Public Input No. 135-NFPA 780-2023 [Global Input]

Remove “Standard for” from all UL, CAN/ULC standard titles.

Statement of Problem and Substantiation for Public Input

The term “Standard for” is redundant and unnecessary. All references to UL publications are standards.

Submitter Information Verification

Submitter Full Name: Kelly Nicolello
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 10:53:46 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-55-NFPA 780-2023
Statement: Change is part of broader UL program to update referenced documents.

Public Input No. 142-NFPA 780-2023 [Global Input]

Committee should consider rewrite of 7.1.2 to include how to protect other structures or systems that include all flammable vapors. A task group might be beneficial to study the topic.

Statement of Problem and Substantiation for Public Input

This section should be rewritten to address the specific concerns regarding structures that produce but do not contain the flammable products listed in 7.1.1. (ie. Production within and external tanks outside the structure).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 143-NFPA 780-2023 [Section No. 7.1.2]	

Submitter Information Verification

Submitter Full Name: Kelly Nicolello
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 12:42:29 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: NFPA Regulation 4.3.4.1(c) requires the proposed text to be included in the Public Input.

Public Input No. 148-NFPA 780-2023 [Section No. 1.6]

1.6* Maintenance.

~~Recommended guidelines~~ Guidelines for the maintenance of the lightning protection system shall be provided to the owner at the completion of installation.

Statement of Problem and Substantiation for Public Input

The guidelines for maintenance of lightning protection systems are pretty consistent. We provide them in the annex. They are what they are, and calling them "recommended" makes it seem as though the owner could go, "Nah, I don't like this recommendation. I'm going to go with my own idea, which is to have the HVAC contractor look at the system when they're up maintaining condensers."

Submitter Information Verification

Submitter Full Name: Simon Larter
Organization: Dobbyn Lightning Protection
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 14:05:59 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-46-NFPA 780-2023
Statement: The revision clarifies the section.

Public Input No. 149-NFPA 780-2023 [Section No. 1.7]

1.7 Periodic Inspection.

~~Periodic inspections~~ Inspections or testing for compliance to this standard shall be done yearly, or at intervals determined by the authority having jurisdiction.

Statement of Problem and Substantiation for Public Input

Why wouldn't we just tell people right up front that yearly inspections (at minimum) are the way to go? With the "or" in there, we've got wiggle room for AHJs to ignore this, but we've made the baseline clear.

Submitter Information Verification

Submitter Full Name: Simon Larter
Organization: Dobbyn Lightning Protection
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 14:11:15 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-47-NFPA 780-2023
Statement: This adds a minimum compliance period in lieu of periodic as a non-defined term.

Public Input No. 40-NFPA 780-2023 [Section No. 1.8.1]

1.8.1

The values stated shall be a minimum requirement~~, and standard deviations are not permitted~~ .

Statement of Problem and Substantiation for Public Input

The statement "The values stated shall be a minimum requirement." is all that is required. Merriam-Webster's definition of "standard deviation" would not allow the use of the term in this application. This standard is setting the minimum requirement necessary to provide for the safeguarding of persons and property from hazards arising from exposure to lightning.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 09 08:02:53 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The section is clear as currently written. The proposed text would allow material standard deviations into the standard and that is what this section addresses.

Public Input No. 36-NFPA 780-2023 [New Section after 3.3.8.7]

3.3.8.8 Insulating Down Conductor

Conductor provided with a layer of insulation for use in an electrically insulated lightning protection system with the purpose of providing an equivalent separation distance.

Statement of Problem and Substantiation for Public Input

The addition of this definition harmonizes NFPA 780 with IEC 62305-3 and introduces electrically insulated lightning protection systems to achieve separation distance.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 39-NFPA 780-2023 [New Section after 3.3.11.2]	Insulated Lightning Protection Systems
Public Input No. 93-NFPA 780-2023 [New Section after 4.15.2.4]	
Public Input No. 108-NFPA 780-2023 [New Section after 3.3.34]	

Submitter Information Verification

Submitter Full Name: Michael Boyd
Organization: DEHN Inc
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 05 14:08:30 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: This definition does not exist in the latest draft of IEC 62305-3. Insulating down-conductors refers to a specific device described in IEC TR 62561-8. The existing IEC Committee Document (CD) scope calls out insulating stand-offs and insulating down-conductors. The CD does not include the proposed definition.

Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]

Copper-Clad Steel Wire, 40% CCS

The wire consists of a core of homogeneous steel with a continuous outer cladding of copper metalurgically bonded to the core throughout to have minimum copper thickness of 5% of the wire diameter.

Additional Proposed Changes

File Name	Description	Approved
CCS_Corrosion_paper_Rev2.pdf	Corrosion Study	
359379_Double_Shear.pdf	CCS 40% Shear Strength Vs Copper	
CEL_-_13_Grounding_Conductor_Current_Test_002_.pdf	CCS 40% Conductivity Vs Copper	
PL-03027_REP1.pdf	High Frequency Withstand and Fusing Currents Testing	
TD002391.Burndy.pdf	Low Frequency Short Circuit Testing	
Welded_Copper-covered_Steel_CCS_40.pdf	Specification Sheet for 40% Copper Clad Steel Wire	

Statement of Problem and Substantiation for Public Input

Adding CCS 40% to definitions as a conductor. The minimum copper thickness of 5% of the diameter of the wire defines 40% CCS in ASTM B-910, Standard Specification for Annealed Copper-Clad Steel (CCS) Wire. 40% Annealed CCS is the primary grade used in electrical bonding and grounding applications for utilities.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 9-NFPA 780-2023 [New Section after 4.2.2]	
Public Input No. 11-NFPA 780-2023 [Section No. 4.1.1.1.1]	
Public Input No. 12-NFPA 780-2023 [Section No. 4.1.1.1.2]	
Public Input No. 13-NFPA 780-2023 [Section No. 4.2.3]	
Public Input No. 14-NFPA 780-2023 [Section No. 4.2.5]	
Public Input No. 15-NFPA 780-2023 [Section No. 4.3.2]	
Public Input No. 16-NFPA 780-2023 [Section No. 4.3.4.2]	
Public Input No. 17-NFPA 780-2023 [Section No. 4.5.4.6]	
Public Input No. 18-NFPA 780-2023 [Section No. 4.12.3.2]	
Public Input No. 19-NFPA 780-2023 [New Section after 4.12.4]	
Public Input No. 20-NFPA 780-2023 [Section No. 6.2.2 [Excluding any Sub-Sections]]	
Public Input No. 21-NFPA 780-2023 [Section No. 6.4.1.1]	

