AGENDA

NEC Code-Making Panel 1

First Draft Meeting

January 19-24, 2015

Hilton Head, SC

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Subject</th>
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<tr>
<td>15-1-1</td>
<td>Call to Order</td>
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<tr>
<td>15-1-2</td>
<td>Introduction of Members and Guests</td>
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<td>15-1-3</td>
<td>Approval of A2013 ROC Meeting Minutes</td>
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<tr>
<td>15-1-4</td>
<td>Review of Meeting Procedures and Revision Schedule</td>
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<td>15-1-5</td>
<td>Comments/Questions from Committee Members</td>
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<td>15-1-6</td>
<td>Task Group Reports</td>
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<td>15-1-7</td>
<td>Processing of Public Inputs</td>
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<tr>
<td>15-1-8</td>
<td>Fire Protection Research Foundation Requests</td>
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<td>15-1-9</td>
<td>Old Business</td>
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<td>15-1-10</td>
<td>New Business</td>
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<tr>
<td>15-1-11</td>
<td>Adjournment</td>
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NEC Code-Making Panel 1 ROC Meeting Minutes

1. List date(s) and location of meeting:
   11/28-29, 2012, Crowne Plaza Resort, Redondo Beach, CA

2. List names of guests in attendance:
   See Attachment.

3. List names of guests addressing the Panel, the subject of their address, and the length of time they spoke:
   Mr. John Loud of Exponent, Inc representing Joseph Harding, Technical Director, Portable Generator Manufacturers Association.
   Comment 1-22.
   15 Minutes

   James Jongkind, American Honda Motor Co., Inc., Manager, Product Regulations & Safety
   Comment 1-23.
   5 Minutes

   Vincent J. Saporita, Copper Bussman,
   Comment 1-66
   2 Minutes

4. Number of Proposals or Comments acted upon:
   114

5. Number of Panel Generated Proposals or Comments:
   None

6. Appointments of any Task Groups that will be working on any Panel subject, subsequent to the Panel Meeting, along with the names of members of the Task Group(s):
   N/A

7. List any request contained in a Panel Statement that requires Technical Correlating Committee attention:

   Comments 1-11, 1-12, 1-31, 1-84, 1-92, 1-97, 1-98 and 1-106. These Comments relate to proposals and comments received to change the voltage range from 600 Volts to 1000 Volts. CMP-1 was one of two Panels to reject all proposals and comments related to this topic. CMP-1 was concerned that technical substantiation was needed to make changes that impact working spaces and marking requirements in Article 110. The substantiation required by CMP-1 will require research and perhaps the Research Foundation could provide the resources to obtain the substantiation.

   Comment 1-108 is also related to the topic above (600 Volts/1000 Volts). The voltage boundary in 110 is 600 Volts and CMP-9 has accepted Proposal 9-28, which changed the voltage boundary in 314 to 1000 Volts. The voltage span in 110.74(B) is included in both 314.28 and 314.71. The panel requests the Correlating Committee review these items for correlation with Panel 9.

   Comment 1-24 – An extensive discussion was held regarding the use of portable generators that are used to supply cord and plug utilization equipment, such as hand tools that are supplied by receptacles that are part of the generator and the equipment is never connected to any part of the premises wiring. This topic of "Premises Wiring" and the use of portable
generators impacts CMP-1, -5, and -13 and may be an issue that could be further investigated by a Task Group.

Comments 1-46, 1-73, 1-74, 1-75, 1-79, 1-80, 1-81 and 1-82. These comments relate to proposal 1-131, which would have resulted in a general requirement that GFCI and AFCI receptacles be readily accessible. CMP-1 accepted Proposal 1-131 and sent this to CMP-2, 3, 18, and 19 and all recommended that CMP-1 reverse the action they took on Proposal 1-131. CMP-1 accepted these Comments to reject the proposal, which may need correlation with CMP-2, 3, 18, and 19. Also, Comment 1-109 was a similar topic regarding accessibility of GFCI receptacles on rooftops. The action on these comments deleted the proposed section in Article 110 and does not impact the actions taken by Panel 2 in Proposal 2-52.

Comments 1-60, 1-61 and 1-62. These comments concern proposal 1-114 and address marking requirement, which may need correlation with CMP-14 and others.

9. List any Proposals or Comments that should be referred to the Toxicity Advisory Committee:
   N/A

10. List any Proposals or Comments that should be referred to the Environmental Advisory Committee:
    N/A

11. List all Proposals or Comments related to combustibles in plenums or other air handling spaces:
    N/A

12. List any general Panel requests for information or assistance from the Technical Correlating Committee:
    N/A

13. List any additional information that you feel would be helpful to the Technical Correlating Committee, staff, or to the process in general:
    N/A

14. Were any units of measure "Accepted" by the panel that are not listed in Annex C of the NEC Style Manual? If so, please list the section number(s) and proposal/comment number(s) below.
    N/A
### Panel 1 - 250 PI's

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THE FOLLOWING PUBLIC INPUTS (PIs) HAVE BEEN ASSIGNED TO MULTIPLE PANELS.

THESE PUBLIC INPUTS MUST BE RESOLVED (A RESPONSE PROVIDED TO EACH) ON PAPER BY THE PANEL AT THE MEETING. NFPA STAFF WILL COLLECT EACH PANEL’S RESPONSE AND COMPILE THEM OFF-LINE TO FORM ONE RESPONSE.

IF THE PANEL CHOSES TO CREATE AN FIRST REVISION BASED ON THE PI, THAT ACTION WILL BE DONE IN TERRA AT THE MEETING.
Change "physical damage" to "mechanical damage"

Statement of Problem and Substantiation for Public Input

The term "physical damage" is often a source of confusion. One of the points of confusion is what is included in "physical damage"; for example, is exposure to corrosive gas included? I believe other language in the code covers that type of situation, and "mechanical damage" more clearly reflects the intent of the requirements in the NEC that currently refer to "physical damage".

Submitter Information Verification

Submitter Full Name: Christel Hunter
Organization: General Cable
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Mon Sep 22 20:02:13 EDT 2014

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<tbody>
<tr>
<td>300 volts</td>
<td>300 actual volts</td>
</tr>
<tr>
<td>300 Volts</td>
<td>300 Actual Volts</td>
</tr>
<tr>
<td>300-volts</td>
<td>300-actual-volts</td>
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<td>300-Actual-Volts</td>
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<tbody>
<tr>
<td>2000 volts</td>
<td>2000 actual volts</td>
</tr>
<tr>
<td>2000 Volts</td>
<td>2000 Actual Volts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Search for</th>
<th>Replace with</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001 volts</td>
<td>2001 actual volts</td>
</tr>
<tr>
<td>2001 Volts</td>
<td>2001 Actual Volts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Search for</th>
<th>Replace with</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000 volts</td>
<td>5000 actual volts</td>
</tr>
<tr>
<td>5000 Volts</td>
<td>5000 Actual Volts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Search for</th>
<th>Replace with</th>
</tr>
</thead>
<tbody>
<tr>
<td>35,000 volts</td>
<td>35,000 actual volts</td>
</tr>
<tr>
<td>35,000 Volts</td>
<td>35,000 Actual Volts</td>
</tr>
<tr>
<td>35,000 V</td>
<td>35,000 Actual V</td>
</tr>
</tbody>
</table>

These search and replace operations will pick up all references to the listed voltages, all of which are actual rather than nominal values.

### Statement of Problem and Substantiation for Public Input

This section uses voltages that are "actual" hard limits. Refer to the substantiation for 1902 for more information.

### Related Public Inputs for This Document
Related Input
Public Input No. 1902-NFPA 70-2014 [Global Input]

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
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State:
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Submittal Date: Wed Oct 15 19:51:34 EDT 2014

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Public Input No. 3478-NFPA 70-2014 [ Global Input ]

for "provided that the" read "if the"
for "provided that it" read "if it"
for "provided that all" read "if all"
for "provided that such" read "if the"

Statement of Problem and Substantiation for Public Input

NEC_StyleManual_2011.pdf: 3.3.4 Word Clarity. Words and terms used in the NEC shall be specific and clear in meaning, and shall avoid jargon, trade terminology, industry-specific terms, or colloquial language that is difficult to understand. NEC language shall be brief, clear, and emphatic. The following are examples of old-fashioned expressions and word uses that shall not be permitted: "provided that"

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
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Submittal Date: Tue Nov 04 10:33:19 EST 2014

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Public Input No. 3681-NFPA 70-2014 [ Global Input ]

Change the use of the phrase "60 V DC" to "Nominal 50V DC" throughout the NFPA 70 Standard.

Statement of Problem and Substantiation for Public Input

The NEC is conflicted in its use of the terminology which defines the DC voltage level on when certain code rules apply. It would appear that half of the NEC code sections refer to 60V dc as the voltage limit which mandates certain code requirements. And it would appear the other half refers to "50V DC". The code should be consistent in its approach. This public input seeks to resolve this conflict and come up with consistent terminology throughout the code.

In 110.26(A)(1)(b) working space requirements are for 60V DC.
250.162 refers to 60V DC for grounding requirements for DC systems.
393.6 refers to listing requirements for certain DC equipment at 60V.
620.5(D) refers to elevator requirements for uninsulated parts at no more than 60V DC.
Article 640 and 647 have similar DC voltage limits.

For the 50 volt level guarding of live parts in 110.27 refers to both AC and DC systems.
220.7 refers to marking of conductors at 50 volts or less regardless of voltage type.
Article 720 refers to systems at 50 volts or less whether DC or AC.
210.5(C)(2) refers to marking of conductors for DC systems 50V or less
215.12(C)(2) refers to identification of DC feeder conductors at 50V or less.
Section 480.5 states that overcurrent protection shall not be required for conductors from a battery with a nominal voltage of 50 volts or less.
690.71 refers to DC storage batteries that operate at a voltage of 50 volts, nominal or less.

There are many other codes sections not mentioned which vary back and forth between 50 and 60V. The code is not consistent. I am recommending that globally the term 60V DC be replaced with 50V nominal DC.

Submitter Information Verification

Submitter Full Name: Lawrence Ayer
Organization: Biz Com Electric, Inc.
Affiliation: Independent Electrical Contractors, Inc.
Street Address:
City:
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Submittal Date: Tue Nov 04 21:18:12 EST 2014

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Move all definitions to Article 100.

It seems that every cycle definitions are moved from a .2 section within an Article to Article 100 because someone points out that the particular term is used in more than one Article. For NEC users, especially new ones it makes understanding the rules that much more difficult.

We also have examples like Dustight that is defined differently in Article 100 as compared to 500.2. That creates confusion.

A greater problem is when a term is defined within an Article yet the term is used elsewhere in the NEC. Is the term in the Article without it being defined supposed to be something different or can it be used the same way? That also creates confusion.

Some examples include Metal wireway which is defined in 376.2 yet the term is used elsewhere such as in Articles 210, 225, etc. A Tap conductor is defined in 240.2, is a motor tap conductor supposed to be something different in Article 430?

As stated in the NEC Style Manual definitions cannot contain requirements yet it is often argued that stating that something is or is not does not necessarily constitute a requirement. If it is not, then it doesn't meet the definition. If the term is used in multiple articles then creating a definition that is usable in all those Articles is the best approach. Specific requirements which can be different can still be placed in each Article.

Many other standards have all definitions in one location. Constancy will be improved by having the panels develop language that will use the same terms without creating unnecessary conflicts. I understand the Correlating Committee recently agreed to leave terms in the .2 Section of Articles. I respectfully ask them to reconsider that position.

Statement of Problem and Substantiation for Public Input

It seems that every cycle definitions are moved from a .2 section within an Article to Article 100 because someone points out that the particular term is used in more than one Article. For NEC users, especially new ones it makes understanding the rules that much more difficult.

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Many other standards have all definitions in one location. Constancy will be improved by having the panels develop language that will use the same terms without creating unnecessary conflicts. I understand the Correlating Committee recently agreed to leave terms in the .2 Section of Articles. I respectfully ask them to reconsider that position.
Submitter Information Verification

Submitter Full Name: Paul Dobrowsky
Organization: Self
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Submittal Date: Thu Nov 06 19:36:47 EST 2014

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Globally edit the text by removing the following text strings
nominal
Nominal
, nominal
, Nominal
nominal ,
Nominal ,
, nominal ,
, Nominal ,
That is, remove the word nominal and any optional commas preceding or following it. This is a little too broad, I will provide additional submissions that repair "collateral damage" to nominals not related to voltage.

Substantiation:
The NEC contains 2744 sentences that contain volt, voltage, and V. Some of the V are false positives (part V, Volume ...). 317 sentences contain nominal. The use of the word nominal does not appear to have a particular pattern when it is found in connection to voltage. Having some voltages marked as nominal and others not marked when both are intended to be nominal, leads to confusion

Making it clear what a particular voltage reference means is important. Some of the voltage references are for exact voltages. This is true for most "limit" specifications such as "the voltage shall not exceed 42.4 volts". Other voltages are nominal and refer to a range of voltages.

The specification of 600 volts, which is a utilization voltage, and 1000 volts, which is the "new" 600 volts, is problematical. I have chosen to treat these references as nominal.

I propose that the NEC indicate that all voltages listed in it are nominal, unless specifically marked actual. This would rid the document of uncertainty as to whether or not a given voltage specification was actual or nominal.

Also add a table that indicates that the three groups of nominal voltages refer to the same thing: for instance 125/250 device rating, 120/240 load rating, and 115/230 motor rating.

Coordination:
These changes need to be co-ordinated with other submissions. These submission will be keyed back to this submission number (1902). They include defining Actual Voltage and adding actual where appropriate.

(1)nominal for battery circuits  (2)nominal for 120/60 center grounded AC circuits  (3)
Nearly always nominal  (4)Occasionally nominal  (5)nominal in 600

Voltagess references in NEC
<table>
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<th>&lt;=</th>
<th>nominal (utilization)</th>
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</thead>
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<td>10</td>
<td>1280</td>
<td>110</td>
</tr>
<tr>
<td>12.4</td>
<td>1530</td>
<td>115</td>
</tr>
<tr>
<td>15</td>
<td>2000 (4)</td>
<td>120</td>
</tr>
<tr>
<td>21.2</td>
<td>2001</td>
<td>120/240</td>
</tr>
<tr>
<td>24 (1)</td>
<td>5000</td>
<td>180</td>
</tr>
<tr>
<td>24.8</td>
<td>15000 (5)</td>
<td>200</td>
</tr>
<tr>
<td>30</td>
<td>35000</td>
<td>208</td>
</tr>
<tr>
<td>42</td>
<td>208Y/120</td>
<td></td>
</tr>
<tr>
<td>42.4</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>60 (2)</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>277</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>440</td>
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<tr>
<td>100</td>
<td>460</td>
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</tr>
<tr>
<td>132</td>
<td>480</td>
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<tr>
<td>150</td>
<td>480Y/277</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>500</td>
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<tr>
<td>900</td>
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**Additional Proposed Changes**

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**Statement of Problem and Substantiation for Public Input**
The NEC contains 2744 sentences that contain volt, voltage, and V. Some of the V are false positives (part V, Volume ...). 317 sentences contain nominal. The use of the word nominal does not appear to have a particular pattern when it is found in connection to voltage. Having some voltages marked as nominal and others not marked when both are intended to be nominal, leads to confusion.

ALL RELATED submissions link back to this (1902). Although other related submissions may be interrelated, such links would grow exponentially (the mathematical exponentially, not the TV news exponentially).

Making it clear what a particular voltage reference means is important. Some of the voltage references are for exact voltages. This is true for most "limit" specifications such as "the voltage shall not exceed 42.4 volts". Other voltages are nominal and refer to a range of voltages.

The specification of 600 volts, which is a utilization voltage, and 1000 volts, which is the "new" 600 volts, is problematical. I have chosen to treat these references as nominal.

I propose that the NEC indicate that all voltages listed in it are nominal, unless specifically marked actual. This would rid the document of uncertainty as to whether or not a given voltage specification was actual or nominal.

Also add a table that indicates that the three groups of nominal voltages refer to the same thing: for instance 125/250 device rating, 120/240 load rating, and 115/230 motor rating.

Coordination:

These changes need to be co-ordinated with other submissions. These submission will be keyed back to this submission number (1902). They include defining Actual Voltage and adding actual where appropriate.

(1) nominal for battery circuits (2) nominal for 120/60 center grounded AC circuits (3) Nearly always nominal (4) Occasionally nominal (5) nominal in 600

| Actual (exact) | --|
|----------------|
|                 |

Potential voltages references in NEC

---

<table>
<thead>
<tr>
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<th>90</th>
<th>1000</th>
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</thead>
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<tr>
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<td>1280</td>
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<td>115</td>
<td>2400</td>
</tr>
<tr>
<td>15</td>
<td>2000(4)</td>
<td>120</td>
<td>4160</td>
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<td>2001</td>
<td>120/240</td>
<td>7200</td>
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<td>24(1)</td>
<td>5000</td>
<td>180</td>
<td>7500</td>
</tr>
<tr>
<td>24.8</td>
<td>15000(5)</td>
<td>200</td>
<td>13800</td>
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<td>30</td>
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<td>14400</td>
</tr>
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<td>42</td>
<td>208Y/120 15000(5)</td>
<td></td>
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</tr>
<tr>
<td>42.4</td>
<td>220</td>
<td>2300</td>
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</tr>
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<td>50</td>
<td>230</td>
<td>34500</td>
<td></td>
</tr>
<tr>
<td>60(2)</td>
<td>240</td>
<td>46000</td>
<td></td>
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<tr>
<td>65</td>
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<tr>
<td>150</td>
<td>480Y/277</td>
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<td></td>
</tr>
</tbody>
</table>
Public Input No. 2349-NFPA 70-2014
This submission depends on 1902

Public Input No. 2351-NFPA 70-2014
This submission depends on 1902

Public Input No. 2352-NFPA 70-2014
This submission depends on 1902

Public Input No. 2358-NFPA 70-2014
This submission depends on 1902

Public Input No. 2354-NFPA 70-2014
This submission depends on 1902

Public Input No. 2355-NFPA 70-2014
This submission depends on 1902

Public Input No. 2356-NFPA 70-2014
This submission depends on 1902

Public Input No. 2357-NFPA 70-2014
This submission depends on 1902

Public Input No. 2359-NFPA 70-2014
This submission depends on 1902

Public Input No. 2361-NFPA 70-2014
This submission depends on 1902

Public Input No. 2363-NFPA 70-2014
This submission depends on 1902

Submitter Information Verification

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Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Wed Oct 15 11:34:29 EDT 2014

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### Voltages found in NEC

<table>
<thead>
<tr>
<th>Actual (Exact)</th>
<th>Nominal (Utilization)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>1080      90</td>
</tr>
<tr>
<td>10</td>
<td>1280      110</td>
</tr>
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<td>15000(5)  200</td>
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<td>30</td>
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<td>600Y/347</td>
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<tr>
<td>600(3)</td>
<td></td>
</tr>
<tr>
<td>750</td>
<td></td>
</tr>
<tr>
<td>900</td>
<td></td>
</tr>
</tbody>
</table>

(1) Nominal for battery circuits  
(2) Nominal for 120/60 center grounded AC circuits  
(3) Nearly always nominal  
(4) Occasionally nominal  
(5) Nominal in 600
THE FOLLOWING PUBLIC INPUTS (PIs) HAVE BEEN ASSIGNED TO YOUR PANEL ONLY AND WILL BE ACTED UPON IN TERRA.
Create a new "Annex A Explanatory Material" and relocate the "Informational notes" to the new annex and renumber the remaining annex sections.

Statement of Problem and Substantiation for Public Input

Creating of a new Annex A Explanatory Material would be consistent with the layout of the other NFPA codes and standards. The content of the 'informational notes' is consistent with the Annex A material in the other NFPA code and standards. This would lead to ease of use by AHJs, design professionals and contractors since the codes and standards would be organized in a consistent format.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck
Organization: Altamonte Springs Building/Fire Safety Division
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Sun Dec 22 18:13:57 EST 2013
Public Input No. 57-NFPA 70-2013 [ Global Input ]

Relocate Article 90 into a new "Chapter 1 Administration" and renumber the remaining chapters.

Statement of Problem and Substantiation for Public Input

Creating a "Chapter 1 Administration" would be consistent with the layout of all other NFPA Codes and Standards and the Codes promulgated by ICC. A similar layout to other national codes and standards would facilitate ease of use by AHJs, design professionals and contractors.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck
Organization: Altamonte Springs Building/Fire Safety Division
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Sun Dec 22 18:03:48 EST 2013
consider a standard of testing procedures

all too often apprentices learn to use test equipment improperly resulting in substandard installations
often the training is influenced or biased by personal opinion of the trainer and shouldn't be so
most are only trained to use multimeter or amp clamp and little else
for example IR., earth loop impedance tester, phase rotation meter are tools that most are not
trained in unless they seek specialist training.
the following test procedures are from the UK.
but I'm sure they could be adapted for us in the USA.

Default Basic Testing Procedures

Safe isolation

The procedure for proving dead should be by use of a test lamp or two pole voltage detector as recommended in HSE Guidance Note GS38.
Non-contact voltage indicators (voltage sticks) and multi-meters should not be used. The test instrument should be proved to be working on a known live source or proprietary proving unit before and after use. All phases of the supply and the neutral should be tested and proved dead.

Test sequence and descriptions

The following tests are carried out with the Consumers main switch isolated

1. External earth fault loop impedance

   Reason: To establish that a good earth exists at the installation in order for the remaining tests to go ahead.

   Method: Disconnect the main earthing conductor from the main earthing terminal. An earth fault loop impedance tester is connected at line and earth (main earthing conductor) at the supply side of the installation and a test performed. Reconnect the main earthing conductor. The result is Ze and recorded on the sheet. The prospective fault current is measured at the same time after the reconnection of the main earthing conductor.

2. Continuity of protective and bonding conductors

   Reason: To check that all circuit protective conductors (green and yellow cables) are continuous and are present at every electrical accessory on the circuit. Also to check that the main earthing conductor and main bonding conductors are continuous and correctly connected.

   Method 1: The line conductor is connected to the circuit protective conductor of the same circuit at the consumer unit and a measurement taken at ALL accessories on that circuit between line and c.p.c. The highest measurement obtained is recorded on the test report.
   Test result is R1 R2. The line conductor and neutral conductor are then connected and the above
repeated to obtain R1 Rn

Method 2 (used for main earth and main bonding conductors): A wandering lead is connected to one end of the conductor to be tested and a measurement taken between the other end of this lead and the other end of the conductor.
Test result is R2.
During this test polarity can be checked as well. The continuity of the neutral conductor can also be checked.

3. Continuity of ring final circuit conductors

Reason: This test ensures that all ring final circuits (sockets usually) are indeed a continuous ring with no interconnects or breaks within it.

Method: The line, neutral and earth conductors of the circuit are identified and a measurement from one end to the other end of each is taken. These results are r1, r2 and rn.
The incoming line conductor is then connected to the outgoing earth conductor and the outgoing line conductor is connected to the incoming earth conductor. A measurement is then taken at ALL socket outlets on the ring. The highest of which is recorded on the report.
This result is R1 R2 for that circuit. The above is then repeated using the neutral conductor instead of the earth conductor. This test provides R1 Rn which does not need to be recorded on the report but is essential to check the circuit correctly.

4. Insulation Resistance

Reason: This test checks whether the insulation around a cable is still intact and has not broken down over time. It is a good indicator of the age of an installation.

Method: An insulation resistance tester is connected across line and neutral tails at the origin of the supply. 500V are then pumped down the conductors to see if any voltage leaks across from one conductor to the other. The same is then done for the line and earth and the earth and neutral conductors.

5. Polarity

Reason: To check that all accessories are correctly connected to line, neutral and earth and that all switches and circuit breakers are connected in the line conductor only.

Method: The method for this is the same as for continuity and is usually done at the same time by operating switches etc whilst conducting the test.

6. Earth electrode resistance

Reason: To make sure that any earth electrode used is of a sufficiently low impedance to allow the timely operation of the RCD protecting the installation.

Method: An earth fault loop impedance tester is connected between line and earth at the origin of the supply and a test performed. The result of which is considered the resistance of the electrode (Ra).

The following tests are carried out with the Consumers main switch energised

7. Live polarity test

Reason: To verify polarity of supply authorities system.
Method: An approved voltage indicator shall be used or test lamp to GS38. Using the approved voltage indicator, one probe shall be placed on the incoming neutral, and the other on the incoming line conductor, on the main breaker. The indicator should show it is live. One probe shall now be placed on the CPC and the other on the incoming line conductor. The indicator should show it is live. A test shall be preformed between CPC & incoming neutral. The indicator should show that it is not live.

8. Earth fault loop impedance

Reason: This test is done at the furthest point on a circuit in order to make sure the impedance of the earth path is not too high even at the furthest point so that sufficient current will flow under fault conditions to take out the circuit breaker protecting the circuit.

Method: An earth fault loop impedance tester is connected to line and earth at the furthest point on the circuit and the test performed.

9. RCD test

Reason: To make sure RCD's trip within the correct time

Method: An RCD tester is connected and a test at 1/2 times, 1 times and 5 times the trip current is performed on each side of the cycle and a time of trip obtained. Usually milli-seconds with the highest being recorded. The manual test button is then pressed.

10. Functional testing

Reason: To make sure all switches, isolators, MCB's etc. work as they should.

Method: Self explanatory.

Statement of Problem and Substantiation for Public Input

there is no standard of testing procedures and training on test equipment and there should be regulation depends on the community but some standard should be created to provide a guideline to follow concerning training, testing, and documentation.

Submitter Information Verification

Submitter Full Name: Ted Mead
Organization: Ardaugh Group
Street Address:
City:
State:
Zip:
Submittal Date: Sun Oct 26 17:49:46 EDT 2014
Public Input No. 3504-NFPA 70-2014 [ Section No. 90.1(A) ]

(A) Practical Safeguarding.
The purpose of this Code is the practical safeguarding of persons and property from hazards arising from the use of electricity. This Code is not intended as a design specification or an instruction manual for untrained persons.

Statement of Problem and Substantiation for Public Input

by leaving the word intended in the text you sill have the assumption it can still be used as a design manual. Removing this word will also remove this assumption.

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: Master electrician
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Tue Nov 04 12:24:32 EST 2014
Public Input No. 1422-NFPA 70-2014 [ Section No. 90.1(B) ]

(B) Adequacy.

This Code contains provisions that are considered necessary for safety. Compliance therewith Code compliance and proper maintenance results in an installation that is essentially free from hazard but not necessarily efficient, convenient, or adequate for good service or future expansion of electrical use.

Informational Note: Hazards often occur because of overloading of wiring systems by methods or usage not in conformity with this Code. This occurs because initial wiring did not provide for increases in the use of electricity. An initial adequate installation and reasonable provisions for system changes provide for future increases in the use of electricity.

Statement of Problem and Substantiation for Public Input

"considered" is an unenforceable term according to NEC_StyleManual_2011.pdf 3.2.1

"Compliance therewith" is awkward and contains an archaic word "therewith" which is deprecated by NEC_StyleManual_2011.pdf 3.3.4.

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: -none-
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Sep 27 17:48:54 EDT 2014
Public Input No. 1211-NFPA 70-2014 [Section No. 90.2(A)]

(A) Covered.
This Code covers the installation, and removal, of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment, and raceways; and optical fiber cables and raceways for the following:

1. Public and private premises, including buildings, structures, mobile homes, recreational vehicles, and floating buildings
2. Yards, lots, parking lots, carnivals, and industrial substations
3. Installations of conductors and equipment that connect to the supply of electricity
4. Installations used by the electric utility, such as office buildings, warehouses, garages, machine shops, and recreational buildings, that are not an integral part of a generating plant, substation, or control center.

Statement of Problem and Substantiation for Public Input

Removal of conductors or cables is required in many sections including 590.3(D), 640.3(C), 725.25, 760.25, 770.25, 800.25, 820.25, 830.25, and 840.25 and it should be mentioned as part of the scope of the Code.

Submitter Information Verification

Submitter Full Name: RUSS LEBLANC
Organization: EC AND M MAGAZINE
Street Address:
City:
State:
Zip:
Submittal Date: Sat Sep 06 14:40:03 EDT 2014
(B) Not Covered.

This Code does not cover the following:

1. Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles

   Informational Note: Although the scope of this Code indicates that the Code does not cover installations in ships, portions of this Code are incorporated by reference into Title 46, Code of Federal Regulations, Parts 110–113.

2. Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable

3. Installations of railways for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes

4. Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations

5. Installations under the exclusive control of an electric utility where such installations

   a. Consist of service drops or service laterals, and associated metering, or
   b. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy, or
   c. Are located in legally established easements or rights-of-way, or
   d. Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.

   Informational Note to (2): Although the scope of this Code indicates that the Code does not cover installations in mines, portions of this Code and the 1968 Code are incorporated by reference into Title 30, Code of Federal Regulations, Parts 1 to 199.

   Informational Note to (4) and (5): Examples of utilities may include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communications systems (such as telephone, CATV, Internet, satellite, or data services). Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission.

Statement of Problem and Substantiation for Public Input

The Informational Note will eliminate the apparent contradiction between the Code scope and the Title 30 Code of Federal Regulations (CFR) Parts 1 to 199. Compliance with the National Electrical Code is specifically required in Title 30 CFR: 56.12045; 56.12048; 57.12045; 57.12048; 75.513-1; 75.518-1; 77.503-1; 77.506-1; 77.516; and 77.901. Title 30 CFR 77.516 requires all wiring and electrical equipment installed at surface areas of underground coal mines and surface coal mines shall meet the National Electric Code in effect at the time of installation.

Submitter Information Verification

Submitter Full Name: Thomas Barkand
Organization: Mine Safety and Health Admin
(B) Not Covered.

This Code does not cover the following:

1. Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles

   Informational Note: Although the scope of this Code indicates that the Code does not cover installations in ships, portions of this Code are incorporated by reference into Title 46, Code of Federal Regulations, Parts 110–113.

2. Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable

3. Installations of railways for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes

4. Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations

5. Installations under the exclusive control of an electric utility where such installations

   a. Consist of service drops or service laterals, and associated metering, or

   b. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy, or

   c. Are located in legally established easements or rights-of-way "limited to the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy" or

   d. Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.

   Informational Note to (4) and (5): Examples of utilities may include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communications systems (such as telephone, CATV, Internet, satellite, or data services). Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission.

Additional Proposed Changes

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Statement of Problem and Substantiation for Public Input

Note to CMP 1 members. The NFPA Terraview program did not capture the changes that were submitted for this PI. The lettering was reformatted to numbers and underlined some text that is was not intended to change. The changes are limited to the added text in (C)

c. Are located in legally established easements or rights-of-way "limited to the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy," or
The issue of parking lot lighting has been debated over many NEC cycles. An NEC Correlating Committee task
group appointed by then Chairman Jim Carpenter worked extremely hard to clarify this and other issues. There is
more work to be done.

The NEC does not and should never enter into requiring or even inferring “who” does a given installation. However,
the NEC does and should always identify and clarify when and where the NEC applies.

At the present time there are utilities in the United States that are installing parking lot lighting on private property
for private use. (see separate attachment from Duke Energy) 90.2(A)(2) clearly identifies as covered by the NEC;
"the installation of electrical conductors, equipment, and raceways; signaling and communications conductors,
equipment, and raceways; and optical fiber cables and raceways for" parking lots. That is as clear and concise as
possible. There is no ambiguity; the NEC covers electrical installations in parking lots.

The present text 90.2(B)(5)(c) is where the electric utilities are manipulating the NEC. An easement is a legal term
and is defined as: "a right to cross or otherwise use someone else's land for a
specified purpose."
As used in 90.2(B)(5)(c) along with a "right of way" an "easement" allows for limited use of land only. The term
"easement", as defined is limited to use of land, but is being manipulated as a "written agreement" on "contract."

The proposed revision is simple, clear, and concise and clarifies in great detail the true intent of 90.2(B)(5)(c) which
is the limited use of land for the purpose of communications, metering, generation, control, transformation,
transmission, or distribution of electric energy.

If electric utilities wish to enter in "written agreements" or "contracts" and install parking lot lighting on private
property for private use, they have that right. However, the electric utility must install that parking lot lighting on
private property for private use in accordance with the NEC.

The authority having jurisdiction for enforcement of the NEC has the responsibility for making interpretations of the
rules, for deciding on the approval of equipment and materials that can only be achieved when permits are obtained
and inspections are made to ensure a Code compliant installation.

Submitter Information Verification

Submitter Full Name: David Hittinger
Organization: Independent Electrical Contractors of Greater Cincinnati
Affiliation: Independent Electrical Contractors
Street Address:
City: State: Zip:
Submittal Date: Tue Sep 16 15:40:37 EDT 2014
(B) Not Covered.

This Code does not cover the following:

(1) Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or
    automotive vehicles other than mobile homes and recreational vehicles
    Informational Note: Although the scope of this Code indicates that the Code does not cover
    installations in ships, portions of this Code are incorporated by reference into Title 46, Code of

(2) Installations underground in mines and self-propelled mobile surface mining machinery and its attendant
    electrical trailing cable. Informational Note: Although the scope of this Code indicates that the Code
    does not cover installations in mines, portions of this Code and the 1968 Code are incorporated by
    reference into Title 30, Code of Federal Regulations, Parts 1 to 199.

(3) Installations of railways for generation, transformation, transmission, or distribution of power used
    exclusively for operation of rolling stock or installations used exclusively for signaling and
    communications purposes

(4) Installations of communications equipment under the exclusive control of communications utilities
    located outdoors or in building spaces used exclusively for such installations

(5) Installations under the exclusive control of an electric utility where such installations
    (6) Consist of service drops or service laterals, and associated metering, or

    (7) Are on property owned or leased by the electric utility for the purpose of communications,
        metering, generation, control, transformation, transmission, or distribution of electric energy, or

    (8) Are located in legally established easements or rights-of-way, or

    (9) Are located by other written agreements either designated by or recognized by public service
        commissions, utility commissions, or other regulatory agencies having jurisdiction for such
        installations. These written agreements shall be limited to installations for the purpose of
        communications, metering, generation, control, transformation, transmission, or distribution of
        electric energy where legally established easements or rights-of-way cannot be obtained. These
        installations shall be limited to federal lands, Native American reservations through the U.S.
        Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port
        authorities and state agencies and departments, and lands owned by railroads.

Informational Note to (4) and (5): Examples of utilities may include those entities that are typically
designated or recognized by governmental law or regulation by public service/utility commissions and
that install, operate, and maintain electric supply (such as generation, transmission, or distribution
systems) or communications systems (such as telephone, CATV, Internet, satellite, or data services).
Utilities may be subject to compliance with codes and standards covering their regulated activities as
adopted under governmental law or regulation. Additional information can be found through
consultation with the appropriate governmental bodies, such as state regulatory commissions, the

Statement of Problem and Substantiation for Public Input

The Informational Note will eliminate the apparent contradiction between the Code scope and the Title 30 Code of
Federal Regulations (CFR) Parts 1 to 199. Compliance with the National Electrical Code is specifically required in
Title 30 CFR: 56.12045; 56.12048; 57.12045; 57.12048; 75.513-1; 75.518-1; 77.503-1; 77.506-1; 77.516; and
77.901. Title 30 CFR 77.516 requires all wiring and electrical equipment installed at surface areas of underground
coal mines and surface coal mines shall meet the National Electric Code in effect at the time of installation.

Submitter Information Verification

Submitter Full Name: Thomas Barkand
Organization: U.S. Department of Labor, Mine Safety and Health Administration
Street Address:
Public Input No. 375-NFPA 70-2014 [ Section No. 90.2(B) ]

(B) Not Covered.
This Code does not cover the following:

1. Installations in ships, watercraft, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles that are specifically covered in this Code.

   Informational Note No. 1: Although the scope of this Code indicates that the Code does not cover installations in ships, portions of this Code are incorporated by reference into Title 46, Code of Federal Regulations, Parts 110–113.

   Informational Note No. 2: For more information that may be relevant to floating buildings and vehicles that are covered in this code see Articles 550, 551, 552, 553, 555 and 675.

2. Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable

3. Installations of railways for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes

4. Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations

5. Installations under the exclusive control of an electric utility where such installations
   a. Consist of service drops or service laterals, and associated metering, or
   b. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy, or
   c. Are located in legally established easements or rights-of-way, or
   d. Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.

   Informational Note to (4) and (5): Examples of utilities may include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communications systems (such as telephone, CATV, Internet, satellite, or data services). Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission.

Statement of Problem and Substantiation for Public Input

This change will clarify what is not covered in the NEC and eliminate confusing text that referred to what is covered.

Adding informational note #2 will direct users to more specific Articles that may be relevant to watercraft whether fixed or floating and vehicles that either has its own motive power or is mounted on or drawn by another vehicle.

There are other types of vehicles or self-propelled machines such as Article 675 "Electrically Driven or Controlled Irrigation Machines" included in the Informational Note No. 2.

Submitter Information Verification

Panel 1 FD Agenda Page 52
Public Input No. 4067-NFPA 70-2014 [ Section No. 90.2(B) ]

(B) Not Covered.
This Code does not cover the following:

1. Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles.
   
   Informational Note: Although the scope of this Code indicates that the Code does not cover installations in ships, portions of this Code are incorporated by reference into Title 46, Code of Federal Regulations, Parts 110–113.

2. Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable.

3. Installations of railways for generation, transformation, transmission, energy storage, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes.

4. Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations.

5. Installations under the exclusive control of an electric utility where such installations
   
   a. Consist of service drops or service laterals, and associated metering, or
   
   b. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy, or
   
   c. Are located in legally established easements or rights-of-way, or
   
   d. Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.

Informational Note to (4) and (5): Examples of utilities may include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communications systems (such as telephone, CATV, Internet, satellite, or data services). Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission.

Statement of Problem and Substantiation for Public Input

This public input was developed by the NEC DC Task Force of the Technical Correlating Committee. The Task Force is chaired by John R. Kovacik, UL LLC. The participants in the task force and their employers/associations are listed in a separate document which is on file with NFPA.

The scope of the NEC is defined in Article 90. It excludes installations of railways in 90.2(B)(3) “... for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes.” This exclusion does not include energy storage. This means that a railway-owned energy storage system could be subject to the NEC and inspection by the local AHJ, which is not consistent with the present differentiation of scope between the NEC and applicable Codes for railways. This PI proposes to add "energy storage" to the list of NEC scope exclusions for railways in 90.2(B)(3).

Companion PIs have been submitted for 90.2(B)(5)b. and 90.2(B)(5)d.

Related Public Inputs for This Document
Public Input No. 4070-NFPA 70-2014 [ Section No. 90.2(B) ]

(B) Not Covered.
This Code does not cover the following:

1. Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles
   Informational Note: Although the scope of this Code indicates that the Code does not cover installations in ships, portions of this Code are incorporated by reference into Title 46, Code of Federal Regulations, Parts 110–113.

2. Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable

3. Installations of railways for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes

4. Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations

5. Installations under the exclusive control of an electric utility where such installations
   - Consist of service drops or service laterals, and associated metering, or
   - Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, energy storage, or distribution of electric energy, or
   - Are located in legally established easements or rights-of-way, or
   - Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.

Informational Note to (4) and (5): Examples of utilities may include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communications systems (such as telephone, CATV, Internet, satellite, or data services). Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission.

Statement of Problem and Substantiation for Public Input

This public input was developed by the NEC DC Task Force of the Technical Correlating Committee. The Task Force is chaired by John R. Kovacik, UL LLC. The participants in the task force and their employers/associations are listed in a separate document which is on file with NFPA.
The scope of the NEC is defined in Article 90. It excludes utility installations in 90.2(B)(5)b. "... for the purpose of communication, metering, generation, control, transformation, transmission, or distribution of electric energy". This exclusion does not include energy storage. This means that a utility-owned storage system could be subject to the NEC and inspection by the local AHJ, which is not consistent with the present differentiation of scope between the NEC and NESC. This PI proposes to add "energy storage" to the list of NEC scope exclusions for utilities in 90.2(B)(5)b.

Companion PIs have been submitted for 90.2(B)(3) and 90.2(B)(5)d.

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**Submitter Information Verification**

- **Submitter Full Name:** John Kovacik  
- **Organization:** UL LLC  
- **Street Address:**  
- **City:**  
- **State:**  
- **Zip:**  
- **Submittal Date:** Wed Nov 05 23:12:23 EST 2014
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Submitter Information Verification

Submitter Full Name: John Kovacik  
Organization: UL LLC  
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Wed Nov 05 23:07:29 EST 2014
Public Input No. 4072-NFPA 70-2014 [ Section No. 90.2(B) ]

(B) Not Covered.
This Code does not cover the following:

(1) Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles

   Informational Note: Although the scope of this Code indicates that the Code does not cover installations in ships, portions of this Code are incorporated by reference into Title 46, Code of Federal Regulations, Parts 110–113.

(2) Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable

(3) Installations of railways for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes

(4) Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations

(5) Installations under the exclusive control of an electric utility where such installations

   (6) Consist of service drops or service laterals, and associated metering, or

   (7) Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy, or

   (8) Are located in legally established easements or rights-of-way, or

   (9) Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, energy storage, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.

Informational Note to (4) and (5): Examples of utilities may include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communications systems (such as telephone, CATV, Internet, satellite, or data services). Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission.

Statement of Problem and Substantiation for Public Input

This public input was developed by the NEC DC Task Force of the Technical Correlating Committee. The Task Force is chaired by John R. Kovacik, UL LLC. The participants in the task force and their employers/associations are listed in a separate document which is on file with NFPA.

The scope of the NEC is defined in Article 90. It excludes utility installations in 90.2(B)(5)d. "... located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. This exclusion does not include energy storage. This means that a utility-owned energy storage system could be subject to the NEC and inspection by the local AHJ, which is not consistent with the present differentiation of scope between the NEC and NESC. This PI proposes to add "energy storage" to the list of NEC scope exclusions for utilities in 90.2(B)(5)d.

Companion PIs have been submitted for 90.2(B)(3) and 90.2(B)(5)b.
## Related Public Inputs for This Document

<table>
<thead>
<tr>
<th>Related Input</th>
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<tr>
<td>Public Input No. 4067-NFPA 70-2014 [Section No. 90.2(B)]</td>
<td>Companion PI</td>
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<tr>
<td>Public Input No. 4070-NFPA 70-2014 [Section No. 90.2(B)]</td>
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</tbody>
</table>

## Submitter Information Verification

- **Submitter Full Name:** John Kovacik  
- **Organization:** UL LLC  
- **Street Address:**  
- **City:**  
- **State:**  
- **Zip:**  
- **Submittal Date:** Wed Nov 05 23:14:52 EST 2014
Public Input No. 4568-NFPA 70-2014 [ Section No. 90.2(B) ]

(B) Not Covered.
This Code does not cover the following:

(1) Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles

   Informational Note: Although the scope of this Code indicates that the Code does not cover installations in ships, portions of this Code are incorporated by reference into Title 46, Code of Federal Regulations, Parts 110–113.

(2) Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable

(3) Installations of railways for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes

(4) Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations

(5) Installations under the exclusive control of an electric utility where such installations

   (6) Consist of service drops or service laterals, and associated metering, or

   (7) Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy, or

   (8) Are located in legally established easements or rights-of-way, recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdictions for such installations. These easements or rights-of-way shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy.

   (9) Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.

Informational Note to (4) and (5): Examples of utilities may include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communications systems (such as telephone, CATV, Internet, satellite, or data services). Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission.

Statement of Problem and Substantiation for Public Input

The only text that is being changed is 90.2(B)(5)(c) .... Are located in legally established easements or rights-of-way, "recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdictions for such installations. These easements or rights-of-way shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy."

While I understand the utility industry is exempt from NEC code rules where an easement or a right-of-way is involved, it should only be exempt where the work within these boundaries is recognized by some governing body or regulatory authority, similar to the wording in 90.2(B)(5)(d). If the utility industry cannot obtain regulatory approval then they should be required to follow the rules and requirements set forth in the NEC document.

This section as presently written would allow utility organizations to perform ANY work after a legal document has...
been produced to use someone else's land to install numerous types of electrical systems such as PV systems, wind farms, area lighting systems, etc without regard to a nationally recognized consensus process that is used to determine the rules necessary for a safe installation. The scope and what is exempt in 90.2(B)(5) is important to the utility industry but it also important that the public be safeguarded. I do not think this is the way the scope of 90.2(B)(5)(c) was intended to be written and should be changed for the public’s safety.

Submitter Information Verification

Submitter Full Name: Lawrence Ayer
Organization: Biz Com Electric, Inc.
Affiliation: Independent Electrical Contractors, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 07 10:23:56 EST 2014
90.3 Code Arrangement.

This Code is divided into the introduction and nine chapters, as shown in Figure 90.3. Chapters 1, 2, 3, and 4 apply generally; Chapters 5, 6, and 7 apply to special occupancies, special equipment, or other special conditions. These latter chapters supplement or modify the general rules. Chapters 1 through 4 apply except as amended by Chapters 5, 6, and 7 amend identifiable requirements of Chapters 1 through 4 for the particular conditions. Where more than one Article of Chapters 5, 6, and 7 are applicable to an electrical installation, requirements of those Articles apply concurrently except as an Article amends identifiable requirements of another Article of Chapters 5, 6, and 7 for the particular conditions.

Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8.

Chapter 9 consists of tables that are applicable as referenced.

Informative annexes are not part of the requirements of this Code but are included for informational purposes only.

Figure 90.3 Code Arrangement.

Statement of Problem and Substantiation for Public Input

Increasingly, Articles within Chapters 5, 6 and 7 are adding to their sections XXX.3 entitled “Other Articles” statements that read without further qualification as follows:

"Wherever the requirements of other Articles of this Code and Article XXX differ, the requirements of Article XXX shall apply."

Rather than adding clarity in interpretation, such a broad-based “calling dibs” statement adds confusion in applicability and enforcement to installers, AHJs, and equipment manufacturers alike who seek to apply the NEC® with certainty. If this type of statement were to be replicated subsequently throughout every Article of NEC® Chapters 5 – 7, there would be no method by which interpretational disputes could be easily reconciled.

Code-Making Panel 1 has responsibility for NEC® 90.3 Code Arrangement, yet CMP-1 is never brought into these deliberations when such carte blanche statements are introduced into these “XXX.3 Other Articles” sections.

Furthermore, with no specifically referenced requirements or installation conditions cited, such statements are de facto declarations of Article scope. In accordance with 3.4.3 of the Regulations Governing Committee Projects, it is the Correlating Committee that has authority for establishing Articles’ Scopes and to resolve conflicts in Scopes. Yet these nebulous “XXX.3 Other Articles” claim-staking statements, however, are so sweeping in their undefined breadth, they effectively transfer that authority to the NEC® Code-Making Panel responsible for such Articles of Chapters 5, 6 and 7.

In accordance with 4.1.1 of the 2011 NEC® Style Manual, the largest portion of an Article that can be referenced is...
Part, not an entire Article (unless conditions are specified). These statements, however, go well beyond that restriction by referencing as a generalization ALL Articles of the entire Code without specification.

In addition to the revisions specific to NEC® 90.3, all such “XXX.3 Other Articles” statements generalizing “requirements of other Articles of this Code and Article XXX differ” throughout the Code should be removed or revised to provide specific citation of requirements and/or conditions. Some were located and are reflected in "Related Public Inputs". I’m also aware of other Articles where this statement will be proposed to be newly added by Public Input this Code cycle.

At their core, those statements have no meaning whatsoever. Differences in requirements can be mutually exclusive or complementary. "Wherever the requirements of other Articles of this Code and Article XXX differ ...". This does not say "conflict". So how do the requirements "differ"? Even the most minor difference in, say, editorial arrangement? Judgment call at best! Unenforceable at worst!!

"... the requirements of Article XXX shall apply." This does not say "supersede". Wouldn't the requirements of Article XXX apply whether or not these and some other requirements differed? Mutually exclusive differences of requirements are to be correlated explicitly.

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<td>Public Input No. 2593-NFPA 70-2014 [Section No. 626.3 [Excluding any Sub-Sections]]</td>
<td>reference to unspecified entire Articles [4.1.1 of the 2011 NEC® Style Manual, 3.4.3 of the Regulations Governing Committee Projects]</td>
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<td>reference to unspecified entire Articles [4.1.1 of the 2011 NEC® Style Manual, 3.4.3 of the Regulations Governing Committee Projects]</td>
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<tr>
<td>Public Input No. 3127-NFPA 70-2014 [Section No. 525.3(A)]</td>
<td>reference to unspecified entire Articles [4.1.1 of the 2011 NEC® Style Manual, 3.4.3 of the Regulations Governing Committee Projects]</td>
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Submitter Information Verification

Submitter Full Name: Brian Rock
Organization: Hubbell Incorporated
Street Address:
City:
State:
Zip:
Submittal Date: Mon Oct 27 14:49:36 EDT 2014
90.3 Code Arrangement.

This Code is divided into the introduction and nine chapters, as shown in Figure 90.3. Chapters 1, 2, 3, and 4 apply generally; Chapters 5, 6, and 7 apply to special occupancies, special equipment, or other special conditions. These latter chapters, Chapters 5 and 7, supplement or modify the general rules in Chapters 1 through 4. Chapter 6 supplements or modifies the general rules in Chapters 1 through 4 and also supplements or modifies the special rules in Chapter 7. Chapters 1 through 4, apply except as amended by Chapters 5, 6, and 7 for the particular conditions.

Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8.

Chapter 9 consists of tables that are applicable as referenced.

Informative annexes are not part of the requirements of this Code but are included for informational purposes only.

Figure 90.3 Code Arrangement.

- Chapter 1 — General
- Chapter 2 — Wiring and Protection
- Chapter 3 — Wiring Methods and Materials
- Chapter 4 — Equipment for General Use
- Chapter 5 — Special Occupancies
- Chapter 6 — Special Equipment
- Chapter 7 — Special Conditions
- Chapter 8 — Communications Systems
- Chapter 9 — Tables
- Informative Annex A through Informative Annex J

## Additional Proposed Changes

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<td>Pipe_Organ_Assoc_NEC_P1_90_3_code_arrangement_6-7-2014.pdf</td>
<td>PI Form with Figure 90.3</td>
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<tr>
<td>Figure_90.3_revised.jpg</td>
<td>Revised Figure 90.3</td>
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## Statement of Problem and Substantiation for Public Input

Section 90.3 needs to be revised to recognize that some Articles in Chapter 6 also modify Chapter 7 articles. For example, see section 645.4 which explicitly states that Article 645 is permitted to provide alternate wiring methods to Articles 708, 725 and 770.

## Submitter Information Verification

Submitter Full Name: Arthur Schlueter
Organization: A. E. Schlueter Pipe Organ Com
Street Address: 
City: 
State: 
Zip:  

Panel 1 FD Agenda Page 63
90.3__ Code Arrangement.

This Code is divided into the introduction and nine chapters, as shown in Figure 90.3. Chapters 1, 2, 3, and 4 apply generally; Chapters 5, 6, and 7 apply to special occupancies, special equipment, or other special conditions. These latter chapters supplement or modify the general rules.

Chapter 5 Articles 500-506 which address hazardous area classification and acceptable protection techniques for electrical and electronic equipment in hazardous (classified) locations supplements and modifies 90.1 and 90.2.

Chapters 1 through 4 apply except as amended by Chapters 5, 6, and 7 for the particular conditions.

Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8.

Chapter 9 consists of tables that are applicable as referenced.

Informative annexes are not part of the requirements of this Code but are included for informational purposes only.

Figure 90.3 Code Arrangement.

Statement of Problem and Substantiation for Public Input

Chapter 5, Articles 500-506 addresses electrical and electronic equipment used Hazardous Classified Areas and is correctly included in the NEC under 90.1 as a special circumstance due to the need to control electrical and electronic equipment which may become ignition sources for ignitable atmospheres and without which practical safe guarding of persons and property from these hazards may be compromised. Additionally, Chapter 5, Articles 500-506 supplements and modifies 90.1 as the practical safeguarding of persons or property in hazardous (classified) locations may require reference to other standards or guides. Additionally 90.2 Articles 500-506 address more than the installation of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment, and raceways; and optical fiber cables and raceways, etc., as it covers the acceptable protection techniques for electrical and electronic equipment and wiring for all voltages in Class I, Divisions 1 and 2; Class II, Divisions 1 and 2; and Class III, Divisions 1 and 2; Zone 0, Zone 1, Zone 2, Zone 20, Zone 21, and Zone 22 locations; where fire or explosion hazards may exist due to flammable gases, flammable liquid–produced vapors, combustible liquid–produced vapors, combustible dusts, or ignitible fibers/flyings. Again these are locations determined to present fire or explosion hazards which create requirements. While the NEC currently does not have a definition for electrical and electronic equipment, one used by the US EPA is as follows: “Electrical and Electronic Equipment (EEE) is defined as equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents and fields. As a general rule of thumb, if it has a battery or needs a power supply to work properly, it is Electrical and Electronic Equipment...” Clarification is required under 90.3 so that the proper application of the NEC may be achieved; as it may be incorrectly inferred that Chapter 5 only supplements or modifies the general rules, which are those thought only to be found in Chapters 1, 2, 3 and 4, and therefore 90.1 and 90.2 are excluded as being supplemented or...
modified.

As examples consider the significant safety issues created with either of the following improper understandings: 1) By limiting only to ‘installed’ electrical equipment found in Chapters 1, 2, 3 and 4, the requirement Article 505.5 (A) which states in part “Locations shall be classified depending on the properties of the flammable gas, flammable liquid-produced vapor…..” could be misunderstood as not being applicable (i.e., no requirement to classify a location) when there was no installed electrical equipment, which clearly is not the intent of this requirement for Classification of Locations. 2) Chapter 5 and specifically 500.1 would not be applicable to hand carried electronic instruments or even a simple device like a flash light, which are not specifically addressed in Chapters 1, 2, 3 and 4, but are used in a hazardous classified location. The broad information and requirements presented in Chapter 5 would be applicable to electronic and electrical equipment and would therefore provide for controls for the ignition potentials arising from the use of these types of electrical/electronic devices.

Submitter Information Verification

Submitter Full Name: David Wechsler
Organization: [ Not Specified ]
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Jun 18 11:00:43 EDT 2014
90.5 Retroactivity.

(A) The provisions of this code reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this code at the time the code was issued.

(B) Unless otherwise specified, the provisions of this code shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the code. Where specified, the provisions of this code shall be retroactive.

(C) In those cases where the AHJ determines that the existing situation presents an unacceptable degree of risk, the AHJ shall be permitted to apply retroactively any portion of this code deemed appropriate.

(D) The retroactive requirements of this code shall be permitted to be modified if their application clearly would be impractical in the judgment of the AHJ, and only where it is clearly evident that a reasonable degree of safety is provided.

Statement of Problem and Substantiation for Public Input

The proposed retroactivity language is from the NFPA Manual of Style. This language will provide appropriate guidance to AHJ, design professional, contractor and end user as to when it appropriate to apply the specific edition of the code and that retroactive application is not appropriate unless one of the specific conditions are applicable.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck
Organization: Altamonte Springs Building/Fire Safety Division
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Sun Dec 22 18:24:32 EST 2013
Public Input No. 60-NFPA 70-2013 [ New Section after 90.4 ]

90.5 Equivalencies, Alternatives, and Modifications.

(A) Equivalencies. Nothing in this Code is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety to those prescribed by this Code, provided technical documentation is submitted to the AHJ to demonstrate equivalency and the system, method, or device is approved for the intended purpose.

(B) Alternatives. The specific requirements of this Code shall be permitted to be altered by the AHJ to allow alternative methods that will secure equivalent electrical safety, but in no case shall the alternative afford less electrical safety than, in the judgment of the AHJ, that which would be provided by compliance with the provisions contained in this Code.

(C) Modifications. The AHJ is authorized to modify any of the provisions of this Code upon application in writing by the owner, a lessee, or a duly authorized representative where there are practical difficulties in the way of carrying out the provisions of the Code, provided that the intent of the Code shall be complied with, public safety secured, and substantial justice done.

(D) Buildings with equivalency, alternatives, or modifications approved by the AHJ shall be considered as conforming with this Code.

(E) Each application for an alternative approach shall be filed with the AHJ and shall be accompanied by such evidence, letters, statements, results of tests, or other supporting information as required to justify the request. The AHJ shall keep a record of actions on such applications, and a signed copy of the AHJ's decision shall be provided for the applicant.

(F) Approval. The AHJ shall approve such alternative construction systems, materials, or methods of design when it is substantiated that the standards of this Code are at least equaled. If, in the opinion of the AHJ, the standards of this Code shall not be equaled by the alternative requested, approval for work shall be refused.

Statement of Problem and Substantiation for Public Input

The proposed public input language provides direction to the AHJ on how to deal with equivalencies, alternatives and modifications. This language is similar to other language utilized in NFPA standards/codes and is consistent with the NFPA Manual of Style. Providing similar language in NFPA 70 as to the other codes and standards will provide consistency and ease of use with the other NFPA documents.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck
Organization: Altamonte Springs Building/Fire Safety Division
Street Address:
City:
State:
Zip:
Submittal Date: Sun Dec 22 20:13:35 EST 2013
90.4 Enforcement.

This Code is intended to be suitable for mandatory application by governmental bodies that exercise legal jurisdiction over electrical installations, including signaling and communications systems, and for use by insurance inspectors. The authority having jurisdiction for enforcement of the Code has the responsibility for making interpretations of the rules, for deciding on the approval of equipment and materials, and for granting the special permission contemplated in a number of the rules. The authority having jurisdiction of enforcement of the Code shall accept listed and labeled equipment or materials where used or installed in accordance with instructions included with the listing or labeling.

By special permission, the authority having jurisdiction may waive specific requirements in this Code or permit alternative methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety.

This Code may require new products, constructions, or materials that may not yet be available at the time the Code is adopted. In such event, the authority having jurisdiction may permit the use of the products, constructions, or materials that comply with the most recent previous edition of this Code adopted by the jurisdiction.

Statement of Problem and Substantiation for Public Input

We have seen, in some areas, where the inspectors believe that they can accept or reject anything they please. In some areas an inspector has actually turned down a listed equipment because he didn't like it. There are many listed light fixtures out there that can raise one's eyebrow but if it is listed and installed per the instructions then it should be accepted. I believe Massachusetts has this statement in their amendments.

