress that is separated from all other spaces of a building or structure by construction, location, or equipment as required to provide a protected way of travel to the exit discharge. [101, 2018]

3.3.16.2 Exit Access.
That portion of a means of egress that leads to an exit. [101, 2018]

3.3.16.3 Exit Discharge.
That portion of a means of egress between the termination of an exit and a public way. [101 2018]

3.3.16.4 Public Way.
A street, alley, or other similar parcel of land essentially open to the outside air deeded, dedicated, or otherwise permanently appropriated to the public for public use and having a clear width and height of not less than 10 ft. (3050 mm). [101, 2018]
3.3.17 Neighboring Facility.
A facility that is located adjacent to the facility subject to this plan.

3.3.18 Occupant.
A person within a facility, including an employee, facility personnel, or visitor.

3.3.19 Owner.
Any person, agent, firm, or corporation having a legal or equitable interest in a facility.

3.3.20 Personal Emergency Evacuation Plan (PEEP).
An individual’s evaluation of his or her own evacuation capabilities and the effect on the facility evacuation.

3.3.21 Qualified Person.
A person who, by possession of a recognized degree, certificate, professional standing, or skill, and who, by knowledge, training, and experience, has demonstrated the ability to deal with the subject matter, the work, or the project. [1500, 2018]

3.3.22 Risk Assessment.
The process of identifying threats and hazards to life and the analysis of probabilities, vulnerabilities, and impacts.

3.3.23 Total Evacuation, Remain-in-Place, In-Facility Relocation, and Partial Evacuation (TRIP).
Instructional strategies given to occupants.

3.3.23.1 In-Facility Relocation.
The relocation of occupants within a portion of a facility or an entire facility to an in-facility relocation area (INFRA).

3.3.23.2 In-Facility Relocation Area (INFRA).
A designated area within a facility to which occupants can be relocated.

3.3.23.3 Partial Evacuation.
The withdrawal of a group of occupants from a portion of a building or facility.

3.3.23.4 Remain in Place.
An instruction given to occupants to remain at their current location until given further instruction.

3.3.23.5 Total Evacuation.
The withdrawal of all occupants from a building or facility.

3.3.24 Transportation Mode.
A facility element that allows travel from one point within a facility to another point within the facility.

Chapter 4 General Requirements for Emergency Action Plans (EAPs)

4.1 Authority Having Jurisdiction (AHJ).
The AHJ shall be authorized to:

(1) Review the EAP
(2) Approve the EAP
(3) Require additional information to be incorporated in the EAP
(4) Determine the minimum qualifications for the FLSD

4.2 Responsibilities.
The EAP shall identify and describe the responsibilities and expectations for all parties involved with, and impacted by, the development and execution of the EAP, including the following:

1. Facility owner
2. Facilities fire and life safety direction (FLSD)
3. Facility emergency response team (FERT)
4. Employers

4.2.1 Owner.
4.2.1.1 The owner, or designated representative, shall ensure all of the following:
1. Facility is provided with an accepted or approved EAP
2. EAP is reviewed and updated as required by Chapter 7
3. EAP is filed with the AHJ, where required
4. Appointment of a qualified person as FLSD

4.2.1.2 The owner shall be responsible for fire and life safety of the facility.

4.2.2 Facilities Fire and Life Safety Director (FLSD).
4.2.2.1 The FLSD shall meet the professional qualifications and job performance requirements in NFPA 1082.
4.2.2.2 Under the authority of the owner, the FLSD shall be responsible for all of the following tasks
1. Establishing and implementing the EAP
2. Appointing a facility emergency response team (FERT)
3. Planning and executing trainings, drills, and exercises as designated in the EAP
4. Maintaining all documentation required by the EAP
5. Creating and maintaining facility data records
6. Maintaining the readiness of ERM
7. Maintaining knowledge and awareness of established injury or death notification policies and procedures
8. Maintaining knowledge and awareness of established procedures for occupation or return to operations after activation of the EAP
9. Attending pre-planning meetings with emergency response organizations

4.2.2.3 The tasks included in the responsibilities of the FLSD shall be permitted to be assigned to deputy facilities fire and life safety directors (DFLSD) or other designated qualified persons as identified in the EAP.

4.2.2.4 The FLSD shall be present on-site during all times that the facility is occupied or expected to be occupied by more than 500 persons.
4.2.2.5*

The FLSD shall be given the stated authority and resources to take responsibility for the day-to-day safety management of the facility and to ensure that essential life safety systems are maintained and repaired as necessary, which includes the following:

(1) Maintenance of means of egress in accordance with NFPA 1 and NFPA 101
(2) Monitoring of inspection, testing, and maintenance (ITM) of fire protection and life safety systems
(3) Monitoring of rehabilitation work to confirm that effective fire and life safety measures are in place for facility occupants
(4) Monitoring, supervision, or issuing of facility permits for all hot work operations in accordance with NFPA 51B
(5) Where provided, maintenance of the readiness of the fire command center (FCC) in accordance with NFPA 72 or emergency command center (ECC) in accordance with NFPA 1
(6) Other tasks required to ensure compliance with local building and fire codes

4.2.2.6*

During an emergency event, the FLSD shall be responsible for the following tasks:

(1) Implement the EAP
(2) Communicate emergency-specific instructions to the FERT
(3) Communicate emergency-specific instructions to occupants

4.2.2.7

During an emergency event, the FLSD shall be a liaison with the responding incident command (IC), with responsibilities that include the following:

(1) Establish a working location
(2) Provide input on the facility’s resources
(3) Upon arrival of the IC, brief the IC on the current status of the following:
   (a) Incident
   (b) Incident response
   (c) Facility systems
   (d) Status of evacuation, where applicable
   (e) Occupant locations and conditions
   (f) Special occupant needs and requirements
   (g) Special facility hazards
   (h) Continued operations of the FERT
(4) Cooperate with the IC staff
(5) Oversee the well-being and safety of the FERT and other life safety facility staff assigned to the incident

4.2.3* Floor Wardens.

4.2.3.1

Where required in the EAP, floor wardens shall be a designated occupant on that floor or area.

4.2.3.2*

The tasks included in the responsibilities of the floor warden shall be permitted to be assigned to deputy floor wardens or other designated qualified persons as identified in the EAP.
4.2.3.3
The floor warden, a deputy floor warden, or other designated qualified person shall be present on the floor during all times that the assigned floor of the facility is occupied during normal business hours or after-hour special circumstances. (See A.6.2.1.1 for recommended floor warden training program.)

4.2.3.4
The floor warden shall be responsible for the following on a designated floor, or portion of a floor, under normal operating conditions:

(1) Maintaining equipment designated in the EAP, issued by the FLSD
(2) Assessing the availability of the means of egress components within their designated area
(3) Notifying the FLSD of deviation from normal status of their designated area

4.2.3.5
The floor warden shall be responsible for the following on a designated floor, or portion of a floor, during an activation of the EAP:

(1) Establishing a means of communication with the FLSD, as outlined in the EAP
(2) Assisting in the implementation of a TRIP order
(3) Assessing the availability of the means of egress components within their designated area and redirecting occupants as necessary
(4)* Providing the FLSD information pertaining to the status of the following:
   (a) TRIP status
   (b) Occupant locations and conditions
   (c) Special occupant needs

4.2.4 Employers.
Where applicable, in coordination with the FLSD, employers shall be responsible for all of the following tasks:

(1)* Provide orientation on life safety instruction after the hiring of an employee
(2) Provide employees with materials regarding pertinent portions of the facility’s EAP, as provided to the employer by the FLSD
(3) Ensure employees are provided with required instruction on emergency procedures as outlined in the EAP
(4) Maintain records for employer-provided instruction
(5) Draft and maintain an accurate list of employees
(6) Establish and maintain a system of assigning responsibility for accounting for employees present in the facility
(7) Establish procedures for incident reporting procedures for any facility-related issues that should be reported to the owner

4.3 Risk Assessment.

4.3.1*
A risk assessment shall be completed and identify hazards specific to the facility to be included in the EAP.

4.3.2*
The risk assessment shall address the impacts on occupant life safety during each identified hazard.
4.3.3
A life safety evaluation in accordance with NFPA 101 shall be considered acceptable.

4.3.4*
A risk assessment in accordance with NFPA 1600 shall be considered acceptable.

4.3.5
Risk assessments for active shooter/hostile events (ASHER incidents) shall be conducted in accordance with NFPA 3000.

4.3.6
The elements of a risk assessment in accordance with NFPA 99 shall be considered and included where applicable for health care occupancies.

4.4 Emergency Response.

4.4.1*
The EAP shall include a response for each identified hazard.