Public Input No. 22-NFPA 780-2023 [Section No. 8.4.2.4]
Public Input No. 23-NFPA 780-2023 [Section No. 10.2.2.1]
Public Input No. 24-NFPA 780-2023 [Section No. 10.2.2.2]
Public Input No. 25-NFPA 780-2023 [Section No. 10.2.2.3]
Public Input No. 30-NFPA 780-2023 [Section No. 11.4.1.2]
Public Input No. 26-NFPA 780-2023 [Section No. 10.4.1.1]
Public Input No. 27-NFPA 780-2023 [Section No. 10.4.2.1]
Public Input No. 28-NFPA 780-2023 [Section No. 10.4.5.2.1]
Public Input No. 29-NFPA 780-2023 [Section No. 11.4.1.1]
Public Input No. 31-NFPA 780-2023 [Section No. 11.4.2.5]
Public Input No. 32-NFPA 780-2023 [Section No. 11.4.2.6.2.2]
Public Input No. 33-NFPA 780-2023 [Section No. 11.4.6 [Excluding any Sub-Sections]]
Public Input No. 34-NFPA 780-2023 [Section No. A.4.1.1.1]
Public Input No. 9-NFPA 780-2023 [New Section after 4.2.2]
Public Input No. 11-NFPA 780-2023 [Section No. 4.1.1.1.1]
Public Input No. 12-NFPA 780-2023 [Section No. 4.1.1.1.2]
Public Input No. 13-NFPA 780-2023 [Section No. 4.2.3]
Public Input No. 14-NFPA 780-2023 [Section No. 4.2.5]
Public Input No. 16-NFPA 780-2023 [Section No. 4.3.4.2]
Public Input No. 17-NFPA 780-2023 [Section No. 4.5.4.6]
Public Input No. 18-NFPA 780-2023 [Section No. 4.12.3.2]
Public Input No. 19-NFPA 780-2023 [New Section after 4.12.4]
Public Input No. 20-NFPA 780-2023 [Section No. 6.2.2 [Excluding any Sub-Sections]]
Public Input No. 21-NFPA 780-2023 [Section No. 6.4.1.1]
Public Input No. 22-NFPA 780-2023 [Section No. 8.4.2.4]
Public Input No. 23-NFPA 780-2023 [Section No. 10.2.2.1]
Public Input No. 24-NFPA 780-2023 [Section No. 10.2.2.2]
Public Input No. 25-NFPA 780-2023 [Section No. 10.2.2.3]
Public Input No. 26-NFPA 780-2023 [Section No. 10.4.1.1]
Public Input No. 27-NFPA 780-2023 [Section No. 10.4.2.1]
Public Input No. 28-NFPA 780-2023 [Section No. 10.4.5.2.1]
Public Input No. 29-NFPA 780-2023 [Section No. 11.4.1.1]
Public Input No. 30-NFPA 780-2023 [Section No. 11.4.1.2]
Public Input No. 31-NFPA 780-2023 [Section No. 11.4.2.5]
Public Input No. 32-NFPA 780-2023 [Section No. 11.4.2.6.2.2]
Public Input No. 33-NFPA 780-2023 [Section No. 11.4.6 [Excluding any Sub-Sections]]
Public Input No. 34-NFPA 780-2023 [Section No. A.4.1.1.1]

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association

Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 08:09:37 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 39-NFPA 780-2023 [New Section after 3.3.11.2]

3.3.12 Electrically Insulated Lightning Protection System

A lightning protection system with a insulated mast strike-termination system and insulated-cond uctor system attached to the structure but positioned in such a way that it has no electrical contact with the structure to be protected except at ground level for equipotential bonding and that provides an equivalent separation distance comparable to the bonding calculation.

Statement of Problem and Substantiation for Public Input

The addition of this definition harmonizes NFPA 780 with IEC 62305-3 definition 3.5 and introduces electrically insulated lightning protection systems to achieve separation distance.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 36-NFPA 780-2023 [New Section after 3.3.8.7]	
Public Input No. 93-NFPA 780-2023 [New Section after 4.15.2.4]	
Public Input No. 108-NFPA 780-2023 [New Section after 3.3.34]	

Submitter Information Verification

Submitter Full Name: Michael Boyd
Organization: DEHN Inc
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 05 14:47:00 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: This definition does not exist in the latest draft of IEC 62305-3. Insulating down-conductors refers to a specific device described in IEC TR 62561-8. The existing IEC Committee Document (CD) scope calls out insulating stand-offs and insulating down-conductors. The CD does not include the proposed definition.

Public Input No. 44-NFPA 780-2023 [Section No. 3.3.12]

3.3.12 ~~Explosives~~ Explosive Materials.

Materials, including explosives, blasting agents, and detonators, that are authorized for transportation by the Department of Transportation or the Department of Defense as explosive materials.

Statement of Problem and Substantiation for Public Input

removal of S corrects syntax

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 09 08:40:07 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The wording as currently given is in line with military standards.