Submitter Information Verification

Submitter Full Name: DENNIS ALWON
Organization: ALWON ELECTRIC
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Fri Oct 17 17:33:18 EDT 2014
Public Input No. 2776-NFPA 70-2014 [Section No. 90.4]

90.4 Enforcement.

This Code is intended to be suitable for mandatory application by governmental bodies that exercise legal jurisdiction over electrical installations, including signaling and communications systems, and for use by insurance inspectors. The authority having jurisdiction for enforcement of the Code has the responsibility for making interpretations of the rules, for deciding on the approval of equipment and materials, and for granting the special permission contemplated in a number of the rules.

By special permission, the authority having jurisdiction may waive specific requirements in this Code or permit alternative methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety.

This Code may require new products, constructions, or materials that may not yet be available at the time the Code is adopted. In such event, the authority having jurisdiction may permit the use of the products, constructions, or materials that comply with the most recent previous edition of this Code adopted by the jurisdiction.

Statement of Problem and Substantiation for Public Input

This provision was added to the 90.4 in the 1984 NEC and it was never intended to be applied to products that don’t exist. The first electronic GFCI was developed in 1961 and the first requirement for GFCI protection in the NEC was in the 1968 edition and it was limited to protection of underwater lighting in swimming pools. Imagine what would have happened if the 1959 NEC required GFCI protection in light of the fact that the first circuit breaker type GFCI was not introduced until 1968 and the first receptacle type GFCI was not introduced until 1972. It is a disservice to the public to require a product that is not available to fulfill a requirement in the NEC. To continue to go down this path is to put the NEC in jeopardy of being adopted. The credibility of the NEC is compromised by requiring products that do not exist. To take this matter to be ridiculous, someone could propose a requirement for a receptacle that they plan to develop that will provide AFCI, GFCI, ALCI, ELCI, IDCI, and LCDI protection. This receptacle will also be tamper resistant, weather resistant, and have the ability to change color to match the wall color. Since 90.4 permits requiring new products that may not be available at the time the Code is adopted, this magic receptacle could be accepted.

Submitter Information Verification

Submitter Full Name: Robert Wilkinson
Organization: IEC Texas Gulf Coast
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Oct 29 11:30:13 EDT 2014
90.4 Enforcement.

This Code is intended to be suitable for mandatory application by governmental bodies that exercise legal jurisdiction over electrical installations, including signaling and communications systems, and for use by insurance inspectors. The authority having jurisdiction for enforcement of the Code has the responsibility for making interpretations of the rules, for deciding on the approval of equipment and materials, and for granting the special permission contemplated in a number of the rules.

By special permission, the authority having jurisdiction may grant special permission and waive specific requirements in this Code or permit alternative methods where it is assured that equivalent objectives are achieved by establishing and maintaining effective safety.

This Code may require new products, constructions, or materials that may not yet be available at the time the Code is adopted. In such event, the authority having jurisdiction may permit the use of the products, constructions, or materials that comply with the most recent previous edition of this Code adopted by the jurisdiction.

Statement of Problem and Substantiation for Public Input

"to be suitable" and "can" are unenforceable terms according to NEC_StyleManual_2011.pdf 3.2.1.

"By special permission" does not grant to the AHJ the ability to "waive specific requirements", rather the AHJ grants "special permission" by "waiving specific requirements".

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Mon Nov 03 14:11:09 EST 2014
90.7 Examination of Equipment for Safety.

For specific items of equipment and materials referred to in this Code, examinations for safety made under standard conditions provide a basis for approval where the record is made generally available through promulgation by organizations properly equipped and qualified for experimental testing, inspections of the run of goods at factories, and service-value determination through field inspections. This avoids the necessity for repetition of examinations by different examiners, frequently with inadequate facilities for such work, and the confusion that would result from conflicting reports on the suitability of devices and materials examined for a given purpose.

Examinations shall be performed based on requirements which are compatible with this Code.

It is the intent of this Code that factory-installed internal wiring or the construction of equipment need not be inspected at the time of installation of the equipment, except to detect alterations or damage, if the equipment has been listed by a qualified electrical testing laboratory that is recognized as having the facilities described in the preceding paragraph and that requires suitability for installation in accordance with this Code.

Informational Note No. 1: See requirements in 110.3.
Informational Note No. 2: Listed is defined in Article 100.
Informational Note No. 3: Informative Annex A contains an informative list of product safety standards for electrical equipment.

Statement of Problem and Substantiation for Public Input

Equipment standards are developed in coordination with installation Codes to ensure safety and compatibility. Product standards which do not specifically anticipate compliance or coordination with the NEC present installation problems (such as specifying metric conductor sizes), non-compliance issues (with Code specific construction requirements) and safety concerns (such as overcurrent protection schemes which are incompatible with the NEC). Product standards which are developed to align with the NEC identify this intention in the scope of each Standard, and unless additional evaluation is performed, only these products can be assured to meet NEC requirements. Reference to Annex A provides guidance as to which standards are commonly used.

Related Public Inputs for This Document

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Submitter Information Verification

Submitter Full Name: Robert Osborne
Organization: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 07 13:18:17 EST 2014
90.7 Examination of Equipment for Safety.
For specific items of equipment and materials referred to in this Code, examinations for safety made under standard conditions provide a basis for approval where the record is made generally available through promulgation by independent organizations properly equipped and qualified for experimental testing, inspections of the run of goods at factories, and service-value determination through field inspections. Standards used to evaluate equipment and materials need to be applicable for the product to ensure compliance with this Code. This avoids the necessity for repetition of examinations by different examiners, frequently with inadequate facilities for such work, and the confusion that would result from conflicting reports on the suitability of devices and materials examined for a given purpose.

It is the intent of this Code that factory-installed internal wiring or the construction of equipment need not be inspected at the time of installation of the equipment, except to detect alterations or damage, if the equipment has been listed by a qualified electrical testing laboratory that is recognized as having the facilities described in the preceding paragraph and that requires suitability for installation in accordance with this Code.

For listed and labeled equipment that is modified in the field, or unique one-of-a-kind equipment, field evaluations performed by a third party field evaluation body using the applicable standard provides a basis for approval.

Informational Note No. 1: See requirements in 110.3.
Informational Note No. 2: Listed is defined in Article 100.
Informational Note No. 3: Informative Annex A contains an informative list of product safety standards for electrical equipment.
Informational Note No. 4: See NFPA 790 for competency requirements for field evaluation bodies, and NFPA 791 for reporting requirements.

Statement of Problem and Substantiation for Public Input
To rely on examinations of safety by an organization, these organizations should have the expertise and knowledge, as well as be independent. Also, the standards used for the examination should be applicable for the product and address what is anticipated by this Code's requirements. The process and reliance on field evaluations is already referenced in NFPA 79. Besides certifications, field evaluations also provide a basis for approval. NFPA has developed two new documents, NFPA 790 and 791, in the last code cycle to provide assistance in determining who is qualified to perform field evaluations, and how the field evaluations should be performed.

There is no need to state in the Informational Note that Annex A is an "informative" annex, because an annex by definition is informative. Annex A is already identified as an informative annex.

Submitter Information Verification
Submitter Full Name: John Taeker
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Submittal Date: Fri Nov 07 17:57:21 EST 2014
90.8  Wiring Planning.

(A)  Future Expansion and Convenience.

Plans and specifications that provide ample space in raceways, spare raceways, and additional spaces allow for future increases in electric power and communications circuits. Distribution centers located in readily accessible locations provide convenience and safety of operation.

(B)  Number of Circuits in Enclosures.

It is elsewhere provided in this Code that the number of wires and circuits confined in a single enclosure be varyingly restricted. Limiting the number of circuits in a single enclosure minimizes the effects from a short circuit or ground fault.

Informational Note:  For additional information on wiring planning see IEEE 3001.1 Recommended Practice for the Planning of Industrial and Commercial Power Systems

Statement of Problem and Substantiation for Public Input

Wiring planning should be informed by faster-moving engineering considerations available in the new IEEE 3000 series of recommended practices. The IEEE Industrial Applications Society 3000 series of standards are part of a larger project to revise and reorganize the technical content of the 13 existing IEEE Color Books which provided significant engineering information from experienced engineers. While many of the 3000 series standards are still “works in progress”, and the topical coverage seeking its proper place, it is not too soon for the various NEC committees to evaluate the importance of strengthening the NEC’s linkage to electrical engineering thought leadership.

More information is available at this link http://standards.ieee.org/findstds/3000stds/index.html

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Submittal Date:  Mon Nov 03 21:38:43 EST 2014
90.8 Wiring Planning,

(A) Informational Note 1: Future Expansion and Convenience.
Plans and specifications that provide ample space in raceways, spare raceways, and additional spaces allow for future increases in electric power and communications circuits. Distribution centers located in readily accessible locations provide convenience and safety of operation.

(B) Informational Note 2: Number of Circuits in Enclosures.
It is elsewhere provided in this Code that the number of wires and circuits confined in a single enclosure be varyingly restricted. Limiting the number of circuits in a single enclosure minimizes the effects from a short circuit or ground fault.

Statement of Problem and Substantiation for Public Input

90.8 is a non-enforceable article and in conformance with the NEC format should be moved to 90.1 as an informational note.

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Submittal Date: Mon Apr 07 14:53:59 EDT 2014
Public Input No. 4619-NFPA 70-2014 [ Section No. 90.8(B) ]

(B) Number of Circuits in Enclosures.

It is elsewhere provided in this Code that the number of wires, conductors, and circuits confined in a single enclosure be varyingly restricted. Limiting the number of circuits in a single enclosure minimizes the effects from a short circuit or ground fault.

Statement of Problem and Substantiation for Public Input

Wires are not defined in the NEC and the text should be changed to a generic term of “conductors” since bare, covered, and insulated conductors are all defined in Article 100. This text has been in the NEC since before the 1940 NEC, the updated version of “conductors” should be used, rather than the antiquated version of “wires.”

Submitter Information Verification

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Submittal Date: Fri Nov 07 12:03:58 EST 2014
Public Input No. 2662-NFPA 70-2014 [ Sections 90.9(C), 90.9(D) ]

Sections 90.9(C), 90.9(D)

(C) Permitted Uses of Soft Conversion.
The cases given in 90.9(C) (1) through (C)(4) shall not be required to use hard conversion and shall be permitted to use soft conversion.

(1) Trade Sizes.
Where the actual measured size of a product is not the same as the nominal size, trade size designators shall be used rather than dimensions. Trade practices shall be followed in all cases.

(2) Extracted Material.
Where material is extracted from another standard, the context of the original material shall not be compromised or violated. Any editing of the extracted text shall be confined to making the style consistent with that of the NEC.

(3) Industry Practice.
Where industry practice is to express units in inch-pound units, the inclusion of SI units shall not be required.

(4) Safety.
Where a negative impact on safety would result, soft conversion shall be used.

(D) Compliance.
Conversion from inch-pound units to SI units shall be permitted to be an approximate conversion. Compliance with the numbers shown in either the SI system or the inch-pound system shall constitute compliance with this Code.


90.2 Definitions

Hard conversion is considered a change in dimensions or properties of an item into new sizes that might or might not be interchangeable with the sizes used in the original measurement.

Soft conversion is considered a direct mathematical conversion and involves a change in the description of an existing measurement but not in the actual dimension.


Statement of Problem and Substantiation for Public Input

Currently hard conversion and soft conversion are defined in an information note. Information notes are not enforceable per the code. If hard and soft conversions are going to be defined, they also need to be in the correct section of the code. IE XXX.2 per what is currently being taught in the codeology methodology. This means that the current 90.2 would have to be moved to a different section.

As I am just an apprentice in training, I have not yet completely read the entire NEC 70 manual to see if these terms are used elsewhere in the code. In that case these two definitions would then need to be in Article 100, instead of article 90.2.

Submitter Information Verification

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Submittal Date: Tue Oct 28 00:01:37 EDT 2014
Public Input No. 1928-NFPA 70-2014 [Section No. 90.9(C)(1)]

(1) Trade Sizes.
Where the actual measured size of a product is not the same as the nominal size, trade size designators shall be used rather than dimensions. Trade practices shall be followed in all cases.

Statement of Problem and Substantiation for Public Input

Submission 1902 may have removed “nominal” from this section. This submission restores it. 1902 removes all “nominal” words from the NEC because about 300 instances refer to voltage, and “nominal” is being made the default kind of voltage.

Refer to the substantiation for 1902 for more information.

Related Public Inputs for This Document

<table>
<thead>
<tr>
<th>Related Input</th>
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<tr>
<td>Public Input No. 1902-NFPA 70-2014 [Global Input]</td>
<td>This submittal depends on 1902</td>
</tr>
</tbody>
</table>

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
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Submittal Date: Wed Oct 15 16:00:05 EDT 2014
90.10 Severability. If any provision of this Code or the application thereof to any person or circumstance is held invalid, the remainder of the Code and the application of such provision to other persons or circumstances shall not be affected thereby.

Statement of Problem and Substantiation for Public Input

This PI inserts standard severability language to ensure if any portion of the code is found to be invalid by a court, the remaining portions will still remain in force.

Submitter Information Verification

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Submittal Date: Sun Dec 22 20:25:49 EST 2013
Public Input No. 1953-NFPA 70-2014 [ New Article after 90 ]

90.10 Calculations

**90.10 Calculations.** Calculations shall be permitted to be rounded to the nearest whole ampere, with decimal fractions smaller than 0.5 dropped.

Statement of Problem and Substantiation for Public Input

This proposal (and its companion) moves the language of 220.5(B) to this new section in Article 90. This provision should apply throughout the Code, not just in Article 220. While there are certainly a lot of calculations performed as a result of Article 220, there are many more that are not. For example, ampacity adjustment and correction factors, conductor sizing, etc. This proposal is suggesting a new section 90.10 because it is similar, in a way, to 90.9. If the members of CMP(s) can decide on a better location that makes this provision applicable to the entire Code, that would certainly be fine as well.

Submitter Information Verification

**Submitter Full Name:** RYAN JACKSON  
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**Submittal Date:** Wed Oct 15 18:33:23 EDT 2014
Article 100 Definitions

Scope. This article contains only those definitions essential to the proper application of this Code. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. In general, only those terms that are used in two or more articles are defined in Article 100. Other definitions are included in the article in which they are used but may be referenced in Article 100.

Part I of this article contains definitions intended to apply wherever the terms are used throughout this Code.
Part II contains definitions applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600 volts, nominal.

Part I. General

Accessible (as applied to equipment).
Admitting close approach; not guarded by locked doors, elevation, or other effective means.

Accessible (as applied to wiring methods).
Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.

Accessible, Readily (Readily Accessible).
Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to actions such as to use tools, to climb over or remove obstacles, or to resort to portable ladders, and so forth.

Adjustable Speed Drive.
Power conversion equipment that provides a means of adjusting the speed of an electric motor.

Informational Note: A variable frequency drive is one type of electronic adjustable speed drive that controls the rotational speed of an ac electric motor by controlling the frequency and voltage of the electrical power supplied to the motor.

Adjustable Speed Drive System.
A combination of an adjustable speed drive, its associated motor(s), and auxiliary equipment.

Ampacity.
The maximum current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating.

Appliance.
Utilization equipment, generally other than industrial, that is normally built in standardized sizes or types and is installed or connected as a unit to perform one or more functions such as clothes washing, air-conditioning, food mixing, deep frying, and so forth.

Approved.
Acceptable to the authority having jurisdiction.

Arc-Fault Circuit Interrupter (AFCI).
A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

Askarel.
A generic term for a group of nonflammable synthetic chlorinated hydrocarbons used as electrical insulating media.

Informational Note: Askarels of various compositional types are used. Under arcing conditions, the gases produced, while consisting predominantly of noncombustible hydrogen chloride, can include varying amounts of combustible gases, depending on the askarel type.

Attachment Plug (Plug Cap) (Plug).
A device that, by insertion in a receptacle, establishes a connection between the conductors of the attached flexible cord and the conductors connected permanently to the receptacle.

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.

Informational Note: 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.

**Automatic.**
Performing a function without the necessity of human intervention.

**Bathroom.**
An area including a basin with one or more of the following: a toilet, a urinal, a tub, a shower, a bidet, or
similar plumbing fixtures.

**Battery System.**
Interconnected battery subsystems consisting of one or more storage batteries and battery chargers, and
can include inverters, converters, and associated electrical equipment.

**Bonded (Bonding).**
Connected to establish electrical continuity and conductivity.

**Bonding Conductor or Jumper.**
A reliable conductor to ensure the required electrical conductivity between metal parts required to be
electrically connected.

**Bonding Jumper, Equipment.**
The connection between two or more portions of the equipment grounding conductor.

**Bonding Jumper, Main.**
The connection between the grounded circuit conductor and the equipment grounding conductor at the
service.

**Bonding Jumper, System.**
The connection between the grounded circuit conductor and the supply-side bonding jumper, or the
equipment grounding conductor, or both, at a separately derived system.

**Branch Circuit.**
The circuit conductors between the final overcurrent device protecting the circuit and the outlet(s).

**Branch Circuit, Appliance.**
A branch circuit that supplies energy to one or more outlets to which appliances are to be connected and
that has no permanently connected luminaires that are not a part of an appliance.

**Branch Circuit, General-Purpose.**
A branch circuit that supplies two or more receptacles or outlets for lighting and appliances.

**Branch Circuit, Individual.**
A branch circuit that supplies only one utilization equipment.

**Branch Circuit, Multiwire.**
A branch circuit that consists of two or more ungrounded conductors that have a voltage between them, and
a grounded conductor that has equal voltage between it and each ungrounded conductor of the circuit and
that is connected to the neutral or grounded conductor of the system.

**Building.**
A structure that stands alone or that is cut off from adjoining structures by fire walls with all openings therein
protected by approved fire doors.

**Cabinet.**
An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame,
mat, or trim in which a swinging door or doors are or can be hung.

**Cable Routing Assembly.**
A single channel or connected multiple channels, as well as associated fittings, forming a structural system
that is used to support and route communications wires and cables, optical fiber cables, data cables
associated with information technology and communications equipment, Class 2 and Class 3 cables, and
power-limited fire alarm cables.

**Charge Controller.**
Equipment that controls dc voltage or dc current, or both, and that is used to charge a battery or other
energy storage device.

**Circuit Breaker.**
A device designed to open and close a circuit by nonautomatic means and to open the circuit automatically
on a predetermined overcurrent without damage to itself when properly applied within its rating.

Informational Note: The automatic opening means can be integral, direct acting with the circuit
breaker, or remote from the circuit breaker.

**Adjustable (as applied to circuit breakers).**
A qualifying term indicating that the circuit breaker can be set to trip at various values of current, time, or
both, within a predetermined range.
**Instantaneous Trip (as applied to circuit breakers).**
A qualifying term indicating that no delay is purposely introduced in the tripping action of the circuit breaker.

**Inverse Time (as applied to circuit breakers).**
A qualifying term indicating that there is purposely introduced a delay in the tripping action of the circuit breaker, which delay decreases as the magnitude of the current increases.

**Nonadjustable (as applied to circuit breakers).**
A qualifying term indicating that the circuit breaker does not have any adjustment to alter the value of the current at which it will trip or the time required for its operation.

**Setting (of circuit breakers).**
The value of current, time, or both, at which an adjustable circuit breaker is set to trip.

**Clothes Closet.**
A nonhabitable room or space intended primarily for storage of garments and apparel.

**Communications Equipment.**
The electronic equipment that performs the telecommunications operations for the transmission of audio, video, and data, and includes power equipment (e.g., dc converters, inverters, and batteries), technical support equipment (e.g., computers), and conductors dedicated solely to the operation of the equipment.

**Communications Raceway.**
An enclosed channel of nonmetallic materials designed expressly for holding communications wires and cables, typically communications wires and cables and optical fiber and data (Class 2 and Class 3) in plenum, riser, and general-purpose applications.

**Concealed.**
Rendered inaccessible by the structure or finish of the building.

**Informational Note:** Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.

**Conductor, Bare.**
A conductor having no covering or electrical insulation whatsoever.

**Conductor, Covered.**
A conductor encased within material of composition or thickness that is not recognized by this Code as electrical insulation.

**Conductor, Insulated.**
A conductor encased within material of composition and thickness that is recognized by this Code as electrical insulation.

**Conduit Body.**
A separate portion of a conduit or tubing system that provides access through a removable cover(s) to the interior of the system at a junction of two or more sections of the system or at a terminal point of the system.

Boxes such as FS and FD or larger cast or sheet metal boxes are not classified as conduit bodies.

**Connector, Pressure (Solderless).**
A device that establishes a connection between two or more conductors or between one or more conductors and a terminal by means of mechanical pressure and without the use of solder.

**Continuous Load.**
A load where the maximum current is expected to continue for 3 hours or more.

**Control Circuit.**
The circuit of a control apparatus or system that carries the electric signals directing the performance of the controller but does not carry the main power current.

**Controller.**
A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected.

**Cooking Unit, Counter-Mounted.**
A cooking appliance designed for mounting in or on a counter and consisting of one or more heating elements, internal wiring, and built-in or mountable controls.

**Coordination (Selective).**
Localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the selection and installation of overcurrent protective devices and their ratings or settings for the full range of available overcurrents, from overload to the maximum available fault current, and for the full range of overcurrent protective device opening times associated with those overcurrents.

**Copper-Clad Aluminum Conductors.**
Conductors drawn from a copper-clad aluminum rod, with the copper metallurgically bonded to an aluminum core, where the copper forms a minimum of 10 percent of the cross-sectional area of a solid conductor or each strand of a stranded conductor.
Cutout Box.  
An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the box proper.

Counter Top.  
A horizontal work surface in kitchens and bathrooms.

Dead Front.  
Without live parts exposed to a person on the operating side of the equipment.

Demand Factor.  
The ratio of the maximum demand of a system, or part of a system, to the total connected load of a system or the part of the system under consideration.

Device.  
A unit of an electrical system, other than a conductor, that carries or controls electric energy as its principal function.

Disconnecting Means.  
A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

Dusttight.  
Constructed so that dust will not enter the enclosing case under specified test conditions.

Duty, Continuous.  
Operation at a substantially constant load for an indefinitely long time.

Duty, Intermittent.  
Operation for alternate intervals of (1) load and no load; or (2) load and rest; or (3) load, no load, and rest.

Duty, Periodic.  
Intermittent operation in which the load conditions are regularly recurrent.

Duty, Short-Time.  
Operation at a substantially constant load for a short and definite, specified time.

Duty, Varying.  
Operation at loads, and for intervals of time, both of which may be subject to wide variation.

Dwelling, One-Family.  
A building that consists solely of one dwelling unit.

Dwelling, Two-Family.  
A building that consists solely of two dwelling units.

Dwelling, Multifamily.  
A building that contains three or more dwelling units.

Dwelling Unit.  
A single unit, providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking, and sanitation.

Effective Ground-Fault Current Path.  
An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions from the point of a ground fault on a wiring system to the electrical supply source and that facilitates the operation of the overcurrent protective device or ground-fault detectors.

Electric Power Production and Distribution Network.  
Power production, distribution, and utilization equipment and facilities, such as electric utility systems that deliver electric power to the connected loads, that are external to and not controlled by an interactive system.

Electric Sign.  
A fixed, stationary, or portable self-contained, electrically illuminated utilization equipment with words or symbols designed to convey information or attract attention.

Electric-Discharge Lighting.  
Systems of illumination utilizing fluorescent lamps, high-intensity discharge (HID) lamps, or neon tubing.

Electrically Actuated Fuse.  
An overcurrent protective device that generally consists of a control module that provides current-sensing, electronically derived time–current characteristics, energy to initiate tripping, and an interrupting module that interrupts current when an overcurrent occurs. Such fuses may or may not operate in a current-limiting fashion, depending on the type of control selected.

Enclosed.  
Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting energized parts.

Enclosure.  
The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage.
Informational Note: See Table 110.28 for examples of enclosure types.

**Energized.**
Electrically connected to, or is, a source of voltage.

**Equipment.**
A general term, including fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, an electrical installation.

**Explosionproof Equipment.**
Equipment enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby.

Informational Note: For further information, see ANSI/UL 1203-2009, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.*

**Exposed (as applied to live parts).**
Capable of being inadvertently touched or approached nearer than a safe distance by a person.

Informational Note: This term applies to parts that are not suitably guarded, isolated, or insulated.

**Exposed (as applied to wiring methods).**
On or attached to the surface or behind panels designed to allow access.

**Externally Operable.**
Capable of being operated without exposing the operator to contact with live parts.

**Feeder.**
All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device.

**Festoon Lighting.**
A string of outdoor lights that is suspended between two points.

**Fitting.**
An accessory such as a locknut, bushing, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function.

**Garage.**
A building or portion of a building in which one or more self-propelled vehicles can be kept for use, sale, storage, rental, repair, exhibition, or demonstration purposes.

Informational Note: For commercial garages, repair and storage, see Article 511.

**Ground.**
The earth.

**Ground Fault.**
An unintentional, electrically conductive connection between an ungrounded conductor of an electrical circuit and the normally non–current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment, or earth.

**Grounded (Grounding).**
Connected (connecting) to ground or to a conductive body that extends the ground connection.

**Grounded, Solidly.**
Connected to ground without inserting any resistor or impedance device.

**Grounded Conductor.**
A system or circuit conductor that is intentionally grounded.

**Ground-Fault Circuit Interrupter (GFCI).**
A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device.

Informational Note: Class A ground-fault circuit interrupters trip when the current to ground is 6 mA or higher and do not trip when the current to ground is less than 4 mA. For further information, see UL 943, *Standard for Ground-Fault Circuit Interrupters.*

**Ground-Fault Current Path.**
An electrically conductive path from the point of a ground fault on a wiring system through normally non–current-carrying conductors, equipment, or the earth to the electrical supply source.

Informational Note: Examples of ground-fault current paths are any combination of equipment grounding conductors, metallic raceways, metallic cable sheaths, electrical equipment, and any other electrically conductive material such as metal, water, and gas piping; steel framing members; stucco mesh; metal ducting; reinforcing steel; shields of communications cables; and the earth itself.

**Ground-Fault Protection of Equipment.**
A system intended to provide protection of equipment from damaging line-to-ground fault currents by
operating to cause a disconnecting means to open all ungrounded conductors of the faulted circuit. This protection is provided at current levels less than those required to protect conductors from damage through the operation of a supply circuit overcurrent device.

**Grounding Conductor, Equipment (EGC).**

The conductive path(s) that provides a ground-fault current path and connects normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both.

Informational Note No. 1: It is recognized that the equipment grounding conductor also performs bonding.

Informational Note No. 2: See 250.118 for a list of acceptable equipment grounding conductors.

**Grounding Electrode.**

A conducting object through which a direct connection to earth is established.

**Grounding Electrode Conductor.**

A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on the grounding electrode system.

**Guarded.**

Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach or contact by persons or objects to a point of danger.

**Guest Room.**

An accommodation combining living, sleeping, sanitary, and storage facilities within a compartment.

**Guest Suite.**

An accommodation with two or more contiguous rooms comprising a compartment, with or without doors between such rooms, that provides living, sleeping, sanitary, and storage facilities.

**Handhole Enclosure.**

An enclosure for use in underground systems, provided with an open or closed bottom, and sized to allow personnel to reach into, but not enter, for the purpose of installing, operating, or maintaining equipment or wiring or both.

**Hermetic Refrigerant Motor-Compressor.**

A combination consisting of a compressor and motor, both of which are enclosed in the same housing, with no external shaft or shaft seals, with the motor operating in the refrigerant.

**Hoistway.**

Any shaftway, hatchway, well hole, or other vertical opening or space in which an elevator or dumbwaiter is designed to operate.

**Hybrid System.**

A system comprised of multiple power sources. These power sources could include photovoltaic, wind, micro-hydro generators, engine-driven generators, and others, but do not include electric power production and distribution network systems. Energy storage systems such as batteries, flywheels, or superconducting magnetic storage equipment do not constitute a power source for the purpose of this definition. The energy regenerated by an overhauling (descending) elevator does not constitute a power source for the purpose of this definition.

**Identified (as applied to equipment).**

Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular Code requirement.

Informational Note: Some examples of ways to determine suitability of equipment for a specific purpose, environment, or application include investigations by a qualified testing laboratory (listing and labeling), an inspection agency, or other organizations concerned with product evaluation.

**In Sight From (Within Sight From, Within Sight).**

Where this Code specifies that one equipment shall be “in sight from,” “within sight from,” or “within sight of,” and so forth, another equipment, the specified equipment is to be visible and not more than 15 m (50 ft) distant from the other.

**Industrial Control Panel.**

An assembly of two or more components consisting of one of the following: (1) power circuit components only, such as motor controllers, overload relays, fused disconnect switches, and circuit breakers; (2) control circuit components only, such as push buttons, pilot lights, selector switches, timers, switches, and control relays; (3) a combination of power and control circuit components. These components, with associated wiring and terminals, are mounted on, or contained within, an enclosure or mounted on a subpanel.

The industrial control panel does not include the controlled equipment.

**Interactive System.**

An electric power production system that is operating in parallel with and capable of delivering energy to an electric primary source supply system.
Interrupting Rating.
The highest current at rated voltage that a device is identified to interrupt under standard test conditions.

Informational Note: Equipment intended to interrupt current at other than fault levels may have its interrupting rating implied in other ratings, such as horsepower or locked rotor current.

Intersystem Bonding Termination.
A device that provides a means for connecting intersystem bonding conductors for communications systems to the grounding electrode system.

Isolated (as applied to location).
Not readily accessible to persons unless special means for access are used.

Kitchen.
an area with a sink and permanent provisions for food preparation and cooking.

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.

Lighting Outlet.
an outlet intended for the direct connection of a lampholder or luminaire.

Lighting Track (Track Lighting).
a manufactured assembly designed to support and energize luminaires that are capable of being readily repositioned on the track. Its length can be altered by the addition or subtraction of sections of track.

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.

Informational Note: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.

Live Parts.
Energized conductive components.

Location, Damp.
locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture.

Informational Note: Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold-storage warehouses.

Location, Dry.
A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.

Location, Wet.
Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather.

Luminaire.
a complete lighting unit consisting of a light source such as a lamp or lamps, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light. A lampholder itself is not a luminaire.

Motor Control Center.
an assembly of one or more enclosed sections having a common power bus and principally containing motor control units.

Multioutlet Assembly.
a type of surface, flush, or freestanding raceway designed to hold conductors and receptacles, assembled in the field or at the factory.

Neutral Conductor.
The conductor connected to the neutral point of a system that is intended to carry current under normal conditions.

Neutral Point.
The common point on a wye-connection in a polyphase system or midpoint on a single-phase, 3-wire
system, or midpoint of a single-phase portion of a 3-phase delta system, or a midpoint of a 3-wire, direct-current system.

Informational Note: At the neutral point of the system, the vectorial sum of the nominal voltages from all other phases within the system that utilize the neutral, with respect to the neutral point, is zero potential.

Nonautomatic.
Requiring human intervention to perform a function.

Nonlinear Load.
A load where the wave shape of the steady-state current does not follow the wave shape of the applied voltage.

Informational Note: Electronic equipment, electronic/electric-discharge lighting, adjustable-speed drive systems, and similar equipment may be nonlinear loads.

Outlet.
A point on the wiring system at which current is taken to supply utilization equipment.

Outline Lighting.
An arrangement of incandescent lamps, electric-discharge lighting, or other electrically powered light sources to outline or call attention to certain features such as the shape of a building or the decoration of a window.

Overcurrent.
Any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short circuit, or ground fault.

Informational Note: A current in excess of rating may be accommodated by certain equipment and conductors for a given set of conditions. Therefore, the rules for overcurrent protection are specific for particular situations.

Overcurrent Protective Device, Branch-Circuit.
A device capable of providing protection for service, feeder, and branch circuits and equipment over the full range of overcurrents between its rated current and its interrupting rating. Such devices are provided with interrupting ratings appropriate for the intended use but no less than 5000 amperes.

Overcurrent Protective Device, Supplementary.
A device intended to provide limited overcurrent protection for specific applications and utilization equipment such as luminaires and appliances. This limited protection is in addition to the protection provided in the required branch circuit by the branch-circuit overcurrent protective device.

Overload.
Operation of equipment in excess of normal, full-load rating, or of a conductor in excess of rated ampacity that, when it persists for a sufficient length of time, would cause damage or dangerous overheating. A fault, such as a short circuit or ground fault, is not an overload.

Panelboard.
A single panel or group of panel units designed for assembly in the form of a single panel, including buses and automatic overcurrent devices, and equipped with or without switches for the control of light, heat, or power circuits; designed to be placed in a cabinet or cutout box placed in or against a wall, partition, or other support; and accessible only from the front.

Photovoltaic (PV) System.
The total components and sub-system that, in combination, convert solar energy into electric energy suitable for connection to a utilization load.

Plenum.
A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.

Power Outlet.
An enclosed assembly that may include receptacles, circuit breakers, fuseholders, fused switches, buses, and watt-hour meter mounting means; intended to supply and control power to mobile homes, recreational vehicles, park trailers, or boats or to serve as a means for distributing power required to operate mobile or temporarily installed equipment.

Premises Wiring (System).
Interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed. This includes (a) wiring from the service point or power source to the outlets or (b) wiring from and including the power source to the outlets where there is no service point.

Such wiring does not include wiring internal to appliances, luminaires, motors, controllers, motor control centers, and similar equipment.

Informational Note: Power sources include, but are not limited to, interconnected or stand-alone batteries, solar photovoltaic systems, other distributed generation systems, or generators.

Qualified Person.
One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.

Informational Note: Refer to NFPA 70E-2012, Standard for Electrical Safety in the Workplace, for electrical safety training requirements.

**Raceway.**
An enclosed channel of metallic or nonmetallic materials designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this Code.

Informational Note: A raceway is identified within specific article definitions.

**Rainproof.**
Constructed, protected, or treated so as to prevent rain from interfering with the successful operation of the apparatus under specified test conditions.

**Raintight.**
Constructed or protected so that exposure to a beating rain will not result in the entrance of water under specified test conditions.

**Receptacle.**
A receptacle is a contact device installed at the outlet for the connection of an attachment plug. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple receptacle is two or more contact devices on the same yoke.

**Receptacle Outlet.**
An outlet where one or more receptacles are installed.

**Remote-Control Circuit.**
Any electrical circuit that controls any other circuit through a relay or an equivalent device.

**Retrofit Kit.**
A general term for a complete subassembly of parts and devices for field conversion of utilization equipment.

**Sealable Equipment.**
Equipment enclosed in a case or cabinet that is provided with a means of sealing or locking so that live parts cannot be made accessible without opening the enclosure.

Informational Note: The equipment may or may not be operable without opening the enclosure.

**Separately Derived System.**
An electrical source, other than a service, having no direct connection(s) to circuit conductors of any other electrical source other than those established by grounding and bonding connections.

**Service.**
The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

**Service Cable.**
Service conductors made up in the form of a cable.

**Service Conductors.**
The conductors from the service point to the service disconnecting means.

**Service Conductors, Overhead.**
The overhead conductors between the service point and the first point of connection to the service-entrance conductors at the building or other structure.

**Service Conductors, Underground.**
The underground conductors between the service point and the first point of connection to the service-entrance conductors in a terminal box, meter, or other enclosure, inside or outside the building wall.

Informational Note: Where there is no terminal box, meter, or other enclosure, the point of connection is considered to be the point of entrance of the service conductors into the building.

**Service Drop.**
The overhead conductors between the utility electric supply system and the service point.

**Service-Entrance Conductors, Overhead System.**
The service conductors between the terminals of the service equipment and a point usually outside the building, clear of building walls, where joined by tap or splice to the service drop or overhead service conductors.

**Service-Entrance Conductors, Underground System.**
The service conductors between the terminals of the service equipment and the point of connection to the service lateral or underground service conductors.

Informational Note: Where service equipment is located outside the building walls, there may be no service-entrance conductors or they may be entirely outside the building.

**Service Equipment.**
The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service conductors to a building or other structure, or an...
otherwise designated area, and intended to constitute the main control and cutoff of the supply.

**Service Lateral.**
The underground conductors between the utility electric supply system and the service point.

**Service Point.**
The point of connection between the facilities of the serving utility and the premises wiring.

Informational Note: The service point can be described as the point of demarcation between where
the serving utility ends and the premises wiring begins. The serving utility generally specifies the
location of the service point based on the conditions of service.

**Short-Circuit Current Rating.**
The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is able to be
connected without sustaining damage exceeding defined acceptance criteria.

**Show Window.**
Any window used or designed to be used for the display of goods or advertising material, whether it is fully
or partly enclosed or entirely open at the rear and whether or not it has a platform raised higher than the
street floor level.

**Signaling Circuit.**
Any electrical circuit that energizes signaling equipment.

**Special Permission.**
The written consent of the authority having jurisdiction.

**Structure.**
That which is built or constructed.

**Substation.**
An enclosed assemblage of equipment (e.g., switches, interrupting devices, circuit breakers, buses, and
transformers) through which electric energy is passed for the purpose of distribution, switching, or modifying
its characteristics.

**Surge Arrester.**
A protective device for limiting surge voltages by discharging or bypassing surge current; it also prevents
continued flow of follow current while remaining capable of repeating these functions.

**Surge-Protective Device (SPD).**
A protective device for limiting transient voltages by diverting or limiting surge current; it also prevents
continued flow of follow current while remaining capable of repeating these functions and is designated as
follows:

Type 1: Permanently connected SPDs intended for installation between the secondary of the service
transformer and the line side of the service disconnect overcurrent device.

Type 2: Permanently connected SPDs intended for installation on the load side of the service disconnect
overcurrent device, including SPDs located at the branch panel.

Type 3: Point of utilization SPDs.

Type 4: Component SPDs, including discrete components, as well as assemblies.

Informational Note: For further information on Type 1, Type 2, Type 3, and Type 4 SPDs, see UL

**Switch, Bypass Isolation.**
A manually operated device used in conjunction with a transfer switch to provide a means of directly
connecting load conductors to a power source and of disconnecting the transfer switch.

**Switch, General-Use.**
A switch intended for use in general distribution and branch circuits. It is rated in amperes, and it is capable
of interrupting its rated current at its rated voltage.

**Switch, General-Use Snap.**
A form of general-use switch constructed so that it can be installed in device boxes or on box covers, or
otherwise used in conjunction with wiring systems recognized by this Code.

**Switch, Isolating.**
A switch intended for isolating an electrical circuit from the source of power. It has no interrupting rating, and
it is intended to be operated only after the circuit has been opened by some other means.

**Switch, Motor-Circuit.**
A switch rated in horsepower that is capable of interrupting the maximum operating overload current of a
motor of the same horsepower rating as the switch at the rated voltage.

**Switch, Transfer.**
An automatic or nonautomatic device for transferring one or more load conductor connections from one
power source to another.

**Switchboard.**
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interruption by severing of the fuse link or by opening of the contacts will occur under oil.

*Oil Switch.*
A switch having contacts that operate under oil (or askarel or other suitable liquid).

*Regulator Bypass Switch.*
A specific device or combination of devices designed to bypass a regulator.

**Statement of Problem and Substantiation for Public Input**

The availability of a power system is its essential characteristic. Everything we do in the power industry is focused on making sure that power is available. This definition, coupled with the term "reliable" should track explicitly in the NEC and should raise awareness that reliability calculations are as essential as short circuit and load flow calculations.

**Submitter Information Verification**

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<thead>
<tr>
<th>Submitter Full Name:</th>
<th>Michael Anthony</th>
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Article 100 Definitions

Scope. This article contains only those definitions essential to the proper application of this Code. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. In general, only those terms that are used in two or more articles are defined in Article 100. Other definitions are included in the article in which they are used but may be referenced in Article 100.

Part I of this article contains definitions intended to apply wherever the terms are used throughout this Code. Part II contains definitions applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600 volts, nominal.

Part I. General

Accessible (as applied to equipment).
Admitting close approach; not guarded by locked doors, elevation, or other effective means.

Accessible (as applied to wiring methods).
Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.

Accessible, Readily (Readily Accessible).
Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to actions such as to use tools, to climb over or remove obstacles, or to resort to portable ladders, and so forth.

Adjustable Speed Drive.
Power conversion equipment that provides a means of adjusting the speed of an electric motor.
Informational Note: A variable frequency drive is one type of electronic adjustable speed drive that controls the rotational speed of an ac electric motor by controlling the frequency and voltage of the electrical power supplied to the motor.

Adjustable Speed Drive System.
A combination of an adjustable speed drive, its associated motor(s), and auxiliary equipment.

Ampacity.
The maximum current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating.

Appliance.
Utilization equipment, generally other than industrial, that is normally built in standardized sizes or types and is installed or connected as a unit to perform one or more functions such as clothes washing, air-conditioning, food mixing, deep frying, and so forth.

Approved.
Acceptable to the authority having jurisdiction.

Arc-Fault Circuit Interrupter (AFCI).
A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

Askarel.
A generic term for a group of nonflammable synthetic chlorinated hydrocarbons used as electrical insulating media.
Informational Note: Askarels of various compositional types are used. Under arcing conditions, the gases produced, while consisting predominantly of noncombustible hydrogen chloride, can include varying amounts of combustible gases, depending on the askarel type.

Attachment Plug (Plug Cap) (Plug).
A device that, by insertion in a receptacle, establishes a connection between the conductors of the attached flexible cord and the conductors connected permanently to the receptacle.

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.
Informational Note: 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.

**Automatic.**
Performing a function without the necessity of human intervention.

**Barrier, Integral to the Cable** - A dielectric non-metallic material rated at the highest voltage rating of the assembled cable or a metallic material connected to an equipment grounding conductor contained within an overall jacket or armor, used to separate conductors of electric light, power, Class 1, non-power-limited fire alarm circuits, and medium-power network-powered broad band communication conductors from Class 2 and Class 3 circuit conductors or cables.

**Bathroom.**
An area including a basin with one or more of the following: a toilet, a urinal, a tub, a shower, a bidet, or similar plumbing fixtures.

**Battery System.**
Interconnected battery subsystems consisting of one or more storage batteries and battery chargers, and can include inverters, converters, and associated electrical equipment.

**Bonded (Bonding).**
Connected to establish electrical continuity and conductivity.

**Bonding Conductor or Jumper.**
A reliable conductor to ensure the required electrical conductivity between metal parts required to be electrically connected.

**Bonding Jumper, Equipment.**
The connection between two or more portions of the equipment grounding conductor.

**Bonding Jumper, Main.**
The connection between the grounded circuit conductor and the equipment grounding conductor at the service.

**Bonding Jumper, System.**
The connection between the grounded circuit conductor and the supply-side bonding jumper, or the equipment grounding conductor, or both, at a separately derived system.

**Branch Circuit.**
The circuit conductors between the final overcurrent device protecting the circuit and the outlet(s).

**Branch Circuit, Appliance.**
A branch circuit that supplies energy to one or more outlets to which appliances are to be connected and that has no permanently connected luminaires that are not a part of an appliance.

**Branch Circuit, General-Purpose.**
A branch circuit that supplies two or more receptacles or outlets for lighting and appliances.

**Branch Circuit, Individual.**
A branch circuit that supplies only one utilization equipment.

**Branch Circuit, Multiwire.**
A branch circuit that consists of two or more ungrounded conductors that have a voltage between them, and a grounded conductor that has equal voltage between it and each ungrounded conductor of the circuit and that is connected to the neutral or grounded conductor of the system.

**Building.**
A structure that stands alone or that is cut off from adjoining structures by fire walls with all openings therein protected by approved fire doors.

**Cabinet.**
An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.

**Cable Routing Assembly.**
A single channel or connected multiple channels, as well as associated fittings, forming a structural system that is used to support and route communications wires and cables, optical fiber cables, data cables associated with information technology and communications equipment, Class 2 and Class 3 cables, and power-limited fire alarm cables.

**Charge Controller.**
Equipment that controls dc voltage or dc current, or both, and that is used to charge a battery or other energy storage device.

**Circuit Breaker.**
A device designed to open and close a circuit by nonautomatic means and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its rating.
Informational Note: The automatic opening means can be integral, direct acting with the circuit breaker, or remote from the circuit breaker.

**Adjustable (as applied to circuit breakers).**
A qualifying term indicating that the circuit breaker can be set to trip at various values of current, time, or both, within a predetermined range.

**Instantaneous Trip (as applied to circuit breakers).**
A qualifying term indicating that no delay is purposely introduced in the tripping action of the circuit breaker.

**Inverse Time (as applied to circuit breakers).**
A qualifying term indicating that there is purposely introduced a delay in the tripping action of the circuit breaker, which delay decreases as the magnitude of the current increases.

**Nonadjustable (as applied to circuit breakers).**
A qualifying term indicating that the circuit breaker does not have any adjustment to alter the value of the current at which it will trip or the time required for its operation.

**Setting (of circuit breakers).**
The value of current, time, or both, at which an adjustable circuit breaker is set to trip.

**Clothes Closet.**
A nonhabitable room or space intended primarily for storage of garments and apparel.

**Communications Equipment.**
The electronic equipment that performs the telecommunications operations for the transmission of audio, video, and data, and includes power equipment (e.g., dc converters, inverters, and batteries), technical support equipment (e.g., computers), and conductors dedicated solely to the operation of the equipment.

**Communications Raceway.**
An enclosed channel of nonmetallic materials designed expressly for holding communications wires and cables, typically communications wires and cables and optical fiber and data (Class 2 and Class 3) in plenum, riser, and general-purpose applications.

**Concealed.**
Rendered inaccessible by the structure or finish of the building.

Informational Note: Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.

**Conductor, Bare.**
A conductor having no covering or electrical insulation whatsoever.

**Conductor, Covered.**
A conductor encased within material of composition or thickness that is not recognized by this Code as electrical insulation.

**Conductor, Insulated.**
A conductor encased within material of composition and thickness that is recognized by this Code as electrical insulation.

**Conduit Body.**
A separate portion of a conduit or tubing system that provides access through a removable cover(s) to the interior of the system at a junction of two or more sections of the system or at a terminal point of the system.

Boxes such as FS and FD or larger cast or sheet metal boxes are not classified as conduit bodies.

**Connector, Pressure (Solderless).**
A device that establishes a connection between two or more conductors or between one or more conductors and a terminal by means of mechanical pressure and without the use of solder.

**Continuous Load.**
A load where the maximum current is expected to continue for 3 hours or more.

**Control Circuit.**
The circuit of a control apparatus or system that carries the electric signals directing the performance of the controller but does not carry the main power current.

**Controller.**
A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected.

**Cooking Unit, Counter-Mounted.**
A cooking appliance designed for mounting in or on a counter and consisting of one or more heating elements, internal wiring, and built-in or mountable controls.

**Coordination (Selective).**
Localizaton of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the selection and installation of overcurrent protective devices and their ratings or settings for the full range of available overcurrents, from overload to the maximum available fault current, and for the full range
of overcurrent protective device opening times associated with those overcurrents.

**Copper-Clad Aluminum Conductors.**
Conductors drawn from a copper-clad aluminum rod, with the copper metallurgically bonded to an aluminum core, where the copper forms a minimum of 10 percent of the cross-sectional area of a solid conductor or each strand of a stranded conductor.

**Cutout Box.**
An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the box proper.

**Dead Front.**
Without live parts exposed to a person on the operating side of the equipment.

**Demand Factor.**
The ratio of the maximum demand of a system, or part of a system, to the total connected load of a system or the part of the system under consideration.

**Device.**
A unit of an electrical system, other than a conductor, that carries or controls electric energy as its principal function.

**Disconnecting Means.**
A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

**Dusttight.**
Constructed so that dust will not enter the enclosing case under specified test conditions.

**Duty, Continuous.**
Operation at a substantially constant load for an indefinitely long time.

**Duty, Intermittent.**
Operation for alternate intervals of (1) load and no load; or (2) load and rest; or (3) load, no load, and rest.

**Duty, Periodic.**
Intermittent operation in which the load conditions are regularly recurrent.

**Duty, Short-Time.**
Operation at a substantially constant load for a short and definite, specified time.

**Duty, Varying.**
Operation at loads, and for intervals of time, both of which may be subject to wide variation.

**Dwelling, One-Family.**
A building that consists solely of one dwelling unit.

**Dwelling, Two-Family.**
A building that consists solely of two dwelling units.

**Dwelling, Multifamily.**
A building that contains three or more dwelling units.

**Dwelling Unit.**
A single unit, providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking, and sanitation.

**Effective Ground-Fault Current Path.**
An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions from the point of a ground fault on a wiring system to the electrical supply source and that facilitates the operation of the overcurrent protective device or ground-fault detectors.

**Electric Power Production and Distribution Network.**
Power production, distribution, and utilization equipment and facilities, such as electric utility systems that deliver electric power to the connected loads, that are external to and not controlled by an interactive system.

**Electric Sign.**
A fixed, stationary, or portable self-contained, electrically illuminated utilization equipment with words or symbols designed to convey information or attract attention.

**Electric-Discharge Lighting.**
Systems of illumination utilizing fluorescent lamps, high-intensity discharge (HID) lamps, or neon tubing.

**Electronically Actuated Fuse.**
An overcurrent protective device that generally consists of a control module that provides current-sensing, electronically derived time–current characteristics, energy to initiate tripping, and an interrupting module that interrupts current when an overcurrent occurs. Such fuses may or may not operate in a current-limiting fashion, depending on the type of control selected.

**Enclosed.**
Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting
energized parts.

**Enclosure.**
The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage.

Informational Note: See Table 110.28 for examples of enclosure types.

**Energized.**
Electrically connected to, or is, a source of voltage.

**Equipment.**
A general term, including fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, an electrical installation.

**Explosionproof Equipment.**
Equipment enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby.

Informational Note: For further information, see ANSI/UL 1203-2009, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.*

**Exposed (as applied to live parts).**
Capable of being inadvertently touched or approached nearer than a safe distance by a person.

Informational Note: This term applies to parts that are not suitably guarded, isolated, or insulated.

**Exposed (as applied to wiring methods).**
On or attached to the surface or behind panels designed to allow access.

**Externally Operable.**
Capable of being operated without exposing the operator to contact with live parts.

**Feeder.**
All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device.

**Festoon Lighting.**
A string of outdoor lights that is suspended between two points.

**Fitting.**
An accessory such as a locknut, bushing, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function.

**Garage.**
A building or portion of a building in which one or more self-propelled vehicles can be kept for use, sale, storage, rental, repair, exhibition, or demonstration purposes.

Informational Note: For commercial garages, repair and storage, see Article 511.

**Ground.**
The earth.

**Ground Fault.**
An unintentional, electrically conductive connection between an ungrounded conductor of an electrical circuit and the normally non-current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment, or earth.

**Grounded (Grounding).**
Connected (connecting) to ground or to a conductive body that extends the ground connection.

**Grounded, Solidly.**
Connected to ground without inserting any resistor or impedance device.

**Grounded Conductor.**
A system or circuit conductor that is intentionally grounded.

**Ground-Fault Circuit Interrupter (GFCI).**
A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device.

Informational Note: Class A ground-fault circuit interrupters trip when the current to ground is 6 mA or higher and do not trip when the current to ground is less than 4 mA. For further information, see UL 943, *Standard for Ground-Fault Circuit Interrupters.*

**Ground-Fault Current Path.**
An electrically conductive path from the point of a ground fault on a wiring system through normally non-current-carrying conductors, equipment, or the earth to the electrical supply source.

Informational Note: Examples of ground-fault current paths are any combination of equipment grounding conductors, metallic raceways, metallic cable sheaths, electrical equipment, and any other
electrically conductive material such as metal, water, and gas piping; steel framing members; stucco mesh; metal ducting; reinforcing steel; shields of communications cables; and the earth itself.

**Ground-Fault Protection of Equipment.**
A system intended to provide protection of equipment from damaging line-to-ground fault currents by operating to cause a disconnecting means to open all ungrounded conductors of the faulted circuit. This protection is provided at current levels less than those required to protect conductors from damage through the operation of a supply circuit overcurrent device.

**Grounding Conductor, Equipment (EGC).**
The conductive path(s) that provides a ground-fault current path and connects normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both.

Informational Note No. 1: It is recognized that the equipment grounding conductor also performs bonding.

Informational Note No. 2: See 250.118 for a list of acceptable equipment grounding conductors.

**Grounding Electrode.**
A conducting object through which a direct connection to earth is established.

**Grounding Electrode Conductor.**
A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on the grounding electrode system.

**Guarded.**
Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach or contact by persons or objects to a point of danger.

**Guest Room.**
An accommodation combining living, sleeping, sanitary, and storage facilities within a compartment.

**Guest Suite.**
An accommodation with two or more contiguous rooms comprising a compartment, with or without doors between such rooms, that provides living, sleeping, sanitary, and storage facilities.

**Handhole Enclosure.**
An enclosure for use in underground systems, provided with an open or closed bottom, and sized to allow personnel to reach into, but not enter, for the purpose of installing, operating, or maintaining equipment or wiring or both.

**Hermetic Refrigerant Motor-Compressor.**
A combination consisting of a compressor and motor, both of which are enclosed in the same housing, with no external shaft or shaft seals, with the motor operating in the refrigerant.

**Hoistway.**
Any shaftway, hatchway, well hole, or other vertical opening or space in which an elevator or dumbwaiter is designed to operate.

**Hybrid System.**
A system comprised of multiple power sources. These power sources could include photovoltaic, wind, micro-hydro generators, engine-driven generators, and others, but do not include electric power production and distribution network systems. Energy storage systems such as batteries, flywheels, or superconducting magnetic storage equipment do not constitute a power source for the purpose of this definition. The energy regenerated by an overhauling (descending) elevator does not constitute a power source for the purpose of this definition.

**Identified (as applied to equipment).**
Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular Code requirement.

Informational Note: Some examples of ways to determine suitability of equipment for a specific purpose, environment, or application include investigations by a qualified testing laboratory (listing and labeling), an inspection agency, or other organizations concerned with product evaluation.

**In Sight From (Within Sight From, Within Sight).**
Where this Code specifies that one equipment shall be “in sight from,” “within sight from,” or “within sight of,” and so forth, another equipment, the specified equipment is to be visible and not more than 15 m (50 ft) distant from the other.

**Industrial Control Panel.**
An assembly of two or more components consisting of one of the following: (1) power circuit components only, such as motor controllers, overload relays, fused disconnect switches, and circuit breakers; (2) control circuit components only, such as push buttons, pilot lights, selector switches, timers, switches, and control relays; (3) a combination of power and control circuit components. These components, with associated wiring and terminals, are mounted on, or contained within, an enclosure or mounted on a subpanel.

The industrial control panel does not include the controlled equipment.
Interactive System.
An electric power production system that is operating in parallel with and capable of delivering energy to an electric primary source supply system.

Interrupting Rating.
The highest current at rated voltage that a device is identified to interrupt under standard test conditions.

Informational Note: Equipment intended to interrupt current at other than fault levels may have its interrupting rating implied in other ratings, such as horsepower or locked rotor current.

Intersystem Bonding Termination.
A device that provides a means for connecting intersystem bonding conductors for communications systems to the grounding electrode system.

Isolated (as applied to location).
Not readily accessible to persons unless special means for access are used.

Kitchen.
An area with a sink and permanent provisions for food preparation and cooking.

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.

Lighting Outlet.
An outlet intended for the direct connection of a lampholder or luminaire.

Lighting Track (Track Lighting).
A manufactured assembly designed to support and energize luminaires that are capable of being readily repositioned on the track. Its length can be altered by the addition or subtraction of sections of track.

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.

Informational Note: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.

Live Parts.
Energized conductive components.

Location, Damp.
Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture.

Informational Note: Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold-storage warehouses.

Location, Dry.
A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.

Location, Wet.
Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather.

Luminaire.
A complete lighting unit consisting of a light source such as a lamp or lamps, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light. A lampholder itself is not a luminaire.

Motor Control Center.
An assembly of one or more enclosed sections having a common power bus and principally containing motor control units.

Multioutlet Assembly.
A type of surface, flush, or freestanding raceway designed to hold conductors and receptacles, assembled in the field or at the factory.

Neutral Conductor.
The conductor connected to the neutral point of a system that is intended to carry current under normal
Neutral Point.
The common point on a wye-connection in a polyphase system or midpoint on a single-phase, 3-wire system, or midpoint of a single-phase portion of a 3-phase delta system, or a midpoint of a 3-wire, direct-current system.

Informational Note: At the neutral point of the system, the vectorial sum of the nominal voltages from all other phases within the system that utilize the neutral, with respect to the neutral point, is zero potential.

Nonautomatic.
Requiring human intervention to perform a function.

Nonlinear Load.
A load where the wave shape of the steady-state current does not follow the wave shape of the applied voltage.

Informational Note: Electronic equipment, electronic/electric-discharge lighting, adjustable-speed drive systems, and similar equipment may be nonlinear loads.

Outlet.
A point on the wiring system at which current is taken to supply utilization equipment.

Outline Lighting.
An arrangement of incandescent lamps, electric-discharge lighting, or other electrically powered light sources to outline or call attention to certain features such as the shape of a building or the decoration of a window.

Overcurrent.
Any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short circuit, or ground fault.

Informational Note: A current in excess of rating may be accommodated by certain equipment and conductors for a given set of conditions. Therefore, the rules for overcurrent protection are specific for particular situations.

Overcurrent Protective Device, Branch-Circuit.
A device capable of providing protection for service, feeder, and branch circuits and equipment over the full range of overcurrents between its rated current and its interrupting rating. Such devices are provided with interrupting ratings appropriate for the intended use but no less than 5000 amperes.

Overcurrent Protective Device, Supplementary.
A device intended to provide limited overcurrent protection for specific applications and utilization equipment such as luminaires and appliances. This limited protection is in addition to the protection provided in the required branch circuit by the branch-circuit overcurrent protective device.

Overload.
Operation of equipment in excess of normal, full-load rating, or of a conductor in excess of rated ampacity that, when it persists for a sufficient length of time, would cause damage or dangerous overheating. A fault, such as a short circuit or ground fault, is not an overload.

Panelboard.
A single panel or group of panel units designed for assembly in the form of a single panel, including buses and automatic overcurrent devices, and equipped with or without switches for the control of light, heat, or power circuits; designed to be placed in a cabinet or cutout box placed in or against a wall, partition, or other support; and accessible only from the front.

Photovoltaic (PV) System.
The total components and sub-system that, in combination, convert solar energy into electric energy suitable for connection to a utilization load.

Plenum.
A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.