4.4.2
The response shall include the following minimum information for each specific hazard identified in the risk analysis, where applicable:

1. Procedures for reporting of emergencies
2. Notification strategy and messaging
3. FERT, occupant, and staff response
4. Occupant TRIP procedures, including the use of the following:
   a. Elevators
   b. Stairways
   c. Other transportation modes (see A.3.3.24)
5. Design and conduct of drills
6. Facility access for emergency response agencies
7. Ventilation system operation, including air-handling equipment, heating, ventilation, and air conditioning (HVAC) equipment, and smoke-management systems
8. Use of portable fire extinguishers
9. Use of fire protection systems, including the following:
   a. Fire suppression systems
   b. Fire alarm systems
   c. Other notification systems
10. Use of interior doors
11. Use of exterior windows
12. Electrical, natural gas, steam, water, and other utility operations
13. Fuel oil storage system and associated pumps and piping
14. Other items required by the AHJ

4.4.3
Response for ASHER incidents shall be in accordance with NFPA 3000.

4.4.4
The AHJ or local emergency response organizations shall be contacted for specific standard operating procedures relative to local or regional hazards.

4.5 Occupant Communication.
4.5.1 Procedures for Reporting Emergencies.
4.5.1.1
The EAP shall include procedures for facility occupants to report emergencies.
4.5.1.2*
Occupants shall be provided with information on how to report emergencies in the facility.

4.5.2 Occupant Notification.
4.5.2.1*
The EAP shall include plans for how and when emergency and TRIP information will be provided to facility occupants and FERT members.
4.5.2.2*
The occupant notification shall consist of accurate, informative, and concise messaging for each identified hazard.

4.6 Total Evacuation, Remain-in-Place, In-Facility Relocation, and Partial Evacuation (TRIP) Strategy.
4.6.1 General.
4.6.1.1*
The EAP shall designate one or more appropriate TRIP strategy(s) outlined in Table 4.6.1.1 for each identified emergency.

<table>
<thead>
<tr>
<th>TRIP Strategy*</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total facility evacuation</td>
<td>Withdrawal of all occupants from the facility</td>
</tr>
<tr>
<td>Remain-in-place</td>
<td>No movement — occupants remain at current location</td>
</tr>
<tr>
<td>In-facility relocation</td>
<td>Relocate occupants to another portion of the facility, on the same floor or a different floor</td>
</tr>
<tr>
<td>Partial facility evacuation</td>
<td>Withdrawal of occupants from a portion of the facility</td>
</tr>
</tbody>
</table>

*See 3.3.23 for TRIP definitions.

4.6.1.2
Mass evacuation, sheltering, and re-entry programs in accordance with NFPA 1616 shall be permitted.

4.6.2 Remain-in-Place (No Evacuation).
Where remain-in-place strategy is utilized, the EAP shall include all of the following:
(1) Actions for occupants to safeguard themselves
(2)* Means of communication to provide occupants with instruction
4.6.3 In-Facility Relocation.
Where in-facility relocation strategy is utilized, the EAP shall include all of the following:

1. Anticipated number of occupants
2. In-facility relocation area (INFRA) locations, including the following for each INFRA:
   (a) Use of the INFRA
   (b) Location of the INFRA, including floor and room number where applicable
   (c) Type of protection the INFRA offers
   (d) Maximum number of occupants the INFRA can accommodate, providing a minimum 3 ft² (0.28 m²) per person
   (e) Access to water, lavatories or other facilities, and equipment or supplies, including prepositioned equipment of supplies from the INFRA, where applicable
3. Designated routes by which occupants would be directed, if such areas are on a different floor, stairwells and elevators to be utilized and their capacity
4. Identified actions to be taken with respect to building components or systems in the event of an in-building relocation, including types of systems and locations
5. Means of communication
6. Means of accounting for persons within the INFRA

4.6.4 Total Evacuation and Partial Evacuation.
The EAP shall identify means of evacuating occupants from the facility or portions of the facility.

4.6.4.1 The EAP shall include the following for both a partial evacuation and a total evacuation:

1. Number of occupants on each floor or evacuation zone of the facility
2. Location of the following, if provided:
   (a) Exits
   (b) Stairways
   (c) Elevators and their capacities
   (d) Evacuation devices
3. Actions to be taken with respect to facility components or systems in the event of a total or partial evacuation, including the types of systems and locations
4. Identification of primary egress routes for evacuation from each floor or evacuation zone and alternative egress routes in the event that the primary egress routes are inaccessible
5. Whether occupants will be directed to leave the site or report to a designated emergency assembly area (EAA)
6. Procedures by which occupants will be accounted for
4.6.4.2
Where occupants are instructed to evacuate to an EAA, the area(s) shall have the following characteristics and provisions:

(1)* Be a safe distance from the facility
(2) Be of sufficient number and size to accommodate the facility occupants and provide at least 3 ft² (0.28 m²) per person [see A.4.6.2(2)(d)]
(3) Allow facility occupants a clear, unobstructed, and accessible path to a public way
(4) Identify alternative locations in case primary location is inaccessible
(5) Not obstruct access to the facility or the EAA for emergency vehicles and emergency response agencies

4.7 FERT Member Identification.
4.7.1*
All FERT members shall be provided with meaningful identification.

4.7.2
The FLSD shall be provided with meaningful identification differentiated from other FERT members.

4.8 Accommodations for Persons with Disabilities.
4.8.1 General.
The EAP shall include procedures for all identified responses for occupants with disabilities that could impact their ability to participate in the response.

4.8.2* Personal Emergency Evacuation Plans (PEEP).
PEEPs shall be offered to all occupants who have self-identified to the FLSD as requiring assistance in the event of an emergency and regularly use the facility.

4.8.2.1
The PEEP shall be kept confidential and secure, and provided only to authorized facility personnel and emergency response agencies in the event of an emergency.

4.8.2.2
A primary and a secondary assistance monitor shall be designated by the individual and identified to the FLSD to assist each occupant that has self-identified as requiring evacuation assistance.

4.8.2.3
PEEPs shall be reviewed annually by the individual and the FLSD.

4.8.2.4
PEEPs shall be permitted to be updated or withdrawn at any time by the individual.

4.8.2.5
The PEEP shall include the following information for each self-identified occupant:

(1) Name
(2) Primary location, including floor and room number where applicable
(3) Phone number
(4) Type of assistance required
(5) Name of primary and secondary assistance monitors
(6)* Signed acknowledgement form(s) from the occupant each assistance monitor

4.9 Post-EAP Activation Analysis.
4.9.1
The FLSD shall be involved in a post-EAP activation analysis and development of a damage assessment report.

4.9.2
The FLSD shall be involved in the development of a restoration plan based upon the post-EAP activation analysis and damage assessment report.

4.9.3
If determined necessary by the AHJ or the FLSD, the EAP shall be updated based on the post-EAP activation analysis.

Chapter 5 Facility Services

5.1 Facility Services and Fire Protection.
The EAP shall identify all mechanical, electrical, and fire protection systems and equipment in the facility.

5.1.1 Utilities.

5.1.1.1
The EAP shall address utilities, including the following:
(1) Gas
(2) Electrical systems
(3) Emergency generators and standby power systems
(4) Stored electrical energy systems
(5) Steam
(6) Water
(7) Sanitary sewer

5.1.1.2
The following shall be provided in the EAP for each identified utility system and associated equipment:
(1) Location, size, and type
(2) Control equipment, point of entry, and shutoff
(3) Contact information for service providers

5.1.2 Heating, Ventilation, and Air-Conditioning (HVAC).

5.1.2.1
The EAP shall address HVAC systems, including the following:
(1) Air conditioning
(2) Ventilating or heat-producing equipment
(3) Commercial cooking ventilation systems
(4) Ventilation systems in laboratories using chemicals

5.1.2.2*
The following shall be provided in the EAP for each identified HVAC systems and associated equipment:
(1) Type of systems
(2) Location of control equipment
(3) Areas served
(4) Interaction of HVAC systems with other fire and life safety systems
5.1.3 Fire Protection and Life Safety Systems.

5.1.3.1
The EAP shall address fire protection and life safety systems and equipment, including the following:

1. Smoke control
2. Fire detection, alarm, and communication systems
3. Mass notification systems
4. Sprinkler systems
5. Standpipe systems
6. Other fire suppression systems
7. Carbon monoxide (CO) and other gas detection systems and warning equipment
8. Portable fire extinguishers

5.1.3.2
The following shall be provided in the EAP for each identified fire protection or life safety system and associated equipment:

1. Type and scope of each system
2. Location of control equipment
3. Area(s) served
4. Contact information for service provider

5.1.4 Mechanical Transportation Modes.
The EAP shall address mechanical transportation modes, including the following:

1. Elevators
2. Escalators
3. Moving walkways
4. Accessible route devices

5.1.5 Refrigeration System.

5.1.5.1
The EAP shall address refrigeration systems and refrigerant storage where regulated under a fire code.

5.1.5.2 A.5.1.5.1
See Chapter 53 of NFPA 1. The EAP shall identify the following:

1. Type and quantity of refrigerant(s)
2. Location of all refrigeration equipment and refrigerant storage
3. Location of all refrigerant detection and alarm equipment
4. Location of all control and shutoff equipment

5.2 Emergency Resource Materials (ERM).

5.2.1 Location.

5.2.1.1
Where the facility is provided with a fire command center (FCC) in accordance with NFPA 7: or an emergency command center (ECC) in accordance with NFPA 1, the ERM shall be located in either the FCC or the ECC.
5.2.1.2*  
In facilities that do not have an FCC or ECC, the ERM shall be located in a single, on-site location.