Public Input No. 43-NFPA 780-2023 [New Section after 3.3.13]

3.3.14 Fitting. **An accessory such as an air terminal base, cable support, bushing, or other part of a lightning protection system that is intended primarily to perform a mechanical rather than an electrical function.**

Statement of Problem and Substantiation for Public Input

The term fitting is not presently defined in the standard. In some cases fitting and connector have been interchanged.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 09 08:31:29 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The proposed definition does not address all the possible applications for a fitting.

Public Input No. 45-NFPA 780-2023 [Section No. 3.3.13]

3.3.13 Fastener.

An attachment device used to secure the conductor and/or fitting to the structure.

Statement of Problem and Substantiation for Public Input

The fastener would typically be used to attach a fitting which is supporting a conductor.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 09 08:49:15 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The proposed definition for a fastener would be in conflict with Section 4.9.

Public Input No. 38-NFPA 780-2023 [New Section after 3.3.23]

3.3.24 Isolated Lightning Protection System.

A lightning protection system positioned in such a way that it has neither electrical nor physical contact with the structure to be protected except at ground level for equipotential bonding.

Statement of Problem and Substantiation for Public Input

The addition of this definition harmonizes NFPA 780 with IEC 62305-3 definition 3.3 and introduces isolated lightning protection systems.

Submitter Information Verification

Submitter Full Name: Michael Boyd
Organization: DEHN Inc
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 05 14:35:33 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: This definition does not exist in the latest draft of IEC 62305-3. Insulating down-conductors refers to a specific device described in IEC TR 62561-8. Definitions are provided for catenary and mast-type lightning protection systems. The existing IEC Committee Document (CD) scope calls out insulating stand-offs and insulating down-conductors. The CD does not include the proposed definition.

Public Input No. 145-NFPA 780-2023 [New Section after 3.3.29]

Mast. **A slender, vertical structure.**

Statement of Problem and Substantiation for Public Input

We've never defined this word, and it's somewhat ambiguous. Seems as though putting in the primary useful definition from Merriam-Webster would be a good idea.

Submitter Information Verification

Submitter Full Name: Simon Larter
Organization: Dobbyn Lightning Protection
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 13:46:02 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Masts described in this standard are much more than slender objects and is well described in the text. There is no need to define mast when NFPA 780 already have mast-type lightning protection systems defined,

Public Input No. 108-NFPA 780-2023 [New Section after 3.3.34]

3.3.35 Separation Distance

Necessary distance between a conductor carrying partial lightning current and other conductive parts to avoid dangerous sideflash.

Statement of Problem and Substantiation for Public Input

The addition of this definition harmonizes NFPA 780 with IEC 62305-3 and defines separation distance referenced in 4.15.2.4.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 36-NFPA 780-2023 [New Section after 3.3.8.7]	Insulated Lightning Protection Systems
Public Input No. 39-NFPA 780-2023 [New Section after 3.3.11.2]	Insulated Lightning Protection Systems
Public Input No. 109-NFPA 780-2023 [Section No. 4.15.2.5.1]	
Public Input No. 110-NFPA 780-2023 [Section No. 4.15.2.6.1]	

Submitter Information Verification

Submitter Full Name: Michael Boyd
Organization: DEHN Inc
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 30 10:56:59 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The term used in NFPA 780 is sideflash and this new definition could cause confusion.

Public Input No. 144-NFPA 780-2023 [Section No. 3.3.45]

3.3.45* Surge-Protective Device (SPD).

A protective device for limiting ~~the~~ transient voltages by diverting or limiting ~~the~~ surge current and preventing ~~the~~ continued flow of ~~the~~ follow current while remaining capable of repeating these functions.

Statement of Problem and Substantiation for Public Input

The definite article wasn't needed in all the locations in this definition. Editing for streamlining and clarity.

Submitter Information Verification

Submitter Full Name: Simon Larter
Organization: Dobbyn Lightning Protection
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 13:36:30 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-68-NFPA 780-2023
Statement: This makes the definition clearer and more concise.