Power Outlet.
An enclosed assembly that may include receptacles, circuit breakers, fuseholders, fused switches, buses, and watt-hour meter mounting means; intended to supply and control power to mobile homes, recreational vehicles, park trailers, or boats or to serve as a means for distributing power required to operate mobile or temporarily installed equipment.

Premises Wiring (System).
Interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed. This includes (a) wiring from the service point or power source to the outlets or (b) wiring from and including the power source to the outlets where there is no service point.

Such wiring does not include wiring internal to appliances, luminaires, motors, controllers, motor control centers, and similar equipment.
Informational Note: Power sources include, but are not limited to, interconnected or stand-alone batteries, solar photovoltaic systems, other distributed generation systems, or generators.

Qualified Person.
One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.

Informational Note: Refer to NFPA 70E-2012, Standard for Electrical Safety in the Workplace, for electrical safety training requirements.

Raceway.
An enclosed channel of metallic or nonmetallic materials designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this Code.

Informational Note: A raceway is identified within specific article definitions.

Rainproof.
Constructed, protected, or treated so as to prevent rain from interfering with the successful operation of the apparatus under specified test conditions.

Raintight.
Constructed or protected so that exposure to a beating rain will not result in the entrance of water under specified test conditions.

Receptacle.
A receptacle is a contact device installed at the outlet for the connection of an attachment plug. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple receptacle is two or more contact devices on the same yoke.

Receptacle Outlet.
An outlet where one or more receptacles are installed.

Remote-Control Circuit.
Any electrical circuit that controls any other circuit through a relay or an equivalent device.

Retrofit Kit.
A general term for a complete subassembly of parts and devices for field conversion of utilization equipment.

Sealable Equipment.
Equipment enclosed in a case or cabinet that is provided with a means of sealing or locking so that live parts cannot be made accessible without opening the enclosure.

Informational Note: The equipment may or may not be operable without opening the enclosure.

Separately Derived System.
An electrical source, other than a service, having no direct connection(s) to circuit conductors of any other electrical source other than those established by grounding and bonding connections.

Service.
The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

Service Cable.
Service conductors made up in the form of a cable.

Service Conductors.
The conductors from the service point to the service disconnecting means.

Service Conductors, Overhead.
The overhead conductors between the service point and the first point of connection to the service-entrance conductors at the building or other structure.

Service Conductors, Underground.
The underground conductors between the service point and the first point of connection to the service-entrance conductors in a terminal box, meter, or other enclosure, inside or outside the building wall.

Informational Note: Where there is no terminal box, meter, or other enclosure, the point of connection is considered to be the point of entrance of the service conductors into the building.

Service Drop.
The overhead conductors between the utility electric supply system and the service point.

Service-Entrance Conductors, Overhead System.
The service conductors between the terminals of the service equipment and a point usually outside the building, clear of building walls, where joined by tap or splice to the service drop or overhead service conductors.

Service-Entrance Conductors, Underground System.
The service conductors between the terminals of the service equipment and the point of connection to the service lateral or underground service conductors.

Informational Note: Where service equipment is located outside the building walls, there may be no service-entrance conductors or they may be entirely outside the building.
Service Equipment.
The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their
accessories, connected to the load end of service conductors to a building or other structure, or an
otherwise designated area, and intended to constitute the main control and cutoff of the supply.

Service Lateral.
The underground conductors between the utility electric supply system and the service point.

Service Point.
The point of connection between the facilities of the serving utility and the premises wiring.

Informational Note: The service point can be described as the point of demarcation between where
the serving utility ends and the premises wiring begins. The serving utility generally specifies the
location of the service point based on the conditions of service.

Short-Circuit Current Rating.
The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is able to be
connected without sustaining damage exceeding defined acceptance criteria.

Show Window.
Any window used or designed to be used for the display of goods or advertising material, whether it is fully
or partly enclosed or entirely open at the rear and whether or not it has a platform raised higher than the
street floor level.

Signaling Circuit.
Any electrical circuit that energizes signaling equipment.

Special Permission.
The written consent of the authority having jurisdiction.

Structure.
That which is built or constructed.

Substation.
An enclosed assemblage of equipment (e.g., switches, interrupting devices, circuit breakers, buses, and
transformers) through which electric energy is passed for the purpose of distribution, switching, or modifying
its characteristics.

Surge Arrester.
A protective device for limiting surge voltages by discharging or bypassing surge current; it also prevents
continued flow of follow current while remaining capable of repeating these functions.

Surge-Protective Device (SPD).
A protective device for limiting transient voltages by diverting or limiting surge current; it also prevents
continued flow of follow current while remaining capable of repeating these functions and is designated as
follows:

Type 1: Permanently connected SPDs intended for installation between the secondary of the service
transformer and the line side of the service disconnect overcurrent device.

Type 2: Permanently connected SPDs intended for installation on the load side of the service disconnect
overcurrent device, including SPDs located at the branch panel.

Type 3: Point of utilization SPDs.

Type 4: Component SPDs, including discrete components, as well as assemblies.

Informational Note: For further information on Type 1, Type 2, Type 3, and Type 4 SPDs, see UL
1449, Standard for Surge Protective Devices.

Switch, Bypass Isolation.
A manually operated device used in conjunction with a transfer switch to provide a means of directly
connecting load conductors to a power source and of disconnecting the transfer switch.

Switch, General-Use.
A switch intended for use in general distribution and branch circuits. It is rated in amperes, and it is capable
of interrupting its rated current at its rated voltage.

Switch, General-Use Snap.
A form of general-use switch constructed so that it can be installed in device boxes or on box covers, or
otherwise used in conjunction with wiring systems recognized by this Code.

Switch, Isolating.
A switch intended for isolating an electrical circuit from the source of power. It has no interrupting rating, and
it is intended to be operated only after the circuit has been opened by some other means.

Switch, Motor-Circuit.
A switch rated in horsepower that is capable of interrupting the maximum operating overload current of a
motor of the same horsepower rating as the switch at the rated voltage.

Switch, Transfer.
An automatic or nonautomatic device for transferring one or more load conductor connections from one power source to another.

**Switchboard.**
A large single panel, frame, or assembly of panels on which are mounted on the face, back, or both, switches, overcurrent and other protective devices, buses, and usually instruments. These assemblies are generally accessible from the rear as well as from the front and are not intended to be installed in cabinets.

**Switchgear.**
An assembly completely enclosed on all sides and top with sheet metal (except for ventilating openings and inspection windows) and containing primary power circuit switching, interrupting devices, or both, with buses and connections. The assembly may include control and auxiliary devices. Access to the interior of the enclosure is provided by doors, removable covers, or both.

Informational Note: All switchgear subject to NEC requirements is metal enclosed. Switchgear rated below 1000 V or less may be identified as “low-voltage power circuit breaker switchgear.” Switchgear rated over 1000 V may be identified as “metal-enclosed switchgear” or “metal-clad switchgear.” Switchgear is available in non–arc-resistant or arc-resistant constructions.

**Thermal Protector (as applied to motors).**
A protective device for assembly as an integral part of a motor or motor-compressor that, when properly applied, protects the motor against dangerous overheating due to overload and failure to start.

Informational Note: The thermal protector may consist of one or more sensing elements integral with the motor or motor-compressor and an external control device.

**Thermally Protected (as applied to motors).**
The words *Thermally Protected* appearing on the nameplate of a motor or motor-compressor indicate that the motor is provided with a thermal protector.

**Ungrounded.**
Not connected to ground or to a conductive body that extends the ground connection.

**Uninterruptible Power Supply.**
A power supply used to provide alternating current power to a load for some period of time in the event of a power failure.

Informational Note: In addition, it may provide a more constant voltage and frequency supply to the load, reducing the effects of voltage and frequency variations.

**Utility-Interactive Inverter.**
An inverter intended for use in parallel with an electric utility to supply common loads that may deliver power to the utility.

**Utilization Equipment.**
Equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes.

**Ventilated.**
Provided with a means to permit circulation of air sufficient to remove an excess of heat, fumes, or vapors.

**Volatile Flammable Liquid.**
A flammable liquid having a flash point below 38°C (100°F), or a flammable liquid whose temperature is above its flash point, or a Class II combustible liquid that has a vapor pressure not exceeding 276 kPa (40 psia) at 38°C (100°F) and whose temperature is above its flash point.

**Voltage (of a circuit).**
The greatest root-mean-square (rms) (effective) difference of potential between any two conductors of the circuit concerned.

Informational Note: Some systems, such as 3-phase 4-wire, single-phase 3-wire, and 3-wire direct current, may have various circuits of various voltages.

**Voltage, Nominal.**
A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (e.g., 120/240 volts, 480Y/277 volts, 600 volts).

Informational Note No. 1: The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

Informational Note No. 2: See ANSI C84.1-2006, *Voltage Ratings for Electric Power Systems and Equipment (60 Hz).*

**Voltage to Ground.**
For grounded circuits, the voltage between the given conductor and that point or conductor of the circuit that is grounded; for ungrounded circuits, the greatest voltage between the given conductor and any other conductor of the circuit.

**Watertight.**
Constructed so that moisture will not enter the enclosure under specified test conditions.

**Weatherproof.**
Constructed or protected so that exposure to the weather will not interfere with successful operation.

Informational Note: Rainproof, raintight, or watertight equipment can fulfill the requirements for weatherproof where varying weather conditions other than wetness, such as snow, ice, dust, or temperature extremes, are not a factor.

Part II. Over 600 Volts, Nominal

Part II contains definitions applicable only to the articles and parts of articles specifically covering installations and equipment operating at over 600 volts, nominal.

The definitions in Part I are intended to apply wherever the terms are used throughout this Code. The definitions in Part II are applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600 volts, nominal.

**Electronically Actuated Fuse.**

An overcurrent protective device that generally consists of a control module that provides current sensing, electronically derived time–current characteristics, energy to initiate tripping, and an interrupting module that interrupts current when an overcurrent occurs. Electronically actuated fuses may or may not operate in a current-limiting fashion, depending on the type of control selected.

**Fuse.**

An overcurrent protective device with a circuit-opening fusible part that is heated and severed by the passage of overcurrent through it.

Informational Note: A fuse comprises all the parts that form a unit capable of performing the prescribed functions. It may or may not be the complete device necessary to connect it into an electrical circuit.

**Controlled Vented Power Fuse.**

A fuse with provision for controlling discharge circuit interruption such that no solid material may be exhausted into the surrounding atmosphere.

Informational Note: The fuse is designed so that discharged gases will not ignite or damage insulation in the path of the discharge or propagate a flashover to or between grounded members or conduction members in the path of the discharge where the distance between the vent and such insulation or conduction members conforms to manufacturer’s recommendations.

**Expulsion Fuse Unit (Expulsion Fuse).**

A vented fuse unit in which the expulsion effect of gases produced by the arc and lining of the fuseholder, either alone or aided by a spring, extinguishes the arc.

**Nonvented Power Fuse.**

A fuse without intentional provision for the escape of arc gases, liquids, or solid particles to the atmosphere during circuit interruption.

**Power Fuse Unit.**

A vented, nonvented, or controlled vented fuse unit in which the arc is extinguished by being drawn through solid material, granular material, or liquid, either alone or aided by a spring.

**Vented Power Fuse.**

A fuse with provision for the escape of arc gases, liquids, or solid particles to the surrounding atmosphere during circuit interruption.

**Multiple Fuse.**

An assembly of two or more single-pole fuses.

**Switching Device.**

A device designed to close, open, or both, one or more electrical circuits.

**Circuit Breaker.**

A switching device capable of making, carrying, and interrupting currents under normal circuit conditions, and also of making, carrying for a specified time, and interrupting currents under specified abnormal circuit conditions, such as those of short circuit.

**Cutout.**

An assembly of a fuse support with either a fuseholder, fuse carrier, or disconnecting blade. The fuseholder or fuse carrier may include a conducting element (fuse link) or may act as the disconnecting blade by the inclusion of a nonfusible member.

**Disconnecting Means.**

A device, group of devices, or other means whereby the conductors of a circuit can be disconnected from their source of supply.

**Disconnecting (or Isolating) Switch (Disconnector, Isolator).**

A mechanical switching device used for isolating a circuit or equipment from a source of power.

**Interrupter Switch.**

A switch capable of making, carrying, and interrupting specified currents.

**Oil Cutout (Oil-Filled Cutout).**

A cutout in which all or part of the fuse support and its fuse link or disconnecting blade is mounted in oil with...
complete immersion of the contacts and the fusible portion of the conducting element (fuse link) so that arc interruption by severing of the fuse link or by opening of the contacts will occur under oil.

**Oil Switch.**

A switch having contacts that operate under oil (or askarel or other suitable liquid).

**Regulator Bypass Switch.**

A specific device or combination of devices designed to bypass a regulator.

**Statement of Problem and Substantiation for Public Input**

Article 725 and 760 permits Class 2 and Class 3 circuits to be installed together with the conductors of electric light, power, Class 1, non-power-limited fire alarm and medium power network-powered broadband communications circuits where they are separated by a barrier. Barriers are not defined and, as such, may not provide suitable separation to keep a fault in the higher voltage conductor from compromising the insulation on the Class 2 or Class 3 cables or conductors and transferring the higher voltage onto the low voltage conductor or cable.

To address this concern the definition for “barrier” and specific suitable barrier requirements are proposed.

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Public Input No. 2854-NFPA 70-2014 [ Article 100 [Excluding any Sub-Sections] ]

**Scope.** This article contains only those definitions essential to the proper application of this Code. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. In general, only those terms that are used in two or more articles are defined in Article 100. Other definitions are included in the article in which they are used but may be referenced in Article 100.

Part I of this article contains definitions intended to apply wherever the terms are used throughout this Code for less than 1000V nominal. Part II contains definitions applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600 volts, 1000 volts, nominal.

Comment (FPN) We need to increase our operating voltage up to 1000V. Wind and solar have already increased. Codes like ANSI C84.1-2011 and IEEE 525 have already increased. We need to increase the voltage to get lower AFC and FLA values.

Statement of Problem and Substantiation for Public Input

There is a change in the world to go green and save, going to higher operating voltages reduces I2R losses and with transformer impedance changes can reduce AFC levels which increases safety for workers by reducing the incident energy levels. Wind and solar have discovered the advantages for higher voltages with lower running ampacities. Motors are already being made for the 1000v systems. Mining and gas industries are already using 1000v services.

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Scope. This article contains only those definitions essential to the proper application of this Code. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. In general, only those terms that are used in two or more articles are defined in Article 100. Other definitions are included in the article in which they are used but may be referenced in Article 100.

Part I of this article contains definitions intended to apply wherever the terms are used throughout this Code. Part II contains definitions applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600, 2000 volts, nominal.

Statement of Problem and Substantiation for Public Input

The definitions in Part II of Article 100 pertain to equipment and devices rated over 2000 V. This revision aligns the NEC with the division of construction and safety requirements found in the industry product standards and correlates with additional revisions proposed to raise the LV voltage limit.

The NEC requires that products used in the electrical installation are suitable for the intended purpose based on the product instructions, labeling, and listing. The division in requirements between LV and HV installations was historically chosen based on the LV limit of 600V despite the construction and product standards requirements for HV beginning at voltages over 2000V. The limitation for low voltage installations and division of HV as applying to all voltages over 600V met the industry needs for many years. However, new challenges for better energy efficiency, microgrids, and integration of distributed sources into the electrical system require general adjustment to this limit. Revisions to product standards have addressed the necessary safety and performance concerns to permit products such as conductors, switches, fuses, and circuit breakers to have ratings exceeding 600V with constructions similar to LV products. In addition to available products, product standard revisions are in process for transfer switches. The demonstrated ability for product standards to develop the necessary materials, configuration, and testing of products for voltages up to 2000V should be acknowledged by the allowance of LV system ratings to this level.

Submitter Information Verification

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**Public Input No. 1552-NFPA 70-2014 [ Article 100 [Excluding any Sub-Sections] ]**

**Scope.** This article contains only those definitions essential to the proper application of this Code. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. In general, only those terms that are used in two or more articles are defined in Article 100. Other definitions are included in the article in which they are used but may be referenced in Article 100.

Part I of this article contains definitions intended to apply wherever the terms are used throughout this Code. Part II contains definitions applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600-1000 volts, nominal.

**Statement of Problem and Substantiation for Public Input**

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises 600 Volts to 1000 Volts in the second paragraph of the Scope in Article 100 before Part I. The Task Group has submitted companion proposals to simply move any numerical clearance changes to a separate listing in the "Under 1000 Volt" area in 110.26 and 110.27.

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Public Input No. 1423-NFPA 70-2014 [ Article 100 [Excluding any Sub-Sections] ]

100.1 Scope. This article contains only those definitions essential to the proper application of this Code. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. In general, only those terms that are used in two or more articles are defined in Article 100. Other definitions are included in the article(s) in which they are used but may be referenced in Article 100.

Part I of this article contains definitions intended to apply wherever the terms are used throughout this Code. Part II contains definitions applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600 volts, nominal.

Statement of Problem and Substantiation for Public Input

Add "100.1" to allow Article 100 to conform to the numbering scheme used in all other articles.

"proper" is an unenforceable term according to NEC_StyleManual_2011.pdf 3.2.1.

"(s)" is added to articles because there are still definitions duplicated in several articles. Examples: "Unclassified Locations" 500.2 and 505.2; "interactive System" 690.2 and 692.2; "Inverter Output Circuit" 690.2 and 694.2.

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: -none-
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Sep 27 18:06:03 EDT 2014
Part II. Over 600 Volts, Nominal

Part II contains definitions applicable only to the articles and parts of articles specifically covering installations and equipment operating at over 1000, 600 volts, nominal.

The definitions in Part I are intended to apply wherever the terms are used throughout this Code. The definitions in Part II are applicable only to articles and parts of articles specifically covering installations and equipment operating at over 1000, 600 volts, nominal.

Statement of Problem and Substantiation for Public Input

To be consistent throughout the Code book, the 600v nominal needs to be increased to 1000v nominal

Submitter Information Verification

Submitter Full Name: JAMES CAIN
Organization: [ Not Specified ]
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 30 11:37:25 EDT 2014
Part II. Over 600-1000 Volts, Nominal

Part II contains definitions applicable only to the articles and parts of articles specifically covering installations and equipment operating at over 600-1000 volts, nominal.

The definitions in Part I are intended to apply wherever the terms are used throughout this Code. The definitions in Part II are applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600-1000 volts, nominal.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises 600 Volts to 1000 Volts in all locations in the Scope of Article 100, Part II. The Task Group has submitted companion proposals to simply move any numerical clearance changes to a separate listing in the "Under 1000 Volt" area in 110.26 and 110.27.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 14:03:21 EDT 2014
Part II. Over 600-2000 Volts, Nominal

Part II contains definitions applicable only to the articles and parts of articles specifically covering installations and equipment operating at over 600-2000 volts, nominal.

The definitions in Part I are intended to apply wherever the terms are used throughout this Code. The definitions in Part II are applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600-2000 volts, nominal.

Statement of Problem and Substantiation for Public Input

The definitions in Part II of Article 100 pertain to equipment and devices rated over 2000 V. This revision aligns the NEC with the division of construction and safety requirements found in the industry product standards and correlates with additional revisions proposed to raise the LV voltage limit.

The NEC requires that products used in the electrical installation are suitable for the intended purpose based on the product instructions, labeling, and listing. The division in requirements between LV and HV installations was historically chosen based on the LV limit of 600V despite the construction and product standards requirements for HV beginning at voltages over 2000V. The limitation for low voltage installations and division of HV as applying to all voltages over 600V met the industry needs for many years. However, new challenges for better energy efficiency, microgrids, and integration of distributed sources into the electrical system require general adjustment to this limit. Revisions to product standards have addressed the necessary safety and performance concerns to permit products such as conductors, switches, fuses, and circuit breakers to have ratings exceeding 600V with constructions similar to LV products. In addition to available products, product standard revisions are in process for transfer switches. The demonstrated ability for product standards to develop the necessary materials, configuration, and testing of products for voltages up to 2000V should be acknowledged by the allowance of LV system ratings to this level.

Submitter Information Verification

Submitter Full Name: Chad Kennedy
Organization: Schneider Electric
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 31 11:23:57 EDT 2014
Public Input No. 1300-NFPA 70-2014 [ Definition: Accessible, Readily (Readily Accessible). ]

Accessible, Readily (Readily Accessible).
Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to actions such as to use tools (other than keys), to climb over or remove obstacles, or to resort to portable ladders, and so forth.

Statement of Problem and Substantiation for Public Input

According to the first dictionary that I found online, a tool is defined as "a device or implement, especially one held in the hand, used to carry out a particular function." Although this dictionary may vary from others in minor ways, that seems to be fairly consistent definition across most dictionaries that I've used. If using a key to access a circuit breaker or fuse results in a Code violation, we have a Code rule that is broken. Not only does this mean that I can't lock an enclosure, it means that I can't lock the door to the equipment room itself! While the language added in 2014 regarding tools has some excellent benefits, it seems that perhaps this is an unintentional consequence.

Submitter Information Verification

Submitter Full Name: RYAN JACKSON
Organization: Ryan Jackson Electrical Training
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Tue Sep 16 15:45:20 EDT 2014
Public Input No. 2317-NFPA 70-2014 [Definition: Accessible, Readily (Readily Accessible).]

Accessible, Readily (Readily Accessible).
Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to actions such as to use tools, to climb over or crawl under, or remove obstacles, or to resort to portable ladders, and so forth.

Statement of Problem and Substantiation for Public Input

Often I found that panelboards and disconnecting means are installed between rows of conveyour lines and similar obstacles. I found workers were crawling under the conveyor line or other obstacles for reaching to such equipment. Crawling under is just opposite of ‘climb over’. Accessing equipment by crawling under some obstacles should not be accepted as "Readily Accessible"

Submitter Information Verification

Submitter Full Name: SATYA SHEEL PANDEY
Organization: COLUMBIA CREST WINERY
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Oct 22 16:07:08 EDT 2014
Accessible, Readily (Readily Accessible).
Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to actions such as to use tools, to climb over or remove obstacles, or to resort to portable ladders, and so forth.

Statement of Problem and Substantiation for Public Input

Delete the phrase added during the 2014 NEC process. The submitter’s substantiation suggested a problem related to disconnecting means being behind covers that needed a tool to remove to gain access to the disconnecting means. Great point, disconnecting means should be able to be reached without the use of a tool. Overcurrent devices are often better placed in an enclosure that needs a tool to open to help limit access to unqualified persons. Every industrial workplace likely has industrial control panels with clamp style fasteners that need a tool to open. A much better solution is to require those disconnecting means that need to be accessed quickly to be required to be accessible without the use of tools.

Submitter Information Verification

Submitter Full Name: Paul Dobrowsky
Organization: Self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Nov 06 19:44:21 EST 2014
Public Input No. 2892-NFPA 70-2014 [ Definition: Accessible, Readily (Readily Accessible). ]

Accessible, Readily (Readily Accessible).

Capable of being easily reached quickly for operation, renewal service, or inspections without requiring those to whom ready access is requisite to actions such as to use the use of tools, the need to climb over or remove obstacles, or the need to resort to portable ladders, and so forth similar equipment.

Statement of Problem and Substantiation for Public Input

The current definition is unclear and poorly written. This revision intends to clarify the intent of the definition. The term "quickly" is changed to "easily" because the concern is with the ease of the access, not the speed of the access. The term "service" replaces "renewal" because it is a term that more clearly defines the issue of replacement, repair and maintenance. The term "those to whom ready access is requisite to actions such as" is unnecessary and confusing. The term "so forth" is not definitive. The remaining additions are intended to clarify the definition.

Submitter Information Verification

Submitter Full Name: Jim Muir
Organization: Clark County, Washington, Building Safety Division
Affiliation: NFPA's Building Code Development Committee (BCDC)
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Oct 30 18:52:51 EDT 2014
Statement of Problem and Substantiation for Public Input

This input restores the wording from the 2011 edition of the NEC. The sentence is now unreadable because of improper syntax. The word “requisite” should not precede the words “to actions”, and has created the impression that the wording pertains to the ability to use tools once access is achieved. If the definition is to retain the concept of limits on the use of tools, then the words “to actions such as” must be deleted. This was the original version in a prior draft of this input. However, following extensive discussion at the IAEI Eastern Section meeting and further reflection on field realities, it is apparent that the 2014 change should be simply reversed.

The limitation on the use of tools is not compatible with the ways in which “readily accessible” is used throughout the NEC, as well as current product designs. For example, 240.24(A) requires overcurrent devices to be readily accessible. NEMA 4X panelboards usually employ cover clamps that require a socket wrench or other tool to loosen in order to open a gasketed panel door that has been designed and listed to withstand a hosedown exposure. The literal text of the revised definition makes the overcurrent devices within any such panel in violation of this rule, and likely to provoke a costly file review on such designs if not revised in this cycle. It is clear that ready access in such a context should involve access to the proximity of the panel, and not the equipment behind the panel door. Another problem involves the unintended consequence of a key possibly being interpreted as a tool in this context.

The submitter considered crafting an additional section in the general part of Article 110 to expressly describe proximity access as opposed to operational access. However, in the larger picture, any such limitations seem adequately covered in the longstanding limitations against the necessity to remove obstacles. The NEC lived with the prior concepts incorporated in the definition for 90 years. It was first included in the 1923 edition and without substantive change took its exact 2011 NEC form in the 1928 edition. If a code making panel desires to include a provision that prohibits a construction or other installation context that requires the use of tools for operation, then it will always remain free to do so in specific circumstances.

Submitter Information Verification

Submitter Full Name: Frederic Hartwell
Organization: Hartwell Electrical Services, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Mon Nov 03 22:27:26 EST 2014
**Public Input No. 3790-NFPA 70-2014 [ Definition: Accessible (as applied to wiring methods). ]**

**Accessible (as applied to wiring methods).**
Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building. Capable of being removed or exposed without excavating.

**Statement of Problem and Substantiation for Public Input**

This is a companion proposal to one for adding new Section 501.15(G) for conduit seals to be accessible. Not only should the conduit seals be accessible inside a building or structure, but it should be clear that conduit seals are not to be buried.

**Related Public Inputs for This Document**

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<th>Related Input</th>
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<td>Public Input No. 3784-NFPA 70-2014 [New Section after 501.15(F)(2)]</td>
<td>The term must be revised to clarify the intent of the proposed section 501.15(G).</td>
</tr>
</tbody>
</table>

**Submitter Information Verification**

- **Submitter Full Name:** Paul Guidry
- **Organization:** Fluor Enterprises, Inc.
- **Affiliation:** Associated Builders and Contractors
- **Street Address:**
- **City:**
- **State:**
- **Zip:**
- **Submittal Date:** Wed Nov 05 10:21:12 EST 2014
Public Input No. 712-NFPA 70-2014 [ Definition: Approved. ]

**Approved.**
Acceptable to the authority having jurisdiction or selected by the licensed professional engineer in charge of the work and not specifically rejected by the AHJ as not in compliance with this code.

Statement of Problem and Substantiation for Public Input

Sometimes the AHJ does not have the expertise to accept that which has been engineered by the licensed professional engineer.

Submitter Information Verification

Submitter Full Name: Billy Breitkreutz
Organization: Fluor Corporation
Affiliation: self
Street Address:  
City:  
State:  
Zip: 
Submittal Date: Wed Jun 18 11:53:25 EDT 2014
Public Input No. 2663-NFPA 70-2014 [ Definition: Authority Having Jurisdiction (AHJ). ]

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.

Informational Note: 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. In general, the agency issuing the permit for the work to be done, needs to be contacted to verify who is the AHJ.

Statement of Problem and Substantiation for Public Input

As noted in an early part of the informational note, the concern is public safety. The homeowner or building owner in the majority of the cases does not have sufficient knowledge to make an educated decision, and may not have the resources, should they sell the home or building at a later date. Then the next owner has to deal with the results of the decision made by the homeowner / building owner.

The agency providing the permit for the work to be done, also follows up with inspections, by an electrical inspector. This agency / person should be the lowest level of who is noted as the AHJ.

As informational notes are not enforceable, this change may be minor. But in consideration of an electrician working in the field with a homeowner or building owner, who has read this and takes it as they can do what they want, can request the electrician to do almost anything. This change can make all the difference in the world, and re-enforce the public safety commitment of the document.

Submitter Information Verification

Submitter Full Name: DANIEL WYMAN
Organization: [ Not Specified ]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Oct 28 00:20:03 EDT 2014
Authority Having Jurisdiction (AHJ).
An organization, office, or individual, with the technical expertise necessary, that is responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

Informational Note: 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.

Statement of Problem and Substantiation for Public Input
We depend on the AJH for making many determinations, from code compliance issues all the way up to classifications of hazards area (514.3). This new text makes it clear the AJH shall be someone or some organization who is knowledgeable in making the determination.

Submitter Information Verification
Submitter Full Name: Alfio Torrisi
Organization: Master electrician
Street Address:
City:
State:
Zip:
Submittal Date: Thu Nov 06 07:14:17 EST 2014
Article 100 Definitions

Scope. This article contains only those definitions essential to the proper application of this Code. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. In general, only those terms that are used in two or more articles are defined in Article 100. Other definitions are included in the article in which they are used but may be referenced in Article 100.

Part I of this article contains definitions intended to apply wherever the terms are used throughout this Code. Part II contains definitions applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600 volts, nominal.

Part I. General

Accessible (as applied to equipment).
Admitting close approach; not guarded by locked doors, elevation, or other effective means.

Accessible (as applied to wiring methods).
Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.

Accessible, Readily (Readily Accessible).
Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to actions such as to use tools, to climb over or remove obstacles, or to resort to portable ladders, and so forth.

Adjustable Speed Drive.
Power conversion equipment that provides a means of adjusting the speed of an electric motor.

Informational Note: A variable frequency drive is one type of electronic adjustable speed drive that controls the rotational speed of an ac electric motor by controlling the frequency and voltage of the electrical power supplied to the motor.

Adjustable Speed Drive System.
A combination of an adjustable speed drive, its associated motor(s), and auxiliary equipment.

Ampacity.
The maximum current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating.

Appliance.
Utilization equipment, generally other than industrial, that is normally built in standardized sizes or types and is installed or connected as a unit to perform one or more functions such as clothes washing, air-conditioning, food mixing, deep frying, and so forth.

Approved.
Acceptable to the authority having jurisdiction.

Arc-Fault Circuit Interrupter (AFCI).
A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

Askarel.
A generic term for a group of nonflammable synthetic chlorinated hydrocarbons used as electrical insulating media.

Informational Note: Askarels of various compositional types are used. Under arcing conditions, the gases produced, while consisting predominantly of noncombustible hydrogen chloride, can include varying amounts of combustible gases, depending on the askarel type.

Attachment Plug (Plug Cap) (Plug).
A device that, by insertion in a receptacle, establishes a connection between the conductors of the attached flexible cord and the conductors connected permanently to the receptacle.

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.

Informational Note: 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.

**Automatic.**
Performing a function without the necessity of human intervention.

**Availability.**
The percentage of time that a system is available to perform its function(s).

**Bathroom.**
An area including a basin with one or more of the following: a toilet, a urinal, a tub, a shower, a bidet, or similar plumbing fixtures.

**Battery System.**
Interconnected battery subsystems consisting of one or more storage batteries and battery chargers, and can include inverters, converters, and associated electrical equipment.

**Bonded (Bonding).**
Connected to establish electrical continuity and conductivity.

**Bonding Conductor or Jumper.**
A reliable conductor to ensure the required electrical conductivity between metal parts required to be electrically connected.

**Bonding Jumper, Equipment.**
The connection between two or more portions of the equipment grounding conductor.

**Bonding Jumper, Main.**
The connection between the grounded circuit conductor and the equipment grounding conductor at the service.

**Bonding Jumper, System.**
The connection between the grounded circuit conductor and the supply-side bonding jumper, or the equipment grounding conductor, or both, at a separately derived system.

**Branch Circuit.**
The circuit conductors between the final overcurrent device protecting the circuit and the outlet(s).

**Branch Circuit, Appliance.**
A branch circuit that supplies energy to one or more outlets to which appliances are to be connected and that has no permanently connected luminaires that are not a part of an appliance.

**Branch Circuit, General-Purpose.**
A branch circuit that supplies two or more receptacles or outlets for lighting and appliances.

**Branch Circuit, Individual.**
A branch circuit that supplies only one utilization equipment.

**Branch Circuit, Multiwire.**
A branch circuit that consists of two or more ungrounded conductors that have a voltage between them, and a grounded conductor that has equal voltage between it and each ungrounded conductor of the circuit and that is connected to the neutral or grounded conductor of the system.

**Building.**
A structure that stands alone or that is cut off from adjoining structures by fire walls with all openings therein protected by approved fire doors.

**Cabinet.**
An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.

**Cable Routing Assembly.**
A single channel or connected multiple channels, as well as associated fittings, forming a structural system that is used to support and route communications wires and cables, optical fiber cables, data cables associated with information technology and communications equipment, Class 2 and Class 3 cables, and power-limited fire alarm cables.

**Charge Controller.**
Equipment that controls dc voltage or dc current, or both, and that is used to charge a battery or other energy storage device.

**Circuit Breaker.**
A device designed to open and close a circuit by nonautomatic means and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its rating.

Informational Note: The automatic opening means can be integral, direct acting with the circuit breaker, or remote from the circuit breaker.
Adjustable (as applied to circuit breakers).
A qualifying term indicating that the circuit breaker can be set to trip at various values of current, time, or both, within a predetermined range.

Instantaneous Trip (as applied to circuit breakers).
A qualifying term indicating that no delay is purposely introduced in the tripping action of the circuit breaker.

Inverse Time (as applied to circuit breakers).
A qualifying term indicating that there is purposely introduced a delay in the tripping action of the circuit breaker, which delay decreases as the magnitude of the current increases.

Nonadjustable (as applied to circuit breakers).
A qualifying term indicating that the circuit breaker does not have any adjustment to alter the value of the current at which it will trip or the time required for its operation.

Setting (of circuit breakers).
The value of current, time, or both, at which an adjustable circuit breaker is set to trip.

Clothes Closet.
A nonhabitable room or space intended primarily for storage of garments and apparel.

Communications Equipment.
The electronic equipment that performs the telecommunications operations for the transmission of audio, video, and data, and includes power equipment (e.g., dc converters, inverters, and batteries), technical support equipment (e.g., computers), and conductors dedicated solely to the operation of the equipment.

Communications Raceway.
An enclosed channel of nonmetallic materials designed expressly for holding communications wires and cables, typically communications wires and cables and optical fiber and data (Class 2 and Class 3) in plenum, riser, and general-purpose applications.

Concealed.
Rendered inaccessible by the structure or finish of the building.

Informational Note: Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.

Conductor, Bare.
A conductor having no covering or electrical insulation whatsoever.

Conductor, Covered.
A conductor encased within material of composition or thickness that is not recognized by this Code as electrical insulation.

Conductor, Insulated.
A conductor encased within material of composition and thickness that is recognized by this Code as electrical insulation.

Conduit Body.
A separate portion of a conduit or tubing system that provides access through a removable cover(s) to the interior of the system at a junction of two or more sections of the system or at a terminal point of the system.

Boxes such as FS and FD or larger cast or sheet metal boxes are not classified as conduit bodies.

Connector, Pressure (Solderless).
A device that establishes a connection between two or more conductors or between one or more conductors and a terminal by means of mechanical pressure and without the use of solder.

Continuous Load.
A load where the maximum current is expected to continue for 3 hours or more.

Control Circuit.
The circuit of a control apparatus or system that carries the electric signals directing the performance of the controller but does not carry the main power current.

Controller.
A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected.

Cooking Unit, Counter-Mounted.
A cooking appliance designed for mounting in or on a counter and consisting of one or more heating elements, internal wiring, and built-in or mountable controls.

Coordination (Selective).
Localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the selection and installation of overcurrent protective devices and their ratings or settings for the full range of available overcurrents, from overload to the maximum available fault current, and for the full range of overcurrent protective device opening times associated with those overcurrents.

Copper-Clad Aluminum Conductors.
Conductors drawn from a copper-clad aluminum rod, with the copper metallurgically bonded to an aluminum core, where the copper forms a minimum of 10 percent of the cross-sectional area of a solid conductor or each strand of a stranded conductor.

**Cutout Box.**
An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the box proper.

**Dead Front.**
Without live parts exposed to a person on the operating side of the equipment.

**Demand Factor.**
The ratio of the maximum demand of a system, or part of a system, to the total connected load of a system or the part of the system under consideration.

**Device.**
A unit of an electrical system, other than a conductor, that carries or controls electric energy as its principal function.

**Disconnecting Means.**
A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

**Dusttight.**
Constructed so that dust will not enter the enclosing case under specified test conditions.

**Duty, Continuous.**
Operation at a substantially constant load for an indefinitely long time.

**Duty, Intermittent.**
Operation for alternate intervals of (1) load and no load; or (2) load and rest; or (3) load, no load, and rest.

**Duty, Periodic.**
Intermittent operation in which the load conditions are regularly recurrent.

**Duty, Short-Time.**
Operation at a substantially constant load for a short and definite, specified time.

**Duty, Varying.**
Operation at loads, and for intervals of time, both of which may be subject to wide variation.

**Dwelling, One-Family.**
A building that consists solely of one dwelling unit.

**Dwelling, Two-Family.**
A building that consists solely of two dwelling units.

**Dwelling, Multifamily.**
A building that contains three or more dwelling units.

**Dwelling Unit.**
A single unit, providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking, and sanitation.

**Effective Ground-Fault Current Path.**
An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions from the point of a ground fault on a wiring system to the electrical supply source and that facilitates the operation of the overcurrent protective device or ground-fault detectors.

**Electric Power Production and Distribution Network.**
Power production, distribution, and utilization equipment and facilities, such as electric utility systems that deliver electric power to the connected loads, that are external to and not controlled by an interactive system.

**Electric Sign.**
A fixed, stationary, or portable self-contained, electrically illuminated utilization equipment with words or symbols designed to convey information or attract attention.

**Electric-Discharge Lighting.**
Systems of illumination utilizing fluorescent lamps, high-intensity discharge (HID) lamps, or neon tubing.

**Electronically Actuated Fuse.**
An overcurrent protective device that generally consists of a control module that provides current-sensing, electronically derived time–current characteristics, energy to initiate tripping, and an interrupting module that interrupts current when an overcurrent occurs. Such fuses may or may not operate in a current-limiting fashion, depending on the type of control selected.

**Enclosed.**
Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting energized parts.

**Enclosure.**
The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage.

Informational Note: See Table 110.28 for examples of enclosure types.

**Energized.**
Electrically connected to, or is, a source of voltage.

**Equipment.**
A general term, including fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, an electrical installation.

**Explosionproof Equipment.**
Equipment enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby.

Informational Note: For further information, see ANSI/UL 1203-2009, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.*

**Exposed (as applied to live parts).**
Capable of being inadvertently touched or approached nearer than a safe distance by a person.

Informational Note: This term applies to parts that are not suitably guarded, isolated, or insulated.

**Exposed (as applied to wiring methods).**
On or attached to the surface or behind panels designed to allow access.

**Externally Operable.**
Capable of being operated without exposing the operator to contact with live parts.

**Feeder.**
All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device.

**Festoon Lighting.**
A string of outdoor lights that is suspended between two points.

**Fitting.**
An accessory such as a locknut, bushing, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function.

**Garage.**
A building or portion of a building in which one or more self-propelled vehicles can be kept for use, sale, storage, rental, repair, exhibition, or demonstration purposes.

Informational Note: For commercial garages, repair and storage, see Article 511.

**Ground.**
The earth.

**Ground Fault.**
An unintentional, electrically conductive connection between an ungrounded conductor of an electrical circuit and the normally non-current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment, or earth.

**Grounded (Grounding).**
Connected (connecting) to ground or to a conductive body that extends the ground connection.

**Grounded, Solidly.**
Connected to ground without inserting any resistor or impedance device.

**Grounded Conductor.**
A system or circuit conductor that is intentionally grounded.

**Ground-Fault Circuit Interrupter (GFCI).**
A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device.

Informational Note: Class A ground-fault circuit interrupters trip when the current to ground is 6 mA or higher and do not trip when the current to ground is less than 4 mA. For further information, see UL 943, *Standard for Ground-Fault Circuit Interrupters.*

**Ground-Fault Current Path.**
An electrically conductive path from the point of a ground fault on a wiring system through normally non-current-carrying conductors, equipment, or the earth to the electrical supply source.

Informational Note: Examples of ground-fault current paths are any combination of equipment grounding conductors, metallic raceways, metallic cable sheaths, electrical equipment, and any other electrically conductive material such as metal, water, and gas piping; steel framing members; stucco mesh; metal ducting; reinforcing steel; shields of communications cables; and the earth itself.
Ground-Fault Protection of Equipment.
A system intended to provide protection of equipment from damaging line-to-ground fault currents by operating to cause a disconnecting means to open all ungrounded conductors of the faulted circuit. This protection is provided at current levels less than those required to protect conductors from damage through the operation of a supply circuit overcurrent device.

Grounding Conductor, Equipment (EGC).
The conductive path(s) that provides a ground-fault current path and connects normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both.

Informational Note No. 1: It is recognized that the equipment grounding conductor also performs bonding.

Informational Note No. 2: See 250.118 for a list of acceptable equipment grounding conductors.

Grounding Electrode.
A conducting object through which a direct connection to earth is established.

Grounding Electrode Conductor.
A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on the grounding electrode system.

Guarded.
Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach or contact by persons or objects to a point of danger.

Guest Room.
An accommodation combining living, sleeping, sanitary, and storage facilities within a compartment.

Guest Suite.
An accommodation with two or more contiguous rooms comprising a compartment, with or without doors between such rooms, that provides living, sleeping, sanitary, and storage facilities.

Handhole Enclosure.
An enclosure for use in underground systems, provided with an open or closed bottom, and sized to allow personnel to reach into, but not enter, for the purpose of installing, operating, or maintaining equipment or wiring or both.

Hermetic Refrigerant Motor-Compressor.
A combination consisting of a compressor and motor, both of which are enclosed in the same housing, with no external shaft or shaft seals, with the motor operating in the refrigerant.

Hoistway.
Any shaftway, hatchway, well hole, or other vertical opening or space in which an elevator or dumbwaiter is designed to operate.

Hybrid System.
A system comprised of multiple power sources. These power sources could include photovoltaic, wind, micro-hydro generators, engine-driven generators, and others, but do not include electric power production and distribution network systems. Energy storage systems such as batteries, flywheels, or superconducting magnetic storage equipment do not constitute a power source for the purpose of this definition. The energy regenerated by an overhauling (descending) elevator does not constitute a power source for the purpose of this definition.

Identified (as applied to equipment).
Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular Code requirement.

Informational Note: Some examples of ways to determine suitability of equipment for a specific purpose, environment, or application include investigations by a qualified testing laboratory (listing and labeling), an inspection agency, or other organizations concerned with product evaluation.

In Sight From (Within Sight From, Within Sight).
Where this Code specifies that one equipment shall be “in sight from,” “within sight from,” or “within sight of,” and so forth, another equipment, the specified equipment is to be visible and not more than 15 m (50 ft) distant from the other.

Industrial Control Panel.
An assembly of two or more components consisting of one of the following: (1) power circuit components only, such as motor controllers, overload relays, fused disconnect switches, and circuit breakers; (2) control circuit components only, such as push buttons, pilot lights, selector switches, timers, switches, and control relays; (3) a combination of power and control circuit components. These components, with associated wiring and terminals, are mounted on, or contained within, an enclosure or mounted on a subpanel.

The industrial control panel does not include the controlled equipment.

Interactive System.
An electric power production system that is operating in parallel with and capable of delivering energy to an electric primary source supply system.

Interrupting Rating.
The highest current at rated voltage that a device is identified to interrupt under standard test conditions.

Informational Note: Equipment intended to interrupt current at other than fault levels may have its interrupting rating implied in other ratings, such as horsepower or locked rotor current.

Intersystem Bonding Termination.
A device that provides a means for connecting intersystem bonding conductors for communications systems to the grounding electrode system.

Isolated (as applied to location).
Not readily accessible to persons unless special means for access are used.

Kitchen.
An area with a sink and permanent provisions for food preparation and cooking.

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.

Lighting Outlet.
An outlet intended for the direct connection of a lampholder or luminaire.

Lighting Track (Track Lighting).
A manufactured assembly designed to support and energize luminaires that are capable of being readily repositioned on the track. Its length can be altered by the addition or subtraction of sections of track.

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.

Informational Note: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.

Live Parts.
Energized conductive components.

Location, Damp.
Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture.

Informational Note: Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold-storage warehouses.

Location, Dry.
A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.

Location, Wet.
Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather.

Luminaire.
A complete lighting unit consisting of a light source such as a lamp or lamps, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light. A lampholder itself is not a luminaire.

Motor Control Center.
An assembly of one or more enclosed sections having a common power bus and principally containing motor control units.

Multioutlet Assembly.
A type of surface, flush, or freestanding raceway designed to hold conductors and receptacles, assembled in the field or at the factory.

Neutral Conductor.
The conductor connected to the neutral point of a system that is intended to carry current under normal conditions.
Neutral Point.
The common point on a wye-connection in a polyphase system or midpoint on a single-phase, 3-wire system, or midpoint of a single-phase portion of a 3-phase delta system, or a midpoint of a 3-wire, directcurrent system.

Informational Note: At the neutral point of the system, the vectorial sum of the nominal voltages from all other phases within the system that utilize the neutral, with respect to the neutral point, is zero potential.

Nonautomatic.
Requiring human intervention to perform a function.

Nonlinear Load.
A load where the wave shape of the steady-state current does not follow the wave shape of the applied voltage.

Informational Note: Electronic equipment, electronic/electric-discharge lighting, adjustable-speed drive systems, and similar equipment may be nonlinear loads.

Outlet.
A point on the wiring system at which current is taken to supply utilization equipment.

Outline Lighting.
An arrangement of incandescent lamps, electric-discharge lighting, or other electrically powered light sources to outline or call attention to certain features such as the shape of a building or the decoration of a window.

Overcurrent.
Any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short circuit, or ground fault.

Informational Note: A current in excess of rating may be accommodated by certain equipment and conductors for a given set of conditions. Therefore, the rules for overcurrent protection are specific for particular situations.

Overcurrent Protective Device, Branch-Circuit.
A device capable of providing protection for service, feeder, and branch circuits and equipment over the full range of overcurrents between its rated current and its interrupting rating. Such devices are provided with interrupting ratings appropriate for the intended use but no less than 5000 amperes.

Overcurrent Protective Device, Supplementary.
A device intended to provide limited overcurrent protection for specific applications and utilization equipment such as luminaires and appliances. This limited protection is in addition to the protection provided in the required branch circuit by the branch-circuit overcurrent protective device.

Overload.
Operation of equipment in excess of normal, full-load rating, or of a conductor in excess of rated ampacity that, when it persists for a sufficient length of time, would cause damage or dangerous overheating. A fault, such as a short circuit or ground fault, is not an overload.

Panelboard.
A single panel or group of panel units designed for assembly in the form of a single panel, including buses and automatic overcurrent devices, and equipped with or without switches for the control of light, heat, or power circuits; designed to be placed in a cabinet or cutout box placed in or against a wall, partition, or other support; and accessible only from the front.

Photovoltaic (PV) System.
The total components and sub-system that, in combination, convert solar energy into electric energy suitable for connection to a utilization load.

Plenum.
A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.

Power Outlet.
An enclosed assembly that may include receptacles, circuit breakers, fuseholders, fused switches, buses, and watt-hour meter mounting means; intended to supply and control power to mobile homes, recreational vehicles, park trailers, or boats or to serve as a means for distributing power required to operate mobile or temporarily installed equipment.

Premises Wiring (System).
Interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed. This includes (a) wiring from the service point or power source to the outlets or (b) wiring from and including the power source to the outlets where there is no service point.

Such wiring does not include wiring internal to appliances, luminaires, motors, controllers, motor control centers, and similar equipment.

Informational Note: Power sources include, but are not limited to, interconnected or stand-alone
batteries, solar photovoltaic systems, other distributed generation systems, or generators.

**Qualified Person.**
One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.

Informational Note: Refer to NFPA 70E-2012, *Standard for Electrical Safety in the Workplace*, for electrical safety training requirements.

**Raceway.**
An enclosed channel of metallic or nonmetallic materials designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this Code.

Informational Note: A raceway is identified within specific article definitions.

**Rainproof.**
Constructed, protected, or treated so as to prevent rain from interfering with the successful operation of the apparatus under specified test conditions.

**Raintight.**
Constructed or protected so that exposure to a beating rain will not result in the entrance of water under specified test conditions.

**Receptacle.**
A receptacle is a contact device installed at the outlet for the connection of an attachment plug. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple receptacle is two or more contact devices on the same yoke.

**Receptacle Outlet.**
An outlet where one or more receptacles are installed.

**Remote-Control Circuit.**
Any electrical circuit that controls any other circuit through a relay or an equivalent device.

**Retrofit Kit.**
A general term for a complete subassembly of parts and devices for field conversion of utilization equipment.

**Sealable Equipment.**
Equipment enclosed in a case or cabinet that is provided with a means of sealing or locking so that live parts cannot be made accessible without opening the enclosure.

Informational Note: The equipment may or may not be operable without opening the enclosure.

**Separately Derived System.**
An electrical source, other than a service, having no direct connection(s) to circuit conductors of any other electrical source other than those established by grounding and bonding connections.

**Service.**
The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

**Service Cable.**
Service conductors made up in the form of a cable.

**Service Conductors.**
The conductors from the service point to the service disconnecting means.

**Service Conductors, Overhead.**
The overhead conductors between the service point and the first point of connection to the service-entrance conductors at the building or other structure.

**Service Conductors, Underground.**
The underground conductors between the service point and the first point of connection to the service-entrance conductors in a terminal box, meter, or other enclosure, inside or outside the building wall.

Informational Note: Where there is no terminal box, meter, or other enclosure, the point of connection is considered to be the point of entrance of the service conductors into the building.

**Service Drop.**
The overhead conductors between the utility electric supply system and the service point.

**Service-Entrance Conductors, Overhead System.**
The service conductors between the terminals of the service equipment and a point usually outside the building, clear of building walls, where joined by tap or splice to the service drop or overhead service conductors.

**Service-Entrance Conductors, Underground System.**
The service conductors between the terminals of the service equipment and the point of connection to the service lateral or underground service conductors.

Informational Note: Where service equipment is located outside the building walls, there may be no service-entrance conductors or they may be entirely outside the building.

**Service Equipment.**
The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service conductors to a building or other structure, or an otherwise designated area, and intended to constitute the main control and cutoff of the supply.

**Service Lateral.**
The underground conductors between the utility electric supply system and the service point.

**Service Point.**
The point of connection between the facilities of the serving utility and the premises wiring.

Informational Note: The service point can be described as the point of demarcation between where the serving utility ends and the premises wiring begins. The serving utility generally specifies the location of the service point based on the conditions of service.

**Short-Circuit Current Rating.**
The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is able to be connected without sustaining damage exceeding defined acceptance criteria.

**Show Window.**
Any window used or designed to be used for the display of goods or advertising material, whether it is fully or partly enclosed or entirely open at the rear and whether or not it has a platform raised higher than the street floor level.

**Signaling Circuit.**
Any electrical circuit that energizes signaling equipment.

**Special Permission.**
The written consent of the authority having jurisdiction.

**Structure.**
That which is built or constructed.

**Substation.**
An enclosed assemblage of equipment (e.g., switches, interrupting devices, circuit breakers, buses, and transformers) through which electric energy is passed for the purpose of distribution, switching, or modifying its characteristics.

**Surge Arrester.**
A protective device for limiting surge voltages by discharging or bypassing surge current; it also prevents continued flow of follow current while remaining capable of repeating these functions.

**Surge-Protective Device (SPD).**
A protective device for limiting transient voltages by diverting or limiting surge current; it also prevents continued flow of follow current while remaining capable of repeating these functions and is designated as follows:

- **Type 1:** Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service disconnect overcurrent device.
- **Type 2:** Permanently connected SPDs intended for installation on the load side of the service disconnect overcurrent device, including SPDs located at the branch panel.
- **Type 3:** Point of utilization SPDs.
- **Type 4:** Component SPDs, including discrete components, as well as assemblies.

Informational Note: For further information on Type 1, Type 2, Type 3, and Type 4 SPDs, see UL 1449, *Standard for Surge Protective Devices*.

**Switch, Bypass Isolation.**
A manually operated device used in conjunction with a transfer switch to provide a means of directly connecting load conductors to a power source and of disconnecting the transfer switch.

**Switch, General-Use.**
A switch intended for use in general distribution and branch circuits. It is rated in amperes, and it is capable of interrupting its rated current at its rated voltage.

**Switch, General-Use Snap.**
A form of general-use switch constructed so that it can be installed in device boxes or on box covers, or otherwise used in conjunction with wiring systems recognized by this Code.

**Switch, Isolating.**
A switch intended for isolating an electrical circuit from the source of power. It has no interrupting rating, and it is intended to be operated only after the circuit has been opened by some other means.

**Switch, Motor-Circuit.**
A switch rated in horsepower that is capable of interrupting the maximum operating overload current of a motor of the same horsepower rating as the switch at the rated voltage.

**Switch, Transfer.**
An automatic or nonautomatic device for transferring one or more load conductor connections from one...
power source to another.

**Switchboard.**
A large single panel, frame, or assembly of panels on which are mounted on the face, back, or both, switches, overcurrent and other protective devices, buses, and usually instruments. These assemblies are generally accessible from the rear as well as from the front and are not intended to be installed in cabinets.

**Switchgear.**
An assembly completely enclosed on all sides and top with sheet metal (except for ventilating openings and inspection windows) and containing primary power circuit switching, interrupting devices, or both, with buses and connections. The assembly may include control and auxiliary devices. Access to the interior of the enclosure is provided by doors, removable covers, or both.

Informational Note: All switchgear subject to NEC requirements is metal enclosed. Switchgear rated below 1000 V or less may be identified as “low-voltage power circuit breaker switchgear.” Switchgear rated over 1000 V may be identified as “metal-enclosed switchgear” or “metal-clad switchgear.”

Switchgear is available in non–arc-resistant or arc-resistant constructions.

**Thermal Protector (as applied to motors).**
A protective device for assembly as an integral part of a motor or motor-compressor that, when properly applied, protects the motor against dangerous overheating due to overload and failure to start.

Informational Note: The thermal protector may consist of one or more sensing elements integral with the motor or motor-compressor and an external control device.

**Thermally Protected (as applied to motors).**
The words *Thermally Protected* appearing on the nameplate of a motor or motor-compressor indicate that the motor is provided with a thermal protector.

**Ungrounded.**
Not connected to ground or to a conductive body that extends the ground connection.

**Uninterruptible Power Supply.**
A power supply used to provide alternating current power to a load for some period of time in the event of a power failure.

Informational Note: In addition, it may provide a more constant voltage and frequency supply to the load, reducing the effects of voltage and frequency variations.

**Utility-Interactive Inverter.**
An inverter intended for use in parallel with an electric utility to supply common loads that may deliver power to the utility.

**Utilization Equipment.**
Equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes.

**Ventilated.**
Provided with a means to permit circulation of air sufficient to remove an excess of heat, fumes, or vapors.

**Volatile Flammable Liquid.**
A flammable liquid having a flash point below 38°C (100°F), or a flammable liquid whose temperature is above its flash point, or a Class II combustible liquid that has a vapor pressure not exceeding 276 kPa (40 psia) at 38°C (100°F) and whose temperature is above its flash point.

**Voltage (of a circuit).**
The greatest root-mean-square (rms) (effective) difference of potential between any two conductors of the circuit concerned.

Informational Note: Some systems, such as 3-phase 4-wire, single-phase 3-wire, and 3-wire direct current, may have various circuits of various voltages.

**Voltage, Nominal.**
A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (e.g., 120/240 volts, 480Y/277 volts, 600 volts).

Informational Note No. 1: The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

Informational Note No. 2: See ANSI C84.1-2006, *Voltage Ratings for Electric Power Systems and Equipment (60 Hz).*

**Voltage to Ground.**
For grounded circuits, the voltage between the given conductor and that point or conductor of the circuit that is grounded; for ungrounded circuits, the greatest voltage between the given conductor and any other conductor of the circuit.

**Watertight.**
Constructed so that moisture will not enter the enclosure under specified test conditions.

**Weatherproof.**
Constructed or protected so that exposure to the weather will not interfere with successful operation.
Informational Note: Rainproof, raintight, or watertight equipment can fulfill the requirements for weatherproof where varying weather conditions other than wetness, such as snow, ice, dust, or temperature extremes, are not a factor.

Part II. Over 600 Volts, Nominal
Part II contains definitions applicable only to the articles and parts of articles specifically covering installations and equipment operating at over 600 volts, nominal.

The definitions in Part I are intended to apply wherever the terms are used throughout this Code. The definitions in Part II are applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600 volts, nominal.

Electronically Actuated Fuse.
An overcurrent protective device that generally consists of a control module that provides current sensing, electronically derived time–current characteristics, energy to initiate tripping, and an interrupting module that interrupts current when an overcurrent occurs. Electronically actuated fuses may or may not operate in a current-limiting fashion, depending on the type of control selected.

Fuse.
An overcurrent protective device with a circuit-opening fusible part that is heated and severed by the passage of overcurrent through it.

Informational Note: A fuse comprises all the parts that form a unit capable of performing the prescribed functions. It may or may not be the complete device necessary to connect it into an electrical circuit.

Controlled Vented Power Fuse.
A fuse with provision for controlling discharge circuit interruption such that no solid material may be exhausted into the surrounding atmosphere.

Informational Note: The fuse is designed so that discharged gases will not ignite or damage insulation in the path of the discharge or propagate a flashover to or between grounded members or conduction members in the path of the discharge where the distance between the vent and such insulation or conduction members conforms to manufacturer’s recommendations.

Expulsion Fuse Unit (Expulsion Fuse).
A vented fuse unit in which the expulsion effect of gases produced by the arc and lining of the fuseholder, either alone or aided by a spring, extinguishes the arc.

Nonvented Power Fuse.
A fuse without intentional provision for the escape of arc gases, liquids, or solid particles to the atmosphere during circuit interruption.

Power Fuse Unit.
A vented, nonvented, or controlled vented fuse unit in which the arc is extinguished by being drawn through solid material, granular material, or liquid, either alone or aided by a spring.

Vented Power Fuse.
A fuse with provision for the escape of arc gases, liquids, or solid particles to the surrounding atmosphere during circuit interruption.