5.2.1.3  
The ERM shall be in a location readily accessible to emergency response agencies, unless otherwise permitted by the AHJ.

5.2.1.4  
Sensitive information required to be secured shall be readily accessible to the FLSD and emergency response agencies.

5.2.2 Content.  

5.2.2.1  
Where applicable, the ERM shall include:

(1) Emergency action plan document  
(2)* Facility data records as required by 5.2.3  
(3) Facility master keys or access cards  
(4) Facility floor plans, which include the following:
   (a) Occupancy classification(s)  
   (b) Maximum occupant load  
   (c) Fire protection and life safety systems provided, including the following:
      i. Fire alarm and annunciator panel locations  
      ii. Fire sprinkler and standpipe control valve locations  
      iii. Location of all control equipment  
   (d) Emergency assembly area(s)  
   (e) Fire department connection(s)  
   (f) Exits  
   (g) Hazardous materials storage areas  
   (h) Stairway locations and designations  
   (i) Electrical room location  
   (j) Mechanical room location  
   (k) INFRAs  
(5) Method of communication with facility occupants, FERT, and emergency response agencies  
(6) PEEPs  
(7) Documentation for training, drills, and exercises required by Chapter 6  
(8) Other items required by the AHJ  

5.2.2.2*  
Facility data records, as set forth in NFPA 1620, shall be maintained with the capability of being transmitted in an electronic format.

5.3 Construction, Alteration, and Demolition Operations.  

5.3.1  
Construction, alteration, and demolition operations shall comply with NFPA 241.
5.3.2* Prior to the commencement of construction, alteration, or demolition procedures, the FLSD shall assess the impact on the EAP.

5.3.3 The FLSD shall maintain communication with the fire prevention program manager (FPPM) required by NFPA 241 during the duration of the construction, alteration, and demolition operations.

Chapter 6 Training, Drills, and Exercises

6.1 General.

6.1.1* Training, drills, and exercises for both FERT members and occupants shall comply with this chapter.

6.1.2 All training, drills, and exercises shall be evaluated for effectiveness in accordance with Section 6.5.

6.1.3 Training, drills, and exercises for ASHER incidents shall be in accordance with NFPA 3000.

6.2 FERT Training.

6.2.1 General.

6.2.1.1* All FERT members shall receive appropriate training and resources to carry out their designated task(s).

6.2.1.2* FERT member training shall include the following:

1. Laws, regulations, and policies applicable to EAP for the facility
2. Organizational structure of the FERT
3. FERT roles and responsibilities
4. Configuration and characteristics of the facility and its occupancies
5. Facilities systems and components outlined in Section 7.2
6. Role of the risk assessment in the establishment of the EAP
7. Hazards identified in the EAP
8. Emergency procedures identified in the EAP
9. Methods and procedures for communications
10. Emergency supplies
11. ERM

6.2.2 Frequency.

6.2.2.1 FERT members shall receive initial training upon assignment.

6.2.2.2 FERT members shall receive a minimum 1-hour training annually, after their initial training.

6.2.3 Facilitation.
6.2.3.1*
FERT training facilitation shall be permitted to include any of the following methods:

(1) Live instructor-lead
(2) Pre-recorded video
(3) Online learning programs

6.2.3.2
Training shall be permitted to be conducted by any qualified person designated by the FLSD.

6.2.3.3
The FLSD or designated qualified person shall be available during the training to answer questions related to the training.

6.3 Discussion-Based Exercises.

6.3.1* General.
Discussion-based exercises shall simulate all-hazard incidents that are identified in the EAP.

6.3.2 Participation.
Exercises shall include the FLSD, FERT members, and other people or agencies who are identified in the EAP as having a policy, planning, or response role.

6.3.3 Frequency.
A discussion-based exercise shall be conducted annually or more frequently where required by the AHJ.

6.3.4 Facilitation.

6.3.4.1*
Exercises shall be conducted live.

6.3.4.2*
Exercises shall be conducted in areas where all participants are capable of participating.

6.4 Drills.

6.4.1 General.

6.4.1.1 Drills shall be permitted to include instructional, means of egress familiarization, and TRIP drills in accordance with 6.4.4.

6.4.1.2 The AHJ shall be permitted to participate in any drill or instructional exercise.

6.4.1.3 Fire drills and emergency egress and relocation drills required by NFPA 101 or other codes shall be in addition to drills required by Section 6.4.

6.4.2 Participation.
A drill shall be permitted to be conducted throughout a facility or a portion of the facility as determined by the FLSD.

6.4.2.1* All facility occupants present in the facility, or portion of the facility conducting the drill, shall be required to participate in the drill, unless otherwise permitted by 6.4.2.2.

6.4.2.2* Occupants shall be permitted to be exempt from participation where participation might cause injury or significant hardship.
6.4.2.3*  
An instructional exercise shall be made available to all occupants exempt from the drill.

6.4.3 Frequency.

6.4.3.1  
The frequency, number, and type of drills shall be determined by the AHJ, unless required by 6.4.3.2.

6.4.3.2  
A minimum of one drill shall be conducted annually, unless otherwise required by 6.4.3.3.

6.4.3.3*  
In facilities that have multiple shifts, drills shall be conducted for each shift.

6.4.3.4  
Drills shall be permitted to any type outlined in 6.4.4, unless otherwise required by the AHJ.

6.4.3.5  
A means of egress familiarization drill shall be conducted a minimum of once every three years.

6.4.3.6*  
Drills shall be conducted at times when the facility is occupied by regular facility occupants.

6.4.4 Type of Drill.

6.4.4.1* Instructional.

6.4.4.1.1 General.  
Instructional drills shall address the implementation of the EAP during regular business hours and off-business hours — times at which FERT members and other EAP staff are not present in the facility.

6.4.4.1.2 Facilitation.  
Instructional drills shall be permitted to include any of the following methods:

1. Live instructor-lead
2. Pre-recorded video
3. Online learning programs

6.4.4.2.2  
Instructional drills shall be permitted to be conducted by any qualified person designated by the FLSD.

6.4.4.2* Means of Egress Familiarization.

6.4.4.2.1 General.  
Means of egress familiarization drills shall be conducted to familiarize occupants with the locations of the means of egress.

6.4.4.2.1.2  
Means of egress familiarization drills shall include stairwell familiarization drills, where applicable.

6.4.4.2.2 Facilitation.  

1. Means of egress familiarization drills shall be conducted live.
6.4.4.2.2
Where stairwell familiarization drills are required, occupants shall enter a facility stairwell and then navigate several levels as identified in the EAP, unless otherwise permitted by 6.4.4.2.2.3.

6.4.4.2.2.3
Occupants unable to navigate stairs shall report to an area of refuge or other safe area as identified in the EAP.

6.4.4.2.2.4*
Where areas of refuge are utilized in a drill, communications equipment and other safety equipment designated in the EAP shall be tested at the time of the drill.

6.4.4.2.3
Means of egress drills shall be permitted to be facilitated by any qualified person designated by the FLSD.

6.4.4.3 TRIP.
6.4.4.3.1 General.

6.4.4.3.1.1*
TRIP drills shall be based on a scenario.

6.4.4.3.1.2
The scenario shall be based on an identified hazard in the EAP which utilizes one or more TRIP strategy(s).

6.4.4.3.1.3*
The following shall be communicated to the drill participants at the start of the drill:

(1) Type of hazard
(2) Location of hazard
(3) Appropriate TRIP strategy(ies)

6.4.4.3.2 Facilitation.
TRIP drills shall be conducted live.

6.4.5 Notification.
6.4.5.1
The FLSD shall not be required to notify occupants and FERT members in advance of drills.

6.4.5.2*
The AHJ shall be notified not less than 72 hours in advance of all drills.

6.4.5.3*
The owners of neighboring facilities that could be affected shall be notified not less than 72 hours in advance of any facility evacuation drills.

6.5 Evaluation.
6.5.1
Evaluations shall be conducted to assess the preparedness and capabilities of the FERT and occupants.

6.5.2*
The use of the following shall be permitted to assess the knowledge and skills of FERT members to conduct their assigned duties:

(1) Written knowledge evaluations
(2) Practical skills evaluations
6.5.3
The use of stair monitoring system video shall be permitted to be used to assess performance of occupants.

6.5.4
The evaluation shall be conducted to assess the performance and attain realistic expectations of an actual emergency response.