Public Input No. 47-NFPA 780-2023 [Section No. 3.3.48]

3.3.48 Turf.

Grass, stabilized soil, ~~asphalt,~~ or any other ~~hard~~ treated surface not intended as a paved shoulder, installed from the edge of the runway or taxiway full strength pavement to just outside the airfield lighting circuits.

Statement of Problem and Substantiation for Public Input

Use of the word "asphalt" would indicate a paved shoulder. Replacing "asphalt and any other hard surface" with "treated" better describes a turf area. On occasion, in addition to the grass, the unpaved shoulder may be treated with various agents to reduce erosion by water, wind or jet blast.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 09 09:05:45 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-64-NFPA 780-2023
Statement: The revised definition provides clarity.

Public Input No. 11-NFPA 780-2023 [Section No. 4.1.1.1.1]

4.1.1.1.1

Structures not exceeding 75 ft (23 m) in height shall be protected with Class I materials as shown in Table 4.1.1.1.1.

Table 4.1.1.1.1 Minimum Class I Material Requirements

		-	-	~~Copper~~	-	Copper/Copper-Clad Steel 40%		Alumi
Type of Conductor	Parameter	US	SI	-	US	SI		
Air terminal, solid	Diameter	⅜ in.	9.5 mm	-	½ in.	12.7 mm		
Air terminal, tubular	Diameter	⅝ in.	15.9 mm	-	⅝ in.	15.9 mm		
	-	Wall thickness	0.033 in.	0.8 mm	-	0.064 in.	1.63 mm	
Main conductor, cable	Size each strand	17 AWG	1.04 mm^2	-	14 AWG	2.08 mm^2		
	-	Weight per length	187 lb/1000 ft	278 g/m	-	95 lb/1000 ft	141 g/m	
	-	Cross-section area	57,400 cir. mils	29 mm^2	-	98,600 cir. mils	50 mm^2	
Bonding conductor, cable (solid or stranded)	Size each strand	17 AWG	1.04 mm^2	-	14 AWG	2.08 mm^2		
	Cross-section area	26,240 cir. mils	13.3 mm^2	-	41,100 cir. mils	20.8 mm^2		
Bonding conductor, solid strip	Thickness	0.051 in.	1.30 mm	-	0.064 in.	1.63 mm		
	-	Width	½ in.	12.7 mm	-	½ in.	12.7 mm	
Main conductor, solid strip	Thickness	0.051 in.	1.30 mm	-	0.064 in.	1.63 mm		
	-	Cross-section area	57,400 cir. mils	29 mm^2	-	98,600 cir. mils	50 mm^2	

Statement of Problem and Substantiation for Public Input

Adding CCS 40% to materials. This PI is one of 26 Public Inputs coordinated to provide the option of using 40% CCS as a conductor for electrical protection.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Adding 40% CCS to 780
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 08:25:14 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 115-NFPA 780-2023 [Section No. 4.1.1.1.1]

4.1.1.1.1

Structures not exceeding 75 ft (23 m) in height shall be protected with Class I, Class II or Class III materials as shown in ~~Table~~ Tables 4.1.1.1.1 and 4 . 1.1.1.2 .

Table 4.1.1.1.1 Minimum Class I Material Requirements

				Copper			Aluminum
Type of Conductor	Parameter	US	SI		US	SI	
Air terminal, solid	Diameter	⅜ in.	9.5 mm		½ in.	12.7 mm	
Air terminal, tubular	Diameter	⅝ in.	15.9 mm		⅝ in.	15.9 mm	
		Wall thickness	0.033 in.	0.8 mm		0.064 in.	1.63 mm
Main conductor, cable	Size each strand	17 AWG	1.04 mm^2		14 AWG	2.08 mm^2	
		Weight per length	187 lb/1000 ft	278 g/m		95 lb/1000 ft	141 g/m
		Cross-section area	57,400 cir. mils	29 mm^2		98,600 cir. mils	50 mm^2
Bonding conductor, cable (solid or stranded)	Size each strand	17 AWG	1.04 mm^2		14 AWG	2.08 mm^2	
	Cross-section area	26,240 cir. mils	13.3 mm^2		41,100 cir. mils	20.8 mm^2	
Bonding conductor, solid strip	Thickness	0.051 in.	1.30 mm		0.064 in.	1.63 mm	
		Width	½ in.	12.7 mm		½ in.	12.7 mm
Main conductor, solid strip	Thickness	0.051 in.	1.30 mm		0.064 in.	1.63 mm	
		Cross-section area	57,400 cir. mils	29 mm^2		98,600 cir. mils	50 mm^2