Multiple Fuse.
An assembly of two or more single-pole fuses.

Switching Device.
A device designed to close, open, or both, one or more electrical circuits.

Circuit Breaker.
A switching device capable of making, carrying, and interrupting currents under normal circuit conditions, and also of making, carrying for a specified time, and interrupting currents under specified abnormal circuit conditions, such as those of short circuit.

Cutout.
An assembly of a fuse support with either a fuseholder, fuse carrier, or disconnecting blade. The fuseholder or fuse carrier may include a conducting element (fuse link) or may act as the disconnecting blade by the inclusion of a nonfusible member.

Disconnecting Means.
A device, group of devices, or other means whereby the conductors of a circuit can be disconnected from their source of supply.

Disconnecting (or Isolating) Switch (Disconnector, Isolator).
A mechanical switching device used for isolating a circuit or equipment from a source of power.

Interruption Switch.
A switch capable of making, carrying, and interrupting specified currents.

Oil Cutout (Oil-Filled Cutout).
A cutout in which all or part of the fuse support and its fuse link or disconnecting blade is mounted in oil with complete immersion of the contacts and the fusible portion of the conducting element (fuse link) so that arc
interruption by severing of the fuse link or by opening of the contacts will occur under oil.

**Oil Switch.**
A switch having contacts that operate under oil (or askarel or other suitable liquid).

**Regulator Bypass Switch.**
A specific device or combination of devices designed to bypass a regulator.

**Statement of Problem and Substantiation for Public Input**

The availability of a power system is its essential characteristic. Everything we do in the power industry is focused on making sure that power is available. This definition, coupled with the term “reliable” should track explicitly in the NEC and should raise awareness that reliability calculations are as essential as short circuit and load flow calculations.

**Submitter Information Verification**

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<thead>
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<th>Submitter Full Name:</th>
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Public Input No. 2109-NFPA 70-2014 [ Definition: Building. ]

**Building.**
A structure that stands alone or that is cut off from adjoining structures by fire walls with all openings therein protected by approved fire doors.

**Statement of Problem and Substantiation for Public Input**

"therein" is an archaic term which is considered to reduce clarity according to NEC_StyleManual_2011.pdf 3.3.4. Removing the archaic word leaves a clearer sentence.

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Submittal Date: Fri Oct 17 20:51:47 EDT 2014
Public Input No. 2109-NFPA 70-2014 [ Definition: Building. ]

Building.
A structure that stands alone or that is cut off from adjoining structures by fire walls with all openings therein protected by approved fire doors.

Statement of Problem and Substantiation for Public Input
"therein" is an archaic term which is considered to reduce clarity according to NEC_StyleManual_2011.pdf 3.3.4. Removing the archaic word leaves a clearer sentence

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Submittal Date: Fri Oct 17 20:51:47 EDT 2014
Title of New Content

Type your content here ...

**Base Flood.** The flood having a 1 percent chance of being equaled or exceeded in any given year. [Source NFPA 5000]

**Base Flood Elevation (BFE).** The elevation of the base flood, including wave height, relative to the datum specified on a jurisdiction's flood hazard map. [Source NFPA 5000]

**Design Flood.** The greater of either (1) the base flood or (2) the flood so designated by the jurisdiction as its regulatory flood, with a 1 percent chance, or less, of being equaled or exceeded in any given year. [Source NFPA 5000]

**Design Flood Elevation (DFE).** The elevation of the design flood, including wave height, relative to the datum specified on a jurisdiction's flood hazard map. [NFPA 5000]

**Dry Floodproofing.** A combination of design modifications that results in a building or structure, including the attendant utility and sanitary facilities, being watertight, with walls substantially impermeable to the passage of water, and with structural components having the capacity to resist loads and load combinations associated with the design flood. [Source NFPA 5000]

**Flood Hazard Area.** The greater of either (1) the special flood hazard area shown on the flood insurance rate map or (2) the area subject to flooding during the design flood and shown on a jurisdiction's flood hazard map, or otherwise legally designated. [Source NFPA 5000]

**Special Flood Hazard Area.** The land area subject to flooding by the base flood, and depicted on the flood insurance rate map or other flood hazard map as Zone A, Zone AE, Zone A1-30, Zone A99, Zone AO, Zone AR, Zone AH, Zone V, Zone VE, Zone V1-30, or Zone VO. (See also 39.2.1.3, Coastal A Zone.) [Source NFPA 5000]

Statement of Problem and Substantiation for Public Input

The Public Input adds 7 flood related definitions to Article 100. These definitions are related to a Public Input to Article 110 Section 3 New Level 1 text (C) Installation in Flood Hazard Areas.

I did not create the several Public Inputs that would be needed to place these definitions in alphabetical order within Article 100. I felt that was editorial.

Also, the text in brackets [] (e.g. [Source NFPA 5000]) cites the source of the definitions and is intended to be for informational use only for the committee assigned to review this Public Input. The bracketed material is not intended to be part of the NEC

Related Public Inputs for This Document

<table>
<thead>
<tr>
<th>Related Input</th>
<th>Relationship</th>
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</thead>
<tbody>
<tr>
<td>Public Input No. 4142-NFPA 70-2014 [New Section after 110.3(B)]</td>
<td>The proposed definitions are used in the related Public Input</td>
</tr>
</tbody>
</table>

Submitter Information Verification

**Submitter Full Name:** David Low

**Organization:** DK Low & Associates, LLC

**Affiliation:** Dept of Homeland Security/FEMA

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Thu Nov 06 10:44:08 EST 2014
Public Input No. 2894-NFPA 70-2014 [ Definition: Building. ]

Building.
A structure that stands alone or that is cut off, separated, from adjoining structures by fire walls, with all openings therein protected by approved fire doors.

Statement of Problem and Substantiation for Public Input

The revision is more consistent with current code language. The term "cut off" is not used in the building codes. Rather, the term "separated" is generally used. Changing "cut off" to "separated" is more consistent with building code terminology. The end of the sentence is deleted because it is incomplete and not necessary. Building codes allow fire walls to have different types of opening, including doors and windows. When such openings are included within a fire wall, the building code dictates the level of protection required for the opening.

Submitter Information Verification

Submitter Full Name: Jim Muir
Organization: Clark County, Washington, Building Safety Division
Affiliation: NFPA's Building Code Development Committee (BCDC)
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Oct 30 19:01:41 EDT 2014
Public Input No. 1425-NFPA 70-2014 [Definition: Concealed.]

Concealed.
Rendered inaccessible by the structure or finish of the building.

Informational Note: Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.

Statement of Problem and Substantiation for Public Input

"considered" and "may" are unenforceable terms according to NEC_StyleManual_2011.pdf 3.2.1.

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: -none-
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Sep 27 18:27:12 EDT 2014
Public Input No. 2111-NFPA 70-2014 [ Definition: Concealed. ]

Concealed.
Rendered inaccessible by the structure or finish of the building.
Informational Note: Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.

Statement of Problem and Substantiation for Public Input

"considered" and "may" are unenforceable terms according to NEC_StyleManual_2011.pdf 3.2.1.

[only deleting "concealed" and "may"]

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 17 20:58:07 EDT 2014
Public Input No. 1307-NFPA 70-2014 [ New Definition after Definition: Disconnecting Means. ]

TITLE OF NEW CONTENT
Disconnect, Required. The required device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply. This disconnecting means shall be designed so that it cannot be closed automatically.

Statement of Problem and Substantiation for Public Input

A disconnect means is mentioned many times in the NEC however only in a few places does it state that the required disconnect cannot be closed automatically. For instance, 430.103 Operation. The disconnecting means shall open all ungrounded supply conductors and shall be designed so that no pole can be operated independently. The disconnecting means shall be permitted in the same enclosure with the controller. The disconnecting means shall be designed so that it cannot be closed automatically.

In other areas of the code a time clock would be allowed as the disconnect means since the last section is not added to those I sections of the NEC. By adding this definition it clears this issue up throughout the code.

Submitter Information Verification

Submitter Full Name: DENNIS ALWON
Organization: ALWON ELECTRIC
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 17 13:11:20 EDT 2014
**Public Input No. 3083-NFPA 70-2014 [ Definition: Disconnecting Means. ]**

**Disconnecting Means.**
A device, group of devices, or other means whereby the conductors of a circuit can be disconnected from their source of supply.

**Statement of Problem and Substantiation for Public Input**

Delete this definition in Part II. The identical definition appears in 100 Part I. The introduction text to Part II states: "The definitions in Part I are intended to apply wherever the terms are used throughout this Code." So the "Part I" covers the area covered by "Part II".

**Submitter Information Verification**

**Submitter Full Name:** JAMES WILLIAMS  
**Organization:** none  
**Affiliation:** Retired Master Electrician  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Mon Nov 03 10:00:14 EST 2014
Public Input No. 1538-NFPA 70-2014 [ Definition: Equipment. ]

Equipment.
A general term, including fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, an electrical installation.

Informational Note: The term equipment is typically used to describe air conditioning units, appliances, devices, luminaires, power outlets (such as Recreational Vehicle Site Supply Equipment or Marine Power Outlets), transformers, and other enclosures that contain electrical products.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by, and represents the majority view of, a Task Group assigned by the NEC Correlating Committee to address structures, including recreational vehicle (RV) pedestals and resolve issues with actions taken by Code-making Panel 19 on proposals and comments in the 2014 NEC cycle relative to comparing the definitions of “Structure” and “Building” regarding differences between “structures” and “equipment” for the purpose of requiring grounding electrodes as compared to installing optional or auxiliary electrodes. Members of the Task Group on Structures, including RV Pedestals for this Public Input included: Susan Newman-Scearce; Paul Dobrowsky; Greg Steinman; Malcolm Allison; William Pancake; Wade Elliott; Barry Bauman; Joseph Marquardt; Todd Stafford; and co-chairs Robert McCullough and Neil F. LaBrake, Jr.; including ad-hoc member Ron Chilton, CMP-19 Chair.

There seems to be confusion about what is considered equipment versus what is considered a structure. Based on the existing definition of structure, everything that is built or constructed is a structure, including equipment. The task group considered limiting equipment to that which was built at the manufacturer’s site but sometimes equipment is built at the user’s site. Although using informational notes to help explain a definition was not the first preference the task group was not able to change the existing definitions to clearly delineate the differences in all cases and concludes this is the best approach at this time.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 12:37:54 EDT 2014
Public Input No. 4732-NFPA 70-2014 [ New Definition after Definition: Equipment. ]

**TITLE OF NEW CONTENT**
Type your content here ... Electrical Equipment  A general term including devices, appliances, luminaires, apparatus, machinery, refrigerant motor-compressor/condenser A/C unit, and motors.

**Statement of Problem and Substantiation for Public Input**
In 110.13 (A) Mounting electrical equipment, this does need a Article 100 Definition for Electrical equipment. In the State of NJ and some other states the Mechanical/Plumbing Subcode inspector has the first call on all A/C condensing/motor compressor units, HVAC equipment and does not require mounting/supporting of the equipment, which they believe this application does fall under the Mechanical/Plumbing enforcement discipline. So in residential installations the HAVC units slip-off/fall-off the equipment pads because they are not secured to the pad.

**Submitter Information Verification**
Submitter Full Name: LARRY CROSS
Organization: Medford NJ DCA Local 98 IBEW
Affiliation: IAEI South Jersey
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 07 15:30:50 EST 2014
Public Input No. 4781-NFPA 70-2014 [ New Definition after Definition: Festoon Lighting.

TITLE OF NEW CONTENT

Field Evaluation. - The process used to determine conformance with requirements for one-of-a-kind, limited production, used, or modified products that are not listed or field labeled under a certification program.

Informational Note: See NFPA 790 and 791 for requirements for field evaluations.

Field Evaluation Body (FEB). - An organization, or part of an organization, that performs field evaluations of electrical or other equipment.

Informational Note: See NFPA 790 for competency requirements for field evaluation bodies.

Statement of Problem and Substantiation for Public Input

These definitions for Field Evaluations and Field Evaluation Bodies are extracted from NFPA 790, and are used in a separate proposal to revise Section 90.7 that identifies field evaluations as a basis for approval of products by authorities having jurisdiction.

Submitter Information Verification

Submitter Full Name: John Taecker
Organization: UL LLC
Affiliation: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 07 18:25:12 EST 2014
Public Input No. 1004-NFPA 70-2014 [ New Article after 100 ]

**Electrical Circuit Protective System.**
A system consisting of components and materials intended for installation as protection for specific electrical wiring systems with respect to the disruption of electrical circuit integrity upon exterior fire exposure.

**Statement of Problem and Substantiation for Public Input**
The term Electrical Circuit Protective System is currently found in articles 250, 300, 695, 700, 708, 725, 728, 760, 770, and 800. Sections 770.2 and 800.2 contain the same definition of this term. It may be appropriate to move this definition to Article 100 in accordance with Section 2.2.2.1 of the NEC Style Manual which states "In general, Article 100 shall contain definitions of terms that appear in two or more other articles of the NEC". I have recommended deletion of the two existing definition of this term found in sections 770.2 and 800.2.

**Related Public Inputs for This Document**

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<tr>
<td>Public Input No. 1003-NFPA 70-2014 [Definition: Electrical Circuit Protective System]</td>
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</tbody>
</table>

**Submitter Information Verification**

**Submitter Full Name:** Charles Palmieri  
**Organization:** Town of Norwell  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Sat Aug 02 09:19:59 EDT 2014
TITLE OF NEW CONTENT

Existing. Any NEC-compliant installation that was installed prior to the effective date of a newly adopted NEC edition by a jurisdiction.

Statement of Problem and Substantiation for Public Input

This will assist enforcement in determining which installations qualify as existing. Also, it will not permit an installation that was not compliant with the NEC in force at the time of installation to be exempt from new rules that exempt existing installations.

Submitter Information Verification

Submitter Full Name: Patrick Ouillette
Organization: Novel Engineering
Affiliation: Novel Engineering
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 07 20:38:11 EST 2014
Fitting.
An accessory such as a locknut, bushing, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function.

Informational Note: A fitting that has a dual role such as a grounding locknut or bushing is still considered a fitting.

Statement of Problem and Substantiation for Public Input

Reduce possible confusion.

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 17 21:03:45 EDT 2014
Public Input No. 2467-NFPA 70-2014 [Definition: Guy.]

Guy (as related to Article 694).
A cable that mechanically supports a wind turbine tower.

Statement of Problem and Substantiation for Public Input

The term "guy" is very generic and the definition is specific to Article 694.

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler
Organization: GBH International
Street Address:
City:
State:
Zip:
Submittal Date: Sat Oct 25 16:14:11 EDT 2014
Habitable Room
A room in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered habitable spaces.

Statement of Problem and Substantiation for Public Input
This term is used 17 times in multiple Articles, but there is no definition in the NEC. This new definition will help correlate the NEC with other building codes and standards.

Submitter Information Verification
Submitter Full Name: RUSS LEBLANC
Organization: EC AND M MAGAZINE
Street Address:
City:
State:
Zip:
Submittal Date: Mon Mar 10 21:39:23 EDT 2014
Public Input No. 3135-NFPA 70-2014 [Definition: In Sight From (Within Sight From, Within Sight).]

In Sight From (Within Sight From, Within Sight).
Where this Code specifies that one equipment shall be "in sight from," "within sight from," or "within sight of," and so forth, from or to another equipment, the specified equipment is to be visible and not more than 15 m (50 ft) distant from the other.

Statement of Problem and Substantiation for Public Input

The added text is necessary to make the definition complete.

Submitter Information Verification

Submitter Full Name: Phil Simmons
Organization: Simmons Electrical Services
Street Address:
City:
State:
Zip:
Submittal Date: Mon Nov 03 13:42:17 EST 2014
Public Input No. 1072-NFPA 70-2014 [Definition: Labeled.]

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.

Informational note. When a listed product is of such a size, shape, material or surface texture that it is not possible to apply legibly the complete label to the product, the complete label will appear on the smallest unit container in which the product is packaged.

Statement of Problem and Substantiation for Public Input

There are numerous sections of the NEC that require a product to be labeled. However, there are numerous products that are physically too small to have a label affixed to the actual product such as ½ inch EMT connectors. This informational note will explain that many of the testing laboratories have provisions to permit their label (certification mark) to be affixed to the packaging where a product is physically not capable of bearing the label on the actual product.

Submitter Information Verification

Submitter Full Name: JEFFREY FECTEAU
Organization: UNDERWRITERS LABORATORIES LLC
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 18 15:33:39 EDT 2014
Public Input No. 4776-NFPA 70-2014 [ Definition: Labeled. ]

**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.

Informational Note: See definition of Listed.

Statement of Problem and Substantiation for Public Input

The new Informational Notes for “Labeled” provides additional clarity on the linkages between this term and the term Listed.

Submitter Information Verification

Submitter Full Name: John Taecker
Organization: UL LLC
Affiliation: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 07 18:08:56 EST 2014
Likely to Become Energized.
A situation where the failure of insulation can energize equipment.

Statement of Problem and Substantiation for Public Input

This phrase is used in several places in the NEC and is commonly misinterpreted and misunderstood. Adding a definition in Article 100 will help in the understanding of a commonly used term. This definition is based on information in the NEC Style Manual.

Submitter Information Verification

Submitter Full Name: Paul Dobrowsky
Organization: Self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Nov 06 20:06:06 EST 2014
Public Input No. 4459-NFPA 70-2014 [ Definition: Listed. ]

Listed.
Equipment, materials, or services included in a list published by an organization a Nationally Recognized Testing Laboratory (NRTL) 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.

Informational Note: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.

Statement of Problem and Substantiation for Public Input

The problem for this change is that the wording that references "an organization" is vague and all encompassing. Also, the AHJ is left to decide which organizations are acceptable and reputable. The change in wording elevates the requirement of "an organization" to a more reputable and recognized level. A NRTL is an organization with a public presence and accountability with OSHA. This change would also shift more of the acceptance criteria from the AHJ to the listing organization. The AHJ would not need to decide if the listing organization is reputable and what they stand for.

Submitter Information Verification

Submitter Full Name: JEFF JONAS
Organization: GENERAC POWER SYSTEMS
Affiliation: Generac Power Systems, Inc.
Street Address:
City: 
State: 
Zip: 
Submittal Date: Thu Nov 06 23:28:07 EST 2014
Public Input No. 4777-NFPA 70-2014 [ Definition: Listed. ]

**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.

- **Informational Note 1:** The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.
- **Informational Note 2:** See 90.7, Examination of Equipment for Safety, and definition of Labeled.

**Statement of Problem and Substantiation for Public Input**

The new Informational Notes for “Listed” and “Labeled” provide additional clarity on the linkages between these terms and with the examination of equipment for safety.

**Submitter Information Verification**

- **Submitter Full Name:** John Taecker
- **Organization:** UL LLC
- **Affiliation:** UL LLC
- **Street Address:**
- **City:**
- **State:**
- **Zip:**
- **Submittal Date:** Fri Nov 07 18:13:10 EST 2014
Public Input No. 2115-NFPA 70-2014 [ Definition: Location, Wet. ]

Location, Wet.
Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; in raceways located underground or outdoors or terminated in locations with different temperatures; and in unprotected locations exposed to weather.

Statement of Problem and Substantiation for Public Input

Emphasize that the interior of a raceway is considered wet in the stated locations.

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 17 21:09:07 EDT 2014
Public Input No. 2570-NFPA 70-2014 [ New Definition after Definition: Location, Wet. ]

Lockable Disconnecting Means.
Capable of being locked in the open position. The provision for locking shall remain in place with or without the lock installed.

Statement of Problem and Substantiation for Public Input

The term Lockable Disconnecting Means appears in several articles. The new 110.25 of the 2014 National Electrical Code makes the statement that where the requirement for the disconnecting means to be lockable appears elsewhere in the Code, “…it shall be capable of being locked in the open position. The provisions for locking shall remain in place with or without the lock installed.” This appears to be a definition. If someone is asked the definition of Lockable Disconnecting Means, there is not one. However, there are many references to it and 110.25 is not the definition. I am not proposing eliminating 110.25, just add a definition of the Lockable Disconnecting Means.

Submitter Information Verification

Submitter Full Name: ROGER ZIEG
Organization: ZIEG ELEC
Street Address:
City:
State:
Zip:
Submittal Date: Sun Oct 26 19:26:08 EDT 2014
**Public Input No. 3635-NFPA 70-2014 [ New Definition after Definition: Luminaire. ]**

<table>
<thead>
<tr>
<th>TITLE OF NEW CONTENT Manufactured</th>
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<tbody>
<tr>
<td>Manufactured. An enclosure or equipment containing component parts that are assembled in the process of manufacturing, are inspected, and approved by a nationally recognized third party organization or an electrical engineer at the manufacturer’s site.</td>
</tr>
</tbody>
</table>

**Statement of Problem and Substantiation for Public Input**

The term Manufacture is used many times. It would be nice to have a clear definition in the NEC. This definition does not include field-assembled components which will require additional approval by the AHJ.

**Submitter Information Verification**

Submitter Full Name: Alfio Torrisi  
Organization: Master electrician  
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Tue Nov 04 19:16:03 EST 2014
Public Input No. 3569-NFPA 70-2014 [ New Definition after Definition: Multioutlet Assembly. ]

Neat and Workmanlike

Electrical equipment, enclosures, raceways, cables, and devices installed level, plumb, and true with the structure and other equipment, in a horizontal or vertical position as intended by the manufacturer. Conductors installed and trained to follow level and plumb lines with a bending radius conforming to the manufacturer’s guidelines and in a flowing manner that is neatly secured in place, while not damaging the conductor or cable insulation. All equipment and connections are securely mounted and installed and all electrical connections are tight. The installation shows skill, good work practices, attention to detail, and consideration for location, function, and safe operation of the electrical system and all associated electrical equipment for the intended use.

Informational Note: Accepted industry standards are described in ANSI/NECA 1-2010, Standard for Good Workmanship in Electrical Construction, and other ANSI-approved installation standards).

Statement of Problem and Substantiation for Public Input

This proposal is presented as an answer to the question as to what will be considered as 'neat and workmanlike'. Quality electrical installations are installed in a manner that not only properly functions and operates electrically, but also where the work is performed in a neat and workmanlike manner.

A ‘neat and workmanlike’ installation is required in NEC Section 110.12, but has not been clearly defined.

Often, it is difficult for electrical inspectors to enforce the present requirement in Section 110.12, because with no definition, what is considered as ‘neat and workmanlike’ may vary from one person to another, and / or depending upon who is making the determination.

Thank you.

Submitter Information Verification

Submitter Full Name: MICHAEL WEITZEL
Organization: Bechtel
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Tue Nov 04 15:26:10 EST 2014
Public Input No. 3459-NFPA 70-2014 [ New Definition after Definition: Photovoltaic (PV) System.]

**Physical Damage**

Damage to electrical equipment, system or circuit grounding or bonding, insulation integrity, enclosures, raceways, cables, overcurrent protective devices, disconnecting means, and the like, that destroys, breaks, or otherwise adversely affects the safe operation, mechanical strength, or integrity of such equipment or conductors which thereby violates manufacturer’s instructions for installation and use.

**Statement of Problem and Substantiation for Public Input**

The NEC has requirements to protect electrical equipment and installations from physical damage. But, there is no definition provided. A definition is needed. I believe that my proposal provides a thorough enough definition that is also clear to understand and to enforce, and provides a solution.

**Related Public Inputs for This Document**

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<thead>
<tr>
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<tbody>
<tr>
<td>Public Input No. 4288-NFPA 70-2014 [New Section after 110.21]</td>
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**Submitter Information Verification**

Submitter Full Name: MICHAEL WEITZEL  
Organization: Bechtel  
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Tue Nov 04 09:09:32 EST 2014
Physical Damage, Severe

Damage to electrical equipment, enclosures, raceways, cables, conductors, devices, and the like, that presents an immediate or sustained hazard to life or property. Such damage may also include damage to overcurrent protective devices, disconnecting means, insulation integrity, or system or circuit grounding or bonding.

Statement of Problem and Substantiation for Public Input

The phrase 'severe physical damage' is used in the NEC, but is not defined. I believe that a definition is needed, and can prove to be useful.

This definition may prove to be very helpful to electrical inspection personnel and electric utilities to address installations that have suffered severe physical damage, present an immediate hazard to life and property, and therefore require immediate correction, or disconnection of power.

'Severe physical damage' is used in Section 358.12 for EMT, and possibly elsewhere in the NEC.

Submitter Information Verification

Submitter Full Name: MICHAEL WEITZEL
Organization: Bechtel
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Tue Nov 04 09:22:08 EST 2014
Physical Damage, Severe

Damage to electrical equipment, enclosures, raceways, cables, and the like, that presents an immediate or sustained hazard to life or property. Such damage may also include damage to overcurrent protective devices, disconnecting means, insulation integrity, electrical enclosures, raceways, cables, conductors, or system or circuit grounding or bonding.

Statement of Problem and Substantiation for Public Input

Raceways, cables, enclosures, overcurrent protective devices, and more are not permitted to be installed where 'subject to severe physical damage.'

In Section 358.12, for example - for thinwall tubing - EMT - the words "severe physical damage" are found - but nowhere is severe physical damage defined.

Furthermore, if EMT is not permitted where exposed to severe physical damage, does that mean if the thinwall tubing is subject to physical damage, then that's ok?

(Note that EMT is permitted as a wiring method for over 600 volt systems, as well as 480-volt under 600 volt - systems).

Back to the point... there may be other places where 'severe physical damage' is used in the NEC.

If CMP 1 believes that this is a term that is useful to the NEC, then a definition is needed.

Thank you.

Submitter Information Verification

Submitter Full Name: MICHAEL WEITZEL
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Thu Nov 06 17:33:36 EST 2014
Qualified Person.

One who has demonstrated skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize, identify, and avoid the hazards involved.

Informational Note: Refer to NFPA 70E-2012 2015, Standard for Electrical Safety in the Workplace, for electrical safety training requirements.

Statement of Problem and Substantiation for Public Input

This public input seeks correlation of the defined term "qualified person" between the NEC and NFPA 70E. This proposed revision provides correlation between documents and better aligns with the definition of qualified person in OSHA standards. The addition of the term "demonstrated" is necessary to ensure that the individual that is to be considered as "qualified" has at some point "demonstrated" the skills and knowledge related to the construction and operation of the electrical equipment they will work on. An editorial revision deletes "the" as it is not necessary. The term "recognize" is deleted and is replaced with the more appropriate term "identify." Safety training specifically includes identification of hazards, not simply recognition.

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
Street Address:
City:
State:
Zip:
Submittal Date: Wed Nov 05 13:31:34 EST 2014
Qualified Person.

One who has demonstrated skills and knowledge related to the construction and operation of the electrical equipment and installations, and has received safety training to recognize and identify and avoid the hazards involved, and demonstrated skills.

Informational Note: Refer to NFPA 70E: 2012 Standard for Electrical Safety in the Workplace, for electrical safety training requirements.

Statement of Problem and Substantiation for Public Input

Update the definition to match the wording in NFPA 70E -2015.

It is very important that the qualified person be able to demonstrate that they have the skills to recognize and identify the hazards involved when working in, on, or around energized electrical equipment.

Submitter Information Verification

Submitter Full Name: MICHAEL WEITZEL
Organization: Bechtel
Street Address:
City:
State:
Zip:
Submittal Date: Wed Nov 05 17:33:44 EST 2014
**Qualified Person.**
One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.

**One who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazards involved.**

Informational Note: Refer to NFPA 70E-2012, *Standard for Electrical Safety in the Workplace*, for electrical safety training requirements.

### Additional Proposed Changes

<table>
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<tr>
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<tr>
<td>Proposal_5.pdf</td>
<td>PI Form</td>
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</tbody>
</table>

### Statement of Problem and Substantiation for Public Input

OSHA has changed their definition of qualified worker, and as such the NEC should align.

### Submitter Information Verification

- **Submitter Full Name:** ROBERT CLUKEY
- **Organization:**
- **Street Address:**
- **City:**
- **State:**
- **Zip:**
- **Submittal Date:** Tue May 06 09:19:04 EDT 2014
Public Input No. 2573-NFPA 70-2014 [ New Definition after Definition: Remote-Control Circuit. ]

Reliability. The probability that a system or component will operate properly for a specified period of time under design operating conditions without failure.

Informational Note: Additional information is available in ANSI/IEEE P3005.4 - Recommended Practice for Improving the Reliability of Emergency and Stand-By Power Systems

Statement of Problem and Substantiation for Public Input

Electrical safety has a strong correlation with power system reliability -- for electricians as well as occupants. Reliability is the probability that a product or service will operate properly for a specified period of time under design operating conditions without failure. Reliability is time dependent. The longer the time, the lower the reliability, regardless of what the system design is. The higher quality of the system design, the higher the probability of successful operation for a longer period of time. By comparison, a related term is Availability. Availability is the long-term average fraction of time that a repairable component or system is in service and satisfactorily performing its intended function. For example, if the electricity is off for one hour in a year, but the rest of the year the electricity is on, the availability of electrical power for that year is 8759 hours divided by 8760 hours, which is 0.999886.

As the mother standard for nearly all electrical power standards in the world these distinctions need to track in the vocabulary of our industry - specifically in Article 100 -- because this is the go-to place for electrical terminology in global electrical standards. The word "reliability" appears 15 times in the 2014 NEC.

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Article 100  Definitions

Scope. This article contains only those definitions essential to the proper application of this Code. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. In general, only those terms that are used in two or more articles are defined in Article 100. Other definitions are included in the article in which they are used but may be referenced in Article 100.

Part I of this article contains definitions intended to apply wherever the terms are used throughout this Code. Part II contains definitions applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600 volts, nominal.

Part I.  General

Accessible (as applied to equipment).
Admitting close approach; not guarded by locked doors, elevation, or other effective means.

Accessible (as applied to wiring methods).
Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.

Accessible, Readily (Readily Accessible).
Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to actions such as to use tools, to climb over or remove obstacles, or to resort to portable ladders, and so forth.

Adjustable Speed Drive.
Power conversion equipment that provides a means of adjusting the speed of an electric motor.

Informational Note: A variable frequency drive is one type of electronic adjustable speed drive that controls the rotational speed of an ac electric motor by controlling the frequency and voltage of the electrical power supplied to the motor.

Adjustable Speed Drive System.
A combination of an adjustable speed drive, its associated motor(s), and auxiliary equipment.

Ampacity.
The maximum current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating.

Appliance.
Utilization equipment, generally other than industrial, that is normally built in standardized sizes or types and is installed or connected as a unit to perform one or more functions such as clothes washing, air-conditioning, food mixing, deep frying, and so forth.

Approved.
Acceptable to the authority having jurisdiction.

Arc-Fault Circuit Interrupter (AFCI).
A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

Askarel.
A generic term for a group of nonflammable synthetic chlorinated hydrocarbons used as electrical insulating media.

Informational Note: Askarels of various compositional types are used. Under arcing conditions, the gases produced, while consisting predominantly of noncombustible hydrogen chloride, can include varying amounts of combustible gases, depending on the askarel type.

Attachment Plug (Plug Cap) (Plug).
A device that, by insertion in a receptacle, establishes a connection between the conductors of the attached flexible cord and the conductors connected permanently to the receptacle.

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.

Informational Note: 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.

**Automatic.**
Performing a function without the necessity of human intervention.

**Bathroom.**
An area including a basin with one or more of the following: a toilet, a urinal, a tub, a shower, a bidet, or similar plumbing fixtures.

**Battery System.**
Interconnected battery subsystems consisting of one or more storage batteries and battery chargers, and can include inverters, converters, and associated electrical equipment.

**Bonded (Bonding).**
Connected to establish electrical continuity and conductivity.

**Bonding Conductor or Jumper.**
A reliable conductor to ensure the required electrical conductivity between metal parts required to be electrically connected.

**Bonding Jumper, Equipment.**
The connection between two or more portions of the equipment grounding conductor.

**Bonding Jumper, Main.**
The connection between the grounded circuit conductor and the equipment grounding conductor at the service.

**Bonding Jumper, System.**
The connection between the grounded circuit conductor and the supply-side bonding jumper, or the equipment grounding conductor, or both, at a separately derived system.

**Branch Circuit.**
The circuit conductors between the final overcurrent device protecting the circuit and the outlet(s).

**Branch Circuit, Appliance.**
A branch circuit that supplies energy to one or more outlets to which appliances are to be connected and that has no permanently connected luminaires that are not a part of an appliance.

**Branch Circuit, General-Purpose.**
A branch circuit that supplies two or more receptacles or outlets for lighting and appliances.

**Branch Circuit, Individual.**
A branch circuit that supplies only one utilization equipment.

**Branch Circuit, Multiwire.**
A branch circuit that consists of two or more ungrounded conductors that have a voltage between them, and a grounded conductor that has equal voltage between it and each ungrounded conductor of the circuit and that is connected to the neutral or grounded conductor of the system.

**Building.**
A structure that stands alone or that is cut off from adjoining structures by fire walls with all openings therein protected by approved fire doors.

**Cabinet.**
An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.

**Cable Routing Assembly.**
A single channel or connected multiple channels, as well as associated fittings, forming a structural system that is used to support and route communications wires and cables, optical fiber cables, data cables associated with information technology and communications equipment, Class 2 and Class 3 cables, and power-limited fire alarm cables.

**Charge Controller.**
Equipment that controls dc voltage or dc current, or both, and that is used to charge a battery or other energy storage device.

**Circuit Breaker.**
A device designed to open and close a circuit by nonautomatic means and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its rating.

  **Informational Note:** The automatic opening means can be integral, direct acting with the circuit breaker, or remote from the circuit breaker.

**Adjustable (as applied to circuit breakers).**
A qualifying term indicating that the circuit breaker can be set to trip at various values of current, time, or both, within a predetermined range.
**Instantaneous Trip (as applied to circuit breakers).**
A qualifying term indicating that no delay is purposely introduced in the tripping action of the circuit breaker.

**Inverse Time (as applied to circuit breakers).**
A qualifying term indicating that there is purposely introduced a delay in the tripping action of the circuit breaker, which delay decreases as the magnitude of the current increases.

**Nonadjustable (as applied to circuit breakers).**
A qualifying term indicating that the circuit breaker does not have any adjustment to alter the value of the current at which it will trip or the time required for its operation.

**Setting (of circuit breakers).**
The value of current, time, or both, at which an adjustable circuit breaker is set to trip.

**Clothes Closet.**
A nonhabitable room or space intended primarily for storage of garments and apparel.

**Communications Equipment.**
The electronic equipment that performs the telecommunications operations for the transmission of audio, video, and data, and includes power equipment (e.g., dc converters, inverters, and batteries), technical support equipment (e.g., computers), and conductors dedicated solely to the operation of the equipment.

**Communications Raceway.**
An enclosed channel of nonmetallic materials designed expressly for holding communications wires and cables, typically communications wires and cables and optical fiber and data (Class 2 and Class 3) in plenum, riser, and general-purpose applications.

**Concealed.**
Rendered inaccessible by the structure or finish of the building.

Informational Note: Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.

**Conductor, Bare.**
A conductor having no covering or electrical insulation whatsoever.

**Conductor, Covered.**
A conductor encased within material of composition or thickness that is not recognized by this Code as electrical insulation.

**Conductor, Insulated.**
A conductor encased within material of composition and thickness that is recognized by this Code as electrical insulation.

**Conduit Body.**
A separate portion of a conduit or tubing system that provides access through a removable cover(s) to the interior of the system at a junction of two or more sections of the system or at a terminal point of the system.

Boxes such as FS and FD or larger cast or sheet metal boxes are not classified as conduit bodies.

**Connector, Pressure (Solderless).**
A device that establishes a connection between two or more conductors or between one or more conductors and a terminal by means of mechanical pressure and without the use of solder.

**Continuous Load.**
A load where the maximum current is expected to continue for 3 hours or more.

**Control Circuit.**
The circuit of a control apparatus or system that carries the electric signals directing the performance of the controller but does not carry the main power current.

**Controller.**
A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected.

**Cooking Unit, Counter-Mounted.**
A cooking appliance designed for mounting in or on a counter and consisting of one or more heating elements, internal wiring, and built-in or mountable controls.

**Coordination (Selective).**
Localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the selection and installation of overcurrent protective devices and their ratings or settings for the full range of available overcurrents, from overload to the maximum available fault current, and for the full range of overcurrent protective device opening times associated with those overcurrents.

**Copper-Clad Aluminum Conductors.**
Conductors drawn from a copper-clad aluminum rod, with the copper metallurgically bonded to an aluminum core, where the copper forms a minimum of 10 percent of the cross-sectional area of a solid conductor or each strand of a stranded conductor.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Cutout Box</td>
<td>An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the box proper.</td>
</tr>
<tr>
<td>Dead Front</td>
<td>Without live parts exposed to a person on the operating side of the equipment.</td>
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<tr>
<td>Demand Factor</td>
<td>The ratio of the maximum demand of a system, or part of a system, to the total connected load of a system or the part of the system under consideration.</td>
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<tr>
<td>Device</td>
<td>A unit of an electrical system, other than a conductor, that carries or controls electric energy as its principal function.</td>
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<tr>
<td>Disconnecting Means</td>
<td>A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.</td>
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<tr>
<td>Dusttight</td>
<td>Constructed so that dust will not enter the enclosing case under specified test conditions.</td>
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<tr>
<td>Duty, Continuous</td>
<td>Operation at a substantially constant load for an indefinitely long time.</td>
</tr>
<tr>
<td>Duty, Intermittent</td>
<td>Operation for alternate intervals of (1) load and no load; or (2) load and rest; or (3) load, no load, and rest.</td>
</tr>
<tr>
<td>Duty, Periodic</td>
<td>Intermittent operation in which the load conditions are regularly recurrent.</td>
</tr>
<tr>
<td>Duty, Short-Time</td>
<td>Operation at a substantially constant load for a short and definite, specified time.</td>
</tr>
<tr>
<td>Duty, Varying</td>
<td>Operation at loads, and for intervals of time, both of which may be subject to wide variation.</td>
</tr>
<tr>
<td>Dwelling, One-Family</td>
<td>A building that consists solely of one dwelling unit.</td>
</tr>
<tr>
<td>Dwelling, Two-Family</td>
<td>A building that consists solely of two dwelling units.</td>
</tr>
<tr>
<td>Dwelling, Multifamily</td>
<td>A building that contains three or more dwelling units.</td>
</tr>
<tr>
<td>Dwelling Unit</td>
<td>A single unit, providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking, and sanitation.</td>
</tr>
<tr>
<td>Effective Ground-Fault Current Path</td>
<td>An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions from the point of a ground fault on a wiring system to the electrical supply source and that facilitates the operation of the overcurrent protective device or ground-fault detectors.</td>
</tr>
<tr>
<td>Electric Power Production and Distribution Network</td>
<td>Power production, distribution, and utilization equipment and facilities, such as electric utility systems that deliver electric power to the connected loads, that are external to and not controlled by an interactive system.</td>
</tr>
<tr>
<td>Electric Sign</td>
<td>A fixed, stationary, or portable self-contained, electrically illuminated utilization equipment with words or symbols designed to convey information or attract attention.</td>
</tr>
<tr>
<td>Electric-Discharge Lighting</td>
<td>Systems of illumination utilizing fluorescent lamps, high-intensity discharge (HID) lamps, or neon tubing.</td>
</tr>
<tr>
<td>Electronically Actuated Fuse</td>
<td>An overcurrent protective device that generally consists of a control module that provides current-sensing, electronically derived time–current characteristics, energy to initiate tripping, and an interrupting module that interrupts current when an overcurrent occurs. Such fuses may or may not operate in a current-limiting fashion, depending on the type of control selected.</td>
</tr>
<tr>
<td>Enclosed</td>
<td>Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting energized parts.</td>
</tr>
<tr>
<td>Enclosure</td>
<td>The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage.</td>
</tr>
</tbody>
</table>

Informational Note: See Table 110.28 for examples of enclosure types.
Energized.
Electrically connected to, or is, a source of voltage.

Equipment.
A general term, including fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, an electrical installation.

Explosionproof Equipment.
Equipment enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby.

Informational Note: For further information, see ANSI/UL 1203-2009, Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.

Exposed (as applied to live parts).
Capable of being inadvertently touched or approached nearer than a safe distance by a person.

Informational Note: This term applies to parts that are not suitably guarded, isolated, or insulated.

Exposed (as applied to wiring methods).
On or attached to the surface or behind panels designed to allow access.

Externally Operable.
Capable of being operated without exposing the operator to contact with live parts.

Feeder.
All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device.

Festoon Lighting.
A string of outdoor lights that is suspended between two points.

Fitting.
An accessory such as a locknut, bushing, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function.

Garage.
A building or portion of a building in which one or more self-propelled vehicles can be kept for use, sale, storage, rental, repair, exhibition, or demonstration purposes.

Informational Note: For commercial garages, repair and storage, see Article 511.

Ground.
The earth.

Ground Fault.
An unintentional, electrically conductive connection between an ungrounded conductor of an electrical circuit and the normally non-current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment, or earth.

Grounded (Grounding).
Connected (connecting) to ground or to a conductive body that extends the ground connection.

Grounded, Solidly.
Connected to ground without inserting any resistor or impedance device.

Grounded Conductor.
A system or circuit conductor that is intentionally grounded.

Ground-Fault Circuit Interrupter (GFCI).
A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device.

Informational Note: Class A ground-fault circuit interrupters trip when the current to ground is 6 mA or higher and do not trip when the current to ground is less than 4 mA. For further information, see UL 943, Standard for Ground-Fault Circuit Interrupters.

Ground-Fault Current Path.
An electrically conductive path from the point of a ground fault on a wiring system through normally non-current-carrying conductors, equipment, or the earth to the electrical supply source.

Informational Note: Examples of ground-fault current paths are any combination of equipment grounding conductors, metallic raceways, metallic cable sheaths, electrical equipment, and any other electrically conductive material such as metal, water, and gas piping; steel framing members; stucco mesh; metal ducting; reinforcing steel; shields of communications cables; and the earth itself.

Ground-Fault Protection of Equipment.
A system intended to provide protection of equipment from damaging line-to-ground fault currents by operating to cause a disconnecting means to open all ungrounded conductors of the faulted circuit. This
protection is provided at current levels less than those required to protect conductors from damage through the operation of a supply circuit overcurrent device.

**Grounding Conductor, Equipment (EGC).**

The conductive path(s) that provides a ground-fault current path and connects normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both.

Informational Note No. 1: It is recognized that the equipment grounding conductor also performs bonding.

Informational Note No. 2: See 250.118 for a list of acceptable equipment grounding conductors.

**Grounding Electrode.**

A conducting object through which a direct connection to earth is established.

**Grounding Electrode Conductor.**

A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on the grounding electrode system.

**Guarded.**

Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach or contact by persons or objects to a point of danger.

**Guest Room.**

An accommodation combining living, sleeping, sanitary, and storage facilities within a compartment.

**Guest Suite.**

An accommodation with two or more contiguous rooms comprising a compartment, with or without doors between such rooms, that provides living, sleeping, sanitary, and storage facilities.

**Handhole Enclosure.**

An enclosure for use in underground systems, provided with an open or closed bottom, and sized to allow personnel to reach into, but not enter, for the purpose of installing, operating, or maintaining equipment or wiring or both.

**Hermetic Refrigerant Motor-Compressor.**

A combination consisting of a compressor and motor, both of which are enclosed in the same housing, with no external shaft or shaft seals, with the motor operating in the refrigerant.

**Hoistway.**

Any shaftway, hatchway, well hole, or other vertical opening or space in which an elevator or dumbwaiter is designed to operate.

**Hybrid System.**

A system comprised of multiple power sources. These power sources could include photovoltaic, wind, micro-hydro generators, engine-driven generators, and others, but do not include electric power production and distribution network systems. Energy storage systems such as batteries, flywheels, or superconducting magnetic storage equipment do not constitute a power source for the purpose of this definition. The energy regenerated by an overhauling (descending) elevator does not constitute a power source for the purpose of this definition.

**Identified (as applied to equipment).**

Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular Code requirement.

Informational Note: Some examples of ways to determine suitability of equipment for a specific purpose, environment, or application include investigations by a qualified testing laboratory (listing and labeling), an inspection agency, or other organizations concerned with product evaluation.

**In Sight From (Within Sight From, Within Sight).**

Where this Code specifies that one equipment shall be “in sight from,” “within sight from,” or “within sight of,” and so forth, another equipment, the specified equipment is to be visible and not more than 15 m (50 ft) distant from the other.

**Industrial Control Panel.**

An assembly of two or more components consisting of one of the following: (1) power circuit components only, such as motor controllers, overload relays, fused disconnect switches, and circuit breakers; (2) control circuit components only, such as push buttons, pilot lights, selector switches, timers, switches, and control relays; (3) a combination of power and control circuit components. These components, with associated wiring and terminals, are mounted on, or contained within, an enclosure or mounted on a subpanel.

The industrial control panel does not include the controlled equipment.

**Interactive System.**

An electric power production system that is operating in parallel with and capable of delivering energy to an electric primary source supply system.

**Interrupting Rating.**
The highest current at rated voltage that a device is identified to interrupt under standard test conditions.

Informational Note: Equipment intended to interrupt current at other than fault levels may have its interrupting rating implied in other ratings, such as horsepower or locked rotor current.

**Intersystem Bonding Termination.**
A device that provides a means for connecting intersystem bonding conductors for communications systems to the grounding electrode system.

**Isolated (as applied to location).**
Not readily accessible to persons unless special means for access are used.

**Kitchen.**
An area with a sink and permanent provisions for food preparation and cooking.

**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.

**Lighting Outlet.**
An outlet intended for the direct connection of a lampholder or luminaire.

**Lighting Track (Track Lighting).**
A manufactured assembly designed to support and energize luminaires that are capable of being readily repositioned on the track. Its length can be altered by the addition or subtraction of sections of track.

**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.

Informational Note: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.

**Live Parts.**
Energized conductive components.

**Location, Damp.**
Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture.

Informational Note: Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold-storage warehouses.

**Location, Dry.**
A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.

**Location, Wet.**
Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather.

**Luminaire.**
A complete lighting unit consisting of a light source such as a lamp or lamps, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light. A lampholder itself is not a luminaire.

**Motor Control Center.**
An assembly of one or more enclosed sections having a common power bus and principally containing motor control units.

**Multioutlet Assembly.**
A type of surface, flush, or freestanding raceway designed to hold conductors and receptacles, assembled in the field or at the factory.

**Neutral Conductor.**
The conductor connected to the neutral point of a system that is intended to carry current under normal conditions.

**Neutral Point.**
The common point on a wye-connection in a polyphase system or midpoint on a single-phase, 3-wire system, or midpoint of a single-phase portion of a 3-phase delta system, or a midpoint of a 3-wire, direct-
current system.

Informational Note: At the neutral point of the system, the vectorial sum of the nominal voltages from all other phases within the system that utilize the neutral, with respect to the neutral point, is zero potential.

Nonautomatic.
Requiring human intervention to perform a function.

Nonlinear Load.
A load where the wave shape of the steady-state current does not follow the wave shape of the applied voltage.

Informational Note: Electronic equipment, electronic/electric-discharge lighting, adjustable-speed drive systems, and similar equipment may be nonlinear loads.

Outlet.
A point on the wiring system at which current is taken to supply utilization equipment.

Outline Lighting.
An arrangement of incandescent lamps, electric-discharge lighting, or other electrically powered light sources to outline or call attention to certain features such as the shape of a building or the decoration of a window.

Overcurrent.
Any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short circuit, or ground fault.

Informational Note: A current in excess of rating may be accommodated by certain equipment and conductors for a given set of conditions. Therefore, the rules for overcurrent protection are specific for particular situations.

Overcurrent Protective Device, Branch-Circuit.
A device capable of providing protection for service, feeder, and branch circuits and equipment over the full range of overcurrents between its rated current and its interrupting rating. Such devices are provided with interrupting ratings appropriate for the intended use but no less than 5000 amperes.

Overcurrent Protective Device, Supplementary.
A device intended to provide limited overcurrent protection for specific applications and utilization equipment such as luminaires and appliances. This limited protection is in addition to the protection provided in the required branch circuit by the branch-circuit overcurrent protective device.

Overload.
Operation of equipment in excess of normal, full-load rating, or of a conductor in excess of rated ampacity that, when it persists for a sufficient length of time, would cause damage or dangerous overheating. A fault, such as a short circuit or ground fault, is not an overload.

Panelboard.
A single panel or group of panel units designed for assembly in the form of a single panel, including buses and automatic overcurrent devices, and equipped with or without switches for the control of light, heat, or power circuits; designed to be placed in a cabinet or cutout box placed in or against a wall, partition, or other support; and accessible only from the front.

Photovoltaic (PV) System.
The total components and sub-system that, in combination, convert solar energy into electric energy suitable for connection to a utilization load.

Plenum.
A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.

Power Outlet.
An enclosed assembly that may include receptacles, circuit breakers, fuseholders, fused switches, buses, and watt-hour meter mounting means; intended to supply and control power to mobile homes, recreational vehicles, park trailers, or boats or to serve as a means for distributing power required to operate mobile or temporarily installed equipment.

Premises Wiring (System).
Interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed. This includes (a) wiring from the service point or power source to the outlets or (b) wiring from and including the power source to the outlets where there is no service point.

Such wiring does not include wiring internal to appliances, luminaires, motors, controllers, motor control centers, and similar equipment.

Informational Note: Power sources include, but are not limited to, interconnected or stand-alone batteries, solar photovoltaic systems, other distributed generation systems, or generators.

Qualified Person.
One who has skills and knowledge related to the construction and operation of the electrical equipment and
installations and has received safety training to recognize and avoid the hazards involved.

Informational Note: Refer to NFPA 70E-2012, Standard for Electrical Safety in the Workplace, for electrical safety training requirements.

**Raceway.**
An enclosed channel of metallic or nonmetallic materials designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this Code.

Informational Note: A raceway is identified within specific article definitions.

**Rainproof.**
Constructed, protected, or treated so as to prevent rain from interfering with the successful operation of the apparatus under specified test conditions.

**Raintight.**
Constructed or protected so that exposure to a beating rain will not result in the entrance of water under specified test conditions.

**Receptacle.**
A receptacle is a contact device installed at the outlet for the connection of an attachment plug. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple receptacle is two or more contact devices on the same yoke.

**Receptacle Outlet.**
An outlet where one or more receptacles are installed.

**Reliability.**
The probability and frequency of failures (or lack of failures).

**Remote-Control Circuit.**
Any electrical circuit that controls any other circuit through a relay or an equivalent device.

**Retrofit Kit.**
A general term for a complete subassembly of parts and devices for field conversion of utilization equipment.

**Sealable Equipment.**
Equipment enclosed in a case or cabinet that is provided with a means of sealing or locking so that live parts cannot be made accessible without opening the enclosure.

Informational Note: The equipment may or may not be operable without opening the enclosure.

**Separately Derived System.**
An electrical source, other than a service, having no direct connection(s) to circuit conductors of any other electrical source other than those established by grounding and bonding connections.

**Service.**
The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

**Service Cable.**
Service conductors made up in the form of a cable.

**Service Conductors.**
The conductors from the service point to the service disconnecting means.

**Service Conductors, Overhead.**
The overhead conductors between the service point and the first point of connection to the service-entrance conductors at the building or other structure.

**Service Conductors, Underground.**
The underground conductors between the service point and the first point of connection to the service-entrance conductors in a terminal box, meter, or other enclosure, inside or outside the building wall.

Informational Note: Where there is no terminal box, meter, or other enclosure, the point of connection is considered to be the point of entrance of the service conductors into the building.

**Service Drop.**
The overhead conductors between the utility electric supply system and the service point.

**Service-Entrance Conductors, Overhead System.**
The service conductors between the terminals of the service equipment and a point usually outside the building, clear of building walls, where joined by tap or splice to the service drop or overhead service conductors.

**Service-Entrance Conductors, Underground System.**
The service conductors between the terminals of the service equipment and the point of connection to the service lateral or underground service conductors.

Informational Note: Where service equipment is located outside the building walls, there may be no service-entrance conductors or they may be entirely outside the building.

**Service Equipment.**
The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service conductors to a building or other structure, or an otherwise designated area, and intended to constitute the main control and cutoff of the supply.

**Service Lateral.**
The underground conductors between the utility electric supply system and the service point.

**Service Point.**
The point of connection between the facilities of the serving utility and the premises wiring.

Informational Note: The service point can be described as the point of demarcation between where the serving utility ends and the premises wiring begins. The serving utility generally specifies the location of the service point based on the conditions of service.

**Short-Circuit Current Rating.**
The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is able to be connected without sustaining damage exceeding defined acceptance criteria.

**Show Window.**
Any window used or designed to be used for the display of goods or advertising material, whether it is fully or partly enclosed or entirely open at the rear and whether or not it has a platform raised higher than the street floor level.

**Signaling Circuit.**
Any electrical circuit that energizes signaling equipment.

**Special Permission.**
The written consent of the authority having jurisdiction.

**Structure.**
That which is built or constructed.

**Substation.**
An enclosed assemblage of equipment (e.g., switches, interrupting devices, circuit breakers, buses, and transformers) through which electric energy is passed for the purpose of distribution, switching, or modifying its characteristics.

**Surge Arrester.**
A protective device for limiting surge voltages by discharging or bypassing surge current; it also prevents continued flow of follow current while remaining capable of repeating these functions.

**Surge-Protective Device (SPD).**
A protective device for limiting transient voltages by diverting or limiting surge current; it also prevents continued flow of follow current while remaining capable of repeating these functions and is designated as follows:

Type 1: Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service disconnect overcurrent device.

Type 2: Permanently connected SPDs intended for installation on the load side of the service disconnect overcurrent device, including SPDs located at the branch panel.

Type 3: Point of utilization SPDs.

Type 4: Component SPDs, including discrete components, as well as assemblies.

Informational Note: For further information on Type 1, Type 2, Type 3, and Type 4 SPDs, see UL 1449, *Standard for Surge Protective Devices.*

**Switch, Bypass Isolation.**
A manually operated device used in conjunction with a transfer switch to provide a means of directly connecting load conductors to a power source and of disconnecting the transfer switch.

**Switch, General-Use.**
A switch intended for use in general distribution and branch circuits. It is rated in amperes, and it is capable of interrupting its rated current at its rated voltage.

**Switch, General-Use Snap.**
A form of general-use switch constructed so that it can be installed in device boxes or on box covers, or otherwise used in conjunction with wiring systems recognized by this Code.

**Switch, Isolating.**
A switch intended for isolating an electrical circuit from the source of power. It has no interrupting rating, and it is intended to be operated only after the circuit has been opened by some other means.

**Switch, Motor-Circuit.**
A switch rated in horsepower that is capable of interrupting the maximum operating overload current of a motor of the same horsepower rating as the switch at the rated voltage.

**Switch, Transfer.**
An automatic or nonautomatic device for transferring one or more load conductor connections from one
power source to another.

**Switchboard.**
A large single panel, frame, or assembly of panels on which are mounted on the face, back, or both, switches, overcurrent and other protective devices, buses, and usually instruments. These assemblies are generally accessible from the rear as well as from the front and are not intended to be installed in cabinets.

**Switchgear.**
An assembly completely enclosed on all sides and top with sheet metal (except for ventilating openings and inspection windows) and containing primary power circuit switching, interrupting devices, or both, with buses and connections. The assembly may include control and auxiliary devices. Access to the interior of the enclosure is provided by doors, removable covers, or both.

Informational Note: All switchgear subject to NEC requirements is metal enclosed. Switchgear rated below 1000 V or less may be identified as “low-voltage power circuit breaker switchgear.” Switchgear rated over 1000 V may be identified as “metal-enclosed switchgear” or “metal-clad switchgear.” Switchgear is available in non–arc-resistant or arc-resistant constructions.

**Thermal Protector (as applied to motors).**
A protective device for assembly as an integral part of a motor or motor-compressor that, when properly applied, protects the motor against dangerous overheating due to overload and failure to start.

Informational Note: The thermal protector may consist of one or more sensing elements integral with the motor or motor-compressor and an external control device.

**Thermally Protected (as applied to motors).**
The words *Thermally Protected* appearing on the nameplate of a motor or motor-compressor indicate that the motor is provided with a thermal protector.

**Ungrounded.**
Not connected to ground or to a conductive body that extends the ground connection.

**Uninterruptible Power Supply.**
A power supply used to provide alternating current power to a load for some period of time in the event of a power failure.

Informational Note: In addition, it may provide a more constant voltage and frequency supply to the load, reducing the effects of voltage and frequency variations.

**Utility-Interactive Inverter.**
An inverter intended for use in parallel with an electric utility to supply common loads that may deliver power to the utility.

**Utilization Equipment.**
Equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes.

**Ventilated.**
Provided with a means to permit circulation of air sufficient to remove an excess of heat, fumes, or vapors.

**Volatile Flammable Liquid.**
A flammable liquid having a flash point below 38°C (100°F), or a flammable liquid whose temperature is above its flash point, or a Class II combustible liquid that has a vapor pressure not exceeding 276 kPa (40 psia) at 38°C (100°F) and whose temperature is above its flash point.

**Voltage (of a circuit).**
The greatest root-mean-square (rms) (effective) difference of potential between any two conductors of the circuit concerned.

Informational Note: Some systems, such as 3-phase 4-wire, single-phase 3-wire, and 3-wire direct current, may have various circuits of various voltages.

**Voltage, Nominal.**
A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (e.g., 120/240 volts, 480Y/277 volts, 600 volts).

Informational Note No. 1: The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

Informational Note No. 2: See ANSI C84.1-2006, *Voltage Ratings for Electric Power Systems and Equipment (60 Hz).*

**Voltage to Ground.**
For grounded circuits, the voltage between the given conductor and that point or conductor of the circuit that is grounded; for ungrounded circuits, the greatest voltage between the given conductor and any other conductor of the circuit.

**Watertight.**
Constructed so that moisture will not enter the enclosure under specified test conditions.

**Weatherproof.**
Constructed or protected so that exposure to the weather will not interfere with successful operation.
Informational Note: Rainproof, raintight, or watertight equipment can fulfill the requirements for weatherproof where varying weather conditions other than wetness, such as snow, ice, dust, or temperature extremes, are not a factor.

**Part II.** Over 600 Volts, Nominal

Part II contains definitions applicable only to the articles and parts of articles specifically covering installations and equipment operating at over 600 volts, nominal.