6.5.5
If deemed necessary by the FLSD or the AHJ, the EAP shall be updated based on the results of the evaluation.

6.6 Documentation.

6.6.1
The FLSD shall document all evaluations.

6.6.2
Evaluation documentation shall be considered ERM.

6.6.3
The documentation shall include the following:

(1) Date
(2) Type of training, drill, or exercise
(3) Participants
(4)* Metrics for evaluation
(5)* Corrective actions, if necessary

Chapter 7 Documentation

7.1 General.
This chapter outlines the required documentation that shall be included in the EAP.

7.1.1
The information in the EAP shall be reviewed annually and updated as necessary, unless otherwise required by AHJ, the FLSD, or 7.1.2.

7.1.2
The EAP shall be updated within 30 days if any of the following occur:

(1) Change in facility owner
(2) Change in tenant(s), where applicable
(3) Change in essential facility personnel
(4) Change in emergency contact information
(5) Facility modification, reconstruction, change of use or change of occupancy in accordance with NFPA 101
(6) Modification to any facility system identified in the EAP
(7) Other changes to the facility deemed significant by the AHJ

7.1.3*
The EAP shall be assigned a revision indicator.

7.1.4
The EAP shall include a log of all revisions.

7.1.5
Changes in the EAP shall be submitted to the AHJ, as outlined in Chapter 4.
7.2 Facility Systems and Equipment.

7.2.1
The EAP shall include the following information for facilities systems outlined in 7.2.2.

(1) Type of system
(2) Area(s) served
(3) Control and shutoff equipment
(4) Service provider
(5) System maintainer

7.2.2
The EAP shall include information on the following systems:

(1) Fire protection system(s), including the following:
   (a) Sprinkler systems
   (b) Standpipe systems
   (c) Special suppression systems
   (d) Fire pumps
   (e) Fire department connection (FDC) locations
   (f) Private fire service mains and hydrant locations
   (g) Fire protection water storage tank locations

(2) Fire alarm system(s), including the following:
   (a) Fire alarm monitoring station
   (b) Control panel and annunciator panel locations
   (c) Initiating device types and locations
   (d) Evacuation notification zones

(3) Facility security systems
(4) Emergency generator equipment
(5) Emergency lighting
(6) Utility service main shut-off equipment locations and tools required
(7) Fire department lock box locations
(8) Fire department key switch locations
(9) Smoke control systems
(10) Hazardous material storage and distribution systems
(11) Energy storage systems
(12) Mechanical or electrical systems which pose a hazard to life safety

7.3 Facility Plans.

7.3.1
Accurate plans for the facility and systems shall be readily accessible from the ERM location including the following:

(1) Floor plans or architectural plans
(2) Fire protection system plans
(3) Mechanical, electrical, and plumbing plans
(4) Life safety plans, where provided
7.3.2 Facility plans shall include location of control/shutoff equipment for all facility systems, including the following:

(1) Main and sub electrical panels
(2) Electrical disconnect switches
(3) Disconnect switches for power generating systems
(4) Energy storage systems and universal power systems
(5) Fire alarm control panels and annunciators
(6) Fire protection system control panels and valves
(7) Fuel system emergency shutoffs and control valves
(8) HVAC system equipment and controls
(9) Elevator and escalator controls
(10) Other critical controls for facility operations

7.4 Emergency Contact Information.

Current emergency contact information for the following shall be included in the EAP:

(1) Police, fire, and paramedics
(2) FLSD
(3) Facility security, both on- and off-site where applicable
(4) Security monitoring company
(5) Security system maintenance company(s)
(6) Facility owner or designated representative
(7) Facility maintenance/engineering
(8) Fire alarm monitoring company
(9) Fire protection system maintenance company(s)
(10) FERT members
(11) Utility service providers
(12) Other emergency contacts

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1 NFPA 101 provides the minimum fire and life safety requirements for new and existing facilities and should be referenced when developing an EAP.

This document can be used as a guideline or a best practice in facilities that have occupant loads less than the thresholds in the scope.
A.3.2.2 Authority Having Jurisdiction (AHJ).

The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.3 Code.

The decision to designate a standard as a “code” is based on such factors as the size and scope of the document, its intended use and form of adoption, and whether it contains substantial enforcement and administrative provisions.

A.3.3.9 Facility.

A facility can consist of multiple buildings, structures, or occupiable areas where deemed appropriated by the AHJ.

A.3.3.10 Facility Emergency Response Team (FERT).

Other members of the FERT can include property managers, chief engineers, elevator mechanics, security directors, or, in their absence, their qualified designees, and other facility personnel, employees, or other facility occupants designated to assist in the implementation of the EAP. In healthcare facilities, the FERT should include members of the emergency management committee, where required by NFPA 99.

A.3.3.11 Facilities Fire and Life Safety Director (FLSD).

The FLSD should be designated by the facility owner to perform the duties of the position. The AHJ should have the ability to deem if the FLSD has met the professional qualification and job performance requirements set forth in NFPA 1082.

A.3.3.14 Floor Warden.

The term floor warden is used to describe the role identified in the definition and in this document and can have regional specific terms including floor captain and fire warden. A floor warden can be assigned to an area of a building, a zone in a facility, or a single floor in a building.

A.3.3.24 Transportation Mode.

Transportation modes can include stairways, ramps, sidewalks, elevators, escalators, moving walkways, accessible route devices, and trams.

A.4.1(4)

The qualifications for FLSD should be in accordance with NFPA 1082.

A.4.2

Behaviors in emergencies can be understood as logical attempts to deal with a complex, rapidly changing situation in which minimal information as how to act is available. The effective leadership by the FLSD and the FERT are effective mechanisms for dealing with such complex, rapidly changing situations.

A.4.2.2.2(2)

FERT members should be appointed based on the specific needs of the facility and its occupants. Appointment requirements for the FERT should consider typical staffing of the facility, the specific occupancy, the height of the facility, and occupants.
A.4.2.2.2(7)
The FLSD should consult with their local fire and law enforcement agencies about any local laws or standard operating procedures regarding notifications. Notification of serious injury or death to next of kin should be made by a trained qualified person such as law enforcement officer, medical examiner, or other trained entity.

A.4.2.2.5
It is not the intent of this standard to dictate that the FLSD is responsible for the maintenance of the facility; however, it is vital to the role of the FLSD that he or she has the authority to ensure that the fire protection and life safety systems of the facility are maintained and in proper working condition.

A.4.2.2.6
Depending on the type of incident, the occupant response can include a total evacuation, remain-in-place, in-facility relocation, or partial evacuation (TRIP).

A.4.2.3
This standard does not require a floor warden program. Owners should, in cooperation with the FLSD, consider whether a floor warden program is viable for the facility, or if required by the AHJ.

Where utilized, floor wardens are to perform the duties as assigned and directed to by the FLSD and as detailed in the EAP. At least one floor warden should be assigned to each area, floor, or facility. More than one floor warden could be required if deemed necessary by the FLSD or AHJ due to the facility conditions, area(s) covered, or complexity of the facility or area.

The role of the floor warden is to assist in the movement of occupants during a TRIP strategy initiated by the FLSD. This can include directing occupants to the appropriate exit, emergency assembly area, in-facility relocation area, or other area as directed by the FLSD. The floor warden should notify occupants on appropriate emergency procedures including the use of elevators or other transportation modes. Where there is an evacuation or occupants are instructed to relocate to another area within the facility, the floor warden should check their assigned area to ensure that all occupants have left the area and all procedures detailed in the EAP have been completed.

The floor warden is responsible for accounting for all occupants within their designated area and providing reports to the FLSD as designated in the EAP.

A.4.2.3.2
Another qualified person can include a security guard, housekeeping porter, or other person that has received training for the roles and duties for a floor warden.

A.4.2.3.5(4)
This is not intended to dictate reporting procedures. Reporting procedures should be developed by the FLSD and communicated to floor wardens during training.

A.4.2.4(1)
An employee can include full-time, part-time, temporary, volunteer, or contract workers that are assigned to work in the facility on a regular basis. Orientation on life safety instruction should be developed in coordination with the FLSD to ensure consistent instruction to all facility employees.
The risk assessment should identify potential hazards for the facility and the likelihood and severity of the occurrences. The assessment should include risk of the following hazards:

1. **Geological:** Earthquake, landslide, mudslide, subsidence, tsunami, and volcano

2. **Meteorological:** Drought, extreme temperatures (e.g., hot, cold), famine, flood, flash flood, seiche, tidal surge, geomagnetic storm, lightning, snow, ice, hail, sleet, avalanche, wildland fire, windstorm, tropical cyclone, hurricane, tornado, water spout, dust storm, and sandstorm

3. **Biological:** Food-borne illnesses and infectious/communicable/pandemic diseases

4. **Accidental human-caused:** Building/structure collapse, entrapment, explosion/fire, fuel/resource shortage, hazardous material spill or release, equipment failure, nuclear reactor incident, radiological incident, transportation incident, unavailability of essential employee(s), water control structure failure, and misinformation

5. **Intentional human-caused:** Incendiary fire, bomb threat, demonstrations/civil disturbance/riot/insurrection, discrimination/harassment, disinformation, kidnapping/hostage, acts of war, missing person, cyber security incidents, product defect or contamination, robbery/theft/fraud, strike or labor dispute, suspicious package terrorism, vandalism/sabotage, and workplace/school/university violence

6. **Technological:** Hardware, software, and network connectivity interruption, disruption, or failure, Utility interruption, disruption, or failure

7. **Economic/Financial:** Foreign currency exchange rate change, economic recession, boycott, theft/fraud/malfeasance/impropriety/scandal involving currency, monetary instruments, goods, and intellectual property

8. **Strategic:** Loss of senior executive and failed acquisition/strategic initiative

9. **Humanitarian issues**

The risk assessment should also include any local or regional hazards.