The definitions in Part I are intended to apply wherever the terms are used throughout this Code. The definitions in Part II are applicable only to articles and parts of articles specifically covering installations and equipment operating at over 600 volts, nominal.

**Electronically Actuated Fuse.**

An overcurrent protective device that generally consists of a control module that provides current sensing, electronically derived time–current characteristics, energy to initiate tripping, and an interrupting module that interrupts current when an overcurrent occurs. Electronically actuated fuses may or may not operate in a current-limiting fashion, depending on the type of control selected.

**Fuse.**

An overcurrent protective device with a circuit-opening fusible part that is heated and severed by the passage of overcurrent through it.

Informational Note: A fuse comprises all the parts that form a unit capable of performing the prescribed functions. It may or may not be the complete device necessary to connect it into an electrical circuit.

**Controlled Vented Power Fuse.**

A fuse with provision for controlling discharge circuit interruption such that no solid material may be exhausted into the surrounding atmosphere.

Informational Note: The fuse is designed so that discharged gases will not ignite or damage insulation in the path of the discharge or propagate a flashover to or between grounded members or conduction members in the path of the discharge where the distance between the vent and such insulation or conduction members conforms to manufacturer’s recommendations.

**Expulsion Fuse Unit (Expulsion Fuse).**

A vented fuse unit in which the expulsion effect of gases produced by the arc and lining of the fuseholder, either alone or aided by a spring, extinguishes the arc.

**Nonvented Power Fuse.**

A fuse without intentional provision for the escape of arc gases, liquids, or solid particles to the atmosphere during circuit interruption.

**Power Fuse Unit.**

A vented, nonvented, or controlled vented fuse unit in which the arc is extinguished by being drawn through solid material, granular material, or liquid, either alone or aided by a spring.

**Vented Power Fuse.**

A fuse with provision for the escape of arc gases, liquids, or solid particles to the surrounding atmosphere during circuit interruption.

**Multiple Fuse.**

An assembly of two or more single-pole fuses.

**Switching Device.**

A device designed to close, open, or both, one or more electrical circuits.

**Circuit Breaker.**

A switching device capable of making, carrying, and interrupting currents under normal circuit conditions, and also of making, carrying for a specified time, and interrupting currents under specified abnormal circuit conditions, such as those of short circuit.

**Cutout.**

An assembly of a fuse support with either a fuseholder, fuse carrier, or disconnecting blade. The fuseholder or fuse carrier may include a conducting element (fuse link) or may act as the disconnecting blade by the inclusion of a nonfusible member.

**Disconnecting Means.**

A device, group of devices, or other means whereby the conductors of a circuit can be disconnected from their source of supply.

**Disconnecting (or Isolating) Switch (Disconnector, Isolator).**

A mechanical switching device used for isolating a circuit or equipment from a source of power.

**Interrupter Switch.**

A switch capable of making, carrying, and interrupting specified currents.

**Oil Cutout (Oil-Filled Cutout).**

A cutout in which all or part of the fuse support and its fuse link or disconnecting blade is mounted in oil with complete immersion of the contacts and the fusible portion of the conducting element (fuse link) so that arc...
Statement of Problem and Substantiation for Public Input

The reliability of a power system is its essential characteristic. Everything we do in the power industry is focused on making sure that power is present and safe. This definition, coupled with the term “available” should track explicitly in the NEC and should raise awareness that reliability calculations are as essential as short circuit and load flow calculations.

Submitter Information Verification

Submitter Full Name: Michael Anthony
Organization: University of Michigan
Affiliation: IEEE Educational & Healthcare Facility Electrotechnology Subcommittee
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 07 11:18:28 EST 2014
Sealable Equipment.
Equipment enclosed in a case or cabinet that is provided with a means of sealing or locking so that live parts cannot be made accessible without opening the enclosure after opening the seal or lock.

Informational Note: The equipment may or may not be operable without opening the enclosure.

Statement of Problem and Substantiation for Public Input

The whole point of "sealable equipment" is that you can't open it without opening the seal or lock.

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Oct 18 11:25:30 EDT 2014
Question:

**Short-Circuit Current Rating.**
The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is able to be connected: carry, without sustaining damage exceeding defined acceptance criteria.

**Statement of Problem and Substantiation for Public Input**

SCCR is about the ability to "carry" a current, not to be "connected". It is not clear to me what "connected" means in this context.

**Submitter Information Verification**

- **Submitter Full Name:** JAMES WILLIAMS
- **Organization:** none
- **Affiliation:** Retired Master Electrician
- **Street Address:**
- **City:**
- **State:**
- **Zip:**
- **Submittal Date:** Sat Oct 18 11:22:46 EDT 2014
Structure.
That which is built or constructed.

Informational Note: The term structure is typically used to describe billboards, grain bins, poles, and towers.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by, and represents the majority view of, a Task Group assigned by the NEC Correlating Committee to address structures, including recreational vehicle (RV) pedestals and resolve issues with actions taken by Code-making Panel 19 on proposals and comments in the 2014 NEC cycle relative to comparing the definitions of “Structure” and “Building” regarding differences between “structures” and “equipment” for the purpose of requiring grounding electrodes as compared to installing optional or auxiliary electrodes. Members of the Task Group on Structures, including RV Pedestals for this Public Input included: Susan Newman-Scearce; Paul Dobrowsky; Greg Steinman; Malcolm Allison; William Pancake; Wade Elliott; Barry Bauman; Joseph Marquardt; Todd Stafford; and co-chairs Robert McCullough and Neil F. LaBrake, Jr.; including ad-hoc member Ron Chilton, CMP-19 Chair.

There seems to be confusion about what is considered equipment versus what is considered a structure. Based on the existing definition of structure, everything that is built or constructed is a structure, including equipment. The task group considered limiting equipment to that which was built at the manufacturer’s site but sometimes equipment is built at the user’s site. Although using informational notes to help explain a definition was not the first preference the task group was not able to change the existing definitions to clearly delineate the differences in all cases and concludes this is the best approach at this time.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 12:42:44 EDT 2014
Structure.
That which is built or constructed, Other than equipment or a device.

Statement of Problem and Substantiation for Public Input

This further clarification of the term structure will help the AHJ in applying the code. The way it is written one can interrupt free standing switch gear, a receptacle on a post, or a sector cabinet as a structure and require a building disconnect (225.31), grounding system (250.50) and an intersystem bonding means (250.94) to be installed. I believe this is not the intend results. There is no confusion when it comes to a building. However the current term structure does not exclude this type of equipment or device. Adding this to the definition would make it clear equipment or devices (see definitions) used in an electrical installation are not within the definition of a structure.

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: Master electrician
Street Address: City: State: Zip: Submittal Date: Wed Nov 05 17:48:27 EST 2014
Structure.
That which is not manufactured, but built or constructed in place.

Statement of Problem and Substantiation for Public Input

This proposal is an effort to assist users in clearly differentiating between equipment that is manufactured, as compared to buildings or other structures that are constructed (built) in place. There are some that believe electrical equipment is a structure when it is installed outdoors and away from a building and mounted to a concrete base or footing. As an example, motors on a concrete pad, air conditioners on a concrete pad, cooling towers on a concrete pad, light poles on a concrete pole base, generators mounted to a concrete pad, and so forth. In all of these cases, the electrical equipment is mounted to the structure (concrete or footing). The equipment is manufactured, the concrete is the structure. Another clear example of a structure is a billboard sign. The concrete foundation and the steel create the structure, the lights and service installed on the billboard are equipment. The revision is an attempt to clarify the NEC requirements related to structures, such as the requirements for grounding electrodes. In some instances a structure could be prefabricated and transported to a site and installed on a foundation.

Submitter Information Verification

Submitter Full Name: Michael Johnston
Organization: NECA
Affiliation: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 07 07:45:52 EST 2014
Public Input No. 1579-NFPA 70-2014 [ Part I. ]

Part I. General
Add definitions for:
- Tap Conductors.
- Supervised Industrial Installations.

Statement of Problem and Substantiation for Public Input

Terms are used in several Articles.

Submitter Information Verification

Submitter Full Name: DAVID BREDHOLD
Organization: C & I ENGINEERING
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Sat Oct 04 08:04:15 EDT 2014
Public Input No. 1911-NFPA 70-2014 [ New Definition after Definition: Voltage, Nominal.]

**Definition. Voltage, Actual.**

**100 Voltage, Actual.**

The specific voltage of a circuit used as a limit. Not representing a range of voltages.

**Statement of Problem and Substantiation for Public Input**

This adds a definition of Actual Voltage, which, in contrast with Nominal Voltage, describe a specific voltage, not a range of voltages. This provides a way to understand which type of voltage is meant when a voltage is specified in the NEC.

see substantiation for 1902-NFPA 70-2014 for further information

**Submitter Information Verification**

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address: 
City: 
State: 
Zip: 
Public Input No. 2856-NFPA 70-2014 [ Definition: Voltage, Nominal. ]

**Voltage, Nominal.**
A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (e.g., 120/240 volts, 480Y/277 volts, 600 volts, and 1000v).

Informational Note No. 1: The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

Informational Note No. 2: See ANSI C84.1-, 2011, Voltage Ratings for Electric Power Systems and Equipment (60 Hz).

**Statement of Problem and Substantiation for Public Input**

The ANSI C81.1 has increased services and utilization equipmnet for 60 hz systems to 1000v for the solar wind mine and gas industries. these industries have larger loads and the cables are getting to big s they have increased the voltage class.

**Submitter Information Verification**

Submitter Full Name: JAMES CAIN
Organization: [ Not Specified ]
Affiliation: self
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Oct 30 11:41:33 EDT 2014
110.2 Approval.
The conductors and equipment required or permitted by this Code shall be acceptable only if approved. Approval shall not extend to the internal wiring of a manufactured or listed product.

Informational Note: See 90.7, Examination of Equipment for Safety, and 110.3, Examination, Identification, Installation, and Use of Equipment. See definitions of Approved, Identified, Labeled, and Listed.

Statement of Problem and Substantiation for Public Input

Manufactured or listed products are subject to standards and regulations provided by the manufacture’s engineer and third party agencies. These products are tested for reliability and conformity, section 300.1 (B) supports internal wiring is not within the NEC. Allowing this change will help the AHJ understand the extent of their approval.

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: master electrician
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Oct 30 18:02:05 EDT 2014
Public Input No. 2839-NFPA 70-2014 [Section No. 110.3]

110.3 Examination, Identification, Installation, and Use of Equipment.

(A) Examination.

In judging equipment, considerations such as the following shall be evaluated:

(1) Suitability for installation and use in conformity with the provisions of this Code

    Informational Note: Suitability of equipment use may be identified by a description marked on or provided with a product to identify the suitability of the product for a specific purpose, environment, or application. Special conditions of use or other limitations and other pertinent information may be marked on the equipment, included in the product instructions, or included in the appropriate listing and labeling information. Suitability of equipment may be evidenced by listing or labeling.

(2) Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided

(3) Wire-bending and connection space

(4) Electrical insulation

(5) Heating effects under normal conditions of use and also under abnormal conditions likely to arise in service

(6) Arcing effects

(7) Classification by type, size, voltage, current capacity, and specific use

(8) Other factors that contribute to the practical safeguarding of persons using or likely to come in contact with the equipment

(B) Installation and Use.

Listed or labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling.

(C) Listed. Where equipment, conductors, raceways, devices, fittings and other materials are required to be listed elsewhere in this code, the listing shall be compatible with product standards recognized within the country, state, and/or municipality of the installation.

Statement of Problem and Substantiation for Public Input

The NEC presently has many individual requirements that particular products be listed. When these listed products are required, it is important that they are properly evaluated, and that they be listed to product standards that are compatible with this code. From a safety viewpoint it is also critical that the listing organization have a follow up surveillance program in place to assure continued compliance.

The electrical industry has seen requests to accept CE marked equipment, which merely indicates a one-time, "self-certified" declaration by the manufacturer to European regulations which have not been evaluated to meet the requirements of this code. In some cases tremendous political pressure on an AHJ to accept equipment that is labeled and self certified outside of the United States. This can create many serious safety issues including but not limited to; color code requirements in the NEC that are ignored by the IEC, and overcurrent protective device opening times for similar devices may be significantly expanded.

Both the North American system and the European systems work very well when implemented independently of each other. However, they cannot be mixed together and still achieve the necessary level of safety to protect persons and property from the hazards of electricity.

It is imperative to clarify this with a requirement in the NEC and a new second level subdivision in 110.3 is the appropriate location to get it done.

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
Public Input No. 3492-NFPA 70-2014 [Section No. 110.3(A)]

(A) Examination.
In judging new, used or reconditioned equipment, considerations such as the following shall be evaluated:

(1) Suitability for installation and use in conformity with the provisions of this Code

   Informational Note: Suitability of equipment use may be identified by a description marked on or provided with a product to identify the suitability of the product for a specific purpose, environment, or application. Special conditions of use or other limitations and other pertinent information may be marked on the equipment, included in the product instructions, or included in the appropriate listing and labeling information. Suitability of equipment may be evidenced by listing or labeling. Reconditioned equipment should bear the mark of the organization that performed the work, along with the date of the reconditioning.

(2) Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided

(3) Wire-bending and connection space

(4) Electrical insulation

(5) Heating effects under normal conditions of use and also under abnormal conditions likely to arise in service

(6) Arcing effects

(7) Classification by type, size, voltage, current capacity, and specific use

(8) Other factors that contribute to the practical safeguarding of persons using or likely to come in contact with the equipment

Statement of Problem and Substantiation for Public Input

Reconditioned, recycled and refurbished equipment should be examined before being placed into service.

Submitter Information Verification

Submitter Full Name: Christel Hunter
Organization: General Cable
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Tue Nov 04 11:14:55 EST 2014
Public Input No. 3492-NFPA 70-2014 [Section No. 110.3(A)]

(A) Examination.
In judging new, used or reconditioned equipment, considerations such as the following shall be evaluated:

1. Suitability for installation and use in conformity with the provisions of this Code
   Informational Note: Suitability of equipment use may be identified by a description marked on or provided with a product to identify the suitability of the product for a specific purpose, environment, or application. Special conditions of use or other limitations and other pertinent information may be marked on the equipment, included in the product instructions, or included in the appropriate listing and labeling information. Suitability of equipment may be evidenced by listing or labeling. Reconditioned equipment should bear the mark of the organization that performed the work, along with the date of the reconditioning.

2. Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided

3. Wire-bending and connection space

4. Electrical insulation

5. Heating effects under normal conditions of use and also under abnormal conditions likely to arise in service

6. Arcing effects

7. Classification by type, size, voltage, current capacity, and specific use

8. Other factors that contribute to the practical safeguarding of persons using or likely to come in contact with the equipment

Statement of Problem and Substantiation for Public Input

Reconditioned, recycled and refurbished equipment should be examined before being placed into service.

Submitter Information Verification

Submitter Full Name: Christel Hunter
Organization: General Cable
Street Address:
City:
State:
Zip:
Submittal Date: Tue Nov 04 11:14:55 EST 2014
Public Input No. 3491-NFPA 70-2014 [Section No. 110.3(A)]

(A) Examination.
In judging equipment, new, reconditioned, refurbished or remanufactured equipment, considerations such as the following shall be evaluated:

1) Suitability for installation and use in conformity with the provisions of this Code
   Informational Note: Suitability of equipment use
   new, reconditioned, refurbished or remanufactured equipment, may be identified by a description marked on or provided with a product to identify the suitability of the product for a specific purpose, environment, or application. Special conditions of use or other limitations and other pertinent information may be marked on the equipment, included in the product instructions, or included in the appropriate listing and labeling information. Suitability of equipment may be evidenced by listing or labeling.

2) Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided

3) Wire-bending and connection space

4) Electrical insulation

5) Heating effects under normal conditions of use and also under abnormal conditions likely to arise in service

6) Arcing effects

7) Classification by type, size, voltage, current capacity, and specific use

8) Other factors that contribute to the practical safeguarding of persons using or likely to come in contact with the equipment

Statement of Problem and Substantiation for Public Input

Reconditioned, refurbished and remanufactured electrical equipment is widely used in all types of industry to replace, upgrade or further the life cycle of existing equipment. In many instances the existing equipment manufacturer is no longer in business or the equipment design is no longer available and the use of reconditioned, refurbished and remanufactured equipment must be used. New equipment may not physically fit in the existing facility or equipment location so extending the life of the existing equipment is critical. When electrical equipment is reconditioned, refurbished or remanufactured to industry standards, it also allows existing electrical equipment to be reconditioned, repurposed and upgraded with modern electrical protection systems such as arc-flash protection system, solid state relays and protection systems that provide an overall safer electrical system and compliance with the current NFPA 70 (example NEC 240.87) requirements and NFPA 70E recommendations that protect the electrical worker.

Submitter Information Verification

Submitter Full Name: HOWARD HERNDON
Organization: SOUTHWEST ELECTRITECH SVCS LLC
Affiliation: PEARL
Street Address:
City:
State:
Zip:
Submittal Date: Tue Nov 04 11:14:49 EST 2014
(B) Installation and Use.
Listed or Listed and labeled equipment shall be installed and used in accordance with any instructions included in the listing or listing and labeling.

Statement of Problem and Substantiation for Public Input

By adding the word and, it will identify that listed products also need to be labeled. Both terms listed and labeled are defined in article 100, but are not used consistently throughout the NEC. In some locations the NEC actually permits a choice between a product being listed or labeled, for example; sections 110.3(B), 230.42, 550.4(D) and 625.16. If taken literally, as defined in Article 100, a product could be listed and not labeled and still comply with the NEC when not required to be listed and labeled such as in sections 424.6, 646.3(I), 646.13 and 690.31(C) to identify a few.

The UL White Book identifies that only those products bearing the appropriate UL Mark and the company's name, trade name, trademark or other authorized identification should be considered as being covered by UL's Certification, Listing, Classification and Follow-Up Service. Therefore, if not identified within the UL Certification Directory as indicated in the definition of listed and bearing the appropriate UL mark as indicated in the definition of labeled the product is not considered by UL to be listed. This is not just UL; all of the test laboratories have a very similar requirement. This change will help make the NEC a more consistent document for AHJ's.

Submitter Information Verification

Submitter Full Name: JEFFREY FECTEAU
Organization: UNDERWRITERS LABORATORIES LLC
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Jul 24 14:19:38 EDT 2014
B) Installation and Use.

(1) Listed or labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling.

(2) Use of classified equipment in keeping with any instructions included in the classification shall satisfy 110.3(B)(1).

Statement of Problem and Substantiation for Public Input

The problem has two parts. First, the mere fact of classified equipment can confuse people looking to 110.3(B) for guidance. Consider the installation of retrofit kits that a linear fluorescent marked for use with T12s, that now will run LEDs. The luminaire's label says nothing about inserting kits, just about T12s.

Second, strong statements have been made in print implying that only OEM-authorized and -manufactured components should allow a job to pass inspection. Witness Schneider/Square D’s Classified Breaker Brochure, which says in part, "Classified Circuit Breaker Manufacturers would have you believe that installation contrary to the marking on the panelboard (load center) is consistent with the National Electrical Code (NEC). In fact, NEC 110.3(B) is clear in the requirement to follow the listing and label instructions."

The brochure can be found online here: http://download.schneider-electric.com/files?L=en&p=&p_docId=0106BR0502&p_EnDocType=Brochure&p_File_Id=74226062&
p_File_Name=0106BR0502.pdf

The best remedy to both parts of the problem is to acknowledge in some way, whether in the body of the rule, as suggested here for Classified products, or at least in an Informational Note, that the listing instructions for product use can legitimately be modified without resorting to 90.2(C) Special Permission.

Submitter Information Verification

Submitter Full Name: DAVID SHAPIRO
Organization: SAFETY FIRST ELECTRICAL
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Sat Jun 28 10:55:29 EDT 2014
(B) Installation and Use.
Listed or labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling. Equipment shall be evaluated for compliance with requirements which are compatible with this Code.

Informational Note: Refer to Annex A for a list of product safety standards developed to coordinate with requirements in this Code.

Statement of Problem and Substantiation for Public Input

Equipment standards are developed in coordination with installation Codes to ensure safety and compatibility. Product standards which do not specifically anticipate compliance or coordination with the NEC present installation problems (such as specifying metric conductor sizes), non-compliance issues (with Code specific construction requirements) and safety concerns (such as overcurrent protection schemes which are incompatible with the NEC). Product standards which are developed to align with the NEC identify this intention in the scope of each Standard, and unless additional evaluation is performed, only these products can be assured to meet NEC requirements. Reference to Annex A provides guidance as to which standards are commonly used.

Related Public Inputs for This Document

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Submitter Information Verification

<table>
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<tr>
<th>Submitter Full Name:</th>
<th>Robert Osborne</th>
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<td>UL LLC</td>
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Public Input No. 2895-NFPA 70-2014 [ Section No. 110.3(B) ]

(B) Installation and Use.
Listed or labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling, provided the instructions, listing, or labeling do not conflict with this code.

Statement of Problem and Substantiation for Public Input
This revision clarifies that the provisions of the NEC should take precedence.

Submitter Information Verification
Submitter Full Name: Jim Muir
Organization: Clark County, Washington, Building Safety Division
Affiliation: NFPA's Building Code Development Committee (BCDC)
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 30 19:06:56 EDT 2014
(C) Installations in Flood Hazard Areas. For installations in Flood Hazard Areas, conductors and equipment shall be elevated to or above the Base Flood Elevation plus one foot (BFE 1) or the Design Flood Elevation (DFE) whichever is higher.

Informational Note No. 1: The flood elevation specified applies to One- and Two-family dwellings and to buildings that do not pose a high risk to the public if damaged by flooding. More stringent criteria apply to buildings that do pose a high risk to the public if damaged by flooding. See American Society of Civil Engineers/Structural Engineering Institute standard ASCE/SEI 24 Flood Resistant Design and Construction.

Exception No. 1: Conductors and equipment shall be permitted to be located below the elevation specified above provided they are designed and installed to prevent flood waters from entering or accumulating within components during design flood conditions and all equipment is designed and installed to resist flood loads resulting from inundation to the elevation specified above.

Exception No. 2: Where conductors and equipment are suitable for submerged applications and are designed and installed to resist flood loads resulting from inundation to the elevation specified above.

Informational Note No. 2: See Table 110.28 for appropriate enclosure-type designations for submerged applications.

Exception No. 3: When located in areas protected by dry floodproofing to the elevation specified above.

Exception No. 4: Where allowed by Article 682.

Type your content here ...

Statement of Problem and Substantiation for Public Input

This change includes the minimum flood provisions that already exist in the 2015 Edition of NFPA 5000 Building Construction and Safety Code, the 2015 International Building Code (IBC) and the 2015 International Residential Code for One- and Two-Family Dwellings (IRC).

The change will make the minimum flood provisions more assessable to practicing electrical engineers, electrical inspectors and electricians. The Informational Note included provides a non-mandatory reference to ASCE 24 Flood Resistant Design and Construction, the flood standard referenced by NFPA 5000, the IBC and the IRC for installations other than One- and Two-family dwellings and buildings that do not pose a high risk to the public if damaged by flooding.

Related Public Inputs for This Document

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Submitter Information Verification

Submitter Full Name: David Low
Organization: DK Low & Associates, LLC
Affiliation: Representing Dept of Homeland Security/FEMA
Street Address:
City:
State:
Zip:
Submittal Date: Thu Nov 06 10:34:05 EST 2014
110.41 Inspections and Tests

(A) Pre-Energization and Operating Tests. The complete electrical system design, including settings for protective, switching, and control circuits, shall be prepared in advance and made available on request to the authority having jurisdiction and shall be performance tested when first installed on-site. Each protective, switching, and control circuit shall be adjusted in accordance with the system design and tested by actual operation using current injection or equivalent methods as necessary to ensure that each and every such circuit operates correctly to the satisfaction of the authority having jurisdiction.

(1) Instrument Transformers. All instrument transformers shall be tested to verify correct polarity and burden.

(2) Protective Relays. Each protective relay shall be demonstrated to operate by injecting current or voltage, or both, at the associated instrument transformer output terminal and observing that the associated switching and signaling functions occur correctly and in proper time and sequence to accomplish the protective function intended.

(3) Switching Circuits. Each switching circuit shall be observed to operate the associated equipment being switched.

(4) Control and Signal Circuits. Each control or signal circuit shall be observed to perform its proper control function or produce a correct signal output.

(5) Metering Circuits. All metering circuits shall be verified to operate correctly from voltage and current sources in a similar manner to protective relay circuits.

(6) Site Acceptance Tests. Complete site acceptance tests shall be performed, after the electrical equipment installation is completed, on all assemblies, equipment, conductors, and control and protective systems, as applicable, to verify the integrity of all the systems.

(7) Relays and Metering Utilizing Phase Differences. All relays and metering that use phase differences for operation shall be verified by measuring phase angles at the relay under actual load conditions after operation commences.

(B) Test Report. A test report covering the results of the tests required in 110.41(A) shall be delivered to the authority having jurisdiction prior to energization and made available to those authorized to install, operate, test, and maintain the system.

Statement of Problem and Substantiation for Public Input

This requirement, to be placed at the end of Part III, ensures that electrical system installations greater than 600 volts perform to the design specifications and that the records for verifying the proper settings and test data are available to the authority having jurisdiction and to the installer, operators, testers, and maintainers after the equipment is put into service. This requirement language is the same as in 225.56, except for the addition of text to 110.41(B) "and made available to those authorized to install, operate, test, and maintain the system." 225.56 was added to the 2011 NEC for outdoor feeders and branch circuits greater than 1000V. 225.56 increased safety by assuring the initial installation of these high power circuits is properly done and the protective, switching, and control schemes are properly set and all acceptance testing completed. Circuits of these types inside of buildings have an even higher priority for assurance the initial install is as designed and the equipment will operate as intended. There are greater hazards and higher life safety risks for these circuits when installed inside a building. In addition, having the test data available to those who must operate, test, or maintain the equipment provides important information to evaluate the condition of maintenance in the future. If this is accepted, the text of 110.30 would need to be changed to include "110.30 through 110.40 110.41."

Submitter Information Verification

Submitter Full Name: Scott Brady
Organization: Eaton Corporation
Street Address: 
City: 
State: 
Zip: 

Panel 1 FD Agenda Page 198
Additional Proposed Changes

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<td>T110.4.html</td>
<td>new table</td>
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Statement of Problem and Substantiation for Public Input

Nominal voltages are often specified in families. For instance 125, 120, and 115 all represent the same nominal voltage, 125 for devices, 120 for utilization voltage, and 115 for motor utilization voltages. This is neither clear in the NEC nor in many instructional courses.

Since the NEC is actually an internationally used electrical installation standard, it seems appropriate to provide nominal voltages for other Countries. This is based on information from the NFPA, internet search of governmental sites, international electrical information for travelers, and private communications. It probably contains errors. Corrections are welcomed.

Related Public Inputs for This Document

- Related Input: Public Input No. 1902-NFPA 70-2014 [Global Input]
  - Relationship: 1902 depends on this submission
- Related Input: Public Input No. 1920-NFPA 70-2014 [Section No. 220.5(A)]

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Wed Oct 15 14:02:58 EDT 2014
### Table 110.4 Nominal Voltages.

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<tr>
<td>110/220 1</td>
<td></td>
<td></td>
<td>Belize</td>
</tr>
<tr>
<td>125</td>
<td>120</td>
<td>115</td>
<td>American Samoa, Costa Rica, Ecuador, Panama, Puerto Rico, USA</td>
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<tr>
<td>125/250 1</td>
<td>120/240 1</td>
<td>115/230 1</td>
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<tr>
<td>125</td>
<td>120/208 Y 3</td>
<td>115</td>
<td>American Samoa, Dominican Republic, Puerto Rico, Saudi Arabia, USA</td>
</tr>
<tr>
<td>125</td>
<td>120/208 V 2</td>
<td>115</td>
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<td>127</td>
<td></td>
<td></td>
<td>Mexico</td>
</tr>
<tr>
<td>127/220</td>
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<td>Saudi Arabia</td>
</tr>
<tr>
<td>190/380 3</td>
<td></td>
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<td>Belize, British Virgin Islands, Guam, US Virgin Islands</td>
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110.4 Voltages.
Throughout this Code, the voltage considered shall be that at which the circuit operates. The voltage rating of electrical equipment shall not be less than the nominal voltage of a circuit to which it is connected. All voltages specified in this Code are nominal voltages unless explicitly prefixed with actual. Three systems of voltages are used as described in Table 110.4 Voltages. Voltages listed in a single row are meant to be used in describing the same circuit.

Statement of Problem and Substantiation for Public Input
This indicates that unadorned voltages are "nominal" since they are the most often specified. It also indicates that "actual" is used to mark voltage references that are exact voltages. Finally it refers to a new "Table 110.4 Voltages" that shows the relationship among various nominal voltage specifications.

Related Public Inputs for This Document

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Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
110.5 Conductors.
Conductors normally used to carry current shall be of copper unless otherwise provided in this Code. Where the conductor material is not specified, the material and the sizes given in this Code shall apply to copper conductors. Where other materials are used, the size shall be changed accordingly, or aluminum.

Informational Note 1: For aluminum and copper-clad aluminum conductors, see 310.15.

Informational Note 2: For tightening torque requirements see Annex I

Statement of Problem and Substantiation for Public Input

This proposal states the requirement simply

Submitter Information Verification

Submitter Full Name: Michael Anthony
Organization: University of Michigan
Affiliation: IEEE I&CPS Education and Healthcare Facility Electrotechnology Sub-Committee
Street Address:
City:
State:
Zip:
Submittal Date: Wed Nov 05 07:13:25 EST 2014
Conductors normally used to carry current shall be of copper or aluminum, unless otherwise provided in this Code. Where the conductor material is not specified, the sizes given in this Code shall apply to copper conductors. Where other materials are used, the size shall be changed accordingly.

Informational Note: For aluminum and copper-clad aluminum conductors, see 310.15.

Statement of Problem and Substantiation for Public Input

The NEC code-making panels have done an excellent job throughout the Code of specifying instances where a particular metal is required in a particular installation. We no longer need a blanket statement such as the existing 110.5 (which is now being misinterpreted by some); rather, the suggested language in 110.5 would provide guidance if there is some reference in the NEC that is unclear, without creating confusion in cases where other metals are allowed.

Submitter Information Verification

Submitter Full Name: Christel Hunter
Organization: General Cable
Street Address:
City:
State:
Zip:
Submittal Date: Wed Oct 29 11:02:05 EDT 2014
110.5. Conductors. Conductors normally used to carry current shall be of copper unless otherwise provided in this Code. Where the conductor material is not specified, the material and the sizes given in this Code shall apply to copper conductors. Where other materials are used, the size shall be changed accordingly.

Informational Note: For aluminum and copper-clad aluminum conductors, see 310.15.

Statement of Problem and Substantiation for Public Input

The requirement that all conductors be copper is not needed, and can create confusion. I found myself in a debate with a Code expert that has served on Code Making Panels for over thirty years on this subject. He believed that, because 547.5(F) requires a copper conductor (even though the 2014 Code removed that requirement) because it doesn't specify the material. In his opinion, citing 110.5 as justification, mandates a copper conductor for every portion of every installation unless the Code specifically states that aluminum can be used. 90.3 tells us that the EGC in question can be aluminum, because 250.118 allows for an aluminum conductor, and 547 doesn't supplement or modify that allowance.

The first sentence of 110.5 isn't necessary and only results in confusion, even among experts of the Code.

Submitter Information Verification

Submitter Full Name: RYAN JACKSON
Organization: Ryan Jackson Electrical Training
Affiliation: Owner
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Sat Oct 25 17:08:40 EDT 2014
110.5 Conductors.

Conductors normally used to carry current shall be of copper unless otherwise provided in this Code. Where the conductor material is not specified, the material and the sizes given in this Code shall apply to copper conductors. Where other materials are used, the size shall be changed accordingly.

Informational Note: For aluminum and copper-clad aluminum conductors, see 310.15.
Informational Note: For Copper-Clad Aluminum Conductors used in Flexible Cords, see 400.5.

Statement of Problem and Substantiation for Public Input

We have found that the stranded Copper Clad Aluminum (CCA) in a specified composition can have the same Ampacity of annealed copper conductor, and is suitable for use in Flexible Cords.

We've made a revision in Article 400.5, and added a table 400.5(A)(4) for Flexible Cords from AWG16 to AWG22. The composition rule for CCA strand has also specified there.

Reasons of adding and revising 400.5 have been submitted in Input for article 400.5.

Related Public Inputs for This Document

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Submitter Information Verification

Submitter Full Name: WEIJEN LIU
Organization: LEEVENS TECHPOINT
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Nov 06 20:17:42 EST 2014
110.9 Interrupting Rating.

Equipment intended to interrupt current at fault levels shall have an interrupting rating at nominal circuit voltage sufficient for at least equal to the current that is available at the line terminals of the equipment.

Equipment intended to interrupt current at other than fault levels shall have an interrupting rating at nominal circuit voltage sufficient for at least equal to the current that must be interrupted.

Statement of Problem and Substantiation for Public Input

Table 3.2.1 of the NEC Style Manual states that the word “sufficient” can be considered to be vague and unenforceable and should be reviewed in context to determine if the use of the word becomes unenforceable. The use of the word “sufficient” in 110.9 does not indicate that the interrupting rating must be equal to the current that must be interrupted, whereas the words “at least equal to the current” provides clear text for the enforcement of this requirement.

Submitter Information Verification

Submitter Full Name: David Hittinger
Organization: Independent Electrical Contractors of Greater Cincinnati
Affiliation: Independent Electrical Contractors
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Fri Nov 07 12:10:50 EST 2014
Statement of Problem and Substantiation for Public Input

The term “equipment grounding conductor” is a misnomer even though it has been in use for many many years. Although it is a grounded conductor in normal practice for grounded systems, the idea that grounding makes a system safe and prevents an electrical shock is inherently false. Connecting a conductor from metallic equipment “likely to become energized” to the earth does not reduce the shock potential during a fault but, rather, may enhance it if it becomes the only path back to the source. The shock potential is the voltage drop along the conductor (equipment grounding conductor) due to fault current flowing back to the source. The shock hazard depends upon the time until the fault is cleared by an overcurrent device or some other event, thus the clearing time is a critical factor in safety.

This conductor (equipment grounding conductor) is intended to protect equipment and personnel by providing a sufficiently high fault current to operate an overcurrent device and clear the fault rapidly. A low impedance fault current path can provide the necessary high fault current regardless of whether the conductor is grounded or not. It is only the fault current path and not the “grounding” that can provide the high fault current necessary to operate an overcurrent device rapidly.

The term “bonding” is generally used to insure that a connection and current path is low impedance, reliable, and able to withstand the fault current. This conductor provides a basic bonding function by insuring, through proper sizing and bonding jumpers as necessary, that the connection from equipment to fault current source is both low impedance and reliable. A “bonding” function is the necessary function rather than a “grounding” function to clear a fault rapidly. A grounding function is provided by a grounding electrode conductor that connects an electrical system source to the earth. An overcurrent device operates in a time interval based upon the current through it. That current depends upon proper bonding to the source and is relatively independent of connection to the grounding electrode at the source where the overcurrent device is located. The use of the term “equipment bonding conductor” would better describe the function of this important conductor instead of the term “equipment grounding conductor”. “Systems” are “grounded”, “equipment” is “bonded”. Making this change would also bring the NEC into conformity with the Canadian Electrical Code which uses the term “equipment bonding conductor”.

Code Panel 5 members have often stated that those in the industry understand what the purpose of the equipment grounding conductor is for. The Panel members understand this also. There are, however, many people doing electrical work who don’t understand and think connecting equipment to a local grounding electrode accomplishes the same objective as an equipment grounding conductor. This is apparent from the large number of questions that are asked at IAEI inspectors meetings, grounding classes, and as documented recently in the July/August 2014 issue of the NFPA Journal under the title “Pool Rules”. Just ask the inspectors and the teachers.

Changing the terminology will serve to make it clear that the principal function of this conductor is to bond the equipment being protected to the source where the fault current originates. Changing the terminology will not confuse those that understand the proper purpose of this bonding conductor.

Submitter Information Verification

Submitter Full Name: ELLIOT RAPPAPORT
Organization: ELECTRO TECHNOLOGY
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 16 15:02:27 EDT 2014
110.10  Circuit Impedance, Short-Circuit Current Ratings, Reliability and Other Characteristics.

The overcurrent protective devices, the total impedance, the equipment short-circuit current ratings, and other characteristics of the circuit to be protected shall be selected and coordinated to permit the circuit protective devices used to clear a fault to do so without extensive damage to the electrical equipment of the circuit. This fault shall be assumed to be either between two or more of the circuit conductors or between any circuit conductor and the equipment grounding conductor(s) permitted in 250.118. Listed equipment applied in accordance with their listing shall be considered to meet the requirements of this section.

Informational Note: System reliability is an essential characteristic of a power system. System grounding through an impedance that is now permitted in Section 250.36 will yield an early warning signal that a power delivery component is about to fail and thereby reduce the frequency of use of the second source. The impedance grounded system will, in most cases, permit the system to deliver power until a scheduled outage thereby reducing risk to occupants. Impedance grounded systems also reduce incident energy exposure by dramatically by diverting fault current through a resistor. With incident energy reduced, maintenance may be undertaken more safely reducing the risk of more forced outages.

Statement of Problem and Substantiation for Public Input

This proposal is another in a series to raise the visibility of system reliability as an essential characteristic and to convey information about how short circuit, incident energy, system grounding methods and reliability are all related.

Submitter Information Verification

Submitter Full Name: Michael Anthony
Organization: University of Michigan
Affiliation: University of Michigan
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 07 15:19:09 EST 2014
Public Input No. 845-NFPA 70-2014 [ New Section after 110.12(B) ]

(C) Installation
All wiring, protection, wiring methods, materials, and equipment in this code shall be installed by qualified persons.
Informational Note: See Article 100 for the definition of qualified person.

Statement of Problem and Substantiation for Public Input

All wiring, protection, wiring methods, materials, and equipment should only be installed by qualified personnel. I am not indicating that individuals should be licensed, as that requirement is the responsibility of local jurisdictions to define what a qualified person is. There are too many situations where individuals that are unqualified are doing electrical installations due in part to a lack of a requirement as the one I am proposing.

Submitter Information Verification

Submitter Full Name: T.J. Woods
Organization: Wyoming Electrical JATC
Affiliation: Wyoming Electrical Joint Apprenticeship and Training Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 22 18:26:31 EDT 2014
Title of New Content

110.12C Incomplete and Abandoned Electric Work
Incomplete or abandoned electrical work, in the vicinity of new electric work, shall be removed.

Exception: Incomplete or abandoned work may remain if all remaining work is properly supported and any conductors are terminated in a way that the installation is free from electrical faults if it were inadvertently energized.

Statement of Problem and Substantiation for Public Input

Complete it or delete it. Several articles come close but don’t quite say it. 110.7, 110.12, 300.18
All electrical work should be free from faults. Incomplete or abandoned work that became inadvertently energized could present an unsafe condition.

Submitter Information Verification

Submitter Full Name: Norman Feck
Organization: State of Colorado
Affiliation: self
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Oct 30 15:12:20 EDT 2014
Public Input No. 107-NFPA 70-2014 [ Global Input ]

Proposed new wording: To prevent static pressure water lines installed in an electrical panel.

Additional Proposed Changes

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Statement of Problem and Substantiation for Public Input

Please see the uploaded pictures and my published paper with heading combined electrical and process equipment panel with pressurized water piping.

Submitter Information Verification

Submitter Full Name: John Robert Davis
Organization:
Affiliation: Davis Instrumentation Services
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jan 28 07:24:08 EST 2014
Public Input No. 2416-NFPA 70-2014 [Section No. 110.12 [Excluding any Sub-Sections]]

Electrical equipment shall be installed in a neat and workmanlike manner.  
Informational Note: Accepted industry practices are described in ANSI/NECA 1-2010 2015, *Standard Practice of for Good Workmanship in Electrical Construction*, and other ANSI-approved installation standards.

Statement of Problem and Substantiation for Public Input


Submitter Information Verification

Submitter Full Name: DIANA BRIOSO  
Organization: NECA  
Affiliation: NECA  
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Fri Oct 24 15:48:40 EDT 2014
Public Input No. 2409-NFPA 70-2014 [Section No. 110.12 [Excluding any Sub-Sections]]

Electrical equipment shall be installed in a neat and workmanlike manner.

Informational Note: Accepted industry practices are described in ANSI/NECA 1-2010 2015, Standard Practice of Good Workmanship in Electrical Construction, and other ANSI-approved installation standards.

Statement of Problem and Substantiation for Public Input

NECA 1 is submitted for reaffirmation in 2015. The proposed revision reflect the current edition edition of the standard.

Submitter Information Verification

Submitter Full Name: Michael Johnston
Organization: NECA
Affiliation: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 24 14:34:00 EDT 2014
Because of different characteristics of dissimilar metals, devices such as pressure terminal or pressure splicing connectors and soldering lugs shall be identified for the material of the conductor and shall be properly installed and used. Conductors of dissimilar metals shall not be intermixed in a terminal or splicing connector where physical contact occurs between dissimilar conductors (such as copper and aluminum, copper and copper-clad aluminum, or aluminum and copper-clad aluminum), unless the device is identified for the purpose and conditions of use. Materials such as solder, fluxes, inhibitors, and compounds, where employed, shall be suitable for the use and shall be of a type that will not adversely affect the conductors, installation, or equipment.

Connectors and terminals for conductors more finely stranded than Class B and Class C stranding as shown in Chapter 9, Table 10, shall be identified for the specific conductor class or classes.

Informational Note No 1: Many terminations and equipment are either marked with tightening torque or are identified as to tightening torque in the installation instructions provided.

Informational Note No 2: See Informative Annex I for information on recommended tightening torque when in the absence of installation instructions.

Statement of Problem and Substantiation for Public Input

Currently there is an informational note reminding the installer to use the correct torque when the manufacture has marked on the termination or equipment or has identified the correct torque in the installation instructions. It also should be reminding the installer that in the event this is not available or has been misplaced that there is also information in this document that would help in correctly installing this equipment to the correct torque values.

Submitter Information Verification

Submitter Full Name: DARRYL HILL
Organization: WICHITA ELECTRICAL JATC
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Tue Oct 28 17:07:53 EDT 2014
Public Input No. 2179-NFPA 70-2014 [Section No. 110.14 [Excluding any Sub-Sections]]

Because of different characteristics of dissimilar metals, devices such as pressure terminal or pressure splicing connectors and soldering lugs shall be identified for the material of the conductor and shall be properly installed and used. Conductors of dissimilar metals shall not be intermixed in a terminal or splicing connector where physical contact occurs between dissimilar conductors (such as copper and aluminum, copper and copper-clad aluminum, or aluminum and copper-clad aluminum), unless the device is identified for the purpose and conditions of use. Materials such as solder, fluxes, inhibitors, and compounds, where employed, shall be suitable for the use and shall be of a type that will not adversely affect the conductors, installation, or equipment.

Connectors and terminals for conductors more finely stranded than Class B and Class C stranding as shown in Chapter 9, Table 10, shall be identified for the specific conductor class or classes.

Informational Note: Many terminations and equipment are either marked with tightening torque or are identified as to tightening torque in the installation instructions provided. In the absence of torquing information, Informative Annex I Recommended Tightening Tables from UL Standards 486A-B can provide guidance.

Statement of Problem and Substantiation for Public Input

Point to the information provided in the book.

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Oct 18 18:59:29 EDT 2014
Public Input No. 1324-NFPA 70-2014 [Section No. 110.14 [Excluding any Sub-Sections]]

Because of different characteristics of dissimilar metals, devices such as pressure terminal or pressure splicing connectors and soldering lugs shall be identified for the material of the conductor and shall be properly installed and used. Conductors of dissimilar metals shall not be intermixed in a terminal or splicing connector where physical contact occurs between dissimilar conductors (such as copper and aluminum, copper and copper-clad aluminum, or aluminum and copper-clad aluminum), unless the device is identified for the purpose and conditions of use. Materials such as solder, fluxes, inhibitors, and compounds, where employed, shall be suitable for the use and shall be of a type that will not adversely affect the conductors, installation, or equipment.

Connectors and terminals for conductors more finely stranded than Class B and Class C stranding as shown in Chapter 9, Table 10, shall be identified for the specific conductor class or classes.

Informational Note: Many terminations and equipment are either marked with tightening torque or are identified as to tightening torque in the installation instructions provided.

Statement of Problem and Substantiation for Public Input

This proposal aligns with the NEMA proposal to add new 110.14(D), where the substance of the informational note in 110.14 is incorporated in new 110.14(D).

Submitter Information Verification

Submitter Full Name: VINCE BACLAWSKI
Organization: NEMA
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Fri Sep 19 11:49:25 EDT 2014
Public Input No. 611-NFPA 70-2014 [Section No. 110.14(A)]

(A) Terminals.
Connection of conductors to terminal parts shall ensure a thoroughly good connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for 10 AWG or smaller conductors. All conductors shall terminate in a single lug or termination point.
Terminals for more than one conductor and terminals used to connect aluminum shall be so identified.

Additional Proposed Changes

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<td>Alwon_Art_110.pdf</td>
<td>PI Form</td>
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Statement of Problem and Substantiation for Public Input

As it stands there does not seem to be a violation to split conductors and install them under 2 lugs. It has been both accepted and rejected in different areas. I believe the intent is to disallow this type of install (shown below) however I am not convinced it is unsafe. There are products that are market for terminating larger conductor on a ground bar if the conductor is too large.(shown below)

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

Submitter Information Verification

Submitter Full Name: DENNIS ALWON
Organization: ALWON ELECTRIC
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 21 11:23:30 EDT 2014
Terminals. Connection of conductors to terminal parts shall ensure a thoroughly good connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for 10 AWG or smaller conductors. An individual conductors shall terminate in a single lug or termination point. Terminals for more than one conductor and terminals used to connect aluminum shall be so identified.

Additional Proposed Changes

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<td>Conductor_termination_in_2_lugs.jpg</td>
<td>One conductor Terminating in 2 lugs on a buss bar</td>
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<tr>
<td>Ground_Bar_Lug.jpg</td>
<td>Available lug for larger conductors</td>
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</tbody>
</table>

Statement of Problem and Substantiation for Public Input

I have not found this to be non compliant in the code however it seems that this type of install should not be allowed. Some inspectors accept it while other will not. This would help to clarify if it is accessible or not. One might be able to say that this is no different than a parallel connection however that is not allowed for smaller than 1/0 awg. This would keep it consistent with I believe the intent is meant to be.

Submitter Information Verification

Submitter Full Name: DENNIS ALWON
Organization: ALWON ELECTRIC
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 12 14:04:01 EDT 2014
Public Input No. 1120-NFPA 70-2014 [ Section No. 110.14(A) ]

(A) Terminals.
Connection of conductors to terminal parts shall ensure a thoroughly good connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for 10 AWG or smaller conductors.

Terminals for more than one conductor and terminals used to connect aluminum shall be so identified.

Where stranded conductors are terminated by wire-binding screws, the strands shall be twisted in a counter clockwise direction as the installer faces the end of the conductor to be terminated to prevent the strands from being squeezed out from under the screw.

Statement of Problem and Substantiation for Public Input

110.14(A) does mandate a “thoroughly good connection” but does not prohibit the direct connection of stranded conductors under a wire binding screw. Possibly, the NEC should not allow this due to too many poor connections made in the field that the inspector just didn't see. I am one who believes it should be permissible provided the “thoroughly good connection” is made. I have similar proposed text for 250.8(A)(5) as I've written here for 110.14(A).

A seasoned electrician has seen and frowns on encountering stranded conductors squeezed out of contact of a termination point. Like a chain, conductors and their terminations are only good as their weakest link.

Submitter Information Verification

Submitter Full Name: Norman Feck
Organization: State of Colorado
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 26 16:45:09 EDT 2014
Public Input No. 2723-NFPA 70-2014 [ Section No. 110.14(B) ]

(B) Splices.
Conductors shall be spliced or joined with splicing devices identified for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be spliced or joined so as to be mechanically and electrically secure without solder and then be soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an identified insulating device. Twist-on wire connectors shall not be used where subject to vibration, such as connections to motors.

Wire connectors or splicing means installed on conductors for direct burial shall be listed for such use.

Statement of Problem and Substantiation for Public Input

Twist on connectors are subject to loosening under vibration conditions. NFPA 79 recognizes this hazard and includes requirements to protect against this hazard. NFPA 79 section 13.5.9.2 "Motor Control Boxes already includes this restriction. "Electrical connections at motor terminal boxes shall be made with an identified method of connection. Twist-on wire connectors shall not be used for this purpose."

This NEC revision will coordinate these requirements for both NFPA documents.

Submitter Information Verification

Submitter Full Name: Gregory Steinman
Organization: Thomas Betts Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Tue Oct 28 14:38:32 EDT 2014
Public Input No. 1121-NFPA 70-2014 [ Section No. 110.14(B) ]

(B) Splices.
Conductors shall be spliced or joined with splicing devices identified for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be spliced or joined so as to be mechanically and electrically secure without solder and then be soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an identified insulating device.

Wire connectors or splicing means installed on conductors for direct burial shall be listed for such use.

Terminations and splices made within 18” of earth shall be wet location rated.

Statement of Problem and Substantiation for Public Input

My experience in the field has shown connections made within 18” of earth (earth – not grade, not concrete) are vulnerable and will deteriorate at a rate greater than outdoor terminations made above 18”. This proposed new text would apply to copper, copper-clad aluminum, and aluminum conductor terminations and splices.

Factors such as sprinkler systems spraying these boxes regularly, climate, or some soils being more corrosive than others, does corrode splices made in these junction boxes more so than splices made in less harsh conditions. Outlets for coach light fixtures, for example, would not be subject to this new code text and rightfully so. If a fixture was installed correctly per 410.10(A), the terminations I generally witness are fine. It is when opening low mount outdoor junction boxes that an electrician is more likely to observe deteriorating terminations and splices, even if the boxes were installed according to 314.15.

These wet location splices and terminations follow the reasoning of 250.64(A), 250.120(B), and 406.9 in that these connections are vulnerable.

I find it necessary that these wet location splices and terminations are rated for wet locations for the same reasoning as they are necessary in 314.30(C).

This new code entry would prevent disconnects, panelboards, etc. from being mounted within 18” of earth in many cases.

Submitter Information Verification

Submitter Full Name: Norman Feck
Organization: State of Colorado
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 26 16:50:02 EDT 2014
Public Input No. 1073-NFPA 70-2014 [ Section No. 110.14(B) ]

(B) Splices.
Conductors shall be spliced or joined with splicing devices identified for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be spliced or joined so as to be mechanically and electrically secure without solder and then be soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an identified insulating device.

Wire connectors or splicing means installed on conductors for direct burial shall be listed for and labeled for such use.

Statement of Problem and Substantiation for Public Input

By adding the words and labeled, it will identify that listed products also need to be labeled. Both terms listed and labeled are defined in article 100, but are not used consistently throughout the NEC. If taken literally, as defined in Article 100, a product could be listed and not labeled and still comply with the NEC when not required to be listed and labeled such as in sections 424.6, 646.3(I), 646.13 and 690.31(C) to identify a few. The UL White Book identifies that only those products bearing the appropriate UL Mark and the company's name, trade name, trademark or other authorized identification should be considered as being covered by UL's Certification, Listing, Classification and Follow-Up Service. Therefore, if not identified within the UL Certification Directory as indicated in the definition of listed and bearing the appropriate UL mark as indicated in the definition of labeled the product is not considered by UL to be listed. This is not just UL; all of the test laboratories have a very similar requirement. This change will help make the NEC a more consistent document for AHJ's.

Submitter Information Verification

Submitter Full Name: JEFFREY FECTEAU
Organization: UNDERWRITERS LABORATORIES LLC
Street Address:
City: 
State: 
Zip: 
Submittal Date: Mon Aug 18 15:58:29 EDT 2014
(B) Splices.
Conductors shall be spliced or joined with splicing devices identified for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be spliced or joined so as to be mechanically and electrically secure without solder and then be soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an identified insulating device.

Wire connectors or splicing means installed in a damp location shall be listed for damp or wet locations. Wire connectors or splicing means installed in a wet location shall be listed for wet locations. Wire connectors or splicing means installed on conductors for direct burial shall be listed for such use.

Statement of Problem and Substantiation for Public Input

Section 110.14(B) includes requirements for connectors or splicing means which are installed for direct burial. Other environmental considerations are encountered which are not addressed in this Section. One common environment in electrical systems is “wet location”. Other parts of the Code specifically define areas within the raceway where conductors may be installed as “wet location” (i.e., 300.5(B) and 300.9). This Public Input provides requirements for those environmental locations, noting that the connector or splicing means in a wet location shall be listed for wet location.

This Public Input also considers that not all locations are either “dry”, direct bury”, or “wet”, and introduces “damp location” into the consideration. “Damp Locations” are referenced throughout the Code, and the definition in Article 100 describes environments that are likely to occur in areas where connectors or splices may be installed. This Public Input does not limit the requirement to the use of “Damp Location” connectors or splices, as the existing “wet location” products are available and can continue to be used in both “wet” and “damp” locations.

It should be noted that at the time of submitting this Public Input, “Damp Location” is not a rating found in the UL Standards used to evaluate connectors or splices. This Public Input would create the opportunity for a “damp location” rating to be defined in the product Standards, while at the same time, not creating a scenario where the Code has to wait for a product to be developed to achieve compliance. This Public Input is being submitted as a companion to another proposals in Section 410.56(D) to address a common “damp location” where splices are encountered (poles used to support luminaires).

Related Public Inputs for This Document

<table>
<thead>
<tr>
<th>Related Input</th>
<th>Relationship</th>
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<tr>
<td>Public Input No. 4376-NFPA 70-2014 [Section No. 410.56(D)]</td>
<td>All three Public Inputs address splices installed in other than dry locations</td>
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<tr>
<td>Public Input No. 4381-NFPA 70-2014 [New Section after 725.141]</td>
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Submitter Information Verification

Submitter Full Name: Donald Cook
Organization: Shelby County Department of Development Services
Street Address:
City:
State:
Zip:
Submittal Date: Thu Nov 06 20:32:44 EST 2014
Public Input No. 1323-NFPA 70-2014 [ New Section after 110.14(C) ]

110.14(D) Installation:
Where a tightening torque is indicated as a numeric value on equipment or in installation instructions provided by the manufacturer, a torque tool shall be used to achieve the indicated torque value, unless the equipment manufacturer has provided installation instructions for an alternative method of achieving the required torque.

Statement of Problem and Substantiation for Public Input

Many electricians use non-torqueing tools to terminate conductors on set-screw connectors in equipment. Findings of a field study presented to CMP-1 during the 2011 cycle to substantiate Annex I, and articles published in IAEI News and EC&M showed that electricians incorrectly tighten these terminations at least 75 percent of the time when not using a torque wrench. Since the reliability and safety of terminations depends on proper connection, it is essential to require the use of the proper tool. This language would make it clear to installers that using torque tools is required when a torque value is indicated on the equipment.

Submitter Information Verification

Submitter Full Name: VINCE BACLAWSKI
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Fri Sep 19 11:46:29 EDT 2014
The temperature rating associated with the ampacity of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device. Conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampacity adjustment, correction, or both. The ambient temperature at the location of the termination shall be used for determining compliance with this requirement.

Statement of Problem and Substantiation for Public Input

A conductor to an outdoor motor may be sized based on a high outdoor ambient temperature. The motor starter termination may be indoors in a lower ambient temperature.

Submitter Information Verification

Submitter Full Name: Billy Breitkreutz
Organization: Fluor Corporation
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jun 06 15:09:11 EDT 2014
Public Input No. 673-NFPA 70-2014 [ Section No. 110.14(C) [Excluding any Sub-Sections] ]

The temperature rating associated with the ampacity of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device. Conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampacity adjustment, correction, or both full load current rating multiplier, or all.

Statement of Problem and Substantiation for Public Input

Low voltage motor circuits in hot outdoor areas are oversized to meet termination temperature limits as a result of the requirement for conductors to have an ampacity of 125% of motor full-load rating. The conductor will seldom, if ever be subjected to the 125% current and the termination will seldom, if ever be subjected to the resulting higher temperature.

Submitter Information Verification

Submitter Full Name: Billy Breitkreutz
Organization: Fluor Corporation
Affiliation: self
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Fri Jun 06 14:45:24 EDT 2014
The temperature rating associated with the ampacity of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device. Conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampacity adjustment, correction, or both. Connected termination temperature amperage ratings must also be corrected for temperature ratings due to ambient temperatures.

Statement of Problem and Substantiation for Public Input

The problem is Article 110.14C does not clearly state the temperature rating of the device cables are to be connected to must also be adjusted for the ambient temperature of the circuit. As an example if you had a device with temperature ratings for 60 deg. C and was tested in a 30 degree ambient, to utilize that device in a circuit that was in a 40 degree ambient, the terminal ampacity would have to be derated for the 40 deg. C ambient. Examples of this issue should also be included in the next revision to make this issue clear. I recently reviewed this issue with an NFPA 70 code expert John Blunk and he agreed I should identify this issue.

Submitter Information Verification

Submitter Full Name: ANTHONY SCATURRO
Organization: [ ENERCON Services Inc.]
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 22 11:16:43 EDT 2014
Public Input No. 68-NFPA 70-2014 [Section No. 110.16]

110.16 Arc-Flash Hazard Warning.
Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket
enclosures, and motor control centers, that are in other than dwelling units, and are likely to require
examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn
qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in
110.21(B) and shall be located so as to be clearly visible to qualified persons before examination,
adjustment, servicing, or maintenance of the equipment.

Informational Note No. 1: NFPA 70E-2012, Standard for Electrical Safety in the Workplace, provides
guidance, such as determining severity of potential exposure, planning safe work practices, arc flash
labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-1998, Product Safety Signs and Labels, provides guidelines
for the design of safety signs and labels for application to products.

Informational Note: A safety check for the presence of voltage prior to working on de-energized
equipment does not constitute a likely examination while energized.

Additional Proposed Changes

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<td>70_110-16_PI68.pdf</td>
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Statement of Problem and Substantiation for Public Input

Inspectors in this State have been enforcing this section so that all equipment is assumed energized until verified it
does de-energized. The equipment must be “examined” for the presence of voltage, while assuming it is energized,
before it can be considered de-energized. While nearly every building owner and electrical company has a policy to
not work on equipment while energized, all businesses are being forced to purchase or rent high level PPE. The
Inspectors claim there is no point in having a warning if the level of danger is not posted too. In order to know what
level of PPE is required building owners are being forced to calculate the potential arc-fault energy available at each
panel and post the PPE level required in the blast radius of each panel before a certificate of occupancy will be
issued. Every Electrician is required to wear the appropriate level of PPE just to verify a piece of equipment is
de-energized. The concern is both the hazard of electricians deciding to save time and working on equipment while
energized since they are already required to put on the PPE, and the added cost of requiring a building wide
arc-flash hazard study for every building with the added cost of high level PPE when the large majority of
businesses forbid working on energized equipment.

An official question submitted to the State’s OSHA board has confirmed this interpretation that all equipment must
be considered energized and appropriate PPE worn until the equipment is verified to be de-energized. Projects
inspected by State Building Code Inspectors in recent years have followed this same interpretation. This has been
trickling down to local AHJ’s.

This section already states that field marking is required for equipment “likely” to require examination while
energized. This section just needs clarification for eager Inspectors that while it is possible a panel may be
energized after opening the perceived feeder switch, it is not “likely”.

Submitter Information Verification

Submitter Full Name: William Swanson
Organization: Integrated Architecture
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jan 07 07:42:13 EST 2014
Arc-Flash Hazard Warning.

Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that are in other than dwelling units, and are likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

Informational Note No. 1: Current edition of NFPA 70E-2012, Standard for Electrical Safety in the Workplace, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-1998, Product Safety Signs and Labels, provides guidelines for the design of safety signs and labels for application to products.

Additional Proposed Changes

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Statement of Problem and Substantiation for Public Input

In 2015 we will receive a new version of 70E. It will supersede all previous editions. The NEC will be referencing everybody to a document that is no longer in effect.

Submitter Information Verification

Submitter Full Name: ROBERT CLUKEY
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 06 09:14:02 EDT 2014
Public Input No. 551-NFPA 70-2014 [ Section No. 110.16 ]

110.16 Arc-Flash Hazard Warning.
Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that are in other than dwelling units, and are likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment. The label shall contain the following information:

(1) At least one of the following:
a. Available incident energy and the corresponding working distance
b. Minimum arc rating of clothing
c. Required level of PPE
d. Highest Hazard/Risk Category (HRC) for the equipment

(2) Nominal system voltage
(3) Arc flash boundary

Exception: Labels applied prior to September 30, 2011, are acceptable if they contain the available incident energy, or required level of PPE.

The method of calculating and data to support the information, for the label shall be documented.

Informational Note No. 1: NFPA 70E-2012, Standard for Electrical Safety in the Workplace, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-1998, Product Safety Signs and Labels, provides guidelines for the design of safety signs and labels for application to products.

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Statement of Problem and Substantiation for Public Input

It states in the forward to 70E ((1) Scope has been revised to align with the NEC.)
Also, the NEC already addresses work practices in section 250.174(C) For example, Mats of insulating rubber or other suitable floor insulation shall be provided for the operator where the voltage to ground exceeds 50. What better way to reflect the purpose of the code (practical safeguarding of persons and property. Economically, it would be wise to install these labels at the time of installation, when all the information is documented on prints, rather than years later, have to collect all the information.

Submitter Information Verification

Submitter Full Name: ROBERT CLUKEY
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 06 09:08:29 EDT 2014
Public Input No. 493-NFPA 70-2014 [ Section No. 110.16 ]

110.16 Arc-Flash Hazard Warning.
Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that are in other than dwelling units, and are likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment. Where the warning includes calculated estimates for incident energy and recommended protective equipment, the calculations shall be performed by or under the supervision of a licensed electrical engineer. The calculated results shall be recorded and sealed by the licensed engineer, and shall be made available to the AHJ upon request.

Informational Note No. 1: NFPA 70E-2012, Standard for Electrical Safety in the Workplace, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-1998, Product Safety Signs and Labels, provides guidelines for the design of safety signs and labels for application to products.

Statement of Problem and Substantiation for Public Input
Improperly performed arc flash calculations can create an extremely dangerous situation if a person working on a piece of energized equipment is not wearing the appropriate PPE because the calculation underestimated the arc flash hazard. Licensed electrical engineers have both the knowledge and training to successfully perform the calculations. The requirement for sealed documents ensures that a proper standard of care is taken to provide accurate calculations. This addition would not be in effect if the tables and guidelines contained in NFPA 70E are used in lieu of calculated values.

Submitter Information Verification
Submitter Full Name: ROBERT SCHINDLER P E
Organization: PROCESS PLUS
Street Address:
City:
State:
Zip:
Submittal Date: Tue Apr 08 20:18:35 EDT 2014
110.16  
Hazard Warnings.  
(A) Electrical Shock Hazard.  
Equipment above 50 Volts, except switches for lights and general purpose receptacles and equipment in dwellings shall be marked with a "Shock Hazard" warning. Warning label shall indicate maximum voltage available at the equipment. Warning label shall also indicate PPE necessary in order to minimize the possibility of electric shock. It shall be allowed to combine Shock Hazard warning with Arc Flash hazard warning in one label.  

Informational Note No. 1: Current edition of NFPA 70E, Standard for Electrical Safety in the Workplace provides guidance in selecting personal protective equipment  

(B) Arc Flash Hazard Warning.  
Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that are in other than dwelling units, and are likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.  

Informational Note No. 1: Current edition of NFPA 70E-2012, Standard for Electrical Safety in the Workplace, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.  

Informational Note No. 2: ANSI Z535.4-1998, Product Safety Signs and Labels, provides guidelines for the design of safety signs and labels for application to products.

Statement of Problem and Substantiation for Public Input  
As per NFPA 70E equipment where incident energy is less than 1.2 cal will not need an arc flash hazard warning label. But shock hazard is always present. A shock hazard warning label is needed so workers can protect themselves by using appropriate PPE. In any case equipment will have a label and will remove doubt if any equipment left unlabeled inadvertently.

Submitter Information Verification  
Submitter Full Name: SATYA SHEEL PANDEY  
Organization: Sheel Electrical Services  
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Wed Nov 05 17:42:11 EST 2014
110.16 Arc-Flash Hazard Warning.

(A) General. Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that are in other than dwelling units, and are likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

(B) Service Equipment. Additional field marking shall include the following:

1. Nominal system voltage
2. Arc flash boundary
3. The available incident energy with the corresponding working distance

Where modifications to the electrical installation occur that render the label inaccurate, the label shall be updated.

Informational Note No. 1: NFPA 70E-2012, Standard for Electrical Safety in the Workplace, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-1998, Product Safety Signs and Labels, provides guidelines for the design of safety signs and labels for application to products.

Statement of Problem and Substantiation for Public Input

The existing text in 110.16 is editorially revised as a first level subdivision and titled “General” to allow for a new first level subdivision and a logical separation of multiple requirements.

The available short circuit current is known at the time of installation to comply with the interrupting requirements of 110.9 and 110.10. This information can easily be applied to determine the incident energy and working distance. The suggested text is limited in list item (3) to the available incident energy and corresponding working distance. The minimum arc rating of protective equipment and arc rated clothing is under the purview of NFPA 70E.

An employer that chooses to apply NFPA 70E, the standard for electrical safety in the workplace, is required to perform an arc flash risk assessment before justified energized work is performed. NFPA 70E contains only requirements for safe work practices and cannot contain installation requirements. The proposed revision is properly located in NFPA 70, the NEC to address the necessary installation requirements to identify incident energy and the working distance.

Adding a requirement to label equipment with an incident energy level and working distance is an installation requirement and is properly located in NFPA 70, the NEC. Many attempts have been made to mandate such labeling at the time of installation in both NFPA 70 and NFPA 70E in the past. They have been rejected in NFPA 70E because the NEC has purview over installation requirements. Past attempts to add such a requirement in the NEC have failed because there was no limit to the required labeling. This public input seeks only to label at the service equipment. It should be noted that UL 67 has been modified to require barriers in all panelboards used as service equipment with an exception for the six disconnect rule as permitted in 230.71. Public input 1281 will be acted upon by CMP-9 to add “panelboards” to 408.3(A)(2). This is an extremely significant step forward for safety. This barrier will now prevent inadvertant contact with the service line side connection and allow for an electrically safe working condition to be established. Acceptance of this public input will provide the available incident energy and corresponding working distance necessary where justified energized work is performed in service equipment.

Related Public Inputs for This Document

<table>
<thead>
<tr>
<th>Related Input</th>
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<tr>
<td>Public Input No. 1281-NFPA 70-2014 [Section No. 408.3(A)(2)]</td>
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</tr>
</tbody>
</table>

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
Public Input No. 4789-NFPA 70-2014 [ Section No. 110.16 ]

110.16 Arc-Flash Hazard Warning.
Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that are in other than dwelling units, and are likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall comply with both (A) and (B). The markings shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

(A) General. Electrical equipment shall be field or factory marked to warn qualified persons of potential electric arc flash hazards.

(B) Incident Energy Labeling. Additional field marking shall include the following:
(1) Nominal system voltage
(2) Arc flash boundary
(3) The available incident energy with the corresponding working distance

Where modifications to the electrical installation occur that render the label inaccurate, the label shall be updated.

Informational Note No. 1: NFPA 70E-2012, Standard for Electrical Safety in the Workplace, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-1998, Product Safety Signs and Labels, provides guidelines for the design of safety signs and labels for application to products.

Statement of Problem and Substantiation for Public Input

The existing text in 110.16 is editorially revised as parent text with a new first level subdivision titled “General” to allow for a new first level subdivision and a logical separation of multiple requirements. The available short circuit current is known at the time of installation to comply with the interrupting requirements of 110.9 and 110.10. This information can easily be applied to determine the incident energy and working distance. The minimum arc rating of protective equipment and arc rated clothing is under the purview of NFPA 70E. An employer that chooses to apply NFPA 70E, the standard for electrical safety in the workplace, is required to perform an arc flash risk assessment before justified energized work is performed. NFPA 70E contains only requirements for safe work practices and cannot contain installation requirements. The proposed revision is properly located in NFPA 70, the NEC to address the necessary installation requirements to identify incident energy and the working distance. Adding a requirement to label equipment with an incident energy level and working distance is an installation requirement and is properly located in NFPA 70, the NEC. Many attempts have been made to mandate such labeling at the time of installation in both NFPA 70 and NFPA 70E in the past. They have been rejected in NFPA 70E because the NEC has purview over installation requirements.

This is one of two public inputs from this submitter on labeling incident energy. This is the preferred action by CMP-1. Another PI is submitted that limits incident energy labeling to service equipment only. This public input is submitted after many discussions with industry representatives that have voted in opposition in the past but now claim they will support this concept. The time for CMP-1 to embrace incident energy labeling has come. At the time of installation a coordination study is performed and incident energy labeling is easily achieved.

If this concept is accepted into the NEC in 2017, it will still take decades to get the majority of installations labeled with incident energy. This is a safety driven proposed revision that exemplifies the stated purpose of the NEC.

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Fri Nov 07 19:03:13 EST 2014
110.16 Arc-Flash Hazard Warning.
Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that are at other than dwelling units, and are likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

Informational Note No. 1: NFPA 70E-2012, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.


Statement of Problem and Substantiation for Public Input

The using the word “in” for the actual text for the phrase “in other than dwelling units” indicates that electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, located outside of a dwelling unit must comply with the arc flash hazard warning but does not require compliance where located inside of the dwelling units. The suggested change of replacing “in” with “at” provides clarity. Since many new dwelling units are being supplied with services where the utility fault can be up to 22,000 AIC an alternative change would be to delete the phrase “in other than dwelling units” so that all electrical equipment must be installed with the arc flash hazard warning, regardless of occupancy.

Submitter Information Verification

Submitter Full Name: David Hittinger
Organization: Independent Electrical Contractors of Greater Cincinnati
Affiliation: Independent Electrical Contractors
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 07 12:15:33 EST 2014
Public Input No. 3507-NFPA 70-2014 [ New Section after 110.16 ]

**UPS output to fixed wiring**

**110.17 Uninterrupted Power Supplies Output Connected to Fixed Wiring.** The output circuits of any uninterrupted power supply (UPS) contained in fixed wiring methods shall have the cover of each enclosure in which these circuits are found marked "UPS".

*Exception: This shall not apply to UPS circuits found in area governed by NEC Articles 645 and 646.*

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**Statement of Problem and Substantiation for Public Input**

UPSs output circuits are now being connected to fixed wiring systems in locations other than data processing rooms or facilities. These include residences, especially ones with more than average computer equipment and high-end audiovisual equipment (home theaters).

UPSs are also being embedded in control systems that have UPS-supplied circuits external to the control cabinet.

These pose a new hazard to electricians in that after disconnecting all the sources of electrical power (and locking them out) to a building or system, live circuits still are found in fixed wiring systems.

Using a label reading "UPS" on every enclosure's cover that contains these "unexpectedly" live circuits serve as a warning to persons opening the enclosure. The use of "UPS" on receptacle covers is probably something that would be "tolerated" in home theater applications.

This is a low-cost requirement that is in line with the 90.1(A) purpose of the NEC

90.1 Purpose.

(A) Practical Safeguarding. The purpose of this Code is the practical safeguarding of persons and property from hazards arising from the use of electricity.

**Submitter Information Verification**

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Tue Nov 04 12:42:36 EST 2014
New Section 110.17

More Than One Power Source. Electrical equipment supplied by more than one power source shall be marked in accordance with 110.21(B) with a warning sign to read:

WARNING:

MORE THAN ONE POWER SOURCE.

DISCONNECT ALL SOURCES OF POWER BEFORE SERVICING.

A disconnecting means shall be provided for each source of electrical energy in accordance with 110.25, and the equipment and disconnecting means shall both be marked in accordance with 110.22(A).

Statement of Problem and Substantiation for Public Input

It seems that a lot of equipment these days, including industrial control panels, refrigeration equipment, and industrial process heating equipment, is being provided electrical power from more than one power source.

This proposal placed in the General Requirements in Article 110 will provide guidance to Code users that can be referred to and used in later articles and sections of the NEC.

Submitter Information Verification

Submitter Full Name: MICHAEL WEITZEL
Organization: Bechtel
Street Address:
City:
State:
Zip:
Submittal Date: Tue Nov 04 18:12:08 EST 2014
110.20 Increased in Size. When ungrounded conductors are increased in size from the minimum size that has sufficient ampacity for the intended installation, each ungrounded conductor that terminates to an overcurrent device shall be marked and labeled to indicate reason for the increase. The markings or labels shall be permitted on the conductor(s) or enclosure.

Statement of Problem and Substantiation for Public Input

While it is a common practice for electrical contractors to increase the size of a conductor to compensate for things like "voltage drop" and peak operation of various sensitive equipment, it is also common for others to come along later and see a 20A OCPD on a 10 AWG or 8 AWG and not be aware that the branch circuit may reduce back down to a 12 AWG somewhere out in the branch circuit. In the event where the load is changed or OCPD activation takes place due to some changes in the original installation due to a load increase, an individual may overlook the fact that the circuit must be protected at it's ampacity and tried to change the 20A to a 30A because they see the 10 AWG or 8 AWG in the panel enclosure terminated to a 20A OCPD. While we do not want to play "expectors" versus being "inspectors" it seems that in my experience as a NEMA Field Representative I received many questions from the inspection industry where they had concerns over this. While it is very common to place a 40A OCPD on a 12 AWG or in some cases possibly a 14 AWG due to the permission of 240.4(G) for HVAC and Motor which have merit and code language to permit the practice....it seems to me that we should be making users aware (who will venture into their panel from time to time) why there is a 20A OCPD on a 10 AWG or 8 AWG and why it should stay that way.

Submitter Information Verification

Submitter Full Name: PAUL W ABERNATHY
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 31 10:05:34 EDT 2014
(C) Field Marking

Where legibly marked, legibly field marked, legible warning notice, marked, field marking and similar are required by this code, such markings shall meet the following requirements:

1. The label shall be permanently affixed to the equipment or wiring method and shall not be hand written. 
   Exception: Portions of labels or markings that are variable, or that could be subject to change(s), shall be permitted to be hand written and shall be legible.

2. The label shall be of sufficient durability to withstand the environment involved.

Informational Note: ANSI Z535.4-2011, Product Safety Signs and Labels, provides guidelines for the design and durability of safety signs and labels for application to electrical equipment.

Additional Proposed Changes

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<thead>
<tr>
<th>File Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engraved_Lable_and_Ahesive_Labels.pdf</td>
<td>This photograph shows printed adhesive labels and an engraved label, after 15 years outside. Notice the engraved label is fading. This is on the north side of a building.</td>
</tr>
<tr>
<td>Printed_Adhesive_Label.png</td>
<td>This printed adhesive label was done with a typical office label maker. It was installed in 2008 outside with no shade. UV resistance is very good.</td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Input

Substantiation: It is important to have field marking(s) readable and durable for worker safety. There are numerous locations in the NEC that require marking(s), examples are disconnects, transformers, and marking of the high leg. One example of legibly marked is section 110.22 Identification of the Disconnecting Means, where each disconnecting means shall be legibly marked. Legibly marked and similar is subjective and the marking may not withstand the environment. There are many manufactures of small, inexpensive, portable label makers that can be used to print adhesive labels that will comply with this requirement.

Washington State use to only allow engraved labels for field marking. Currently, state code rule WAC 296-46B 100, General Definitions, ‘identification plate’ allows approved adhesive labels, as an alternative. Two pictures were uploaded, one shows the durability of printed adhesive labels that can be made from a portable label maker.

Submitter Information Verification

Submitter Full Name: TOM BAKER
Organization: Puget Sound Electrical Training
Street Address:
City:
State:
Zip:
Submittal Date: Mon Nov 03 21:54:36 EST 2014
Public Input No. 4288-NFPA 70-2014 [ New Section after 110.21 ]

110.20 Physical Damage. NEW Section.

**Physical Damage.** Where installed in locations subject to motorized vehicular traffic, such as driveways or alleys, electrical equipment, enclosures, switches, cabinets, cutout boxes, meter socket enclosures, raceways, cables, and the like shall be located to avoid physical damage by vehicular contact, or be provided protection from physical damage.

Statement of Problem and Substantiation for Public Input

Electrical equipment such as meter socket enclosure, switches, raceways, cables, or HVAC equipment have often been installed in areas located on the side of a building or structure where vehicular contact with the electrical equipment is possible, if the vehicle operator is not careful. Often times, these systems are electrical service equipment, and thousands of amps of fault current are available at the line terminals of the equipment, if the equipment suffers damage.

If the equipment is damaged or ruptured, the situation can present an immediate or sustained hazard to life or property. Such damage may also include damage to disconnecting means, insulation integrity, or system or circuit grounding or bonding.

This new section of the Code provides Code enforcement personnel with a tool to require the installer to either locate the equipment to avoid physical damage by motorized vehicular contact, or be provide protection from physical damage, such as vertical posts (bollards of metal pipe filled with concrete) installed at proper working space distance in front of the equipment that will provide protection from vehicular contact.

A motorized vehicle could be a car, truck, forklift, etc..

Thank you for your thoughtful consideration of this proposal.

Related Public Inputs for This Document

<table>
<thead>
<tr>
<th>Related Public Input</th>
<th>Relationship</th>
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</thead>
<tbody>
<tr>
<td>Public Input No. 3459-NFPA 70-2014 [New Definition after Definition: Photovoltaic (PV) System.]</td>
<td></td>
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</table>

Submitter Information Verification

**Submitter Full Name:** MICHAEL WEITZEL  
**Organization:** Bechtel  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Thu Nov 06 17:58:43 EST 2014
(A) Manufacturer's Markings.

The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified shall be placed on all electrical equipment. Other markings that indicate voltage, current, wattage, or other ratings shall be provided as specified elsewhere in this Code. The marking or label shall be of sufficient durability to withstand the environment involved. Labels should meet the requirements of ANSI Z535.4-2011, Product Safety Signs and Labels, which provides guidelines for suitable font sizes, words, colors, symbols and location requirements for labels.

Statement of Problem and Substantiation for Public Input

Currently, the industry standard for safety labeling is ANSI Z535.4-2011. I am not aware of any other published label standard that deals with the design, implementation and format of safety labels. Improper labeling can be a serious liability issue for companies and installations. If I thought it would pass, I would recommend that this be a SHALL and not a SHOULD, but we need to emphasize the use of the standard more clearly than using an informational note. Having a common format that everyone understands is the basis of good code development and the ANSI standard does exactly this for the Electrical industry and has for many decades. If users are allowed to make their own labels, there is a chance that it will not adequately warn of a particular hazard. A traditional DANGER sign has a lot more impact that someone else's interpretation of how to identify a dangerous situation by creating their own design that may have nothing to do with ANSI requirements.

Submitter Information Verification

Submitter Full Name: Ronald Fries
Organization: HellermannTyton
Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Mar 13 15:33:35 EDT 2014
Section 110.21(A) - **Manufacturer's Markings.**

1. The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified shall be placed on all electrical equipment. Other markings that indicate voltage, current, wattage, or other ratings shall be provided as specified elsewhere in this Code. The marking or label shall be of sufficient durability to withstand the environment involved.

2. **Reconditioned, Refurbished or Remanufactured Equipment Markings**

Reconditioned, Refurbished or Remanufactured Equipment shall be marked with the reconditioners, refurbishers or remanufacturers organization and the date of the reconditioning, refurbishing or remanufacturing to identify the organization responsible and the date of the reconditioning, refurbishing or remanufacturing of the electrical equipment.

**Statement of Problem and Substantiation for Public Input**

Reconditioned, refurbished or remanufactured electrical equipment is widely used in all types of industry to replace or further the life cycle of aging equipment. Marking the equipment with the organizations name and date of the reconditioned, refurbished or remanufactured of the electrical equipment will give tracability of the equipment and information to the purchaser, operator and AHJ as to who is responsible and when the work was done.

**Submitter Information Verification**

**Submitter Full Name:** HOWARD HERNDON  
**Organization:** SOUTHWEST ELECTRITECH SVCS LLC  
**Affiliation:** PEARL  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Tue Nov 04 10:55:53 EST 2014
Public Input No. 2369-NFPA 70-2014 [Section No. 110.21(A)]

(A) Manufacturer's Equipment Markings.

(1) The manufacturer’s name, trademark, or other descriptive marking by which the organization responsible for the product can be identified shall be placed on all electrical equipment. Other markings that indicate voltage, current, wattage, or other ratings shall be provided as specified elsewhere in this Code. The marking or label shall be of sufficient durability to withstand the environment involved.

(2) Reconditioned equipment shall be marked with the reconditioner's name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning.

Informational note: Reconditioning (also known as refurbishment or recycling) of used electrical equipment should be done based on appropriate industry standards and information.

Statement of Problem and Substantiation for Public Input

There is a lot of used electrical equipment that is evaluated, tested and maintained to be put back into service. Requiring labeling gives traceability and information for the purchaser and inspector as to when and who did the evaluation and maintenance.

Submitter Information Verification

Submitter Full Name: Christel Hunter
Organization: General Cable
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 23 10:20:20 EDT 2014
Public Input No. 401-NFPA 70-2014 [ Section No. 110.21(B) ]

(B) Field-Applied Hazard Markings.
Where caution, warning, or danger signs or labels are required by this Code, the labels shall meet the following requirements:

1. The marking shall adequately warn of the hazard using effective words and/or colors and/or symbols.
   Informational Note: ANSI Z535.4-2011, Product Safety Signs and Labels, provides guidelines for suitable font sizes, words, colors, symbols, and location requirements for labels.

2. The label shall be permanently affixed to the equipment or wiring method and shall not be hand written.
   Exception to (2): Portions of labels or markings that are variable, or that could be subject to changes, shall be permitted to be hand written and shall be legible unless exposed to continuous outdoor conditions where UV exposure can degrade or erase hand written markings.

3. The label shall be of sufficient durability to withstand the environment involved.
   Informational Note: ANSI Z535.4-2011, Product Safety Signs and Labels, provides guidelines for the design and durability of safety signs and labels for application to electrical equipment.

Additional Proposed Changes

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<th>File Name</th>
<th>Description</th>
<th>Approved</th>
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<td>This shows actual test results showing what happens to hand written text when exposed to outdoor conditions. Hand written text can totally disappear in under a year, making future identification impossible. Indoor exposure is less of an issue and variable text that is hand written will last longer.</td>
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</table>

Statement of Problem and Substantiation for Public Input

In the PV market, when installers are labeling to the requirements of Article 690, many hand write the variable information, such as voltage calculations, on the labels. Sharpie and other types of pens tend to fade quickly in outdoor conditions, making future identification impossible. Tests have shown that hand written markings can disappear totally in a year or less, depending on conditions. Labels that contain variable information and are subject to constant outdoor exposure should be machine generated only to protect the integrity and safety of the system long term.

Submitter Information Verification

Submitter Full Name: Ronald Fries
Organization: HellermannTyton
Affiliation: Self
Street Address:  
City: 
State: 
Zip:  
Submittal Date: Thu Mar 13 15:22:32 EDT 2014
Fading on laminated and unlaminated Sharpie style pens after only 1400 hours of Xenon Arc Exposure
Field-Applied Hazard Markings.
Where caution, warning, or danger signs or labels are required by this Code, the labels shall meet the following requirements:

1. The marking shall adequately warn of the hazard using effective words and/or colors and/or symbols.
   
   Informational Note: ANSI Z535.4-2011, Product Safety Signs and Labels, provides guidelines for suitable font sizes, words, colors, symbols, and location requirements for labels.

2. The label shall be permanently affixed to the equipment or wiring method and shall not be hand written. Exception to (2): Portions of labels or markings that are variable, or that could be subject to changes, shall be permitted to be hand written and shall be legible.

3. The label shall be of sufficient durability to withstand the environment involved.
   
   Informational Note: ANSI Z535.4-2011, Product Safety Signs and Labels, provides guidelines for the design and durability of safety signs and labels for application to electrical equipment.

Statement of Problem and Substantiation for Public Input

"adequately" is an unenforceable term according to NEC_StyleManual_2011.pdf 3.2.1.

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Oct 18 19:02:29 EDT 2014
**Title of New Content**

Type your content here ...

110.22(D) Disconnects used for Ties. Where both the line and load sides of a disconnect are energized when open, the disconnect shall be labelled:

**CAUTION - LOAD SIDE TERMINALS OF DISCONNECT ARE ENERGIZED WHEN OPEN**

**Statement of Problem and Substantiation for Public Input**

This addition would simply recognize a common practice.

**Submitter Information Verification**

- **Submitter Full Name:** ERIC STROMBERG
- **Organization:** STROMBERG ENGINEERING
- **Affiliation:** myself
- **Street Address:**
- **City:**
- **State:**
- **Zip:**
- **Submittal Date:** Sun Oct 12 19:59:43 EDT 2014
110.22 Identification of Disconnecting Means.

(A) General.
Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. The marking shall be of sufficient durability to withstand the environment involved.

(B) Engineered Series Combination Systems.
Equipment enclosures for circuit breakers or fuses applied in compliance with series combination ratings selected under engineering supervision in accordance with 240.86(A) shall be legibly marked in the field as directed by the engineer to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:

CAUTION — ENGINEERED SERIES COMBINATION SYSTEM RATED _____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

(C) Tested Series Combination Systems.
Equipment enclosures for circuit breakers or fuses applied in compliance with the series combination ratings marked on the equipment by the manufacturer in accordance with 240.86(B) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:

CAUTION — SERIES COMBINATION SYSTEM RATED _____ AMPERES. MAXIMUM MOTOR LOAD CONTRIBUTION ALLOWED _____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

Statement of Problem and Substantiation for Public Input

This proposed change is generated by the significant amount of series rated systems there are in the commercial and multifamily installations. I am comfortable in stating that 50% of the installations I inspect are, series rated systems. I have been a full time field electrical inspector for almost 15 years and can offer real data as to the lack of knowledge of what a series rated system is let alone what may prohibit the installation of one. A consistent problem that I encounter is in a core & shell installation; before the tenant build out, it is easy to meet the 1% of motor load contribution. Once rooftop units, compressors and refrigeration equipment is added under another permit. I find the violation of excessive motor loads. Equally as important is the service electrician who adds, up sizes or rearranges a panel for convenience. The required sticker stating that it is a series rated system falls short in giving the proper awareness to all parties involved. By simply adding the words ‘maximum motor loads contribution allowed _____ amperes” would add vital information. I also believe that a positive unintended consequence would occur in educating all parties as it has by the insertion of 110.24. Since that article has been added there has been a positive awareness in the industry. Having to write in a figure in the field is proving to be a valuable educational tool. This is a small cost high reward change. This change can be of real value to the electrician, the inspector, the engineer and also the property owner.

Submitter Information Verification

Submitter Full Name: James Dorsey
Organization: Douglas County Building Department
Affiliation: Employee (Electrical Inspector)
Street Address:
City:
State:
Zip:
Submittal Date: Sun Apr 27 21:07:43 EDT 2014
110.22 Identification of Disconnecting Means.

(A) General.
Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. The marking shall be of sufficient durability to withstand the environment involved.

(B) Engineered Series Combination Systems.
Equipment enclosures for circuit breakers or fuses applied in compliance with series combination ratings selected under engineering supervision in accordance with 240.86(A) shall be legibly marked in the field as directed by the engineer to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:
CAUTION — ENGINEERED SERIES COMBINATION SYSTEM RATED _____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

(C) Tested Series Combination Systems.
Equipment enclosures for circuit breakers or fuses applied in compliance with the series combination ratings marked on the equipment by the manufacturer in accordance with 240.86(B) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:
CAUTION — SERIES COMBINATION SYSTEM RATED ____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

Informational Note: See IEEE 3004.5-2014 Recommended Practice for the Application of Low-Voltage Circuit Breakers in Industrial and Commercial Power Systems

Statement of Problem and Substantiation for Public Input

Series circuit breaker ratings have subtleties that should be informed by faster-moving engineering considerations available in the new IEEE 3000 series of recommended practices. The IEEE Industrial Applications Society 3000 series of standards are part of a larger project to revise and reorganize the technical content of the 13 existing IEEE Color Books which provided significant engineering information from experienced engineers. While many of the 3000 series standards are still "works in progress", and the topical coverage seeking its proper place, it is not too soon for the various NEC committees to evaluate the importance of strengthening the NEC's linkage to electrical engineering thought leadership.

More information is available at this link http://standards.ieee.org/findstds/3000stds/index.html

Submitter Information Verification

Submitter Full Name: Michael Anthony
Organization: University of Michigan
Affiliation: IEEE I&CPS Education and Healthcare Facility Electrotechnology Sub-Committee
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Nov 05 10:22:20 EST 2014
Public Input No. 4722-NFPA 70-2014 [ New Section after 110.22 ]

TITLE OF NEW CONTENT
Type your content here ... (D) Selective Coordinated Systems. Equipment enclosures for circuit breakers, fuses and transfer equipment installed in compliance with a selective coordinated system shall be legibly marked in the field to indicate the equipment in the field has been installed in accordance with the documented selective coordination. The marking shall be readily visible and state the following

CAUTION SELECTIVE COORDINATED SYSTEM REPLACEMENT COMPONENTS SHALL BE PER DOCUMENTED SELECTIVE COORDINATION

Statement of Problem and Substantiation for Public Input
this requirement will make clear in the field what equipment is part of the documented selective coordination for those authorized to design, install, inspect and maintain the system.

Submitter Information Verification
Submitter Full Name: Michael Dempsey
Organization: Trinity Code Inspections
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Fri Nov 07 15:18:01 EST 2014
Public Input No. 3346-NFPA 70-2014 [Section No. 110.22(A)]

(A) General. Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. The marking(s) shall indicate each device or equipment where the power originates. The marking shall be of sufficient durability to withstand the environment involved. Marking of the power origination is not required for one- or two-family dwellings.

Statement of Problem and Substantiation for Public Input

Substantiation: Proposed language is similar to proposal 9-116 for the 2014 NEC. It is just as important to mark disconnecting means with the power supply origination as it is for switchboards and panelboards, as required in section 404.4(B). Washington State has a state code rule in WAC 296-46B-110 022, Identification of Disconnecting Means, that requires, “In other than dwelling units, the identification plate must include the identification designation of the circuit source panelboard that supplies the disconnecting means.”

Submitter Information Verification

Submitter Full Name: TOM BAKER
Organization: Puget Sound Electrical Training
Street Address:
City:
State:
Zip:
Submittal Date: Mon Nov 03 21:50:13 EST 2014
(A) General.
Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. The marking shall be of sufficient durability to withstand the environment involved.

Statement of Problem and Substantiation for Public Input

It would help end users and technicians save time and add safety to quickly identify overcurrent device locations in the event of an emergency

Submitter Information Verification

Submitter Full Name: BRUCE MYERS
Organization: MYERS ELECTRIC & CONSTRUCTION
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Fri Oct 10 16:39:57 EDT 2014
Public Input No. 2540-NFPA 70-2014 [ Section No. 110.24 ]

110.24 - Available Fault Current.

(A) - Field Marking.
Service equipment in other than dwelling units shall be legibly marked in the field with the maximum available fault current. The field marking(s) shall include the date the fault-current calculation was performed and be of sufficient durability to withstand the environment involved.

Informational Note: The available fault-current marking(s) addressed in 110.24 is related to required short-circuit current ratings of equipment. NFPA 70E - 2012, Standard for Electrical Safety in the Workplace, provides assistance in determining the severity of potential exposure, planning safe work practices, and selecting personal protective equipment.

(B) - Modifications.
When modifications to the electrical installation occur that affect the maximum available fault current at the service, the maximum available fault current shall be verified or recalculated as necessary to ensure the service equipment ratings are sufficient for the maximum available fault current at the line terminals of the equipment. The required field marking(s) in 110.24(A) shall be adjusted to reflect the new level of maximum available fault current.

Exception: The field marking requirements in 110.24(A) and 110.24(B) shall not be required in industrial installations where conditions of maintenance and supervision ensure that only qualified persons service the equipment.

Statement of Problem and Substantiation for Public Input

The principal reason to delete this section is that the major portion of the available fault current is subject to change at any time due to the activities of the serving electric utility. These activities are entirely beyond the scope of the NEC and the inspectors called upon to enforce its provisions. Therefore, the marking applied under the terms of the NEC rule should never be relied upon as having any continuing validity. The Advisory Committee believes that a requirement to place a marking that should not be relied upon after it has been placed is not an appropriate requirement to retain in the NEC. Furthermore, this section has been placed in the general part of the article, and therefore additionally applies to medium voltage services. The available fault current in these installations varies continually over time with utility switching activities, and any posted number will have no continuing validity under even the most optimistic assumptions.

Submitter Information Verification

Submitter Full Name: Frederic Hartwell
Organization: Massachusetts Electrical Code Advisory Committee
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Sun Oct 26 16:13:52 EDT 2014

Panel 1 FD Agenda Page 251
110.24(C) Electrical Risk Assessment (New)
An electrical risk assessment including an incident energy analysis shall be performed for all new buildings or structures.

Statement of Problem and Substantiation for Public Input

When new buildings are constructed, information such as available current needs to be determined to verify that interrupting ratings and short circuit current ratings are appropriate. Conductor sizes and lengths can be obtained with minimal extra work and at typically at a much lower risk of exposure to hazards. In many cases the incident energy and arc flash boundary calculations are not done until the employer decides or is convinced it is necessary. The ideal time to have this done is during the initial design or installation.

Submitter Information Verification

Submitter Full Name: Paul Dobrowsky
Organization: Self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Nov 06 19:49:48 EST 2014
110.24(C) Electrical Risk Assessment (New)

An electrical risk assessment including an incident energy analysis shall be performed for all new buildings or structures.

Statement of Problem and Substantiation for Public Input

When new buildings are constructed, information such as available current needs to be determined to verify that interrupting ratings and short circuit current ratings are appropriate. Conductor sizes and lengths can be obtained with minimal extra work and at typically at a much lower risk of exposure to hazards. In many cases the incident energy and arc flash boundary calculations are not done until the employer decides or is convinced it is necessary. The ideal time to have this done is during the initial design or installation.

Submitter Information Verification

Submitter Full Name: Paul Dobrowsky
Organization: Self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Nov 06 19:49:48 EST 2014
Field Marking.

Service equipment in other than dwelling units shall be legibly marked in the field with the maximum available fault current. The field marking(s) shall include the date the fault-current calculation was performed and be of sufficient durability to withstand the environment involved. Calculations shall be performed by or under the supervision of a licensed electrical engineer. The results shall be documented and sealed by the licensed engineer and shall be provided to the AHJ if requested.

Informational Note: The available fault-current marking(s) addressed in 110.24 is related to required short-circuit current ratings of equipment. NFPA 70E-2012, Standard for Electrical Safety in the Workplace, provides assistance in determining the severity of potential exposure, planning safe work practices, and selecting personal protective equipment.

Statement of Problem and Substantiation for Public Input

Improperly performed fault and arc flash calculations can create an extremely dangerous situation if a person working on a piece of energized equipment is not wearing the appropriate PPE because the calculation underestimated the arc flash hazard. Improperly braced and rated equipment can present a serious fire hazard in the even of a fault. Licensed electrical engineers have both the knowledge and training to successfully perform the calculations. The requirement for sealed documents ensures that a proper standard of care is taken to provide accurate calculations.

Submitter Information Verification

Submitter Full Name: ROBERT SCHINDLER P E
Organization: PROCESS PLUS
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Tue Apr 08 19:51:56 EDT 2014
(A) Field Marking.
Service equipment in other than dwelling units shall be legibly marked in the field with the maximum available fault current. The field marking(s) shall include the date the fault-current calculation was performed and be performed by an licensed professional engineer in the design of electrical installations and be of sufficient durability to withstand the environment involved.

Informational Note: The available fault-current marking(s) addressed in 110.24 is related to required short-circuit current ratings of equipment. NFPA 70E-2012, Standard for Electrical Safety in the Workplace, provides assistance in determining the severity of potential exposure, planning safe work practices, and selecting personal protective equipment.

Statement of Problem and Substantiation for Public Input

As an electrical inspector, I see fault currents placed in service equipment that are way off base. I was involved in a large hospital emergency room addition. I was able to get the available fault current from the utility myself and perform the calculation using an app from a fuse company. When I plugged in the transformer impedance, kva, voltage and size and length of conductors from the transformer into the service equipment, I came up with a lot less available fault current than the available fault current that was placed on the service equipment. Motor contribution was not a major factor in this case to add to the fault current. I performed the same calculation using infinite bus which is the maximum, and the numbers place on the service equipment still did not come close. I think people in a lot of cases are just putting up numbers. No one checks to see if the calculations are correct. A licensed professional engineer will not just put arbitrary numbers on the service equipment.

Submitter Information Verification

Submitter Full Name: HERBERT PORTER
Organization: Porter Electric
Street Address:
City:
State:
Zip:
Submittal Date: Tue Nov 04 15:57:02 EST 2014
Public Input No. 1495-NFPA 70-2014 [ Section No. 110.24(B) ]

(B) Modifications.
When modifications to the electrical installation occur that affect the maximum available fault current at the service, the maximum available fault current shall be verified or recalculated as necessary to ensure the service equipment ratings are sufficient for the maximum available fault current at the line terminals of the equipment. The required field marking(s) in 110.24(A) shall be adjusted to reflect the new level of maximum available fault current.

Exception: The field marking requirements in 110.24(A) and 110.24(B) shall not be required in industrial installations where conditions of maintenance and supervision ensure that only qualified persons service the equipment.

Statement of Problem and Substantiation for Public Input

There is no practical reason for this exception. The requirement is not a burden and must be in place for all installers and maintainers including outside contractors. It is just as critical for equipment to have adequate interrupting ratings and short-circuit current ratings in industrial installations as it is in all other types of installations.

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 02 14:17:16 EDT 2014
110.25 Lockable Disconnecting Means.

Where (A) Lockable in the Open Position. If a disconnecting means is required to be lockable open elsewhere in this Code, it shall be capable of being locked in the open position. The provisions for locking shall remain in place with or without the lock installed.

Exception: Cord Locking provisions for cord-and-plug connection. Locking provisions shall not be required to remain in place without the lock installed.

(B) Locked Electrical Equipment Rooms or Enclosures. Electrical equipment rooms or enclosures housing electrical apparatus that are controlled by a lock(s) shall be considered accessible to qualified persons who have access means.

Statement of Problem and Substantiation for Public Input

In addition to editorial improvements, this Public Input is intended to add the text from 110.26(F) to this section as a new (B). Section 110.25 will be a much more logical location for the present rule on access to locked enclosures. Section 110.26 deals with Working Spaces and the present 110.26(F) seems to not be within the scope of the section.

Note that the NEC Style Manual indicates that "if" is preferred to "where" as "If" represents a conditional statement as used in the present 110.25.

Related Public Inputs for This Document

<table>
<thead>
<tr>
<th>Related Input</th>
<th>Relationship</th>
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</thead>
<tbody>
<tr>
<td>Public Input No. 3169-NFPA 70-2014 [Section No. 110.26(F)]</td>
<td>Text proposed to be moved.</td>
</tr>
</tbody>
</table>

Submitter Information Verification

Submitter Full Name: Phil Simmons
Organization: Simmons Electrical Services
Street Address:
City:
State:
Zip:
Submittal Date: Mon Nov 03 13:53:37 EST 2014
**Public Input No. 263-NFPA 70-2014 [ Section No. 110.25 ]**

110.25 Lockable Disconnecting Means.
Where a disconnecting means is required to be lockable open elsewhere in this Code, it shall be capable of being locked in the open position independent of a door position. The provisions for locking shall remain in place with or without the lock installed.

*Exception: Cord-and-plug connection locking provisions shall not be required to remain in place without the lock installed.*

**Statement of Problem and Substantiation for Public Input**

The previous version of the code under section 430.227 used wording, i.e. at the switch or circuit breaker. The new version leaves the definition vague and leaves the ability not to place a locking device at the disconnect itself. Additionally, NFPA 79 (section 5.3.3.1 (3)) and UL508A (section 66.6.3) requires a disconnect independent of the door. The propose change will allign the code to the standards, remove confusion, and reduce issues in the field.

**Submitter Information Verification**

Submitter Full Name: Richard Trainor
Organization: TUV SUD America Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Sat Feb 08 14:38:05 EST 2014
## Public Input No. 2858-NFPA 70-2014 [ Part II. ]

| Part II. | 1000 | 600 Volts, Nominal, or Less |

### Statement of Problem and Substantiation for Public Input

As throughout the code typically the value 6000 needs to be increased to 1000v. Some electrician union are starting to get certified up to 1000v equipment for splices and terminations.

### Submitter Information Verification

- **Submitter Full Name:** JAMES CAIN
- **Organization:** [ Not Specified ]
- **Affiliation:** self
- **Street Address:**
- **City:**
- **State:**
- **Zip:**
- **Submittal Date:** Thu Oct 30 11:59:52 EDT 2014
Public Input No. 1065-NFPA 70-2014 [ Section No. 110.26 ]

110.26 Spaces About Electrical Equipment.
Access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment.

Informational Note: NFPA 70E-2015, Standard for Electrical Safety in the Workplace, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

(A) Working Space.
Working space for equipment operating at 600 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A) (1), (A)(2), and (A)(3) or as required or permitted elsewhere in this Code.

(1) Depth of Working Space.
The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A) (1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

<table>
<thead>
<tr>
<th>Nominal Voltage to Ground</th>
<th>Condition 1</th>
<th>Condition 2</th>
<th>Condition 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–150</td>
<td>914 mm (3 ft)</td>
<td>914 mm (3 ft)</td>
<td>914 mm (3 ft)</td>
</tr>
<tr>
<td>151–600</td>
<td>914 mm (3 ft)</td>
<td>1.07 m (3 ft 6 in.)</td>
<td>1.22 m (4 ft)</td>
</tr>
</tbody>
</table>

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

(a) Dead-Front Assemblies. Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) Low Voltage. By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) Existing Buildings. In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

(2) Width of Working Space.
The width of the working space in front of the electrical equipment shall be the width of the equipment or 762 mm (30 in.), whichever is greater. In all cases, the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.

(3) Height of Working Space.
The work space shall be clear and extend from the grade, floor, or platform to a height of 2.0 m (6 1/2 ft) or the height of the equipment, whichever is greater. Within the height requirements of this section, other equipment that is associated with the electrical installation and is located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.

Exception No. 1: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the height of the working space is less than 2.0 m (6 1/2 ft).
Exception No. 2: Meters that are installed in meter sockets shall be permitted to extend beyond the other equipment. The meter socket shall be required to follow the rules of this section.

(4) Limited Access.

Where equipment operating at 600 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized is located in a space with limited access, all of the following shall apply:

(1) Where equipment is installed above a lay-in ceiling there shall be an opening not smaller than 559 mm x 559 mm (22 in. x 22 in.), or in a crawl space, there shall be an accessible opening not smaller than 559 mm x by 762 mm (22 in. x by 30 in.).

(2) The width of the working space shall be the width of the equipment enclosure or a minimum of 762 mm (30 in.), whichever is greater.

(3) All enclosure doors or hinged panels shall be capable of opening a minimum of 90 degrees.

(4) The space in front of the enclosure shall comply with the depth requirements of Table 110.26(A)(1). The maximum height of the working space shall be the height necessary to install the equipment in the limited space. A horizontal ceiling structural member or access panel shall be permitted in this space.

(B) Clear Spaces.

Working space required by this section shall not be used for storage. When normally enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded.

(C) Entrance to and Egress from Working Space.

(1) Minimum Required.

At least one entrance of sufficient area shall be provided to give access to and egress from working space about electrical equipment.

(2) Large Equipment.

For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 1/2 ft) high at each end of the working space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C) (2)(a) or (C)(2)(b) is met.

(a) Unobstructed Egress. Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) Extra Working Space. Where the depth of the working space is twice that required by 110.26(A) (1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

(3) Personnel Doors.

Where equipment rated 800 A or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open in the direction of egress and be equipped with listed panic hardware.

(D) Illumination.

Illumination shall be provided for all working spaces about service equipment, switchboards, switchgear, panelboards, or motor control centers installed indoors and shall not be controlled by automatic means only. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A) (1), Exception No. 1, for switched receptacles.

(E) Dedicated Equipment Space.

All switchboards, switchgear, panelboards, and motor control centers shall be located in dedicated spaces and protected from damage.

Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.

(1) Indoor.

Indoor installations shall comply with 110.26(E) (1)(a) through (E)(1)(d).

(a) Dedicated Electrical Space. The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.
Foreign Systems. The area above the dedicated space required by 110.26(E) (1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

Sprinkler Protection. Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

Suspended Ceilings. A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.

Outdoor. Outdoor installations shall comply with 110.26(E) (2)(a) and (b).

Installation Requirements. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

Dedicated Equipment Space. The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Locked Electrical Equipment Rooms or Enclosures. Electrical equipment rooms or enclosures housing electrical apparatus that are controlled by a lock(s) shall be considered accessible to qualified persons.

Statement of Problem and Substantiation for Public Input

This public input is the work of a task group appointed by the NEC Correlating Committee to review requirements for working space of equipment that is often installed in spaces with limited access. The task group was charged with reviewing the revision to section 424.66 during the 2014 NEC revision cycle (see comment 17-19) and to explore the feasibility of a new general requirement for the 2017 NEC in Article 110 for clarity and usability.

The task group members were Susan Scearce, Robert Osborne, Chad Kennedy, Keith Lofland, Jeff Holmes, Randy Hunter, Donny Cook, Don Jhonson, Duke Schamel, David Hittinger, Neil LaBrake and James Dollard.

The concerns of the Correlating Committee were discussed. The CC formed this task group to address the concerns of the CMP-17 Chair and another committee member. The task group reviewed the action taken by CMP-17 on section 424.66 and agreed that a general requirement in 110.26 was necessary for several reasons:

1. Requirements for adequate working space for equipment that is likely to require examination, adjustment, servicing, or maintenance while energized are general requirements and belong in section 110.26,
2. In the next revision cycle other CMP's may implement similar requirements that may differ slightly creating potential conflicts and possible confusion,
3. Requirements for working space in spaces with limited access must be practical, feasible and enforceable, and;
4. A single general requirement in Chapter 1 to address all impacted equipment would provide clarity, usability and eliminate potential conflict and confusion.

The task group recognizes that this revision is necessary for correlation throughout the NEC, and to provide the relief necessary for installations with limited access. The task group understands that the rules as presently written in 110.26 apply to all equipment that is likely to require examination, adjustment, servicing, or maintenance while energized. It is widely understood that strict compliance with 110.26(A)(1), (A)(2) and (A)(3) in ceiling spaces and crawl spaces is not feasible. The task group recommends that all committees are sent the CMP-1 action on this proposal public input whether accepted, accepted with changes or rejected for correlation in other Articles.

Suggested new Informational Note

The first suggested revision is a new Informational Note to reference NFPA 70E. The task group understands that working space is required for equipment that is likely to require examination, adjustment, servicing, or maintenance while energized. Therefore an Informational Note to reference NFPA 70E Standard for Electrical Safety in the Workplace is appropriately located after the parent text in 110.26. The task group originally located this Informational Note after the proposed new requirement but quickly realized that it applies to multiple first level subdivisions in 110.26.

Suggested new text in 110.26(A)

The second suggested revision is a new last sentence in the parent text to 110.26(A) as follows:

"Working space for equipment permitted elsewhere in this Code to be installed in spaces with limited access such..."
as above a ceiling, in elevated areas that are not readily accessible, or in crawl spaces shall comply with 110.26(A)(4).
This proposed revision leaves the first sentence of 110.26(A) unchanged as the general requirement for all equipment requiring workspace clearances. The new second sentence will modify the general rule for specific equipment that is “installed in spaces with limited access”. This equipment “installed in spaces with limited access” is further limited with the text “such as above a ceiling, in elevated areas that are not readily accessible, or in crawl spaces” to provide clarity.

Suggested new second level subdivision 110.26(A)(4)

A new second level subdivision “110.26(A)(4) Limited Access”, is added with basic parent text that is similar to the first sentence in 110.26(A). This parent text limits the scope of this subdivision to equipment “located in a space with limited access” and this mandates that all of the following four list items shall apply.

Suggested new 110.26(A)(4)(1)
The first list item requires that equipment installed above a lay-in ceiling have access through an opening not smaller than 559 mm x 559 mm (22 in. x 22 in.) which recognizes a standard 2 foot x 2 foot lay-in ceiling opening.
Additionally, a crawl space is required to be accessible through an opening not smaller than 559 mm x by 762 mm (22 in. x by 30 in.). These dimensions for the crawl space are similar to the access requirements for signs in 600.21(E) with dimensions that correlate with the applicable building codes and spaces between standard framing.

Suggested new 110.26(A)(4)(2)
The second list item requires the width of the working space to be the width of the enclosure, or a minimum of 762 mm (30 in.), whichever is greater.

Suggested new 110.26(A)(4)(3)
The third list item requires all doors or hinged panels be capable of opening a minimum of 90 degrees.

Suggested new 110.26(A)(4)(4)
The fourth list item requires the space in front of the enclosure comply with the depth requirements of Table 110.26(A)(1). This list item provides relief from the general height requirement and permits the height of the working space to be the maximum height necessary to install the equipment in the limited space. This list item also recognizes relief necessary in most ceiling spaces and permits a horizontal ceiling structural member or access panel in this space.

Summary
All electrical equipment referenced in 110.26(A) requires working space in accordance with the requirements therein without regard to where the equipment is installed. The task group recognizes that where equipment referenced in 110.26(A) is installed in spaces with limited access, such as above a ceiling, meeting the requirements of 110.26(A) will in most cases be impossible. The proposed revision recognizes that;
(1) 110.26(A) requires working space for equipment located in spaces with limited access,
(2) Strict compliance with 110.26(A) will in almost all cases be infeasible
(3) The electrical industry has been installing equipment in such spaces for decades
(4) Prescriptive requirements for such spaces are needed

This proposed revision is an attempt to provide relief for both the installer/maintainer and the AHJ. This task group was formed by the NEC Correlating Committee in an attempt to eliminate correlation issues across multiple committees. In order to achieve this goal, the task group has provided a suggested general requirement for such spaces in Article 110 under the purview of CMP-1. It is the opinion of the task group that all purview over working space clearances should reside with CMP-1. An alternate approach to address this issue is to provide individual code making panels with purview over working space clearances of equipment within their purview where it is located in spaces with limited access. If CMP-1 rejects the inclusion of a general requirement in 110.26 for spaces with limited access the NEC Correlating Committee should consider standardized text for such requirements across multiple committees.

A companion public input is sent to CMP-17 to delete the limited access working space requirements in 424.66. This deletion would be conditional based upon the actions of CMP-1 to include a general requirement for spaces with limited access.

Related Public Inputs for This Document
<table>
<thead>
<tr>
<th>Related Input</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Input No. 1066-NFPA 70-2014 [Section No. 424.66]</td>
<td></td>
</tr>
</tbody>
</table>

**Submitter Information Verification**

- **Submitter Full Name:** James Dollard
- **Organization:** IBEW Local Union 98
- **Street Address:**
- **City:**
- **State:**
- **Zip:**
- **Submittal Date:** Mon Aug 18 08:02:38 EDT 2014
Public Input No. 1225-NFPA 70-2014 [ Section No. 110.26(A) ]

(A) Working Space.

Working space for equipment operating at 600 volts, nominal, or less phase to ground phase and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A) (1), (A)(2), and (A)(3) or as required or permitted elsewhere in this Code.

(1) Depth of Working Space.

The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A) (1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

<table>
<thead>
<tr>
<th>Nominal Voltage to Ground</th>
<th>Condition 1</th>
<th>Condition 2</th>
<th>Condition 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–150</td>
<td>914 mm (3 ft)</td>
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<td>914 mm (3 ft)</td>
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<tr>
<td>151–600</td>
<td>914 mm (3 ft)</td>
<td>1.07 m (3 ft 6 in.)</td>
<td>1.22 m (4 ft)</td>
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</table>

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

(a) Dead-Front Assemblies. Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) Low Voltage. By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) Existing Buildings. In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

(2) Width of Working Space.

The width of the working space in front of the electrical equipment shall be the width of the equipment or 762 mm (30 in.), whichever is greater. In all cases, the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.

(3) Height of Working Space.

The work space shall be clear and extend from the grade, floor, or platform to a height of 2.0 m (6 1/2 ft) or the height of the equipment, whichever is greater. Within the height requirements of this section, other equipment that is associated with the electrical installation and is located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.

Exception No. 1: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the height of the working space is less than 2.0 m (6 1/2 ft).

Exception No. 2: Meters that are installed in meter sockets shall be permitted to extend beyond the other equipment. The meter socket shall be required to follow the rules of this section.

Statement of Problem and Substantiation for Public Input

Part II refers to 600 volts not higher. If you use 600 volts to ground it would mean 1040 volts phase to phase. I do not this this was the intent.
Submitter Information Verification

Submitter Full Name: Joel Rencsok
Organization: [ Not Specified ]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 09 13:33:33 EDT 2014
110.26 (A)(4) Control Panels Installed above Conveyors and other Obstructions. Where a control panel on an equipment is positioned directly above the conveyor or other obstructions a work-platform shall be provided in front of the control panel above the conveyor or obstruction. Work-platform shall be sized as per 110.26(A)(1). Work-platform shall be installed permanently. Suitable guards or railing shall be provided as a fall and slip prevention. Length of the work-platform shall meet the length of the equipment.

Statement of Problem and Substantiation for Public Input

Often I see equipment with control panel mounted on the equipment directly above a conveyor line or some other obstacle. Workers doing troubleshooting or repairing have to stand upon a ladder at the one side of the obstruction and stretch their hand and body part to access inside of the control panel. Workers can get hurt by the materials on conveyor line or by coming close to the moving parts of the conveyor.

My input for providing a work-platform in front of the control panel and above conveyor line and other obstruction will provide workers a safe place to work by sitting or standing upon it.

Submitter Information Verification

Submitter Full Name: SATYA SHEEL PANDEY  
Organization: COLUMBIA CREST WINERY  
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Wed Nov 05 12:24:13 EST 2014
Title of New Content

Type your content here ...

110.26 (A) (4) Control Panels Installed above Conveyors and other Obstructions. Where a control panel on an equipment is positioned directly above the conveyor or other obstructions a work-platform shall be provided in front of the control panel above the conveyor or obstruction. Work-platform shall be sized as per 110.26(A)(1). Work-platform shall be installed permanently. Suitable guards or railing shall be provided as a fall and slip prevention. Length of the work-platform shall meet the length of the equipment.

Statement of Problem and Substantiation for Public Input

Often I see equipment with control panel mounted on the equipment directly above a conveyor line or some other obstacle. Workers doing troubleshooting or repairing have to stand upon a ladder at the one side of the obstruction and stretch their hand and body part to access inside of the control panel. Workers can get hurt by the materials on conveyor line or by coming close to the moving parts of the conveyor.

My input for providing a work-platform in front of the control panel and above conveyor line and other obstruction will provide workers a safe place to work by sitting or standing upon it.

Submitter Information Verification

Submitter Full Name: SATYA SHEEL PANDEY
Organization: COLUMBIA CREST WINERY
Street Address:
City:
State:
Zip:
Submittal Date: Wed Nov 05 12:24:13 EST 2014
110.26(A)(4) Separation from Low-Voltage Equipment

Where switches, cutouts, or other equipment operating at 601 to 1000 volts, nominal, or less are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating at over 600 volts, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the low voltage equipment by a suitable partition, fence, or screen.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change adds a new requirement to the list in 110.26(A) for “Separation from Low-Voltage Equipment.” This change is needed to correlate with companion Public Inputs to Part III.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 11:09:57 EDT 2014
Public Input No. 4495-NFPA 70-2014 [ Section No. 110.26(A) [Excluding any Sub-Sections] ]

Working space for equipment operating at 600 volts, nominal, or less

phase, to
ground

phase, and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A) (1), (A)(2), and (A)(3) or as required or permitted elsewhere in this Code.