The risk assessment in **NFPA 1600** includes provisions for business continuity for public, private, and nonprofit and nongovernmental entities.

The emergency response plans can be part of the EAP or an annex to the EAP. It is not the intent of this document to create an individual plan for every hazard. A response plan can be applicable for multiple hazards which have similar impacts or outcomes. For EAPs with multiple response plans, the EAP should include a hazard/response matrix.

When an emergency is reported it can either be directly to an emergency response agency or through an internal telecommunication system. The emergency reporting protocol should also include a means to notify the FLSD of the emergency.

Timely and accurate communication with facility occupants during emergencies can help avoid apprehension and reinforce the perceived reliability of the FERT. Causes of false alarms and other system activations should be explained to facility occupants. Information including updates on the emergency and TRIP information should be provided to facility occupants in a timely manner to provide facility occupants adequate time to react to the emergency situation.

The use of non-fire-alarm-system PA systems, telecommunication systems, portable radios, social media, text messaging, mobile applications, or email can all be forms of communication.
A.4.5.2.2

The EAP should include sample messages for different emergencies. The FLSD should assess the need to provide messaging in multiple languages.

A.4.6

Various potential threats to a facility can require best-practice procedures so as not to delay moving people to a safe area. This includes provisions for an effective means of initiating, monitoring, and managing such movement. The four types of movement that should be evaluated in the development of the EAP — total evacuation, remain-in-place, in-facility relocation, and partial evacuation — are referred to by this document as the TRIP strategy for movement.

Where a TRIP strategy is implemented, occupants should be monitored to facilitate effective management of egress capacity, including prioritization of egress for those occupants in the greatest danger. Different parts of the facility can be evacuated in controlled phase sequences, with the original incident area being evacuated first. The FLSD should announce a directive message as to which type of TRIP mode will be used.

A.4.6.1.1

During an emergency, more than one TRIP strategy can be appropriate. Due to the dynamic nature of emergencies, it is not expected that the EAP outline all possible situations, but instead provide general outlines of applicable strategies for a given emergency. For example, in a fire event in a high-rise building, occupants on the fire floor and within a certain number of floors above and below are instructed to evacuate, and occupants in the remainder of the building are instructed to remain-in-place. The TRIP strategy(s) in the EAP should be based on an analysis of the nature of the emergency in which such action could best provide for the safety of the facility occupants and the manner in which that action could best be implemented in the facility.

A.4.6.2(2)

Occupants should be provided with instructions on a timely basis. During a remain-in-place scenario, occupants should be notified at regular intervals as outlined in the EAP.

A.4.6.3(2)(a)

Examples of uses can include office, lobby, or conference room.

A.4.6.3(2)(d)

The area provided per person can be increased based on the specific use of the facility, the demographics of the occupants, or the anticipated duration of the emergency. The use of 3 ft\(^2\) (0.28 m\(^2\)) per person is consistent with requirements in NFPA 101 for the clear floor area for horizontal exits and waiting spaces for assembly occupancies.

A.4.6.4

The EAP should prioritize evacuation from floors or areas of the facility most at risk of harm, and in designation of egress routes, to the avoidance of congestion that would delay the movement of those with priority.

A.4.6.4.1(4)

The identification often includes stairwell designations. Occupants should be provided with timely notification if an egress route becomes inaccessible.

A.4.6.4.2(1)

The safe distance from the facility should be based on factors including the use of the facility; the construction of the facility, the height of the facility, and the nature of the incident.

A.4.7.1

The purpose of meaningful identification is to allow FERT members to be readily identifiable by facility occupants and emergency responders. The use of colored vests with reflective striping is recommended as an effective means for identifying FERT members.
A.4.8.2

It is not always feasible to create individual PEEPs for all visitors to a facility. Therefore, 4.9.2 only requires PEEPs to be created when requested by an occupant such as an employee, contractor, tenant, or resident that regularly uses the facility. Occupants can be unaware that there is a program to provide them with special assistance, therefore it is important to include information about the PEEP program in training, drills, and exercises.

A.4.8.2.5(6)

The purpose of the acknowledgement form(s) is to ensure that the occupant and the assistance monitors are all informed of the specific procedures established in the PEEP.

A.5.1.2.2

The intent of 5.1.2.2 is to identify integrated HVAC systems whose operation could impact life safety during an emergency.

A.5.2.1.2

The ERM is intended to be stored in a location where the FLSD and other FERT members can access all documentation and tools relating to the EAP during an emergency. Locations that could store the ERM can include an office, security desk, sprinkler valve room, or location adjacent to the fire alarm panel. This is not intended to prohibit redundant locations.

A.5.2.2.1(2)

In some jurisdictions this can be referred to as a building information card (BIC). (See NFPA 1620.)

A.5.2.2.2

Electronic transmission of pre-incident/building information cards provides emergency response agencies with critical facility information on their initial response in a timely manner.

A.5.3.2

The assessment should include impact to egress facilities, fire protection systems, other facility systems, and communications.

A.5.3.3

This standard does not prohibit the FLSD from functioning as the FPPM.
A.6.1.1

The type of training, drills, and exercises should be based on the individual facility. There are many factors that can impact the correct training, drills, and exercises, including the type of facility, facility location, and capabilities of occupants. Table A.6.1.1(a) and Table A.6.1.1(b) outline examples for training, drills, and exercises.

Table A.6.1.1(a) FERT Member Training and Exercises

<table>
<thead>
<tr>
<th>Type</th>
<th>Type of Facilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial training</td>
<td>Live instructor-lead, pre-recorded video, online learning programs</td>
</tr>
<tr>
<td>Annual training</td>
<td>Live instructor-lead, pre-recorded video, online learning programs</td>
</tr>
<tr>
<td>Discussion-based exercise</td>
<td>Live, including in-person, video conference, or teleconference</td>
</tr>
</tbody>
</table>

Table A.6.1.1(b) Facility Occupant Drills

<table>
<thead>
<tr>
<th>Type</th>
<th>Type of Facilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional</td>
<td>Live instructor-lead, pre-recorded video, online learning programs</td>
</tr>
<tr>
<td>Means of egress familiarization</td>
<td>Live</td>
</tr>
<tr>
<td>TRIP</td>
<td>Live</td>
</tr>
</tbody>
</table>
A.6.2.1.1

The floor warden training program, including deputy floor warden, should consist of the following information:

1. Procedures for recognizing and reporting hazards that could endanger life both inside and outside the facility, including basic fire dynamics and a history of past dangers from similar facilities
2. Basic exiting procedures highlighting specific evacuation procedures for the applicable area, floor, or facility
3. Information about the facility's fire protection and life safety systems, including fire suppression operations
4. Basic internal communications methods for FERT members and the overall facility, including the incident management system
5. Overview of the EAP, including specific area(s), floor(s), facilities, and the overall site
6. Procedures for identifying different types of emergency responses, including evacuations, in facility relocations or shelter-in-place, as well as challenges associated with each
7. Specific strategies of the emergency response actions for individuals requiring special assistance or requiring additional time to evacuate
8. Method for accountability after a TRIP strategy is implemented
9. Training on use of any specialty equipment necessary for any TRIP strategy
10. Importance of reporting the effectiveness of all drills, problems with implementing drills (e.g., occupants not participating, malfunctioning equipment), and any additional details specific for a particular drill, including the following:
   a. How long does it take to implement the TRIP strategy?
   b. Can the alarm notify all occupants within the facility?
   c. Have there been recent alterations or changes to the route or work activity?

This program can vary in duration to the participants and delivered through different visual methods. Depending on the ease or complexity of the facility and time necessary to appropriately train personnel, it is recommended that this training program be not less than a minimum of 2 hours for the initial training. On an annual basis, a retraining program of not less than 1 hour should be utilized. The program should be reviewed annually to determine modifications are necessary. Where required, the AHJ should be made aware of any modifications.

A.6.2.1.2

Training can include discussion-based exercises and situational training exercises.

A.6.2.1.2(3)

Each member of the FERT should be aware of the roles and responsibilities for other persons and entities of the FERT.

A.6.2.3.1

Interactive training should be the primary method of training. The training facilitation should be based on the individual facility. There are many factors that can impact the most effective facilitation including the type of facility, facility location, and capabilities of occupants.
A.6.3.1

FEMA's Independent Study 120.c and DHS's *Homeland Security Exercise and Evaluation Program*, "Unit 2: Exercise Program Management," are resources that can be used during the planning and conducting of discussion-based exercises.