Statement of Problem and Substantiation for Public Input

Part II refers to 600 volts not higher.
If you use 600 volts to ground it would mean 1040 volts phase to phase.
I do not think this was the intent

Submitter Information Verification

Submitter Full Name: ROCCO DELUCA
Organization: City of Phoenix AZ
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 07 08:37:06 EST 2014
(1) Depth of Working Space.
The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

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<tr>
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<td>151–600</td>
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<td>1</td>
<td>1.1 m (3 ft 6 in.)</td>
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Note: Where the conditions are as follows:

**Condition 1** — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

**Condition 2** — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

**Condition 3** — Exposed live parts on both sides of the working space.

(a) *Dead-Front Assemblies.* Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) *Low Voltage.* By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) *Existing Buildings.* In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

**Statement of Problem and Substantiation for Public Input**

The present values in this Table were established by Proposal 1-110 for the 2008 NEC. In that Proposal the submitter asked for these values stating that “A true conversion is essential for application of the code in a global business environment where metric system is the only acceptable system.” The Proposal was accepted with the Panel Statement that “The Panel concludes that the submitter’s soft conversion is appropriate in accordance with 90.9(C)(4).” This was unanimously accepted by written ballot. There were no subsequent Comments.

There are a couple of problems with this. First, a similar change was neither proposed nor considered for Table...
110.34(A) so the result is that for voltages of 601 Volts to 2500 Volts the metric numbers sometimes result in LESS REQUIRED WORKING SPACE than for voltages up to 600 Volts under Condition 1 in the Tables. This is an obvious correlation issue. Second, the measurements did not always result in larger spacing for voltages up to 600 Volts. For 3 feet, 900 mm became 914 mm and for 4 feet, it went from 1.2 m to 1.22 m. But for 3 feet, 6 inches the measurement went from 1.1 m to 1.07 m, an obvious lesser distance.

In addition, even the largest increase from 1.2 m to 1.22 m is not only just marginally larger (in inches, this is about 0.79 inches in 4 feet or less than 2%) but also somewhat harder to accurately measure. No samples of what is used elsewhere were submitted by the original submitter but a quick investigation of Canadian Codes shows that instead of moving to either 914 mm or 900 mm, they use 1.0 m instead of 3 feet. While I have not investigated further than this, my theory is that similar exchanges of "metric equivalent" measures are used instead of either "900 mm" or "914 mm" for ease of measurement.

My conclusion is that "900 mm" is perfectly acceptable where the metric system is used since it is only marginally different and since the adopter may adopt their own measurements anyway. To assume otherwise would also require that every other use of the NEC metric conversions be changed to achieve a correlated result. I assume also that this was taken into account during the original decision regarding conversion to metric equivalent numbers. Finally, I would ask that if this Public Input is not accepted, Table 110.34(A) should be revised to correlate with Table 110.26(A)(1). No companion Public Input was submitted for that Table.

Submitter Information Verification

Submitter Full Name: Thomas Adams
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jun 10 10:02:39 EDT 2014
(1) **Depth of Working Space.**

The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the face of the enclosure or opening if the live parts are enclosed.

**Table 110.26(A)(1) Working Spaces**

<table>
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<tr>
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(b) **Low Voltage.** By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) **Existing Buildings.** In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

**Statement of Problem and Substantiation for Public Input**

The electricians are always trying to interpret this section when dealing with an enclosure that houses live parts. They are always stating that it is measured from the live parts in the enclosure and not from the enclosure face or opening. The addition of a few key word will make it easier for the electrician on the job to understand where the measurement is taken from, the live parts or the enclosure itself.

**Submitter Information Verification**

**Submitter Full Name:** JAKE LEAHY  
**Organization:** JLECC  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Wed May 14 13:17:51 EDT 2014
(1) Depth of Working Space.
The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed. Table 110.26(A)(1) Working Spaces

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My conclusion is that "900 mm" is perfectly acceptable where the metric system is used since it is only marginally different and since the adopter may adopt their own measurements anyway. To assume otherwise would also require that every other use of the NEC metric conversions be changed to achieve a correlated result. I assume also that this was taken into account during the original decision regarding conversion to metric equivalent numbers. Finally, I would ask that if this Public Input is not accepted, Table 110.34(A) should be revised to correlate with Table 110.26(A)(1). No companion Public Input was submitted for that Table.

Submitter Information Verification

Submitter Full Name: Thomas Adams
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jun 10 10:02:39 EDT 2014
(1) Depth of Working Space.
The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

<table>
<thead>
<tr>
<th>Nominal Voltage to Ground</th>
<th>Minimum Clear Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Condition 1</td>
</tr>
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Statement of Problem and Substantiation for Public Input

"as" makes the sentence awkward and adds no meaning.

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Mon Nov 03 18:39:54 EST 2014
(1) Depth of Working Space.
The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A) (1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

### Table 110.26(A)(1) Working Spaces

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**Condition 2** — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

**Condition 3** — Exposed live parts on both sides of the working space.

(a) **Dead-Front Assemblies.** Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) **Low Voltage.** By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) **Existing Buildings.** In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

Note 2: For grounded direct current systems, use nominal DC voltage to apply Table 110.26(A)(1). For ungrounded direct current systems or high resistance grounded systems, Condition 1 applies.

### Statement of Problem and Substantiation for Public Input

Table 110.26(A)(1) bases working clearances on the voltage-to-ground rating. Battery systems and other types of energy storage systems are sometimes installed as ungrounded systems. Because the Table does not distinguish between alternating current and direct current, a new footnote is added advising the reader to use nominal voltage to determine the dc voltage category.

Most dc systems above 50 volts nominal are ungrounded systems, and are potentially safer for personnel.

The following PI’s are associated with setting the safety threshold for direct current at 100 Vdc:

- PI # 1027 - 110.27(A)
- PI # 2630 – 480.6(A)
- PI # 2708 - 690.71(B)
- PI # 2745 – 690.71(E)
- PI # 2747 – 690.71(F)
- PI # 2748 – 690.71(G)
- PI # 3265 - 110.27(A)
- PI # 3270 – 480.9(B)

### Submitter Information Verification

Panel 1 FD Agenda Page 277
Public Input No. 2859-NFPA 70-2014 [ Section No. 110.26(A)(1) ]

(1) Depth of Working Space.
The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A) 1(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

<table>
<thead>
<tr>
<th>Nominal Voltage to Ground</th>
<th>Condition 1</th>
<th>Condition 2</th>
<th>Condition 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–150</td>
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<td>914 mm (3 ft)</td>
</tr>
<tr>
<td>151–600</td>
<td>914 mm (3 ft)</td>
<td>1.07 m (3 ft 6 in.)</td>
<td>1.22 m (4 ft)</td>
</tr>
<tr>
<td>601–1000</td>
<td>1.22 (4 ft)</td>
<td></td>
<td>1.37 (4 ft 6&quot;)</td>
</tr>
</tbody>
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Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

(a) Dead-Front Assemblies. Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) Low Voltage. By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) Existing Buildings. In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

Statement of Problem and Substantiation for Public Input

For the 1000V industry we need to increase the operating space to match other codes and standards

Submitter Information Verification

Submitter Full Name: JAMES CAIN
Organization: [ Not Specified ]
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 30 12:05:00 EDT 2014

Panel 1 FD Agenda Page 279
(1) Depth of Working Space.

The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

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Note: Where the conditions are as follows:

**Condition 1** — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

**Condition 2** — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

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(a) **Dead-Front Assemblies.** Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) **Low Voltage.** By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 actual volts rms, 42 actual volts peak, or 60 actual volts dc.

(c) **Existing Buildings.** In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

**Statement of Problem and Substantiation for Public Input**

This section uses voltages that are "actual" hard limits.

Refer to the substantiation for 1902 for more information.

**Related Public Inputs for This Document**

<table>
<thead>
<tr>
<th>Related Input</th>
<th>Relationship</th>
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<tbody>
<tr>
<td>Public Input No. 1902-NFPA 70-2014 [Global Input]</td>
<td>This submission depends on 1902</td>
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</tbody>
</table>

**Submitter Information Verification**

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Public Input No. 1556-NFPA 70-2014 [ Section No. 110.26(A)(1) ]

(1) Depth of Working Space.
The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

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</tr>
<tr>
<td>601–1000</td>
<td>914 mm (3 ft)</td>
<td>1.22 m (4 ft)</td>
<td>1.5 m (5 ft)</td>
</tr>
</tbody>
</table>

Note: Where the conditions are as follows:

**Condition 1** — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

**Condition 2** — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

**Condition 3** — Exposed live parts on both sides of the working space.

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(b) **Low Voltage.** By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) **Existing Buildings.** In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guiry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change adds a row to Table 110.26(A)(1) for 601-1000 volts working space conditions. This addition is from same requirements and aligning Code structure by pulling a portion of the first row of Table 110.34(A) into Table 110.26(A)(1) to cover working space conditions up to 1000 Volts.

The working space requirements in Table 110.26(A)(1) came from the distance measured based on the depth of the body plus the length of the arm for a total of 3 feet for Condition 1, 2 and 3 for zero to 150 volts. As the voltage increases above the 150 volt level, the distance increases 6 inches for grounded parts to give the person the extra 6 inch buffer and 12 inches where there are live parts behind the installer. This applies for the normal application of 600 volts or less and would apply for most tools rated at 600 volts or less such as voltage testers and similar tools.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
<table>
<thead>
<tr>
<th>Organization:</th>
<th>National Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street Address:</td>
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</tr>
<tr>
<td>City:</td>
<td></td>
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<tr>
<td>State:</td>
<td></td>
</tr>
<tr>
<td>Zip:</td>
<td></td>
</tr>
<tr>
<td>Submittal Date:</td>
<td>Fri Oct 03 14:17:24 EDT 2014</td>
</tr>
</tbody>
</table>
Public Input No. 3263-NFPA 70-2014 [ Section No. 110.26(A)(3) ]

(3) Height of Working Space.
The work space shall be clear and extend from the grade, floor, or platform to a height of 2.0 m (6 1⁄2 ft) or the height of the equipment, whichever is greater. Within the height requirements of this section, other equipment that is associated with the electrical installation and is located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.

Exception No. 1: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the height of the working space is less than 2.0 m (6 1⁄2 ft).

Exception No. 2: Meters that are installed in meter sockets shall be permitted to extend beyond the other equipment. The meter socket shall be required to follow the rules of this section.

Exception No. 3: On battery systems mounted on open racks, the top clearance shall comply with 480.9(D).

Statement of Problem and Substantiation for Public Input

A new Exception No. 3 is added to direct the reader back to Article 480 for top clearance. NEC 480.9(C) states that “spaces about battery systems shall comply with 110.26.” But then 480.9(C) goes on to prescribe “spaces about battery systems.” 480.9(D) addresses the working space required above top terminal batteries installed on tiered racks.

Submitter Information Verification

Submitter Full Name: Stephen McCluer
Organization: Schneider Electric
Affiliation: IEEE Stationary Battery Committee
Street Address:
City:
State:
Zip:
Submittal Date: Mon Nov 03 18:40:27 EST 2014
**Public Input No. 641-NFPA 70-2014 [ New Section after 110.26(B) ]**

110.26(B)

(1) A sign shall be present at each entry of a designated electrical room to prohibit storage of any kind within the room. The sign shall read: ELECTRIC ROOM. THIS ROOM MUST BE KEPT FREE FROM OBSTRUCTION. NO PORTABLE EQUIPMENT, CONSTRUCTION MATERIALS, BUILDING FURNISHINGS, BUSINESS OR CLASSROOM MATERIALS, OR JANITORIAL SUPPLIES AND EQUIPMENT SHALL BE STORED IN THIS ROOM.

(2) Where the electrical equipment is located in a room that is shared with other functions, the required electrical clearances and egress routes shall be defined by painting 4 inch wide red stripes on the floor, with 12 inch high yellow text that shall read: ELECTRICAL CLEARANCE AND EGRESS AREA. NO STORAGE ALLOWED.

(3) Where the electrical equipment in a shared room is subject to potential damage, barrier posts or a wire cage shall be erected to minimize or prevent such damage.

### Additional Proposed Changes

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprague_110.26.pdf</td>
<td>PI Form with documentation</td>
<td></td>
</tr>
</tbody>
</table>

**Statement of Problem and Substantiation for Public Input**

Please review the uploaded documentation that documents the need for these additions to 110.26(B).

**Submitter Information Verification**

Submitter Full Name: RONALD SPRAGUE  
Organization: R. L. SPRAGUE, P.E.  
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Tue Jun 03 09:02:33 EDT 2014
NEC 70 2017

The justification for revisions to Article 110.26(B).

There should be many more restrictions in these articles to minimize the occurrences of electric room horrors that I am about to show you. Sadly, trying to revise the NEC to eliminate these problems will just be treating the symptoms, and will not prevent these events from recurring.

The various building design codes, such as NFPA 101, 220, 900, International Building Code, or the Uniform Building Code, do not address the need to provide adequate spaces for Janitorial storage, for the storage of maintenance equipment and for storage of office and teaching materials, particularly in an educational environment. Thus, when a building is designed under an extremely tight budget, these storage spaces are usually eliminated by the Architect, as there is no building code obligation to provide them. Since janitorial equipment, supplies, and furniture need to be stored somewhere, the only available spaces become the electric rooms in these building designs.

It is highly recommended that language be inserted in these building design and construction codes to mandate rooms be include in the design for Janitorial equipment storage, for Maintenance storage and equipment, and for Office and Educational equipment and supplies. Electric rooms should require signs that state storage of any kind is prohibited in the dedicated space. Further, where electrical equipment is to be installed in a multiple use area, the floor shall be striped with red paint and with yellow letters to define the No Storage Area. A sign shall be permanently posted at each point of egress, on the dedicated electric door that states

"THIS AREA IS DEDICATED FOR ELECTRICAL EQUIPMENT ONLY. NO STORAGE OF ANY KIND IS ALLOWED IN THIS SPACE."

An alternate proposal would be to enclose the electrical equipment area with a wire fence and with barrier posts to isolate the equipment area from the other storage or equipment areas. The sign proposed about should be posted at each of space entrances.
PHOTO 2
ELECTRICAL AND MECHANICAL ROOM COMBINED.
PHOTO 3
ELECTRIC ROOM AND JANITORIAL CLOSET COMBINED.
THESE THINGS MAKE DANDY MOP DRYERS.
ON THE OTHER SIDE OF THIS WALL IS A KINDERGARTEN CLASS.
PHOTO 4
INSTALLING ELECTRICAL PANELS IN A KINDERGARTEN CLASS IS A BAD IDEA.
PHOTO 5
ELECTRIC ROOM AND CLASSROOM WORK AREA.
PHOTO 6
ANOTHER ELECTRIC ROOM AND CLASSROOM STORAGE AREA.
PHOTO 7
THERE IS A TRANSFORMER IN HERE SOMEWHERE.
PHOTO 8
ANOTHER ELECTRIC ROOM AND CLASSROOM STORAGE AREA.
NOTE THE STORAGE ON THE TRANSFORMER
PHOTO 9
ELECTRIC EQUIPMENT AND MERCHANDISE STORAGE.
PHOTO 10
ELECTRICAL EQUIPMENT AND MERCHANDISE STORAGE.
PHOTO 11
ELECTRICAL EQUIPMENT AND MERCHANDISE STORAGE.
PHOTO 12
ELECTRICAL EQUIPMENT AND WORKBENCH AREA.
This room must be kept clean and free from obstruction. No portable equipment, construction materials or building furnishings may be stored in this room without written approval by the Fire Marshall.

To report a violation call Facilities Management at (480) 965-3633.
Public Input No. 2860-NFPA 70-2014 [ Section No. 110.26(C)(2) ]

(2) Large Equipment.
For equipment rated 1200 amperes or more at 600V nominal and less, or 800 amperes or more at 1000v to 601v, or is over 1.8 m (6 ft) wide that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 1/2 ft) high at each end of the working space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C) (2)(a) or (C)(2)(b) is met.

(a) Unobstructed Egress. Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) Extra Working Space. Where the depth of the working space is twice that required by 110.26(A) (1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

Statement of Problem and Substantiation for Public Input

1200a at 1000V is over 2000kva, this is to much power not to have the doors for egress. We need to drop the 1000v down to an 800A panel which is a 1000 kva transformer source or so.

Submitter Information Verification

Submitter Full Name: JAMES CAIN
Organization: [ Not Specified ]
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 30 12:18:23 EDT 2014
Public Input No. 2367-NFPA 70-2014 [ Section No. 110.26(C)(2) ]

(2) Large Equipment.

For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 1/2 ft) high at each end of the working space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C) (2)(a) or (C)(2)(b) is met.

(a) Unobstructed Egress. Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) Extra Working Space. Where the depth of the working space is twice that required by 110.26(A) (1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

For new installations, the primary and secondary egress paths from the space may not include a ladder or other obstruction that impedes access to medical attention. For existing installations, the "second" means of egress from the space, may include a ladder as long as there is a safe landing outside the space where the person may be accessed by medical personnel. The primary means of egress from the space shall be unobstructed for existing installations.

Statement of Problem and Substantiation for Public Input

The code is not clear whether or not a ladder may be used in the egress path. NFPA 101, Section 40 and Section 7 appear to allow a "fire ladder" in the egress components for an industrial occupancy. Fundamentally, if we're requiring listed panic hardware on the doors so an injured person may escape from the hazard, it seems that we would also want the person to have an unobstructed exit path to seek medical attention. This public input is an attempt to clarify that and make it clear that for new installations, that is the intent. This is not intended to require existing installation to make costly retrofits if they have an unobstructed "primary" means of egress. If both entrances involve the use of a ladder, however, this language would require retrofit of existing installations.

Submitter Information Verification

Submitter Full Name: Richard Holub
Organization: The DuPont Company, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 23 08:42:39 EDT 2014
Public Input No. 1505-NFPA 70-2014 [ Section No. 110.26(C)(2) ]

Large Equipment.
For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 11⁄2 ft) high at each end of the working space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C) (2)(a) or (C)(2)(b) is met.

(a) Unobstructed Egress. Where the location permits a continuous and unobstructed way of egress travel unobstructed egress travel without passing through the working space required by 110.26(A)(1), a single entrance to the working space shall be permitted.

(b) Extra Working Space. Where the depth of the working space is twice that required by 110.26(A) (1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

Statement of Problem and Substantiation for Public Input

As an AHJ, I have seen the current language interpreted by engineers and installers alike as follows: 110.26(C)(2)(a) so long as the way of egress is continuous and unobstructed, a single exit would be permitted even if personnel would be required to exit through the working space during an arcing event. So long as the "line of sight" path from the opposite side of the working space to the exit is clear of obstructions, (other equipment, changes in wall line, etc.) then a single exit is permitted.

It seems to me to be the intent of the NEC to require safe egress for personnel away from large equipment without passing through the working space set forth in 110.26(A)(1) during an arcing event. I feel the change I have proposed provides clarification of this intent.

Submitter Information Verification

Submitter Full Name: Mitch Feininger
Organization: North Dakota State Electrical
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 08:41:45 EDT 2014
Public Input No. 1262-NFPA 70-2014 [ Section No. 110.26(C)(2) ]

(2) Large Equipment.
For equipment rated 1200 amperes, rated 800 amperes or more and over 1.8 m (6 ft) wide that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 1⁄2 ft) high at each end of the working space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C) (2)(a) or (C)(2)(b) is met.

(a) Unobstructed Egress. Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

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Statement of Problem and Substantiation for Public Input

The electrical safety hazard to the electrical worker is the very high incident energy from a ground-fault or short-circuit event.

For instance, there are large service disconnect switches with overcurrent devices that operate at 480-volts, which are only 36 inches wide, but still present a serious arc flash hazard to personnel.

Here is an example; because only 36 " minimum width and 42 " depth in a 110.26(A) Condition 2 workspace is required at present from the front of the equipment enclosure to a metal or concrete wall, the electrical worker will still be within the arc flash Limited Approach Boundary, even when not directly in front the switch enclosure. The worker would also be within the space of a Exposed Fixed Circuit Part.

Does CMP 1 want to reconsider this issue? Thank you.

Submitter Information Verification

Submitter Full Name: MICHAEL WEITZEL
Organization: CWEE
Affiliation: Bechtel
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 11 15:00:32 EDT 2014
Public Input No. 550-NFPA 70-2014 [Section No. 110.26(D)]

(D) Illumination.
Illumination shall be provided for all working spaces about service equipment, switchboards, switchgear, panelboards, or motor control centers installed indoors and shall not be controlled by automatic means. Only.
Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A) (1), Exception No. 1, for switched receptacles.

Statement of Problem and Substantiation for Public Input

Since it is allowed to have automatic means to turn on the lights if the switch has a manual override, there may be a time when the lights are on by automatic means when the electrician comes in to work on the equipment. A meter reader may come in and leave. The lights come on and when the person leaves the lights will stay on for several minutes. In the mean time an electrician comes in and the lights are on. The electrician may be in an area where the sensor can't pick him up, like behind equipment doors. At this point the lights may go out and the electrician may be left in the dark with his hands in the equipment.

Submitter Information Verification

Submitter Full Name: Lee Jolley
Organization: Baltimore County Government Md
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 06 08:11:38 EDT 2014
Public Input No. 4761-NFPA 70-2014 [ Section No. 110.26(D) ]

(D) Illumination.
Illumination shall be provided for all working spaces about service equipment, switchboards, switchgear, panelboards, or motor control centers installed indoors and shall not be controlled by automatic means only. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A) (1), Exception No. 1, for switched receptacles.

(E) Emergency Illumination.
An emergency lighting system shall automatically illuminate the areas around electrical service equipment greater than 200 amperes for a duration of not less than 90 minutes.

Statement of Problem and Substantiation for Public Input
To provide ingress and egress illumination in the event of a power failure -- especially when the power failure is the result of an accident at the service.

Submitter Information Verification
Submitter Full Name: Michael Anthony
Organization: University of Michigan
Affiliation: APPA - Leadership in Education
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 07 16:35:16 EST 2014
Public Input No. 3240-NFPA 70-2014 [ New Section after 110.26(D) ]

110.26 D (1)

Emergency Illumination

Emergency illumination is required about all service equipment, motor control centers, switch gears, panelboards, load centers etc. installed indoors within commercial and industrial occupancies. If a battery pack is the source of emergency illumination, a minimum of 90 minutes is required. The lighting outlet shall be located near the equipment. For large electrical rooms additional lighting outlets may be required.

Statement of Problem and Substantiation for Public Input

In the 2014 version, we have added a requirement to have a 120 volt receptacle installed about all service equipment within commercial occupancies. I wish to expand on that requirement to require in addition to 110.26 D, emergency illumination be required about all service equipment, motor control centers, load centers, panel boards etc. installed indoors within commercial and industrial occupancies. A 90 minute battery pack would even be acceptable. The lighting outlet shall be located near the equipment. For large electrical rooms additional lighting outlets may be required. (The type of source of emergency illumination would be left up to the designer) Too many times someone has to go into a dark electrical room usually packed with other items violating the dedicated spacing requirements. Since we are unable to police this requirement after installation, at least we can increase the safety of the person(s) who must troubleshoot, reset and even locate the electrical equipment to restore power. Additional, think about the possible disaster that may occur if someone is working on a system and there is a power failure. Illumination would still be provided to assist him to safely re-secure the equipment and safely exit the room until power has been restored. I am asking an extension to be added to 110.26 D mandating this change.

Submitter Information Verification

Submitter Full Name: ROBERT WELBORNE
Organization: R & R ELECTRIC COMPANY - BRANDYWINE MARYLAND
Affiliation: PRESIDENT (GEORGE WASHINGTON CHAPTER) - INTERNATIONAL ASSOCIATION OF ELECTRICAL INSPECTORS
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Mon Nov 03 17:29:43 EST 2014
Public Input No. 1306-NFPA 70-2014 [ Section No. 110.26(E)(1) ]

Indoor. Indoor installations shall comply with 110.26(E)(1)(a) through (E)(1)(d).

(a) Dedicated Electrical Space. The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

   Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

   Exception: The height of the dedicated space in existing locations may be reduced under engineering supervision when adequate space is available for the intended electrical installation.

(b) Foreign Systems. The area above the dedicated space required by 110.26(E)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

(c) Sprinkler Protection. Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

(d) Suspended Ceilings. A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.

Statement of Problem and Substantiation for Public Input

There is a problem when installing electrical equipment in existing locations and there is either no need for the space above the equipment or the required 6 feet is not available above the equipment.

The space above electrical equipment in existing locations should not be prevented from being used for piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation where all the space is not needed for the electrical installation and the installation is under engineering supervision. This is especially important when installing electrical equipment in existing facilities. Qualified engineering supervision can determine if there is adequate space for the intended electrical installation, such as the minimum conduit and cable bending radius. Where there is no engineering supervision and it is not an existing location, there would be no reduction in the height of the dedicated space above electrical equipment.

An example of this problem is where a large chemical company upgraded 7 DC drives and motors. The DC equipment and motors were replace with new VFDs and motors. Also 14 new motors and VFDs were added to the process. The new VFD equipment was 25 feet long and 2 feet deep and 8 feet high. The space above the new location had an existing air duct so that so that only about 4 feet of space was open above the VFD. This was adequate space to install a cable tray above the equipment and there was adequate space to make all cable bends as needed. Most of the motor cables were 4/C #12 AWG with largest 3/C #8 AWG w/grounds. The supply to the VFD lineup was a 3/C 500 kcmil w/ground from the side. The duct was also insulated to eliminate possible condensation.

We obtained special permission from the AHJ to do this as allowed in Article 90.4. Had a structural ceiling been where the bottom of the air duct was, there would be no issue and our installation would not have required permission from the AHJ.

From my time on CMP-1 (2002), the dedicated space was to be reserved to prevent it from being used on a first come, first served basis by other crafts. This would not be the case on fully engineered jobs as normally produced under engineering supervision. It is important for all jobs that there be adequate space for the electrical installation. Qualified engineering supervision can insure the space is adequate.

Submitter Information Verification

Submitter Full Name: RALPH PRICHARD
<table>
<thead>
<tr>
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<th>[ Not Specified ]</th>
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<td>Wed Sep 17 11:33:18 EDT 2014</td>
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Public Input No. 495-NFPA 70-2014 [ Section No. 110.26(E)(2) ]

(2) Outdoor installations of switchboards, switchgear, panelboards, and motor control centers shall comply with 110.26(E)(2)(a) and (b) and (c).

(a) Installation Requirements. Outdoor electrical equipment shall comply with the following:

(1) shall be installed in suitable enclosures and

(2) shall be protected from accidental spillage or leakage from piping systems that would harm the enclosures

(3) shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems

(4) shall be protected from accidental contact by vehicular traffic

(b) Working Clearance Space. The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

(c) Dedicated Equipment Space. The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Statement of Problem and Substantiation for Public Input

Restated in a list format and added text to help clarify what is intended to be covered by this section. Clarified that water leaking onto gear located outdoors is not an issue, it is substances that would be caustic to the enclosures from other process piping.

Submitter Information Verification

Submitter Full Name: Christine Porter
Organization: Intertek Testing Services
Affiliation: self
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Apr 09 14:52:10 EDT 2014
Public Input No. 4035-NFPA 70-2014 [ Section No. 110.26(E)(2) ]

(2) Outdoor.
Outdoor installations shall comply with 110.26(E) (2)(a) and (b).

(a) Installation Requirements. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance, architectural accessory, or other equipment shall be located in this zone.

(b) Dedicated Equipment Space. The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Statement of Problem and Substantiation for Public Input

Appurtenance is not a common word most people are familiar with and "the code" does not define this term. To ensure usability and understanding in this section of such importance a more well known synonym should be used to clarify what is meant.

Submitter Information Verification

Submitter Full Name: Lance Cheever
Organization: Wichita Electrical JATC
Affiliation: IBEW Local 271
Street Address:
City:
State:
Zip:
Submittal Date: Wed Nov 05 21:48:37 EST 2014
Public Input No. 3039-NFPA 70-2014 [ Section No. 110.26(E)(2) ]

(2) Outdoor.
Outdoor installations shall comply with 110.26(E) (2)(a) and (b).

(a) Installation Requirements. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

(b) Dedicated Equipment Space. The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Statement of Problem and Substantiation for Public Input

Substantiation: When surface mounting panelboards on the side of a building it is many times impossible to maintain the required dedicated space above or below the panelboard since parts of the building structure (soffits/overhangs, gutters, leaders, etc.) will need to be located within the dedicated space. This deletion will allow the code to recognize that these specific installations will be code compliant even if foreign systems occupy the dedicated equipment space of the equipment installed outdoors.

Submitter Information Verification

Submitter Full Name: robert meier
Organization: NA
Street Address:
City:
State:
Zip:
Submittal Date: Sun Nov 02 08:55:55 EST 2014
(2) Outdoor.
Outdoor installations shall comply with 110.26(E)(2)(a) and (b).

(a) Installation Requirements. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

(b) Dedicated Equipment Space. The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) or roof extensions above the equipment, shall be dedicated to the electrical installation. No piping, building structural parts, or other equipment foreign to the electrical installation shall be located in this zone.

Statement of Problem and Substantiation for Public Input

There is no requirement to completely keep this space clear of building parts or overhangs at outdoor installations. Many outdoor installations cannot comply with the 6 foot rule. What about a residence?

Submitter Information Verification

Submitter Full Name: Joel Rencsok
Organization: [ Not Specified ]
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Tue Sep 09 13:35:37 EDT 2014
Public Input No. 4628-NFPA 70-2014 [ Section No. 110.26(E)(2) ]

(2) Outdoor.
Outdoor installations shall comply with 110.26(E) (2)(a) and (b).

(a) Installation Requirements. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

(b) Dedicated Equipment Space. The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment or to any structural overhang, whichever is lower, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Statement of Problem and Substantiation for Public Input

The text added to (2)(b) for dedicated equipment space is similar to the text for dedicated equipment space located indoors based on 110.26(1)(a) where the structural ceiling may impede the installation of raceways into the top of the electrical equipment. Summarily, a structural overhang may be a necessary structural component of the building and cannot be moved, deleted, or otherwise changed without affecting the integrity of the building.

Submitter Information Verification

Submitter Full Name: David Hittinger
Organization: Independent Electrical Contractors of Greater Cincinnati
Affiliation: Independent Electrical Contractors
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Fri Nov 07 12:19:09 EST 2014
Public Input No. 1514-NFPA 70-2014 [ New Section after 110.26(F) ]

110.26(F)(1) The entrance to all buildings, vaults, rooms, or enclosures containing exposed live parts or exposed conductors operating at 601 to 1000 volts, nominal, shall be kept locked unless such entrances are under the observation of a qualified person at all times.

Permanent and conspicuous danger signs shall be provided. The danger sign shall meet the requirements in 110.21(B) and shall read as follows:

[DANGER — HIGH VOLTAGE — KEEP OUT]

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change adds a new requirement creating a list item to 110.26(F) for "Locked Rooms or Enclosures." This originates from 110.34(C) which is affected by a companion proposal.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Fri Oct 03 11:11:35 EDT 2014
Locked Electrical Equipment Rooms or Enclosures.
Electrical equipment rooms or enclosures housing electrical apparatus, such as generator enclosures, that are controlled by a lock(s) shall be considered accessible to qualified persons.

Statement of Problem and Substantiation for Public Input
In our area of the country some enforcing authorities do not consider a locked generator enclosure as accessible. This would spell it out for those who decide to enforce the Code in this manner.

Submitter Information Verification
Submitter Full Name: JAKE LEAHY
Organization: JLECC
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 14 13:08:44 EDT 2014
Locked Electrical Equipment Rooms or Enclosures.

Electrical equipment rooms or enclosures housing electrical apparatus that are controlled by a lock(s) shall be considered accessible to qualified persons.

Statement of Problem and Substantiation for Public Input

Please see the companion Public Input that relocates this rule to 110.25(B).

Related Public Inputs for This Document

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Submitter Information Verification

Submitter Full Name: Phil Simmons
Organization: Simmons Electrical Services
Street Address:
City: 
State: 
Zip: 
Submittal Date: Mon Nov 03 14:18:39 EST 2014
Public Input No. 69-NFPA 70-2014 [Section No. 110.27(A)]

(A) Live Parts Guarded Against Accidental Contact.

Except as elsewhere required or permitted by this Code, live parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by approved enclosures or by any of the following means:

1. By location in a room, vault, or similar enclosure that is accessible only to qualified persons.

2. By suitable permanent, substantial partitions or screens arranged so that only qualified persons have access to the space within reach of the live parts. Any openings in such partitions or screens shall be sized and located so that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them.

3. By location on a suitable balcony, gallery, or platform elevated and arranged so as to exclude unqualified persons.

4. By elevation above the floor or other working surface as shown in 110.27(A)(4)(a) or (b) below:
   a. A minimum of 2.5 m (8 ft) for 50 to 300 volts
   b. A minimum of 2.6 m (8 1/2 ft) for 301 to 600 volts

Informational Note: A safety check for the presence of voltage prior to working on de-energized equipment does not constitute a likely examination while energized.

Additional Proposed Changes

File Name                Description Approved
70_110-27A_PI69.pdf     input form

Statement of Problem and Substantiation for Public Input

Inspectors in this State have been enforcing this section so that all equipment is assumed energized until verified it is de-energized. The equipment must be “examined” for the presence of voltage, while assuming it is energized, before it can be considered de-energized. While nearly every building owner and electrical company has a policy to not work on equipment while energized, all businesses are being forced to purchase or rent high level PPE. The Inspectors claim there is no point in having a warning if the level of danger is not posted too. In order to know what level of PPE is required building owners are being forced to calculate the potential arc-fault energy available at each panel and post the PPE level required in the blast radius of each panel before a certificate of occupancy will be issued. Every Electrician is required to wear the appropriate level of PPE just to verify a piece of equipment is de-energized. The concern is both the hazard of electricians deciding to save time and working on equipment while energized since they are already required to put on the PPE, and the added cost of requiring a building wide arc-flash hazard study for every building with the added cost of high level PPE when the large majority of businesses forbid working on energized equipment.

An official question submitted to the State’s OSHA board has confirmed this interpretation that all equipment must be considered energized and proper PPE worn until the equipment is verified to be de-energized. Projects inspected by State Building Code Inspectors in recent years have followed this same interpretation. This has been trickling down to local AHJ’s.

This section already states that field marking is required for equipment “likely” to require examination while energized. This section just needs clarification for eager Inspectors that while it is possible a panel may be energized after opening the perceived feeder switch, it is not “likely”.

Submitter Information Verification

Submitter Full Name: William Swanson
Organization: Integrated Architecture
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jan 07 07:44:21 EST 2014
Public Input No. 382-NFPA 70-2014 [ Section No. 110.27(A) ]

(A) Live Parts Guarded Against Accidental Contact.

Except as elsewhere required or permitted by this Code, live parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by approved enclosures or by any of the following means:

(1) By location in a room, vault, or similar enclosure that is accessible only to qualified persons.

(2) By suitable permanent, substantial partitions or screens arranged so that only qualified persons have access to the space within reach of the live parts. Any openings in such partitions or screens shall be sized and located so that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them.

(3) By location on a suitable balcony, gallery, or platform elevated and arranged so as to exclude unqualified persons.

(4) By elevation above the floor or other working surface as shown in 110.27 (A)(4)(a) or (b) below:

   a. A minimum of 2.5 m (8 ft) for 50 to 300 volts between phases
   b. A minimum of 2.6 m (8 1/2 ft) for 301 to 600 volts between phases

Statement of Problem and Substantiation for Public Input

This change will clarify that the voltage threshold is determined "between phases" not "phase to ground" for the guarding of live parts by elevation in 110.27(A)(4) a and b.

Based on the explanation of negative vote by Mr. LaBrake on Proposal 1-158 and the unanimously acceptance by Panel 1 of Comment 1-94 for the 2014 NEC, Table 124-1 of the NESC provides these measurements as “phase to phase” or as voltages “between phases”. The text in this section of the NEC should be changed to match the related text in the NESC to provide direction to the user of the NEC of the critical clearances required for guarding of live parts by elevation.

Submitter Information Verification

Submitter Full Name: David Hittinger
Organization: Independent Electrical Contractors of Greater Cincinnati
Affiliation: Independent Electrical Contractors
Street Address:
City:
State:
Zip:
Submittal Date: Thu Mar 06 10:28:17 EST 2014
Public Input No. 3265-NFPA 70-2014 [Section No. 110.27(A)]

(A). Live Parts Guarded Against Accidental Contact.

Except as elsewhere required or permitted by this Code, live energized parts of electrical equipment operating at or above 50 volts AC or above 100 volts DC shall be guarded against accidental contact by approved enclosures or by any of the following means:

1. By location in a room, vault, or similar enclosure that is accessible only to qualified persons.

2. By suitable permanent, substantial partitions or screens arranged so that only qualified persons have access to the space within reach of the live parts. Any openings in such partitions or screens shall be sized and located so that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them.

3. By insulating covers over exposed conductive parts, removable only by qualified persons having access to the space, such that it is possible to expose only one phase or polarity at a time.

4. By location on a suitable balcony, gallery, or platform elevated and arranged so as to exclude unqualified persons.

5. By elevation above the floor or other working surface as shown in 110.27(A)(4)(a) or (b) below:

   6. A minimum of 2.5 m (8 ft) for 50 to 300 volts

   7. A minimum of 2.6 m (8 1/2 ft) for 301 to 600 volts

Statement of Problem and Substantiation for Public Input

480.9(B) “Live Parts” requires battery installations to comply with 110.27. Batteries are typically installed on open racks in controlled access rooms or in locked cabinets. If uninsulated conductors (e.g., bus bars) are used, the conductors should be covered with removable nonconductive shields. Normal procedure would be to remove covers of only one polarity at a time to prevent accidental short circuit between two polarities.

This public input proposes to add a new means #3 and renumber subsequent means. The new means require:

a) Insulating covers over exposed conductive parts

b) Limited access to the space (e.g., battery room or cabinet interior)

c) Qualified persons only

d) Allows exposure of only one polarity at a time

The following PI’s are associated with setting the safety threshold for direct current at 100 Vdc:

PI # 2630 – 480.6(A)
PI # 2708 - 690.71(B)
PI # 2745 – 690.71(E)
PI # 2747 – 690.71(F)
PI # 2748 - 690.71(G)
PI # 3265 - 110.27(A)
PI # 3270 – 480.9(B)

Submitter Information Verification

Submitter Full Name: Stephen McCluer
Organization: Schneider Electric
Affiliation: IEEE Stationary Battery Committee
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Mon Nov 03 18:47:47 EST 2014
Public Input No. 2861-NFPA 70-2014 [ Section No. 110.27(A) ]

(A) Live Parts Guarded Against Accidental Contact.
Except as elsewhere required or permitted by this Code, live parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by approved enclosures or by any of the following means:

1. By location in a room, vault, or similar enclosure that is accessible only to qualified persons.
2. By suitable permanent, substantial partitions or screens arranged so that only qualified persons have access to the space within reach of the live parts. Any openings in such partitions or screens shall be sized and located so that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them.
3. By location on a suitable balcony, gallery, or platform elevated and arranged so as to exclude unqualified persons.
4. By elevation above the floor or other working surface as shown in 110.27(A)(4)(a) or (b) below:
   5. A minimum of 2.5 m (8 ft) for 50 to 300 volts
   6. A minimum of 2.6 m (8 1/2 ft) for 301 to 600 volts
   7. A minimum of 3m (9ft) for 601 to 1000v.

Statement of Problem and Substantiation for Public Input

We need to increase the overhead service drop to 9ft at 1000v to match other codes like NECS.

Submitter Information Verification

Submitter Full Name: JAMES CAIN
Organization: [ Not Specified ]
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 30 12:28:25 EDT 2014
Public Input No. 2181-NFPA 70-2014 [ Section No. 110.27(A) ]

(A) Live Parts Guarded Against Accidental Contact.
Except as elsewhere required or permitted by this Code, live parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by approved enclosures or by any of the following means:

(1) By location in a room, vault, or similar enclosure that is accessible only to qualified persons.

(2) By suitable permanent, substantial partitions or screens arranged so that only qualified persons have access to the space within reach of the live parts. Any openings in such partitions or screens shall be sized and located so that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them.

(3) By location on a suitable balcony, gallery, or platform elevated and arranged so as to exclude unqualified persons.

(4) By elevation above the floor or other working surface as shown in 110.27 (A)(4)(a) or (b) below:

(5) A minimum of 2.5 m (8 ft) for 50 to 300 volts

(6) A minimum of 2.6 m (8 1/2 ft) for 301 to 600 volts

Statement of Problem and Substantiation for Public Input

"suitable" is an unenforceable terms according to NEC_StyleManual_2011.pdf 3.2.1.

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Oct 18 19:06:20 EDT 2014
Public Input No. 1933-NFPA 70-2014 [Section No. 110.27(A)]

(A) Live Parts Guarded Against Accidental Contact.

Except as elsewhere required or permitted by this Code, live parts of electrical equipment operating at 50 actual volts or more shall be guarded against accidental contact by approved enclosures or by any of the following means:

(1) By location in a room, vault, or similar enclosure that is accessible only to qualified persons.

(2) By suitable permanent, substantial partitions or screens arranged so that only qualified persons have access to the space within reach of the live parts. Any openings in such partitions or screens shall be sized and located so that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them.

(3) By location on a suitable balcony, gallery, or platform elevated and arranged so as to exclude unqualified persons.

(4) By elevation above the floor or other working surface as shown in 110.27(A)(4)(a) or (b) below:

(5) A minimum of 2.5 m (8 ft) for 50 actual volts to 300 actual volts

(6) A minimum of 2.6 m (8 1/2 ft) for 301 actual volts to 600 volts

Statement of Problem and Substantiation for Public Input

This section uses voltages that are "actual" hard limits. Refer to the substantiation for 1902 for more information.

[The insertion as recorded by your tool is larger than intended, it should be "actual volts" after 50, "actual" after 300, "actual volts" after 301. NO actual is intended after 600.]

Related Public Inputs for This Document

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Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Oct 15 16:37:19 EDT 2014
Public Input No. 1516-NFPA 70-2014 [Section No. 110.27(A)]

(A) Live Parts Guarded Against Accidental Contact.
Except as elsewhere required or permitted by this Code, live parts of electrical equipment operating at 50 volts or more or insulated energized parts above 600 volts nominal to ground to 1000 volts shall be guarded against accidental contact by approved enclosures or by any of the following means:

1. By location in a room, vault, or similar enclosure that is accessible only to qualified persons.

2. By suitable permanent, substantial partitions or screens arranged so that only qualified persons have access to the space within reach of the live parts. Any openings in such partitions or screens shall be sized and located so that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them.

3. By location on a suitable balcony, gallery, or platform elevated and arranged so as to exclude unqualified persons.

4. By elevation above the floor or other working surface as shown in 110.27(A)(4)(a) or (b) below:

5. A minimum of 2.5 m (8 ft) for 50 to 300 volts

6. A minimum of 2.6 m (8 ft 6 in) for 301 to 600 volts

\[
\text{A minimum of } 2.62 \text{ m (8 ft 7 in) for 601 to 1000 volts.}
\]

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change adds to the text of 110.27(A) covering insulated live parts at 600 to 1000 volts based on a voltage adder of 10 mm (0.4 in) per kV. This provides for the 601-1000V elevation guard requirement based on background material in Comment 1-94 of the 2014 NEC. This is to correlate with companion change to 110.33(A)(2).

Submitter Information Verification

Submitter Full Name: Neil LaBrake  
Organization: National Grid  
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Fri Oct 03 11:16:33 EDT 2014
Warning Signs.

Entrances to rooms and other guarded locations that contain exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter. The marking shall meet the requirements in 110.21(B).

Informational Note: For motors, see 430.232 and 430.233. For over 1000 volts, see 110.34.

Statement of Problem and Substantiation for Public Input

1000v motors are readily available from US Motors, World Motors, Baldor and alike.

Submitter Information Verification

Submitter Full Name: JAMES CAIN
Organization: [ Not Specified ]
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 30 12:35:48 EDT 2014
(C) Warning Signs.

Entrances to rooms and other guarded locations that contain exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter. The marking shall meet the requirements in 110.21(B).

Informational Note: For motors, see 430.232 and 430.233. For over 600 volts, see 110.34.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises "600 volts" to "1000 volts" to correlate with companion proposal on 110.27(A).

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 14:45:32 EDT 2014
110.28  Enclosure Types.
Enclosures (other than surrounding fences or walls) of switchboards, switchgear, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 1000 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

Table 110.28 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the conduit or unsealed openings.

Table 110.28 Enclosure Selection

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</tr>
<tr>
<td>Incidental contact with the enclosed equipment</td>
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<td>1  2  4X  5  6  6P  12  12K  13</td>
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<td>Windblown dust</td>
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*Mechanism shall be operable when ice covered.

Informational Note No. 1: The term "raintight" is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, and 6P. The term "rainproof" is typically used in conjunction with Enclosure Types 3R, and 3RX. The term "watertight" is typically used in conjunction with Enclosure Types 4, 4X, 6, 6P. The term "driptight" is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, and 13. The term "dusttight" is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 5, 12, 12K, and 13.

Informational Note No. 2: Ingress protection (IP) ratings may be found in ANSI/NEMA 60529, Degrees of Protection Provided by Enclosures. IP ratings are not a substitute for Enclosure Type ratings.
1000v rated cabinets and insulating boards are available now and this will be consistent with the rest of the code

### Submitter Information Verification

- **Submitter Full Name:** JAMES CAIN
- **Organization:** [Not Specified]
- **Affiliation:** self
- **Street Address:**
- **City:**
- **State:**
- **Zip:**
- **Submittal Date:** Thu Oct 30 12:39:14 EDT 2014
Enclosure Types.

Enclosures (other than surrounding fences or walls) of switchboards, switchgear, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 600 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

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Informational Note No. 1: The term raintight is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, and 6P. The term rainproof is typically used in conjunction with Enclosure Types 3R, and 3RX. The term watertight is typically used in conjunction with Enclosure Types 4, 4X, 6, and 6P. The term driptight is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, and 13. The term dusttight is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 5, 12, 12K, and 13.

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If a 3R enclosure is in a wet location, the entire interior of the enclosure shall be considered a bone dry location.
Statement of Problem and Substantiation for Public Input

VERSION3:

There are periodic discussions about whether or not the interior of a 3R enclosure (in a wet location) is to be considered damp or wet. This almost always stems from the question of the suitability of NM cable connections to 3R. It is appropriate for the NEC to resolve this question. The new text perhaps should also refer to one or more of "3", "3S", "3X", "3RX", and "3SX".

3R enclosures are not designed to exclude water under the UL50 testing regime. They are designed to prevent water from contacting the device(s), if any, installed in them and to prevent water from rising in the enclosure high enough to cover connections to devices. From numerous anecdotal instances from the field, there has "never" been a problem using conductors not rated for wet or damp locations. Thus the interior of a 3R enclosure should be considered bone dry.

Related Public Inputs for This Document

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Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:

Submittal Date: Sat Oct 18 19:19:06 EDT 2014
Enclosure Types.

Enclosures (other than surrounding fences or walls) of switchboards, switchgear, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 600 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

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If a 3R enclosure is in a wet location, the entire interior of the enclosure shall be considered a damp location.
Statement of Problem and Substantiation for Public Input

VERSION 2:

There are periodic discussions about whether or not the interior of a 3R enclosure (in a wet location) is to be considered damp or wet. This almost always stems from the question of the suitability of NM cable connections to 3R. It is appropriate for the NEC to resolve this question. The new text perhaps should also refer to one or more of "3", "3S", "3X", "3RX", and "3SX".

3R enclosures are not designed to exclude water under the UL50 testing regime. They are designed to prevent water from contacting the device(s), if any, installed in them and to prevent water from rising in the enclosure high enough to cover connections to devices. In this case the high-water mark is, as I understand it, a line below any devices or connections to devices installed in the enclosure and a line below the bottom of any penetration of the enclosure for conductors. Thus any conductor would not be exposed directly to water unless it contacted the interior wall or base of the enclosure. I understand that water is allowed to "sheet" down the interior walls under the UL50 testing regime. Thus the location is not a wet location, but an enclosure containing water is surely a damp location.

Related Public Inputs for This Document

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Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS  
Organization: none  
Affiliation: Retired Master Electrician  
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Sat Oct 18 19:16:21 EDT 2014
Public Input No. 2182-NFPA 70-2014 [ Section No. 110.28 ]

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If a 3R enclosure is in a wet location, the entire interior of the enclosure shall be considered a damp location and any interior space below the top of knockouts or field-made holes for conductors shall be considered a wet location.
Statement of Problem and Substantiation for Public Input

VERSION 1:

There are periodic discussions about whether or not the interior of a 3R enclosure (in a wet location) is to be considered damp or wet. This almost always stems from the question of the suitability of NM cable connections to 3R. It is appropriate for the NEC to resolve this question. The new text perhaps should also refer to one or more of "3", "3S", "3X", "3RX", and "3SX".

3R enclosures are not designed to exclude water under the UL50 testing regime. They are designed to prevent water from contacting the device(s), if any, installed in them and to prevent water from rising in the enclosure high enough to cover connections to devices. The high-water mark is, as I understand it, a line below any devices or connections to devices installed in the enclosure and a line above top of any penetration of the enclosure for conductors.

Thus I believe any cable or conductor entering the enclosure (other than ones entering through a "3R-rated" hub fitting) to be exposed to water. In addition, because metallic enclosures mounted in wet locations must be spaced a minimum of 6 mm. (¼ in.) between the exterior back of the enclosure and the surface it is mounted on, that cable sheaths are exposed to the wet location when coming from a surface which is the boundary for a dry location. Even if the cable is enclosed in a raceway, the interior of the raceway is considered wet in this instance.

I further believe that any conductor or cable exposed to water must be rated for wet locations.

Related Public Inputs for This Document

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<thead>
<tr>
<th>Related Input</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Input No. 2183-NFPA 70-2014 [Section No. 110.28]</td>
<td>alternatives</td>
</tr>
<tr>
<td>Public Input No. 2184-NFPA 70-2014 [Section No. 110.28]</td>
<td>alternatives</td>
</tr>
</tbody>
</table>

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Oct 18 19:11:32 EDT 2014
110.28 Enclosure Types.

Enclosures (other than surrounding fences or walls) of switchboards, switchgear, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 600 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

Table 110.28 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the conduit or unsealed openings.

Table 110.28 Enclosure Selection

<table>
<thead>
<tr>
<th>For Outdoor Use</th>
<th>Enclosure Type Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides a Degree of Protection Against the Following Environmental Conditions</td>
<td>3</td>
</tr>
<tr>
<td>Incidental contact with the enclosed equipment</td>
<td>X</td>
</tr>
<tr>
<td>Rain, snow, and sleet</td>
<td>X</td>
</tr>
<tr>
<td>Sleet*</td>
<td>—</td>
</tr>
<tr>
<td>Windblown dust</td>
<td>X</td>
</tr>
<tr>
<td>Hosedown</td>
<td>—</td>
</tr>
<tr>
<td>Corrosive agents</td>
<td>—</td>
</tr>
<tr>
<td>Temporary submersion</td>
<td>—</td>
</tr>
<tr>
<td>Prolonged submersion</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>For Indoor Use</th>
<th>Enclosure Type Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides a Degree of Protection Against the Following Environmental Conditions</td>
<td>1</td>
</tr>
<tr>
<td>Incidental contact with the enclosed equipment</td>
<td>X</td>
</tr>
<tr>
<td>Falling dirt</td>
<td>X</td>
</tr>
<tr>
<td>Falling liquids and light splashing</td>
<td>—</td>
</tr>
<tr>
<td>Circulating dust, lint, fibers, and flyings</td>
<td>—</td>
</tr>
<tr>
<td>Settling airborne dust, lint, fibers, and flyings</td>
<td>—</td>
</tr>
<tr>
<td>Hosedown and splashing water</td>
<td>—</td>
</tr>
<tr>
<td>Oil and coolant seepage</td>
<td>—</td>
</tr>
<tr>
<td>Oil or coolant spraying and splashing</td>
<td>—</td>
</tr>
<tr>
<td>Corrosive agents</td>
<td>—</td>
</tr>
<tr>
<td>Temporary submersion</td>
<td>—</td>
</tr>
<tr>
<td>Prolonged submersion</td>
<td>—</td>
</tr>
</tbody>
</table>

*Mechanism shall be operable when ice covered.

Informational Note No. 1: The term "raintight" is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, and 6P. The term "rainproof" is typically used in conjunction with Enclosure Types 3R, and 3RX. The term "watertight" is typically used in conjunction with Enclosure Types 4, 4X, 6, 6P. The term "driptight" is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, and 13. The term "dusttight" is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 5, 12, 12K, and 13.

Informational Note No. 2: Ingress protection (IP) ratings may be found in ANSI/NEMA 60529, Degrees of Protection Provided by Enclosures. IP ratings are not a substitute for Enclosure Type ratings. The term "dust-protected" IP5X, is roughly equivalent to the term "dusttight" referred to in Informational Note 1.
Highlight that the term "dust-protected" IP5X from ANSI/IEC 60529 is roughly equivalent to the term "dusttight" used here. It should also be noted that the term "dust-tight" (note the hyphen) is loosely equivalent to the term "dust-ignitionproof", NOT the term "dusttight" (note the lack of hyphen).

Submitter Information Verification

Submitter Full Name: ELIANA BRAZDA
Organization: ISA
Street Address:
City:
State:
Zip:
Submittal Date: Mon Oct 06 15:31:52 EDT 2014
**Public Input No. 1517-NFPA 70-2014 [ Section No. 110.28 ]**

110.28 Enclosure Types.

Enclosures (other than surrounding fences or walls covered in 110.31) of switchboards, switchgear, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 600-1000 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

Table 110.28 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the conduit or unsealed openings.

Table 110.28 Enclosure Selection

<table>
<thead>
<tr>
<th>Provides a Degree of Protection Against the Following Environmental Conditions</th>
<th>For Outdoor Use</th>
<th>For Indoor Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure Type Number</td>
<td>3</td>
<td>3R</td>
</tr>
<tr>
<td>Incidental contact with the enclosed equipment</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rain, snow, and sleet</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sleet*</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Windblown dust</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Hosedown</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Corrosive agents</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Temporary submersion</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Prolonged submersion</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*Mechanism shall be operable when ice covered.

Informational Note No. 1: The term *raintight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, and 6P. The term *rainproof* is typically used in conjunction with Enclosure Types 3R, and 3RX. The term *watertight* is typically used in conjunction with Enclosure Types 4, 4X, 6, 6P. The term *driptight* is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, and 13. The term *dusttight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 5, 12, 12K, and 13.

Informational Note No. 2: Ingress protection (IP) ratings may be found in ANSI/NEMA 60529, *Degrees of Protection Provided by Enclosures*. IP ratings are not a substitute for Enclosure Type ratings.

**Statement of Problem and Substantiation for Public Input**

Panel 1 FD Agenda Page 321
This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises "600 volts" to "1000 volts" and adds "covered in 110.31" after "other than surrounding fences or walls" within the parentheses. Enclosures for specific equipment having this voltage threshold are covered in other articles and product standards such as bus clearances inside enclosures.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 11:29:05 EDT 2014
**110.28 Enclosure Types.**

Enclosures (other than surrounding fences or walls) of switchboards, switchgear, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 600 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

Table 110.28 shall be used for selecting these enclosures for use in specific locations, other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the conduit or unsealed openings.

<table>
<thead>
<tr>
<th>Enclosure Type Number</th>
<th>For Outdoor Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Provides a Degree of Protection Against the Following Environmental Conditions</td>
</tr>
<tr>
<td>3</td>
<td>Incidental contact with the enclosed equipment: X</td>
</tr>
<tr>
<td>3R</td>
<td>Rain, snow, and sleet: X</td>
</tr>
<tr>
<td>3S</td>
<td>Sleet*: —</td>
</tr>
<tr>
<td>3X</td>
<td>Windblown dust: X</td>
</tr>
<tr>
<td>3RX</td>
<td>Hosedown: —</td>
</tr>
<tr>
<td>3SX</td>
<td>Corrosive agents: —</td>
</tr>
<tr>
<td>4</td>
<td>Temporary submersion: —</td>
</tr>
<tr>
<td>4X</td>
<td>Prolonged submersion: —</td>
</tr>
<tr>
<td>6</td>
<td>For Indoor Use</td>
</tr>
<tr>
<td>6P</td>
<td>Provides a Degree of Protection Against the Following Environmental Conditions</td>
</tr>
<tr>
<td>1</td>
<td>Incidental contact with the enclosed equipment: X</td>
</tr>
<tr>
<td>2</td>
<td>Falling dirt: X</td>
</tr>
<tr>
<td>4</td>
<td>Falling liquids and light splashing: X</td>
</tr>
<tr>
<td>4X</td>
<td>Circulating dust, lint, fibers, and flyings: —</td>
</tr>
<tr>
<td>5</td>
<td>Settling airborne dust, lint, fibers, and flyings: X</td>
</tr>
<tr>
<td>6</td>
<td>Hosedown and splashing water: —</td>
</tr>
<tr>
<td>6P</td>
<td>Oil and coolant seepage: —</td>
</tr>
<tr>
<td>12</td>
<td>Oil or coolant spraying and splashing: —</td>
</tr>
<tr>
<td>12K</td>
<td>Corrosive agents: —</td>
</tr>
<tr>
<td>13</td>
<td>Temporary submersion: —</td>
</tr>
<tr>
<td></td>
<td>Prolonged submersion: —</td>
</tr>
</tbody>
</table>

*Mechanism shall be operable when ice covered.

Informational Note No. 1: The term raintight is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, and 6P. The term rainproof is typically used in conjunction with Enclosure Types 3R, and 3RX. The term watertight is typically used in conjunction with Enclosure Types 4, 4X, 6, 6P. The term driptight is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, and 13. The term dusttight is typically used in conjunction with Enclosure Types 3, 3S, 3X, 4, 4X, 5, 6, 6P, 12, 12K, and 13.

Informational Note No. 2: Ingress protection (IP) ratings may be found in ANSI/NEMA 60529, Degrees of Protection Provided by Enclosures. IP ratings are not a substitute for Enclosure Type ratings.

**Statement of Problem and Substantiation for Public Input**
Confusion exists because these Enclosure Types are identified in 110.28 and Table 110.28 as not suitable for hazardous (classified) locations. The proposal clarifies those Enclosure Types that are suitable for dusttight applications according to ANSI/ISA 12.12.01, Nonincendive Electrical Equipment for use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations. Enclosure Types 4, 4X, 6 and 6P were added in accordance with ANSI/ISA 12.12.01; these Enclosure Types are not presently included as suitable for dusttight applications in 110.28, which adds to the confusion.