A discussion-based exercise should follow the following format:

1. A narrative should be read that sets the stage for the imaginary disaster.
2. The facilitator should stimulate the discussion by one or both of the following approaches:
   a. Problem statement to various participants, either individually or by agency
   b. Simulated messages, which are more specific than problem statements
3. Participants should then discuss the action they might take in response to the problem statement or simulated message. In either instance, introduction of the problem should generate a discussion that focuses on roles, plans and coordination, and the effects of the incident on other agencies.
4. Following the conclusion of the discussion relating to imaginary disasters, the participants should discuss if the EAP currently adequately addresses the response.

A.6.3.3.1

Live can include in-person, video conference, or teleconference.

A.6.3.4.2

Discussion-based exercises should be held in an informal, stress-free environment with limited distractions to help elicit constructive discussion as participants examine and resolve problems. The use of maps, charts, and packets of materials can enhance the exercise.

A.6.4

The purpose of drills and exercises is to instill in the minds of all occupants, including the FERT, the correct procedures necessary to ensure safety of life and the joint testing of facility emergency systems and staff duties. NFPA 101 has varying requirements for drills for each occupancy type, therefore, the occupancy classification of the facility can affect the type of drills as well as the familiarity of the facility to occupants.

A.6.4.2.1

Facility occupants includes both regular occupants and visitors.

A.6.4.2.2

Occupants exempt from drills can include persons with disabilities or persons considered critical to facility operations.

A.6.4.2.3

During this instructional exercise occupants should be given the opportunity to generate, update, or review a PEEP.

A.6.4.3.3

Health care occupancies are an example of facilities which might have shift workers.

A.6.4.3.6

This allows the FLSD to choose the most effective and efficient time for a drill. For example, it is not the intent of this section to require a drill in assembly occupancy during a time that the facility is open to the public.

A.6.4.4.1

Instructional drills should serve to familiarize facility occupants with the requirements and procedures of the EAP.
A.6.4.4.2

Means of egress familiarization drills should serve to familiarize facility occupants with the process of all TRIP strategies outlined in Chapter 4, as applicable. It should include an explanation of the types of emergencies in which this strategy would be employed.

A.6.4.4.2.2.4

The intent of 6.4.4.2.2.4 is not the test the communications equipment per the requirements of NFPA 72, but to test the functionality of the equipment and the ability for facility occupants to utilize the equipment. An example of other safety equipment is a stair travel device.

A.6.4.4.3.1.1

Given a specific scenario, all occupants might be asked to leave the facility, or different groups of occupants might be asked to remain in place, relocate to another part of the facility, or leave the facility. The decision about which occupants should be assigned which TRIP strategy should anticipate the actions most likely to keep people separated from the hazard. Keeping occupants separated from hazards necessarily depends on the type of hazard, its location, and how it might develop as the emergency progresses. For example, during a fire, smoke is the hazard most likely to result in loss of life, and as a fire develops, convection can cause the smoke to move upward and the facility’s ventilation system might cause the smoke to travel to relatively remote locations. However, fire-rated barriers, enclosing exits, and smoke detectors and dampers in ventilation systems can mitigate the travel of the smoke. For these reasons, the actions taken during an exercise and/or drill should vary depending on the location of the fire and means by which the facility can mitigate the effects of the fire.

As another example, the secondary hazards posed by an earthquake depend on the locations of the hazard and how capable the structure is in mitigating the hazards. A risk assessment might identify structural failure as the primary hazard in an unreinforced masonry building during an earthquake, and a total building evacuation might be the safest strategy. But in a tall building that is more resilient to structural failure given the maximum likely earthquake intensity, the greatest hazard might be identified as falling debris, and occupants should be advised to take cover inside the building.

A.6.4.4.3.1.3

Means of communication with drill participants can include direct instruction from the FLSD, instruction from FERT members, or notification from a facility communication system. The type of communication for each drill can be dependent upon multiple criteria, including the scenario and available facility communication systems. The FLSD should determine the most appropriate type of communication.

A.6.4.5.2

The FLSD should also consider notifying local emergency response agencies.

A.6.4.5.3

The owners of neighboring facilities should notify the occupants of their facility about the drill so as to prevent the evacuation drill from causing alarm or concern.

A.6.5.2

FERT members should be capable of demonstrating knowledge, skill, and ability of the facility, including all equipment necessary to complete their duties. Practical assessments can be used to evaluate the ability for FERT members to navigate the facility and operate any equipment necessary to conduct their duties as designated in the EAP.

A.6.6.3(4)

Prior to the training, drill, or exercise the FLSD should determine the metrics for evaluations and expected outcome. After the training, drill, or exercise the FLSD should compare the actual results with their original expected outcome.
A.6.6.3(5)

Examples of corrective actions can include the following:

1. Additional training for FERT members or facility occupants
2. Revision to training, drills, or exercise procedures or methods
3. Revisions to the EAP
4. Revisions to emergency reporting or communication
5. Modifications to the facility

A.7.1.3

A revision indicator can include an alpha-numeric identification or a date.

Annex B  Informational References

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1  Referenced Publications.

The documents or portions thereof listed in this annex are referenced within informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

B.1.1  NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471. www.nfpa.org


B.1.2  Other Publications.

B.1.2.1  FEMA Publications.

Fire Equipment Manufacturers Association, Inc., 1300 Sumner Avenue, Cleveland, OH 44115-2851. www.femalifesafety.org

FEMA's Independent Study 120.c, "An Introduction to Exercises," 2018.

B.1.2.2  US Government Publications.


B.2  Informational References. (Reserved)

B.3  References for Extracts in Informational Sections. (Reserved)
**New Project Initiation Form**
(To be completed by proponent of new project/document)
*Additional pages may be attached if necessary.*

<table>
<thead>
<tr>
<th>a.</th>
<th>Explain the Scope of the new project/document:</th>
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<tbody>
<tr>
<td></td>
<td>Create a standalone NFPA code for the establishment of a minimum construction standard for Food Producing Vehicles that are considered necessary to provide protection from loss of life, illness, or injury, from fire, explosion or exposure. This project shall take the place of all existing taskforces currently working separately and independently for the development or update of information for NFPA 1, 58 &amp; 54, 96, and any other code source in development of “Food Truck” expectations / requirements.</td>
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<th>b.</th>
<th>Provide an explanation and any evidence of the need for the new project/document:</th>
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<tbody>
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<td></td>
<td>As all food trucks have inherent differences from typical vapor distributions systems, trying to fit the food producing vehicle standard into NFPA 58 and 54 does not make sense. Nor, based on all the nuances present within a food producing vehicle does it make sense to split the requirements between multiple code standards. Similarly to the methodology that went into NFPA 1192, an all-encompassing standalone construction standard is warranted to address all expectations, inclusive of propane, cooking equipment, ventilation, power generation, wiring, piping, fire protection, storage, refrigeration, climate control, access and egress, fresh water, gray water, sanitation, gas leak detection, container placement, and likely countless others.</td>
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<td>Recognizing that there are already several groups working in support of adding a standard to multiple separate code pamphlets, it is conceivable they are working in opposition or at least independently towards the common objective. Following a recent review of the 2018 International Fire Code requirements for Food Producing Vehicles there are a vast number of inconsistencies that exist between this and other recognized and generally accepted good engineering practices. An effective process to eliminate potential redundancy, or code creep would be to develop a uniform taskforce consisting of members from all of the different code committees to establish one standard for food trucks, independent from the existing codes.</td>
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<td>Using a subsection of those responsible for the 5 code standards mentioned previously and likely others, chapters could be written for each food producing vehicle construction component / system, establishing clear guidelines for critical fire, life safety and health standards and expectations.</td>
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<td>Based on the lack of a single uniform standard for the construction of Food Producing Vehicles to date, varying and contradictory regulations have been published by local jurisdictions, as well as within the separate code sectors, as everyone scrambles to create something in the absence of any clear leader taking control. This reactionary process that has been forced on “standard creating bodies” and will continue to perpetuate until someone uniformly takes control.</td>
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<td>Through the creation of one Technical Standards Committee focused on creating an independent construction standard for food trucks in the spirit of NFPA 1192, leveraging the knowledge of all aspects of the life, health, safety, and construction needs for food producing vehicle development and operation, a uniform expectation can be developed, communicated, and implemented</td>
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<td>Food Producing Vehicle season across much of the country will be starting shortly and in a post COVID-19 world restaurateurs worldwide are being forced to reconsider how to deliver meals to people while social distancing. This could result in a large number of restaurant owners removing cooking equipment from their restaurants and setting up mobile kitchens, knowing that there is no value in reopening with half occupancy in high rent areas. In my opinion we are well behind where we need to be based on the likely result of this pandemic.</td>
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<th>c.</th>
<th>Identify intended users of the new project/document:</th>
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<tbody>
<tr>
<td></td>
<td>Fire Code Officials; Department of Licenses and Inspections; Food Producing Vehicle Builders; Food Producing Vehicle Operators; Mobile Food Producing Equipment, Appliance, and Component Manufacturers; Vehicle / Trailer Manufacturers; Health Inspectors; Fire Departments; Insurance Companies, Event Coordinators, LPG Suppliers, Code Sectors, Legislative Bodies, and Authorities Having Jurisdiction (at large).</td>
</tr>
</tbody>
</table>

| d. | Identify individuals, groups and organizations that should review and provide input on the need for the proposed new project/document; and provide contact information for these groups: |
Identify individuals, groups and organizations that will be or could be affected, either directly or indirectly, by the proposed new project/document, and what benefit they will receive by having this new document available:

Food Producing Vehicle Manufacturers; Fire Code Officials; Food and Drug Administration; Food Producing Vehicle Associations; Industry Trade Associations; Component Manufacturers; Department of Health Officials; Members of NFPA 1, 54, 58, & 96 Technical Committees, Authorities Having Jurisdiction, Support Industry Partners, Insurance Companies, and Mechanical Inspectors

Identify other related documents and projects on the subject both within NFPA and external to NFPA:

NFPA 1, 54, 58, 96, 1192, ICC 2018 International Fire Code, and FDA Food Code 2017

Identify the technical expertise and interest necessary to develop the project/document, and if the committee membership currently contains this expertise and interest:

Food Producing Vehicle Manufacturers; Fire Code Officials; Food and Drug Administration; Food Producing Vehicle Associations; Industry Trade Associations; Component Manufacturers; Department of Health Officials; Members of NFPA 1, 54, 58, & 96 Technical Committees, Authorities Having Jurisdiction, Support Industry Partners, Insurance Companies, and Mechanical Inspectors

Provide an estimate on the amount of time needed to develop the new project/document:

This project needs to be expedited with a projected delivery date of no later than January of 2021.

Comment on the availability of data and other information that exists or would be needed to substantiate the technical requirements and other provisions of the proposed new project/document:

NFPA 1, 54, 58, 96, 1192, ICC 2018 International Fire Code, and FDA Food Code 2017

Please send your request to:
NFPA
Codes and Standards Administration
1 Batterymarch Park
Quincy, MA 02169
Stds_admin@nfpa.org
Rev. 6/16

Signature: __________________________
Name: Christopher J Wagner
Email: Christopher.Wagner@amerigas.com
Affiliation: AmeriGas Propane L.P.
Review of research technical report “Evaluation of Sprinkler Fire Protection of Retail Sales of Consumer Fireworks” prepared and published by FM Global in June 2019

Panel members: FPRF project (2011) on “Sprinkler Protection Criteria for Consumer Fireworks Storage in Retail Facilities Concept Test Plan”

Review Feedback 1: Rich Pehrson
Thanks for sending out this updated information on sprinkler protection for consumer fireworks. Here are my comments:

Determination of worst-case commodity configuration for fire testing
A single commodity configuration was used for the fire testing, so I don’t have a feel if the FM Global tests have captured the reasonable worst-case configuration of fireworks, spacing, storage arrangement, etc. The single type of fountain device used for the FM Global tests had a high energy density, but we don’t know if they are representative of the worst-case commodity configuration from a sprinkler testing perspective. No projectile launching products were tested, nor was a mix of fireworks and ordinary commodities tested. Finally, no projectile launching, and spark spread investigation appears to be included as recommended in the Aon report. In short, we still don’t have a study that has determined the reasonable worst-case configurations necessary to use for fire sprinkler testing.

Determination of appropriate sprinkler configuration(s) for fire testing
The FM testing was limited to Gondola type shelves, thus would not be directly applicable to palletized or rack storage. Excess fire spread down the length of a gondola shelf has yet to be addressed and would be an issue for actual real-world configurations.

Excess sprinkler operation during testing
More importantly, excess sprinkler openings occurred in both tests – confirming that the tested sprinkler protection is not providing meaningful fire control. The speed at which 20-30+ sprinklers operated (under 3 minutes) in both tests is also concerning. A critical question is how would a system with larger orifice sprinklers perform having more than 30 sprinkler open? Again, the FM Global testing confirms what we already knew about the inability of ordinary sprinkler configurations to limit fire growth and development in retail fireworks configurations. No guidance is currently possible for fire sprinkler design areas in larger buildings – especially with higher density configurations.

No evaluation of remote ignition
We still don’t have any study or research on the issue of remote ignition – especially for scenarios such as fireworks sales in big box stores.
Review Feedback 2: Ken Isman

Having been embroiled in the discussion for about 20 years, I would say that there were no surprises in the results of the FM tests. I went back and read the 2011 FPRF report assembled by AON and compared it to the FM tests. The only difference that I noticed was the fact that in the FPRF report, we recommended quick response sprinklers and in the FM tests, they used standard response sprinklers. I don't think that this would have changed much about the fire test results. We originally recommended quick response sprinklers because we thought that was how the sprinklers would have a best chance of controlling the fire. The FM tests show that the standard response sprinklers opened pretty quickly but could not control the number of sprinklers that opened (probably due to the shielding of water spray onto the burning surfaces due to the gondola shelves). So, I doubt that a switch to quick response would have changed the outcome and I can understand why FM wanted to test standard response sprinklers.

It would be extremely difficult to develop protection criteria for sprinkler systems given the results of the two tests by FM. All we could do is require the room design method, which is going to be prohibitively expensive for most building owners. This might provide some advantage for small stores with solid walls to limit the number of sprinklers that open, but for the vast majority of retailers that include fireworks in their stores, the room design method will not work as a design approach.

Based on the FM work, I cannot conclude that OH2 or EH1 protection criteria is appropriate for retail sales of fireworks.

Review Feedback 3: Ed Kaminski

Attached as pdf.

Review Feedback 4: Garner A. Palenske

I have reviewed the information as requested. I would like to applaud FM Global for their efforts to resolve this important issue. Following are my thoughts:

The goal of this review was to clarify whether the tests performed by FM Global are consistent with the test plan previously developed by the Research Foundation in 2011.

Test Evaluation Criteria (for reference during the discussion): The following criteria was used for the FM Global tests:

1. Fire spread to the extent of the array
2. Gas temperatures near-ceiling-level maintained at high-levels for a time judged to endanger exposed structural steel
3. Operation of ceiling-level sprinklers on the perimeter of the ceiling and /or unreasonably high water demand.

Commodity selection: The presence of aerial products complicates fire testing of consumer fireworks. When we wrote the test plan in 2011 (Aon Test Plan) the problem was addressed by first testing the highest heat release rate product, and then aerial products separately. The FM Global test series only considered the highest energy products and did not include aerial devices because it was assumed the aerial devices would be confined and also because the testing of the aerial products would create test to test variability. NFPA 1125, Section 7.3.15.5 states that aerial devices shall be packaged and displayed in a manner that will limit travel distance of the products should ignition occur. Application of this requirement can create hardship in merchandising, because it hinders customer access to the product,
such as the cages used for spray paint cans. The application of this in the field is questionable. Ignoring aerial products would greatly affect the results of the fire testing. If the aerial products were not confined, the rocketing of the aerial products could result in increased fire damage beyond the ignition array, which would violate one of the pass/fail criteria.

Sprinkler System Parameters: The FM Global tests used standard response, 5.6 K-Factor, 165 °F rated pendant sprinklers. The Test 1 design density (water flux) was 0.20 gpm/ft² which is appropriate given retail occupancy (Ordinary Hazard Group 2) based upon NFPA 13 requirements. The Test 2 design density (water flux) was 0.30 gpm/ft² which reflects Extra Hazard Group 2 protection. The Aon Test Plan proposed the use of quick response, 5.6 K-Factor, 165 °F rated pendant sprinklers. Quick response sprinklers were proposed due to their common place application in retail occupancies and preferred earlier activation. The Aon Test Plan did not include a sprinkler design parameter; however, the use of Ordinary Hazard Group 2 design parameters is appropriate.

Passive Protection: The FM Global Tests provided fire breaks in both the transverse and longitudinal directions as required by NFPA 1124 (2013 edition). In addition, the back of Side C was sheathed with 3/8-inch gypsum board to simulate the presence of an interior wall. The Aon Test Plan did not include flame breaks or the gypsum board sheathing, standard gondola arrays were proposed.

Test results: The results of Test 1 show the fire traveled to the end of ignition array, Side A, and jumped across the aisle to Side C. The gypsum board likely stopped the propagation of the fire through the backside of Side C. This result begs the question of what would have happened without the gypsum board? It is common for racks pushed against walls to have some standoff space between the wall and the commodity to prevent forklift damage when products are loaded or unloaded. There would then be an air gap between the back of the array and the wall. Same comment on the results of Test 2.

In Test 1, 35 of the 36 sprinklers activated. In Test 2, 36 of the 36 sprinklers activated. This result shows that the sprinkler did not control the fire. They did likely provide cooling for the structural system and the storage array, however. The flame breaks slowed the propagation of the fire. The capacity of the water delivery system was exceeded in Test 1. This compromised the performance of the sprinkler system.