Submitter Information Verification

Submitter Full Name: VINCE BACLAWSKI
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Fri Sep 19 11:52:40 EDT 2014
Part III. Over 600-1000 Volts, Nominal

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises Part III title to "Over 1000 Volts, Nominal". This is to correlate with companion proposed changes to sections contained within this part.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 14:15:45 EDT 2014
Statement of Problem and Substantiation for Public Input

To be consistent, this needs to be for over 1000v systems.

Submitter Information Verification

Submitter Full Name: JAMES CAIN
Organization: [ Not Specified ]
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 30 12:32:26 EDT 2014
Public Input No. 1519-NFPA 70-2014 [ Section No. 110.30 ]

110.30 General.
Conductors and equipment used on circuits over 600-1000 volts, nominal, shall comply with Part I of this article and with 110.30 through 110.40, which supplement or modify Part I. In no case shall the provisions of this part apply to equipment on the supply side of the service point.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises 600 Volts to 1000 volts to correlate with companion proposals on Article 110 Parts II and III.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 11:38:41 EDT 2014
Electrical installations in a vault, room, or closet or in an area surrounded by a wall, screen, or fence, access to which is controlled by a lock(s) or other approved means, shall be considered to be accessible to qualified persons only. The type of enclosure used in a given case shall be designed and constructed according to the nature and degree of the hazard(s) associated with the installation.

For installations other than equipment as described in 110.31(D), a wall, screen, or fence shall be used to enclose an outdoor electrical installation to deter access by persons who are not qualified. A fence shall not be less than 2.1 m (7 ft) in height or a combination of 1.8 m (6 ft) or more of fence fabric and a 300 mm (1 ft) or more extension utilizing three or more strands of barbed wire or equivalent. The distance from the fence to live parts shall be not less than given in Table 110.31.

Table 110.31 Minimum Distance from Fence to Live Parts

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>m</th>
<th>ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>601 – 13,799</td>
<td>3.05</td>
<td>10</td>
</tr>
<tr>
<td>13,800– 230,000</td>
<td>4.57</td>
<td>15</td>
</tr>
<tr>
<td>Over 230,000</td>
<td>5.49</td>
<td>18</td>
</tr>
</tbody>
</table>

Note: For clearances of conductors for specific system voltages and typical BIL ratings, see ANSI C2-2007, National Electrical Safety Code.

Informational Note: See Article 450 for construction requirements for transformer vaults.

Statement of Problem and Substantiation for Public Input

601 needs to be increased to 1001 to be consistent and allow 1000v to stay within the lower voltage sections.

Submitter Information Verification

Submitter Full Name: JAMES CAIN
Organization: [ Not Specified ]
Affiliation: self
Street Address: [Not Specified]
City: [Not Specified]
State: [Not Specified]
Zip: [Not Specified]
Submittal Date: Thu Oct 30 12:44:06 EDT 2014
Public Input No. 1557-NFPA 70-2014 [Section No. 110.31 [Excluding any Sub-Sections]]

Electrical installations in a vault, room, or closet or in an area surrounded by a wall, screen, or fence, access to which is controlled by a lock(s) or other approved means, shall be considered to be accessible to qualified persons only. The type of enclosure used in a given case shall be designed and constructed according to the nature and degree of the hazard(s) associated with the installation.

For installations other than equipment as described in 110.31(D), a wall, screen, or fence shall be used to enclose an outdoor electrical installation to deter access by persons who are not qualified. A fence shall not be less than 2.1 m (7 ft) in height or a combination of 1.8 m (6 ft) more of fence fabric and a 300 mm (1 ft) or more extension utilizing three or more strands of barbed wire or equivalent. The distance from the fence to live parts shall be not less than given in Table 110.31.

Table 110.31 Minimum Distance from Fence to Live Parts

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>Minimum Distance to Live Parts</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>601. 1001 – 13,799</td>
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<td>10</td>
<td></td>
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<tr>
<td>Over 230,000</td>
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<td>18</td>
<td></td>
</tr>
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</table>

Note: For clearances of conductors for specific system voltages and typical BIL ratings, see ANSI C2-2007, National Electrical Safety Code.

Informational Note: See Article 450 for construction requirements for transformer vaults.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guirry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises Table 110.31’s first row for "1001-13,799 volts" to correlate with companion proposals on new 110.26(A)(4) and 110.26(F)(1).

Will eliminate specific requirements for fence, vaults or other enclosures for equipment rated up to 1000 V - Permit between 600V and 1KV to become 4ft of working space versus the current 10ft. There are similar concerns for up to 2.4 kV. There are a number of Sections in Part III of Article 110 (Over 600 volts, Nominal) that have no corresponding requirement for similar installations under 600 volts. Similar electrical safety codes extend the 10 ft requirement in Table 110.31 down to 151 Volts. Additionally, in other codes the need for the construction requirements in fenced enclosure construction required by 110.31 is required for any enclosure, not just those housing installations over 600 volts.

Changed reference in Note to "ANSI C2-2012" for current version of the National Electrical Safety Code.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 14:21:42 EDT 2014
Electrical installations in a vault, room, or closet or in an area surrounded by a wall, screen, or fence, access to which is controlled by a lock(s) or other approved means, shall be considered to be accessible to qualified persons only. The type of enclosure used in a given case shall be designed and constructed according to the nature and degree of the hazard(s) associated with the installation.

For installations other than equipment as described in 110.31(D), a wall, screen, or fence shall be used to enclose an outdoor electrical installation to deter access by persons who are not qualified. A fence shall not be less than 2.1 m (7 ft) in height or a combination of 1.8 m (6 ft) or more of fence fabric and a 300 mm (1 ft) or more extension utilizing three or more strands of barbed wire or equivalent. Fencing fabric must be minimum 9-gage wire mesh and mesh openings must be not be greater than 2-inches (51 mm) per side. The fencing fabric must be extended to within 2 inches (51 mm) of firm ground. The distance from the fence to live parts shall be not less than given in Table 110.31.

Table 110.31 Minimum Distance from Fence to Live Parts

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>Minimum Distance to Live Parts</th>
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<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Note: For clearances of conductors for specific system voltages and typical BIL ratings, see ANSI C2-2007, National Electrical Safety Code.

Informational Note: See Article 450 for construction requirements for transformer vaults.

Statement of Problem and Substantiation for Public Input

Many installations are utilizing fence that can be climbed or easily penetrated by poles or rods.

Submitter Information Verification

Submitter Full Name: ALLAN ST.PETER
Organization: Vermont Department of Public Service
Street Address:
City:
State:
Zip:
Submittal Date: Fri Sep 05 08:08:44 EDT 2014
Public Input No. 1521-NFPA 70-2014 [Section No. 110.31(A) [Excluding any Sub-Sections]]

Where an electrical vault is required or specified for conductors and equipment operating at over 600 volts, nominal, the following shall apply.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change deletes "operating at over 600 volts, nominal", since the requirement is for operating conditions for electrical equipment contained in vaults. This action will correlate with similar requirements in Part V for Manholes and Other Electrical Enclosures.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 11:52:23 EDT 2014
Public Input No. 1728-NFPA 70-2014 [ Section No. 110.31(A)(5) ]

(5) Transformers.
Where a transformer is installed in a vault as required by Article 450, the vault shall be constructed in accordance with the requirements of Part III of Article 450.


Informational Note No. 2: A typical 3-hour construction is 150 mm (6 in.) thick reinforced concrete.

Statement of Problem and Substantiation for Public Input

standard date update

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler
Organization: GBH International
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Oct 08 19:22:18 EDT 2014
In Places Accessible to Unqualified Persons.

Indoor electrical installations that are accessible to unqualified persons shall be made with metal-enclosed equipment. Switchgear, substation, transformers, pull boxes, connection boxes, and other similar associated equipment shall be marked with appropriate caution signs. Openings in ventilated dry-type transformers or similar openings in other equipment shall be designed so that foreign objects inserted through these openings are deflected from energized parts.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change is a companion proposal to the revision of the definition of Substation in Art. 100. The term "unit substation" doesn't clarify what a substation is and the term "unit" should be removed.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 11:50:51 EDT 2014
Public Input No. 3993-NFPA 70-2014 [Section No. 110.31(D)]

(D) Enclosed Equipment Accessible to Unqualified Persons.

Ventilating or similar openings in equipment shall be designed such that foreign objects inserted through these openings are deflected from energized parts. Where exposed to physical damage from vehicular traffic, suitable guards shall be provided. Nonmetallic or metal-enclosed equipment located outdoors and accessible to the general public shall be designed such that exposed nuts or bolts cannot be readily removed, permitting access to live parts. Where nonmetallic or metal-enclosed equipment is accessible to the general public and the bottom of the enclosure is less than 2.5 m (8 ft) above the floor or grade level, the enclosure door or hinged cover shall be kept locked. Doors and covers of enclosures used solely as pull boxes, splice boxes, or junction boxes shall be locked, bolted, or screwed on. Underground box covers that weigh over 45.4 kg (100 lb) shall be considered as meeting this requirement.

Statement of Problem and Substantiation for Public Input

The requirement of 110.31(D) applies to unqualified persons. However, the present text refers to “the general public.” The general public may not have access to the equipment addressed by 110.31 and is not the appropriate focus of this requirement. The requirement should address access by unqualified persons.

Submitter Information Verification

Submitter Full Name: Joseph Bablo
Organization: UL LLC
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Nov 05 18:16:29 EST 2014
Public Input No. 2186-NFPA 70-2014 [Section No. 110.31(D)]

(D) Enclosed Equipment Accessible to Unqualified Persons.

Ventilating or similar openings in equipment shall be designed such that foreign objects inserted through these openings are deflected from energized parts. Where exposed to physical damage from vehicular traffic, suitable guards shall be provided. Nonmetallic or metal-enclosed equipment located outdoors and accessible to the general public shall be designed such that exposed nuts or bolts cannot be readily removed, permitting access to live parts. Where nonmetallic or metal-enclosed equipment is accessible to the general public and the bottom of the enclosure is less than 2.5 m (8 ft) above the floor or grade level, the enclosure door or hinged cover shall be kept locked. Doors and covers of enclosures used solely as pull boxes, splice boxes, or junction boxes shall be locked, bolted, or screwed on. Underground box covers that weigh over 45.4 kg (100 lb) shall be considered as meeting this requirement.

Statement of Problem and Substantiation for Public Input

"nonmetallic or metal-enclosed" is meaningless as it means everything.

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Oct 18 19:28:35 EDT 2014
Public Input No. 2185-NFPA 70-2014 [Section No. 110.31(D)]

(D) Enclosed Equipment Accessible to Unqualified Persons.

Ventilating or similar openings in equipment shall be designed such that foreign objects inserted through these openings are deflected from energized parts. Where exposed to physical damage from vehicular traffic, suitable guards shall be provided. Nonmetallic or metal-enclosed equipment located outdoors and accessible to the general public shall be designed such that exposed nuts or bolts cannot be readily removed, permitting access to live parts. Where nonmetallic or metal-enclosed equipment is accessible to the general public and the bottom of the enclosure is less than 2.5 m (8 ft) above the floor or grade level, the enclosure door or hinged cover shall be kept locked. Doors and covers of enclosures used solely as pull boxes, splice boxes, or junction boxes shall be locked, bolted, or screwed on. Underground box covers that weigh over 45.4 kg (100 lb) shall be considered as meeting this requirement.

Statement of Problem and Substantiation for Public Input

"considered" is an unenforceable term according to NEC_StyleManual_2011.pdf 3.2.1. "shall be considered as meeting" can be more directed expressed as "meet".

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Oct 18 19:25:15 EDT 2014
(2) Guarding.
Where bare energized parts at any voltage or insulated energized parts above 101 volts or 600 volts, nominal, to ground are located adjacent to such entrance, they shall be suitably guarded.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change deletes "operating at over 600 volts, nominal", since the requirement is for operating conditions for electrical equipment contained in vaults. This action will correlate with similar requirements in Part V for Manholes and Other Electrical Enclosures.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Fri Oct 03 11:54:59 EDT 2014
110.34 Work Space and Guarding.

(A) Working Space.

Except as elsewhere required or permitted in this Code, equipment likely to require examination, adjustment, servicing, or maintenance while energized shall have clear working space in the direction of access to live parts of the electrical equipment and shall be not less than specified in Table 110.34(A). Distances shall be measured from the live parts, if such are exposed, or from the enclosure front or opening if such are enclosed.

Exception: Working space shall not be required in back of equipment such as switchgear or control assemblies where there are no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum working space of 762 mm (30 in.) horizontally shall be provided.

Table 110.34(A) Minimum Depth of Clear Working Space at Electrical Equipment

<table>
<thead>
<tr>
<th>Nominal Voltage to Ground</th>
<th>Condition 1</th>
<th>Condition 2</th>
<th>Condition 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001 – 601–2500 V</td>
<td>900 mm (3 ft 6&quot;)</td>
<td>1.2 m (4 ft)</td>
<td>1.5 m (5 ft)</td>
</tr>
<tr>
<td>2501–9000 V</td>
<td>1.2 m (4 ft)</td>
<td>1.5 m (5 ft)</td>
<td>1.8 m (6 ft)</td>
</tr>
<tr>
<td>9001–25,000 V</td>
<td>1.5 m (5 ft)</td>
<td>1.8 m (6 ft)</td>
<td>2.8 m (9 ft)</td>
</tr>
<tr>
<td>25,001 V–75 kV</td>
<td>1.8 m (6 ft)</td>
<td>2.5 m (8 ft)</td>
<td>3.0 m (10 ft)</td>
</tr>
<tr>
<td>Above 75 kV</td>
<td>2.5 m (8 ft)</td>
<td>3.0 m (10 ft)</td>
<td>3.7 m (12 ft)</td>
</tr>
</tbody>
</table>

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

(B) Separation from Low-Voltage Equipment.

Where switches, cutouts, or other equipment operating at 1000 . 600 volts, nominal, or less are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating at over 600 volts, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the low-voltage equipment by a suitable partition, fence, or screen.

Exception: Switches or other equipment operating at 1000 . 600 volts, nominal, or less and serving only equipment within the high-voltage vault, room, or enclosure shall be permitted to be installed in the high-voltage vault, room, or enclosure without a partition, fence, or screen if accessible to qualified persons only.

(C) Locked Rooms or Enclosures.

The entrance to all buildings, vaults, rooms, or enclosures containing exposed live parts or exposed conductors operating at over 1000 . 600 volts, nominal, shall be kept locked unless such entrances are under the observation of a qualified person at all times.

Permanent and conspicuous danger signs shall be provided. The danger sign shall meet the requirements in 110.21(B) and shall read as follows:

DANGER — HIGH VOLTAGE — KEEP OUT

(D) Illumination.

Illumination shall be provided for all working spaces about electrical equipment. The lighting outlets shall be arranged so that persons changing lamps or making repairs on the lighting system are not endangered by live parts or other equipment.

The points of control shall be located so that persons are not likely to come in contact with any live part or moving part of the equipment while turning on the lights.

(E) Elevation of Unguarded Live Parts.
Unguarded live parts above working space shall be maintained at elevations not less than required by Table 110.34(E).

Table 110.34(E) Elevation of Unguarded Live Parts Above Working Space

<table>
<thead>
<tr>
<th>Nominal Voltage Between Phases</th>
<th>Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>601–7500 V</td>
<td>2.8 m</td>
</tr>
<tr>
<td>7501–35,000 V</td>
<td>2.9 m</td>
</tr>
<tr>
<td>Over 35 kV</td>
<td>2.9 m + 9.5 mm/kV</td>
</tr>
</tbody>
</table>

Protection of Service Equipment, Switchgear, and Industrial Control Assemblies.
Pipes or ducts foreign to the electrical installation and requiring periodic maintenance or whose malfunction would endanger the operation of the electrical system shall not be located in the vicinity of the service equipment, switchgear, or industrial control assemblies. Protection shall be provided where necessary to avoid damage from condensation leaks and breaks in such foreign systems. Piping and other facilities shall not be considered foreign if provided for fire protection of the electrical installation.

Statement of Problem and Substantiation for Public Input

The operating space and height clearance needs to be increased from 600 or 601 to 1000 and 10001 to match other codes and standards like NECs and ANSI C84.1

Submitter Information Verification

Submitter Full Name: JAMES CAIN
Organization: [ Not Specified ]
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 30 12:49:35 EDT 2014
Public Input No. 1558-NFPA 70-2014 [Section No. 110.34(A)]

(A) Working Space.

Except as elsewhere required or permitted in this Code, equipment likely to require examination, adjustment, servicing, or maintenance while energized shall have clear working space in the direction of access to live parts of the electrical equipment and shall be not less than specified in Table 110.34(A). Distances shall be measured from the live parts, if such are exposed, or from the enclosure front or opening if such are enclosed.

Exception: Working space shall not be required in back of equipment such as switchgear or control assemblies where there are no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum working space of 762 mm (30 in.) horizontally shall be provided.

Table 110.34(A) Minimum Depth of Clear Working Space at Electrical Equipment

<table>
<thead>
<tr>
<th>Nominal Voltage to Ground</th>
<th>Minimum Clear Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>601–2500 V</td>
<td>900 mm (3 ft)</td>
</tr>
<tr>
<td>2501–9000 V</td>
<td>1.2 m (4 ft)</td>
</tr>
<tr>
<td>9001–25,000 V</td>
<td>1.5 m (5 ft)</td>
</tr>
<tr>
<td>25,001 V–75 kV</td>
<td>1.8 m (6 ft)</td>
</tr>
<tr>
<td>Above 75 kV</td>
<td>2.5 m (8 ft)</td>
</tr>
</tbody>
</table>

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises Table 110.34(A)'s first row to "1001-2500 V" as a companion to the change in Table 110.26(A)(1) to add another row for 601–1000V from same requirements and aligning Code structure. The present requirements in Table 110.34(A) for 1000 volts (as taken from the row for 601 – 2500 V) are 3, 4 and 5 feet for Conditions 1, 2 and 3 respectively. The Code Panel will need to determine if the conditions and tools for working on equipment rated 1000 volts is similar enough to that for 600 volts so that the present requirements for 600 volt working spaces could also apply to 1000 volts.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:

Panel 1 FD Agenda Page 340
Public Input No. 1523-NFPA 70-2014 [ Section No. 110.34(B) ]

(B) Separation from Low-Voltage Equipment.

Where switches, cutouts, or other equipment operating at 600 volts, nominal, or less are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating at over 600-1000 volts, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the low-voltage equipment by a suitable partition, fence, or screen.

Exception: Switches or other equipment operating at 600-1000 volts, nominal, or less and serving only equipment within the high-voltage vault, room, or enclosure shall be permitted to be installed in the high-voltage vault, room, or enclosure without a partition, fence, or screen if accessible to qualified persons only.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises "600 volts" to "1000 volts" to correlate with companion proposals to 110.31. The requirement is for operating voltage consideration for separation of lower voltage systems from those that are higher. Other Articles in Chapt. 5 and above can modify this requirement where specific conditions warrant; e.g. PV and wind systems in Articles 690 and 694.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 12:00:00 EDT 2014
Public Input No. 1524-NFPA 70-2014 [Section No. 110.34(C)]

(C) Locked Rooms or Enclosures.

The entrance to all buildings, vaults, rooms, or enclosures containing exposed live parts or exposed conductors operating at over 600-1000 volts, nominal, shall be kept locked unless such entrances are under the observation of a qualified person at all times.

Permanent and conspicuous danger signs shall be provided. The danger sign shall meet the requirements in 110.21(B) and shall read as follows:

DANGER — HIGH VOLTAGE — KEEP OUT

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises "600 volts" to "1000 volts" to correlate with companion proposal to 110.26(F)(1) NEW.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 12:02:20 EDT 2014
Public Input No. 301-NFPA 70-2014 [Section No. 110.34(D)]

<table>
<thead>
<tr>
<th>(D)</th>
<th>Illumination.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Illumination shall be provided for all working spaces about electrical equipment (and and shall not be controlled by automatic means only). The lighting outlets shall be arranged so that persons changing lamps or making repairs on the lighting system are not endangered by live parts or other equipment.</td>
</tr>
<tr>
<td></td>
<td>The points of control shall be located so that persons are not likely to come in contact with any live part or moving part of the equipment while turning on the lights.</td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Input

This wording will mimic the requirement in section 110.26(D). Having a light fixture suddenly turn off automatically while working on this higher voltage equipment could be extremely dangerous for the worker.

Submitter Information Verification

<table>
<thead>
<tr>
<th>Submitter Full Name:</th>
<th>RUSS LEBLANC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization:</td>
<td>EC AND M MAGAZINE</td>
</tr>
<tr>
<td>Street Address:</td>
<td></td>
</tr>
<tr>
<td>City:</td>
<td></td>
</tr>
<tr>
<td>State:</td>
<td></td>
</tr>
<tr>
<td>Zip:</td>
<td></td>
</tr>
<tr>
<td>Submittal Date:</td>
<td>Mon Feb 24 21:19:25 EST 2014</td>
</tr>
</tbody>
</table>
Public Input No. 1559-NFPA 70-2014 [ Section No. 110.34(E) ]

(E) Elevation of Unguarded Live Parts.
Unguarded live parts above working space shall be maintained at elevations not less than required by Table 110.34(E).

Table 110.34(E) Elevation of Unguarded Live Parts Above Working Space

<table>
<thead>
<tr>
<th>Nominal Voltage Between Phases</th>
<th>Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>601–7500 1001–7500 V</td>
<td>2.8 m</td>
</tr>
<tr>
<td>7501–35,000 V</td>
<td>2.9 m</td>
</tr>
<tr>
<td>Over 35 kV</td>
<td>2.9 m ± 9.5 mm/kV above 35</td>
</tr>
</tbody>
</table>

Table 110.34(E):

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>V ft</td>
<td></td>
</tr>
<tr>
<td>601–7500</td>
<td>9 m</td>
</tr>
<tr>
<td>7501–35,000 V</td>
<td>9 ft 6 in.</td>
</tr>
<tr>
<td>Over 35 kV</td>
<td>9 ft 6 in. ± 0.37 in./kV above 35</td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises Table 110.34(E)'s first row to "1001-7500 V 2.7m 9ft" as a companion Public Input to proposed changes in 110.27(A)(4) in Part II.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 14:29:22 EDT 2014
Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change deletes "over 600 Volts, Nominal" from Part IV title, since no voltage requirements are prescribed in this part.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 11:05:02 EDT 2014
Part IV. Tunnel Installations over 1000 Volts, Nominal

Statement of Problem and Substantiation for Public Input

1000v equipment is now being used in mines and tunnels because of the advantages to higher voltages on lighting and feeder lengths

Submitter Information Verification

Submitter Full Name: JAMES CAIN
Organization: [ Not Specified ]
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 30 12:56:40 EDT 2014
Public Input No. 2371-NFPA 70-2014 [Section No. 110.54]

110.54 Bonding and Equipment Bonding Conductors.

(A) Grounded and Bonded. All non–current-carrying metal parts of electrical equipment and all metal raceways and cable sheaths shall be solidly grounded and bonded to all metal pipes and rails at the portal and at intervals not exceeding 300 m (1000 ft) throughout the tunnel.

(B) Equipment Bonding Conductors. An equipment grounding conductor shall be run with circuit conductors inside the metal raceway or inside the multiconductor cable jacket. The equipment grounding conductor shall be permitted to be insulated or bare.

Statement of Problem and Substantiation for Public Input

The term “equipment grounding conductor” is a misnomer even though it has been in use for many many years. Although it is a grounded conductor in normal practice for grounded systems, the idea that grounding makes a system safe and prevents an electrical shock is inherently false. Connecting a conductor from metallic equipment “likely to become energized” to the earth does not reduce the shock potential during a fault but, rather, may enhance it if it becomes the only path back to the source. The shock potential is the voltage drop along the conductor (equipment grounding conductor) due to fault current flowing back to the source. The shock hazard depends upon the time until the fault is cleared by an overcurrent device or some other event, thus the clearing time is a critical factor in safety.

This conductor (equipment grounding conductor) is intended to protect equipment and personnel by providing a sufficiently high fault current to operate an overcurrent device and clear the fault rapidly. A low impedance fault current path can provide the necessary high fault current regardless of whether the conductor is grounded or not. It is only the fault current path and not the “grounding” that can provide the high fault current necessary to operate an overcurrent device rapidly.

The term “bonding” is generally used to insure that a connection and current path is low impedance, reliable, and able to withstand the fault current. This conductor provides a basic bonding function by insuring, through proper sizing and bonding jumpers as necessary, that the connection from equipment to fault current source is both low impedance and reliable. A “bonding” function is the necessary function rather than a “grounding” function to clear a fault rapidly. A grounding function is provided by a grounding electrode conductor that connects an electrical system source to the earth. An overcurrent device operates in a time interval based upon the current through it. That current depends upon proper bonding to the source and is relatively independent of connection to the grounding electrode at the source where the overcurrent device is located. The use of the term “equipment bonding conductor” would better describe the function of this important conductor instead of the term “equipment grounding conductor”. “Systems” are “grounded”, “equipment” is “bonded”. Making this change would also bring the NEC into conformity with the Canadian Electrical Code which uses the term “equipment bonding conductor”.

Code Panel 5 members have often stated that those in the industry understand what the purpose of the equipment grounding conductor is for. The Panel members understand this also. There are, however, many people doing electrical work who don’t understand and think connecting equipment to a local grounding electrode accomplishes the same objective as an equipment grounding conductor. This is apparent from the large number of questions that are asked at IAEI inspectors meetings, grounding classes, and as documented recently in the July/August 2014 issue of the NFPA Journal under the title “Pool Rules”. Just ask the inspectors and the teachers.

Changing the terminology will serve to make it clear that the principal function of this conductor is to bond the equipment being protected to the source where the fault current originates. Changing the terminology will not confuse those that understand the proper purpose of this bonding conductor.

Submitter Information Verification

Submitter Full Name: ELLIOT RAPPAPORT
Organization: ELECTRO TECHNOLOGY
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 23 12:09:16 EDT 2014
Public Input No. 837-NFPA 70-2014 [ Section No. 110.54(B) ]

(B) Equipment Grounding Conductors.
An equipment grounding conductor shall be run with circuit conductors inside the metal raceway or inside the multiconductor cable jacket. The equipment grounding conductor shall be permitted to be insulated or bare.
It shall be permitted to run the equipment grounding conductors in the same duct bank of non-metallic conduits but not inside the same conduits as the circuit conductors provided there are no metallic reinforcements or other metallic parts between the equipment grounding conductors and the circuit conductors and the equipment grounding conductors are within 2 feet of the circuit conductors.

Statement of Problem and Substantiation for Public Input
What is proposed is common practice but not clearly compliant with this code.

Submitter Information Verification

Submitter Full Name: Billy Breitkreutz
Organization: Fluor Corporation
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 22 09:27:27 EDT 2014
Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change deletes "All Voltages" from the title, since the only voltage requirements are in 110.73 and 110.74.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address:
City:
State:
Zip:
Submittal Date: Fri Oct 03 11:07:28 EDT 2014
110.73 Equipment Work Space.
Where electrical equipment with live parts that is likely to require examination, adjustment, servicing, or maintenance while energized is installed in a manhole, vault, or other enclosure designed for personnel access, the work space and associated requirements in 110.26 shall be met for installations operating at 1000 volts or less. Where the installation is over 1000 volts, the work space and associated requirements in 110.34 shall be met. A manhole access cover that weighs over 45 kg (100 lb) shall be considered as meeting the requirements of 110.34(C).

Statement of Problem and Substantiation for Public Input

Be consistent and manholes nor carry 1000v for wind and pv solar industries.

Submitter Information Verification

Submitter Full Name: JAMES CAIN
Organization: [Not Specified]
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 30 13:02:03 EDT 2014
110.73 Equipment Work Space.
Where electrical equipment with live parts that is likely to require examination, adjustment, servicing, or maintenance while energized is installed in a manhole, vault, or other enclosure designed for personnel access, the work space and associated requirements in 110.26 shall be met for installations operating at 600 volts or less. Where the installation is over 600 volts, the work space and associated requirements in 110.34 shall be met. A manhole access cover that weighs over 45 kg (100 lb) shall be considered as meeting the requirements of 110.34(C).

Statement of Problem and Substantiation for Public Input

"shall be considered as meeting" can be more directly expressed as "meets".

Submitter Information Verification

Submitter Full Name: JAMES WILLIAMS
Organization: none
Affiliation: Retired Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Oct 18 19:35:31 EDT 2014
Public Input No. 1525-NFPA 70-2014 [ Section No. 110.73 ]

110.73 Equipment Work Space.
Where electrical equipment with live parts that is likely to require examination, adjustment, servicing, or maintenance while energized is installed in a manhole, vault, or other enclosure designed for personnel access, the work space and associated requirements in 110.26 shall be met for installations operating at 600–1000 volts or less. Where the installation is over 600–1000 volts, the work space and associated requirements in 110.34 shall be met. A manhole access cover that weighs over 45 kg (100 lb) shall be considered as meeting the requirements of 110.34(C).

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address indoor and outdoor electrical substations, and (3) evaluate other higher voltage threshold requirements to be included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included: Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams; David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises "600 to 1000 volts" in both places to correlate with companion proposals to 110.26 and 110.34.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Fri Oct 03 12:03:38 EDT 2014
110.74  Conductor Installation.
Conductors installed in manholes and other enclosures intended for personnel entry shall be cabled, racked
up, or arranged in an approved manner that provides ready and safe access for persons to enter for
installation and maintenance. The installation shall comply with 110.74(A) or 110.74(B), as applicable.

(A) 600 - 1000 Volts, Nominal, or Less.
Wire bending space for conductors operating at 600 - 1000 volts or less shall be provided in accordance with
the requirements of 314.28.

(B) Over 600 - 1000 Volts, Nominal.
Conductors operating at over 600 - 1000 volts shall be provided with bending space in accordance with
314.71(A) and (B), as applicable.

Exception: Where 314.71(B) applies, each row or column of ducts on one wall of the enclosure shall be
calculated individually, and the single row or column that provides the maximum distance shall be used.

Statement of Problem and Substantiation for Public Input

This Public Input was developed by a Task Group assigned by the NEC Correlating Committee to: (1) resolve
issues with actions taken by Code-making Panels 1 and 8 on proposals and comments in the 2014 NEC cycle
relative to changing the voltage threshold in articles under their purview from 600 volts to 1000 volts, (2) address
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included relative to present trends. Members of the Task Group on Over 600 volts for this Public Input included:
Alan Manche; Donny Cook; Vince Saporita; Lanny Floyd; Paul Barnhart; Eddie Guidry; Alan Peterson; Tom Adams;
David Kendall; Dave Mercier; Tim Pope; and co-chairs Roger McDaniel and Neil F. LaBrake, Jr.; including ad-hoc
members Larry Cogburn, CMP-8 Chair and Ken Boyce, CMP-1 Chair.

This proposed change revises "600 to 1000 volts" in (A) and (B) titles and text. This correlates with 314.28 and
314.71.

Submitter Information Verification

Submitter Full Name: Neil LaBrake
Organization: National Grid
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Fri Oct 03 12:05:07 EDT 2014
Public Input No. 2869-NFPA 70-2014 [Sections 110.74(A), 110.74(B)]

Sections 110.74(A), 110.74(B)
(A) 1000, 600 Volts, Nominal, or Less.
Wire bending space for conductors operating at 1000, 600 volts or less shall be provided in accordance with the requirements of 314.28.
(B) Over 1000, 600 Volts, Nominal.
Conductors operating at over 1000, 600 volts shall be provided with bending space in accordance with 314.71(A) and (B), as applicable.
Exception: Where 314.71(B) applies, each row or column of ducts on one wall of the enclosure shall be calculated individually, and the single row or column that provides the maximum distance shall be used.

Statement of Problem and Substantiation for Public Input

southwire, okonite are now making 1000v cables copper aluminum and al clad copper for the mining gas wind and sloar industries with correct bending radii down to 18 awg in size

Submitter Information Verification

Submitter Full Name: JAMES CAIN
Organization: [Not Specified]
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Oct 30 13:05:17 EDT 2014
Informative Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only.

This informative annex provides a list of product safety standards used for product listing where that listing is required by this Code. It is recognized that this list is current at the time of publication but that new standards or modifications to existing standards can occur at any time while this edition of the Code is in effect.

This informative annex does not form a mandatory part of the requirements of this Code but is intended only to provide Code users with informational guidance about the product characteristics about which Code requirements have been based.

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**Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization**

- "pD"
- "P D"

ANSI/ISA

### ISA-61241-2

**Electrical Intermediate Metal Conduit — Steel**

UL 1242

**Electrical Metallic Tubing — Aluminum & Stainless Steel**

UL 797A

**Electrical Metallic Tubing — Steel**

UL 797

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#### The Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Industrial Applications

**IEEE 515**

**Electrical Rigid Metal Conduit — Steel**

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**Electric-Battery-Powered Industrial Trucks**

UL 583

**Electrochemical Capacitors**

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**Emergency Lighting and Power Equipment**

UL 924

**Enclosed and Dead-Front Switches**

UL 98

**Enclosed and Dead-Front Switches for Use in Photovoltaic Systems**

Subject 98B

**Enclosures for Electrical Equipment, Non-Environmental Considerations**

UL 50

**Enclosures for Electrical Equipment, Environmental Considerations**

UL 50E

**Energy Management Equipment**

UL 916

### Explosionproof

**Explosion-proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations**

UL 1203

**Explosive**

#### Gas

**Atmospheres — Part 0: Equipment- General requirements**

ANSI/ISA-60079-0/ANSI

UL 60079-0

**Explosive**

**Gas**

**Atmospheres — Part 7:**

Increased safety "e"ANSI/ISA-60079-7/ANSI

**Equipment Protection by**, Increased safety "E"

// UL 60079-7

**Explosive**

**Gas ANSI/ISA-60079-1/ANSI**

**Atmospheres — Part 1:**

Type of protection — Flameproof "d"

**Equipment Protection by Flameproof Enclosures "D"**

UL 60079-1

**Explosive**

**Gas ANSI/ISA-60079-5/ANSI**

**Atmospheres — Part 5:**

Type of protection — Powder filling "q"

**Equipment Protection by Powder Filling "Q"**

UL 60079-5

**Explosive**
## Gas

### Atmospheres — Part 6:

**Type of protection** — Oil immersion "o" ANSI/ISA-60079-6/ANSI

#### Equipment Protection by Oil Immersion "O"

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### Household and Similar Electrical Appliances

#### Part 2:40: Particular Requirements for Heating and Cooling

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### Information Technology

#### Equipment

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#### Equipment

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Statement of Problem and Substantiation for Public Input

Referenced updated standard names.

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Submittal Date: Mon Jul 07 17:30:39 EDT 2014
Informative Annex A Product Safety Standards

Informative Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only.

This informative annex provides a list of product safety standards used for product listing where that listing is required by this Code. It is recognized that this list is current at the time of publication but that new standards or modifications to existing standards can occur at any time while this edition of the Code is in effect.

This informative annex does not form a mandatory part of the requirements of this Code but is intended only to provide Code users with informational guidance about the product characteristics about which Code requirements have been based.

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Rationale

Annex A, Product Safety Standards, is proposed to be updated in order for the annex to reflect the most recent product standard designations and names for those UL standards that are currently referenced. Additionally, changes to the Annex are needed in order to reflect the product listing requirements of the NEC, and to reflect those standards that are suitable for evaluating products and identifying them for a particular purpose within the NEC. Listing to these specific product safety standards is one mechanism for meeting the requirement that a product be identified for a particular purpose.

Specifically, this proposal is made to:

1) Add UL 61800-5-1, Adjustable Speed Electrical Power Drive Systems - Part 5-1: Safety Requirements - Electrical, Thermal and Energy and remove UL 508C, Power Conversion Equipment. UL 61800-5-1 is replacing UL 508C.
2) Add a reference to UL 60730-1, Automatic Electrical Controls to accompany the existing reference to UL 916, Energy Management Equipment. UL 60730-1 is harmonized to its IEC equivalent and has been used in certifications. UL 60730-1 may replace UL 916 in the future.
3) Update the designation of the Standard for Batteries for Use in Light Electric Rail (LER) Applications and Stationary Applications from “Subject 1973” to “UL 1973” as UL 1973 is now an ANSI Standard and no longer an Outline of Investigation.
4) Add a reference to UL 9741, Outline of Investigation for Bidirectional Electric Vehicle (EV) Charging System Equipment. UL 9741 was written to address the specific hazards associated with the products that combine the bidirectional functions of EV charging combined with utility grid interconnection. The combination of these diverse functions was best served by a single document that addresses this combination of functions in place of references to the individual standards.
5) Correct the title of UL 1863, Communications-Circuit Accessories.
6) Correct the title of Distributed Generation Wiring Harnesses, Subject 9703
7) Add a reference to UL 1996, Electric Duct Heaters
8) Reflect that UL has assumed ownership of several standards that were formally either co-publications between UL and ISA or that were solely published by ISA. This proposal revises the designations of the following standards to reflect this change in ownership. Also, to be consistent with the numbering of other UL standards in Annex A, where the current designation of the standard is shown as “ANSI/UL xxxx” this proposal changes the designation to “UL xxxx.” However, the documents with the former designation remain ANSI standards.
   a. UL 60079-15, Electrical Apparatus for Explosive Gas Atmospheres — Part 15: Type of Protection “n”;
   b. UL 60079-18, Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection — Encapsulation “m”;
   c. UL 61241-18, Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Encapsulation “mD”
   d. UL 61241-1, Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Enclosure “tD”
   e. UL 61241-0, Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — General Requirements
   f. UL 61241-11, Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Intrinsic Safety “iD”
   g. UL 61241-2, Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization “pD”
   h. UL 60079-0, Explosive Gas Atmospheres — Part 0: Equipment- General requirements
   i. UL 60079-7, Explosive Gas Atmospheres — Part 7: Increased safety “e”
j. UL 60079-1, Explosive Gas Atmospheres — Part 1: Type of protection – Flameproof “d”
k. UL 60079-5, Explosive Gas Atmospheres — Part 5: Type of protection – Powder filling “q”
l. UL 60079-6, Explosive Gas Atmospheres — Part 6: Type of protection – Oil immersion “o”
m. UL 60079-29-1, Performance Requirements of Detectors for Flammable Gases

9) Add a reference to UL 61010-2-201, Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-201: Particular Requirements for Control Equipment as it will be replacing UL 508 for these types of products.
10) Correct the title of UL 797A to “Electrical Metallic Tubing — Aluminum and Stainless Steel.”
11) Correct the title of UL 50 to “Enclosures for Electrical Equipment, Non-Environmental Considerations”
12) Add a reference to UL 9540, Outline of Investigation for Energy Storage Systems and Equipment. UL Subject 9540 is a new outline covering energy storage system safety. It was published in 2014 and will proceed through the UL standards process to become an ANSI UL standard. There is a new article 706 of the NEC being proposed that will cover energy storage systems and this reference will support that work.
13) Correct the title of UL 1203 to “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations”
14) Remove the reference to Gas-Fired Cooking Appliances for Recreational Vehicles, UL 1075 as this standard has been withdrawn.
15) Correct the title of UL 60035-2-40 to “Household and Similar Electrical Appliances, Part 2: Particular Requirements for Electrical Heat Pumps, Air Conditioners and Dehumidifiers.”
16) Add a reference to UL 1022, Line Isolation Monitors as it is used to certify line isolation monitors which are covered by 517.160(B) of the NEC.
17) Correct the title of UL 360 to “Liquid-Tight Flexible Metal Conduit.”
18) Correct the title of UL 248-6 to “Low-Voltage Fuses — Part 6: Class H Non-Renewable Fuses”
19) Add references to the following Standards as they are replacing UL 508 for these products:
   a. UL 60947-1, Low-Voltage Switchgear and Controlgear – Part 1: General Rules;
   b. UL 60947-4-2, Low-Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor- Starters - AC Semiconductor Motor Controllers and Starters
   c. UL 60947-5-1, Low-Voltage Switchgear and Controlgear - Part 5-1: Control Circuit Devices and Switching Elements - Electromechanical Control Circuit Devices
   d. UL 60947-7-1, Low-Voltage Switchgear And Controlgear - Part 7-1: Ancillary Equipment - Terminal Blocks for Copper Conductors
   e. UL 60947-7-2, Low-Voltage Switchgear and Controlgear - Part 7-2: Ancillary Equipment - Protective Conductor Terminal Blocks for Copper Conductors
   f. UL 60947-7-3, Low-Voltage Switchgear and Controlgear - Part 7-3: Ancillary Equipment - Safety Requirements for Fuse Terminal Blocks
20) Update the designation of Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters, from “ UL 6047-4-1A” to “UL 60947-4-1” to reflect that the latter has replaced the former.
21) Add a reference to UL Subject 2755, Modular Data Centers
22) Add a reference to UL Subject 489C, Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines. These molded case circuit breakers are required for use in accordance with Sections 694.7 (B) and 694.15 (A) of the NEC.
23) Correct the title of Routing Assemblies and Communications Raceways, UL 2024.
24) Correct the designation the Standard for Photovoltaic Wire to “UL 4703” as this document has now moved from a UL Outline of Investigation to a UL ANSI Standard.
25) Add a reference to UL 62109-1, Safety of power converters for use in photovoltaic power systems – Part 1: General requirements. This Standard is the US harmonized version of the international PV power conversion standard IEC 62109. IEC 62109 was born out of UL1741 and was expanded / updated to address cutting edge safety aspects of PV power conversion equipment. IEC 62109 is being adopted around the world and is the basis for harmonized international safety certifications. UL 62109, like UL1741, provides a means to determine that PV inverters and other PV electronics:
   a. Are constructed per common industry requirements
   b. Can be installed in accordance with US Codes.
   c. Operated per industry specific required ratings
   d. Perform safely under rated normal worst case conditions
   e. Perform safely under foreseeable abnormal operating conditions and failure modes

26) Add a reference to UL 62109-2, Safety of power converters for use in photovoltaic power systems – Part 2: Particular requirements for inverters. This standard is currently under development and it is anticipated that it will be published by the end of the second quarter of 2015.

27) Add a reference to the Outline of Investigation for Power Distribution Blocks, UL Subject 1953. These products are covered in articles 314.28(E) and 376.56(B).

28) Add a reference to the Standard for Power Ventilators, UL 705

29) Add a reference to the Standard for Solid State Overcurrent Protectors, UL 2367. UL is using this standard more frequently as supplementary protection inherently in equipment.

30) Add a reference to UL 6141, Wind Turbine Generating Systems — Large. This standard is under development and it is anticipated that it will be published before the next edition of the NEC is published.

31) Correct the designation of the Standard for Wind Turbine Generating Systems — Small to “UL 6142” to reflect that this document is now a UL Standard.

32) Correct the designation of the Standard for Wire Connectors to “UL 486A-486B.”

Submitter: William Corder, UL
Administration and Enforcement

Recommend removal of the Section 80 numbering.

Statement of Problem and Substantiation for Public Input

Originally starting as Section 80, ahead of Section 90 in an earlier revision to the NEC (perhaps to mimic the way the International Code Council precedes many of its documents with model administrative language) the 80.X numbering now stands out as an oddity with respect to the other annexes.

Submitter Information Verification

Submitter Full Name: Michael Anthony
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Submittal Date: Wed Nov 05 11:19:30 EST 2014
Public Input No. 2714-NFPA 70-2014 [ New Section after 80.15(B) ]

- (3)
- e. A public sector user-owner primarily engaged in the construction, operation and maintenance.

Statement of Problem and Substantiation for Public Input

State level standards action reflects the influence of incumbent interests such as manufacturers, insurance and labor. It also reflects the public safety priority of adopting agencies with the presence of conformity assessment and labor interests. By public sector user-owner we mean the organizations that directly pay for electrical safety such as schools, college and universities, prisons, health care systems, etc.

Given that the cost of labor is a significant item on our industry's balance sheets, success will also require approaching labor interests that are very strong at the state level and negotiating some practical compromises regarding safety and economy that will contribute to the shared goal of making the public sector more competitive.

In almost all cases, to meet public safety expectations, state and local agencies adopt ANSI standards whole cloth, partially or with local variances that may be more rigorous or relaxed. While the ANSI standards are supposed to be developed with a balance of materially affected stakeholders as a pre-condition of the ANSI imprimatur, nearly all of them reflect a very weak presence of the user/owner interest compared with the presence of manufacturers, insurance, labor and enforcement (so-called "incumbent interests" who have had claims on the regulatory landscape for decades and who are able to build the cost of their assertive engagement in ANSI development processes into the cost of their product and/or service). This weakness -- resulting in higher costs associated with inefficient price discovery -- is amplified when state and local boards are also unable to recruit and retain a strong user/owner stakeholder. Inefficient price discovery may also exist when the legislative rules do not permit a strong User/Owner voice.

This proposal is intended to install a permanent voice on the Electrical Boards of NEC-adopting jurisdictions in order to achieve the balance contemplated in the American national standards process.

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Submittal Date: Tue Oct 28 13:57:48 EDT 2014
Public Input No. 3831-NFPA 70-2014 [ Section No. 80.21(C) ]

(C) Responsibility of the Authority Having Jurisdiction.
It shall be the responsibility of the authority having jurisdiction to promulgate rules that cover the following:

(1) Review of construction documents and drawings shall be completed within established time frames for the purpose of acceptance or to provide reasons for nonacceptance.

(2) Review and approval by the authority having jurisdiction shall not relieve the applicant of the responsibility of compliance with this Code.

(3) Where field conditions necessitate any substantial change from the approved plan, the authority having jurisdiction shall be permitted to require that the corrected plans be submitted for approval.

(4) The authority having jurisdiction shall be permitted to increase or reduce the scope of electrical power system rehabilitation independent of the requirements of the building code.

Statement of Problem and Substantiation for Public Input

This proposal is intended to generate discussion about the degree to which the scope of electrical renovation/rehabilitation shall be permitted to be scaled according to site specific conditions that govern safety and economy. For example, many building codes may require that a 50% change in the square footage affected by a rehabilitation/renovation project may require a corresponding change in the electrical system. That change may or may not be justified on the basis of safety considerations alone. Conversely, the 50% criterion may not be a sufficient threshold to guarantee safety. While this model language for electrical administration may always be subordinate to the building codes, some model language that has been vetted through ANSI processes; that makes scalability a possibility would be welcomed from the standpoint of both safety and economy.

Submitter Information Verification

Submitter Full Name: Michael Anthony
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Submittal Date: Wed Nov 05 11:27:35 EST 2014
Public Input No. 1929-NFPA 70-2014 [Sections I, I]

Sections I, I
Informative Annex I  Recommended Tightening Torque Tables from UL Standard 486A-B

This informative annex is not a part of the requirements of this NFPA document, but is included for informational purposes only.

In the absence of connector or equipment manufacturer’s recommended torque values, Table I.1, Table I.2, and Table I.3 may be used to correctly tighten screw-type connections for power and lighting circuits*.

Control and signal circuits may require different torque values, and the manufacturer should be contacted for guidance.

*For proper termination of conductors, it is very important that field connections be properly tightened. In the absence of manufacturer’s instructions on the equipment, the torque values given in these tables are recommended. Because it is normal for some relaxation to occur in service, checking torque values sometime after installation is not a reliable means of determining the values of torque applied at installation.

Table I.1 Tightening Torque for Screws

<table>
<thead>
<tr>
<th>Test Conductor Installed in Connector</th>
<th>Tightening Torque, N·m (lbf-in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Slot width 1.2 mm (0.047 in.) or less and slot length 6.4 mm (1/4 in.) or less</td>
</tr>
<tr>
<td>AWG or kcmil</td>
<td>mm²</td>
</tr>
<tr>
<td>-------------</td>
<td>-----</td>
</tr>
<tr>
<td>30–10</td>
<td>0.05–5.3</td>
</tr>
<tr>
<td>8</td>
<td>8.4</td>
</tr>
<tr>
<td>6–4</td>
<td>13.2–21.2</td>
</tr>
<tr>
<td>3</td>
<td>26.7</td>
</tr>
<tr>
<td>2</td>
<td>33.6</td>
</tr>
<tr>
<td>1</td>
<td>42.4</td>
</tr>
<tr>
<td>1/0–2/0</td>
<td>53.5–67.4</td>
</tr>
<tr>
<td>3/0–4/0</td>
<td>85.0–107.2</td>
</tr>
<tr>
<td>250–350</td>
<td>127–177</td>
</tr>
<tr>
<td>400</td>
<td>203</td>
</tr>
<tr>
<td>500</td>
<td>253</td>
</tr>
<tr>
<td>600–750</td>
<td>304–380</td>
</tr>
<tr>
<td>800–1000</td>
<td>405–508</td>
</tr>
<tr>
<td>1250–2000</td>
<td>635–1010</td>
</tr>
</tbody>
</table>

*a For values of slot width or length not corresponding to those specified, select the largest torque value associated with the conductor size. Slot width is the nominal design value. Slot length shall be measured at the bottom of the slot.

Table I.2 Tightening Torque for Slotted Head Screws Smaller Than No. 10 Intended for Use with 8 AWG (8.4 mm²) or Smaller Conductors

<table>
<thead>
<tr>
<th>Slotted head No. 10 and larger</th>
<th>Tightening Torque, N·m (lbf-in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot Length of Screw</td>
<td>Slot width of screw smaller than 1.2 mm (0.047 in.)</td>
</tr>
<tr>
<td>mm</td>
<td>in.</td>
</tr>
<tr>
<td>Less than 4</td>
<td>Less than 5/32</td>
</tr>
<tr>
<td>4</td>
<td>5/32</td>
</tr>
<tr>
<td>4.8</td>
<td>7/16</td>
</tr>
</tbody>
</table>
### Table I.3 Tightening Torque for Screws with Recessed Allen or Square Drives

<table>
<thead>
<tr>
<th>Socket Width Across Flats</th>
<th>Tightening Torque, N·m (lbf-in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socket Width Across Flats</td>
<td>mm</td>
</tr>
<tr>
<td>Slotted head No. 10 and larger</td>
<td>mm</td>
</tr>
<tr>
<td>Awg or kcmil</td>
<td>mm²</td>
</tr>
<tr>
<td>30–10</td>
<td>0.05–5.3</td>
</tr>
</tbody>
</table>

### Table I.1 Tightening Torque for Screws

<table>
<thead>
<tr>
<th>Test Conductor Installed in Connector</th>
<th>Tightening Torque, N·m (lbf-in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot width 1.2 mm (0.047 in.) or less and slot length 6.4 mm (1/4 in.) or less</td>
<td>2.3</td>
</tr>
<tr>
<td>Slot width over 1.2 mm (0.047 in.) or slot length over 8.4 mm (1.4 in.)</td>
<td>4.0</td>
</tr>
<tr>
<td>Split-bolt connectors</td>
<td>9.0</td>
</tr>
<tr>
<td>Other connectors</td>
<td>8.5</td>
</tr>
</tbody>
</table>

---

*a*For slot lengths of intermediate values, select torques pertaining to next shorter slot lengths. Also, see 9.1.9.6 of UL 486A-2003, *Wire Connectors and Soldering Lugs for Use with Copper Conductors*, for screws with multiple tightening means. Slot length shall be measured at the bottom of the slot.

*b*Slot width is the nominal design value.

---

This informative annex is not a part of the requirements of this NFPA document, but is included for informational purposes only.

In the absence of connector or equipment manufacturer's recommended torque values, Table I.1, Table I.2, and Table I.3 may be used to correctly tighten screw-type connections for power and lighting circuits.* Control and signal circuits may require different torque values, and the manufacturer should be contacted for guidance.

*For proper termination of conductors, it is very important that field connections be properly tightened. In the absence of manufacturer's instructions on the equipment, the torque values given in these tables are recommended. Because it is normal for some relaxation to occur in service, checking torque values sometime after installation is not a reliable means of determining the values of torque applied at installation.
<table>
<thead>
<tr>
<th>Test Conductor Installed in Connector</th>
<th>Tightening Torque, N·m (lbf-in.)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AWG or kcmil</strong></td>
<td><strong>mm²</strong></td>
<td><strong>Slot width 1.2 mm (0.047 in.) or less</strong></td>
<td><strong>Slot width over 1.2 mm (0.047 in.) or less</strong></td>
<td><strong>Split-bolt connectors</strong></td>
</tr>
<tr>
<td>8</td>
<td>8.4</td>
<td>2.8 (25)</td>
<td>4.5 (40)</td>
<td>9.0 (80)</td>
</tr>
<tr>
<td>6–4</td>
<td>13.2–21.2</td>
<td>4.0 (35)</td>
<td>5.1 (45)</td>
<td>18.5 (165)</td>
</tr>
<tr>
<td>3</td>
<td>26.7</td>
<td>4.0 (35)</td>
<td>5.6 (50)</td>
<td>31.1 (275)</td>
</tr>
<tr>
<td>2</td>
<td>33.6</td>
<td>4.5 (40)</td>
<td>5.6 (50)</td>
<td>31.1 (275)</td>
</tr>
<tr>
<td>1</td>
<td>42.4</td>
<td>—</td>
<td>5.6 (50)</td>
<td>31.1 (275)</td>
</tr>
<tr>
<td>1/0–2/0</td>
<td>53.5–67.4</td>
<td>—</td>
<td>5.6 (50)</td>
<td>43.5 (385)</td>
</tr>
<tr>
<td>3/0–4/0</td>
<td>85.0–107.2</td>
<td>—</td>
<td>5.6 (50)</td>
<td>56.5 (500)</td>
</tr>
<tr>
<td>250–350</td>
<td>127–177</td>
<td>—</td>
<td>5.6 (50)</td>
<td>73.4 (650)</td>
</tr>
<tr>
<td>400</td>
<td>203</td>
<td>—</td>
<td>5.6 (50)</td>
<td>93.2 (825)</td>
</tr>
<tr>
<td>500</td>
<td>253</td>
<td>—</td>
<td>5.6 (50)</td>
<td>113.0 (1000)</td>
</tr>
<tr>
<td>600–750</td>
<td>304–380</td>
<td>—</td>
<td>5.6 (50)</td>
<td>124.3 (1100)</td>
</tr>
<tr>
<td>800–1000</td>
<td>405–508</td>
<td>—</td>
<td>5.6 (50)</td>
<td>124.3 (1100)</td>
</tr>
<tr>
<td>1250–2000</td>
<td>635–1010</td>
<td>—</td>
<td>124.3 (1100)</td>
<td>67.8 (600)</td>
</tr>
</tbody>
</table>

*For values of slot width or length not corresponding to those specified, select the largest torque value associated with the conductor size. Slot width is the nominal design value. Slot length shall be measured at the bottom of the slot.

Table I.2 Tightening Torque for Slotted Head Screws Smaller Than No. 10 Intended for Use with 8 AWG (8.4 mm²) or Smaller Conductors

<table>
<thead>
<tr>
<th>Slot Length of Screwa</th>
<th>Tightening Torque, N·m (lbf-in.)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mm</strong></td>
<td><strong>in.</strong></td>
<td><strong>Slot width of screw smaller than 1.2 mm (0.047 in.)</strong></td>
<td><strong>Slot width of screw 1.2 mm (0.047 in.) and larger</strong></td>
<td></td>
</tr>
<tr>
<td>Less than 4</td>
<td>Less than 5/32</td>
<td>0.79 (7)</td>
<td>1.0 (9)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5/32</td>
<td>0.79 (7)</td>
<td>1.4 (12)</td>
<td></td>
</tr>
<tr>
<td>4.8</td>
<td>3/16</td>
<td>0.79 (7)</td>
<td>1.4 (12)</td>
<td></td>
</tr>
<tr>
<td>5.5</td>
<td>7/32</td>
<td>0.79 (7)</td>
<td>1.4 (12)</td>
<td></td>
</tr>
<tr>
<td>6.4</td>
<td>1/4</td>
<td>1.0 (9)</td>
<td>1.4 (12)</td>
<td></td>
</tr>
<tr>
<td>7.1</td>
<td>9/32</td>
<td>—</td>
<td>1.7 (15)</td>
<td></td>
</tr>
<tr>
<td>Above 7.1</td>
<td>Above 9/32</td>
<td>—</td>
<td>2.3 (20)</td>
<td></td>
</tr>
</tbody>
</table>

aFor slot lengths of intermediate values, select torques pertaining to next shorter slot lengths. Also, see 9.1.9.6 of UL 486A-2003, Wire Connectors and Soldering Lugs for Use with Copper Conductors, for screws with multiple tightening means. Slot length shall be measured at the bottom of the slot.

bSlot width is the nominal design value.

Table I.3 Tightening Torque for Screws with Recessed Allen or Square Drives

<table>
<thead>
<tr>
<th>Socket Width Across Flatsa</th>
<th>Tightening Torque, N·m (lbf-in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mm</strong></td>
<td><strong>in.</strong></td>
</tr>
<tr>
<td>3.2</td>
<td>1/4</td>
</tr>
<tr>
<td>4.0</td>
<td>5/32</td>
</tr>
<tr>
<td>4.8</td>
<td>3/16</td>
</tr>
<tr>
<td>5.5</td>
<td>7/32</td>
</tr>
<tr>
<td>6.4</td>
<td>1/4</td>
</tr>
<tr>
<td>Socket Width Across Flats&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Tightening Torque, N·m (lbf·in.)</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td><strong>mm</strong></td>
<td><strong>in.</strong></td>
</tr>
<tr>
<td>7.9</td>
<td>⅛</td>
</tr>
<tr>
<td>9.5</td>
<td>⅜</td>
</tr>
<tr>
<td>12.7</td>
<td>½</td>
</tr>
<tr>
<td>14.3</td>
<td>¾</td>
</tr>
</tbody>
</table>

<sup>a</sup>See 9.1.9.6 of UL 486A-2003, *Wire Connectors and Soldering Lugs for Use with Copper Conductors*, for screws with multiple tightening means.

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**Statement of Problem and Substantiation for Public Input**

Submission 1902 may have removed "nominal" from this section. This submission restores it. 1902 removes all "nominal" words from the NEC because about 300 instances refer to voltage, and "nominal" is being made the default kind of voltage.

Refer to the substantiation for 1902 for more information.

[[The contents of Annex I appears TWICE in edit window]]

**Related Public Inputs for This Document**

<table>
<thead>
<tr>
<th>Related Input</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Input No. 1902-NFPA 70-2014 [Global Input]</td>
<td>This submission depends on 1902</td>
</tr>
</tbody>
</table>

**Submitter Information Verification**

Submitter Full Name: JAMES WILLIAMS  
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Affiliation: Retired Master Electrician  
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City:  
State:  
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