In summary, the tests completed were not consistent with the Aon Test Plan, as discussed below:

1. The testing doesn’t address the effect aerial products would have on the fire. The inclusion of aerial products would likely change the outcome of the tests substantially. This is an important variable which was included in the Aon Test Plan.
2. The gypsum board on the back of the Side C of the array slows the horizontal propagation of the fire. Removal of the gypsum board could affect test outcome, resulting in excessive fire spread. Also, this may not accurately reflect real life conditions.
3. The use of standard response sprinklers slowed the response of the sprinklers which increased early fire growth.
4. The results show that the sprinklers did not control the fire. They did likely provide cooling for the structural system and the storage array, however.
5. The use of fire breaks in the array was not included in the Aon Test Plan but seem appropriate given the NFPA 1235 requirements (not inducing the backside gypsum board).
6. Drawing conclusions from the results of Test 1 is challenging due to the compromising of the water delivery system. Standard protocol would require the test to be repeated with the water supply issue resolved.
7. Opening all the sprinklers in the test compartment is problematic. As the report notes, using this as a design parameter would lead to very large operating areas which could result in very large sprinkler piping or the installation of fire pumps.

**Review Feedback 5: Daniel O’Connor**

The following are items comparing the Aon FPE Concept Test Plan Report to the FM test results.

- The locations surveyed in the Aon FPE effort noted that products were displayed in cardboard and/or plastic. The testing utilized cartoned commodities which may have overcompensated for the impact/benefit of pre-wetting. Comparison of the type of cardboard utilized in the packaging of the fireworks versus the testing array should also be explored as it appears from the Aon FPE Concept Test Plan surveys that a thinner type of cardboard with a plastic wrapping or encapsulation was common. A thinner cardboard would have less water retention and provide less cellulose material between the firework product. The plastic covering on the packages also limits the pre-wetting.

- The testing program does not include the impact that aerial products would have on the fire which could drastically change the outcome of the tests, which were already shown to be challenging. The Aon FPE Concept Test Plan recommends doing both with and without aerials to understand the potential impact. As summarized in the Aon FPE report; the Battelle tests showed that projectile behavior was common in all of the tests and the SwRi tests also showed that without mesh caging around aerials fireworks were injected between aisles and launched outside of the immediate fire area. Not considering the aerials omits an important component, that was common in both previous test series, and may result in requiring measures to limit aerial sales or how they are displayed, such as wire cages.

- While the fountain sparklers were arguably the product with the highest energy release potential, fountains were noted to be the 6th most common item as reported by the Aon FPE Concept Test Plan. The Aon FPE report noted that the quantity of products from greatest to least were: cakes, mine/shell devices, assortments, aerial shell kits, roman candles, fountains sparklers/dipped sticks, other, and novelties. The Aon FPE Concept Test Plan proposed bench scale testing to determine the worst-case commodity mixture, which would have validated the use of the fountain sparklers.

- The challenge with the fire sprinkler system for one of the tests in addition to changing multiple variables with both the ceiling height and fire sprinkler causes comparisons challenges. The prior test series were also at ceiling heights under 17 feet. Extra-Hazard 1 at the ceiling height of 16 feet would provide a insight to the impact of increases fire sprinkler density.
Ms. Kimball:

This is my review of Evaluation of Sprinkler Fire Protection of Retail Sales of Consumer Fireworks report dated June 2019 by FM Global.

Consumer fireworks present an unusual hazard due to their varied compositions and this is compounded by the multitude of possible storage arrangements and characteristics of the building envelope and suppression systems. The objectives were to establish criteria for sprinkler protection to be included in revised editions of NFPA 1124. That said, a subsequent study to extrapolate the combination of storage arrangement, building characteristics and suppression system design is indicated.

**Concept Test Plan:**

Aon Fire Protection Engineering Corporation was contracted to assist in the development of the test plan. Their findings and recommendations are given in the Fire Protection Research Foundation Report of September 9, 2011 entitled Sprinkler Protection Criteria for Consumer Fireworks Storage on Retail Facilities. Not all the recommended aspects of testing were included in the actual tests or emphasized in the FM Global test report. Including:

It’s noted that the Battelle test were done in an enclosed room. From a sketch on page 29 of the report, one can see that the FM Global tests were also conducted in an enclosed room. This should be emphasized since testing within an enclose space with a degree of confinement is very different than testing under a floating suspended ceiling.

Aon recommended using aerial devices in the testing as well as items such as the fountain devices selected. The brief explanation for limiting the commodity to fountains was for the sake of reproducibility. The fact that aerials will have an unpredictable trajectory increases the hazard and could cause ignitions remote from the area of origin including above the sprinklers. The product selected for testing had a report (deflagration producing noise). A pressure wave and/or projectile that could lift ceiling tiles or breach a gypsum board ceiling was not tested. Retail stores are not
limited to NFPA 220 (000)N (IBC Type IIB) construction. The object of the testing should have been to arrive at protection criteria for a wide range of new and existing retail stores.

Fire scenarios are complex and knowing if the consumer fireworks will set-up a pressure differential that could crack windows or glass entry doors would be good information. This would obviously affect the fire ventilation and be a concern to responding firefighters.

The Aon report recommended using quick response sprinklers while standard response sprinklers were used. The departure from the recommendation was not addressed. The times to first sprinkler operation were 00:57 and 01:28 for tests 1 and 2 respectively. QR’s would likely have operated in half the time. The results of earlier operation can be postulated as either operation of all sprinklers earlier or operation of less sprinklers due to faster water delivery. The outcome can only be proven by tests. The FM Global report summary notes that one is not able to arrive at a design area of application since all sprinklers operated. This issue is further complicated since even more sprinklers could activate if QR’s are used.

The Aon report recommends twelve calorimeter fuel package tests. There was no rationale given for omitting these tests.


The Executive Summary of the FM Global report states that the test design was based on the 2011 Aon report while the actual tests are substantially different from the test concept summary.

Page ii first paragraph: It is noted that “The potential for remote ignition caused by aerial devices was not addressed in this study since the aerials should be contained.” This does not agree with the Aon recommended Test Concept Summary and may not reflect actual retail store conditions. Also, the aerial devices can have secondary breaks after depletion of the lift charge and emit uncontrolled ignition sources. There are other products that have “reports.” Pallet arrangements are not prohibited in retail stores and these don’t lend themselves to containment of aerial devices.

Page ii third paragraph: “The test results showed that the protection can maintain acceptable flame spread and limit ceiling-level steel temperatures to values that would threaten structural integrity.” The interior finish including the ceiling material of the test room is not defined. A flame spread and exposure to other items is not addressed. Retail stores will not always have steel supported roof systems. Ignition above sprinklers is possible.

Page iii second to last sentence: “This approach is achievable for locations with relatively small floor areas (e.g., up to 465 m² (5,000 ft²)) but may be impractical for larger areas.” There is no clear direction of a design area of application. Also, from the sketch on page 29 the test room measured 63.5 by 63.5 feet = 4,032 ft². How do we get to 5,000 ft²?

Page iii last sentence: “If the demand area cannot be equal to the floor area, then it seems reasonable to limit the energy density such that it is in line used in previous testing.” This calls for an
extrapolation of the previous test results. The calorimeter tests that were apparently skipped would provide additional data that could be considered.

Page 35: “The water delivery system was overtaxed and the water pressure dropped below the target value of 0.9 bar (12.8 psig) at 01:58 reaching the a minimum value of (5.6 psig) at 02.:53.” This shows that the sprinkler system was overtaxed and required a manual intervention to establish the required flow and pressure. This does not reflect sprinkler response using a typical municipal water supply.

Page 35: “The water system was supplemented and pressure was gradually increased and was maintained within +/- 15% of the target pressure between 07:40 and 31:10. It is not possible to conclude if maintaining the target pressure would have resulted in fewer sprinkler operations.” As stated, supplementing the water supply during the test does not lend itself to real world installations. A variance of +/- 15% is significant and therefore the using the test establish a standard for a large population of retail stores with varied water supplies would not be responsible. The reduced water delivery had a duration of up to six minutes.

Summary:

The tests plan recommended in the September 9, 2011 Concept Test Plan was not followed or completed within the tests reported in Evaluation of Sprinkler Fire Protection of Retail Sales of Consumer Fireworks, June 2019.

The tests results do not establish:

Sprinkler protection with current typically installed sprinklers with a municipal water supply. Standard response sprinklers are not typically supplied and represent a minority of the type of sprinklers produced. They are typically a special-order item. A steady water supply is not guaranteed in all locations and a fire pump is not typically provided for single story retail buildings with ceiling heights on the order of 16 feet.

Since all or nearly all sprinklers operated in both tests, the design area of application is not established.

The product selected for testing is not representative of typical stock and the effects of devices with “reports” was not evaluated.

The loss of water supply during a test did not produce a test result that can be representative of a municipal water supply without a fire pump.

The impact of the various types of construction and interior finish is not addressed.