Statement of Problem and Substantiation for Public Input

To clarify that Class II and III materials may be substituted for Class I materials.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser

Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 13:07:00 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Class III materials are not defined in this standard. The use of Class III materials should be confined to specific applications which may include heavy-duty stacks and tanks, etc. UL 96A only mentions use of Class III on heavy-duty stacks.

Public Input No. 122-NFPA 780-2023 [New Section after 4.1.1.1.2]

TITLE OF NEW CONTENT

Type your content here ...

4.1.1.1.3. Structures located in corrosive environments shall be protected with Class III materials.

4.1.1.1.4 Class III materials shall meet the minimum requirements for Class II materials, and be constructed of corrosion resistant materials, such as stainless steel, titanium, Monel ® , or Hastelloy ® .

Statement of Problem and Substantiation for Public Input

Establishes Class III materials for use in highly corrosive environments. Brings this standard into agreement with Underwriters Laboratories UL 96.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 13:55:12 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Class III materials are not defined in this standard. The use of Class III materials should be confined to specific applications which may include heavy-duty stacks and tanks, etc. UL 96A only mentions use of Class III on heavy-duty stacks.

Public Input No. 116-NFPA 780-2023 [Section No. 4.1.1.1.2]

4.1.1.1.2

Structures exceeding 75 ft (23 m) in height shall be protected with Class II or Class III materials as shown in Table 4.1.1.1.2.

Table 4.1.1.1.2 Minimum Class II Material Requirements

		Copper				Aluminum
Type of Conductor	Parameter	US	SI		US	SI	
Air terminal, solid	Diameter	½ in.	12.7 mm	-	⅝ in.	15.9 mm	
Main conductor, cable	Size each strand	15 AWG	1.65 mm^2	-	13 AWG	2.62 mm^2	
	-	Weight per length	375 lb/1000 ft	558 g/m	-	190 lb/1000 ft	283 g/m
	-	Cross-section area	115,000 cir. mils	58 mm^2	-	192,000 cir. mils	97 mm^2
Bonding conductor, cable (solid or stranded)	Size each strand	17 AWG	1.04 mm^2	-	14 AWG	2.08 mm^2	
	Cross-section area	26,240 cir. mils	13.2 mm^2	-	41,100 cir. mils	20.8 mm^2	
Bonding conductor, solid strip	Thickness	0.051 in.	1.30 mm	-	0.064 in.	1.63 mm	
	-	Width	½ in.	12.7 mm	-	½ in.	12.7 mm
Main conductor, solid strip	Thickness	0.064 in.	1.63 mm	-	0.1026 in.	2.61 mm	
	-	Cross-section area	115,000 cir. mils	58 mm^2	-	192,000 cir. mils	97 mm^2

Statement of Problem and Substantiation for Public Input

Clarifies that Class III materials may be substituted for Class II materials.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:

State:
Zip:
Submittal Date: Wed May 31 13:16:22 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Class III materials are not defined in this standard. The use of Class III materials should be confined to specific applications which may include heavy-duty stacks and tanks, etc. UL 96A only mentions use of Class III on heavy-duty stacks.

Public Input No. 12-NFPA 780-2023 [Section No. 4.1.1.1.2]

4.1.1.1.2

Structures exceeding 75 ft (23 m) in height shall be protected with Class II materials as shown in Table 4.1.1.1.2.

Table 4.1.1.1.2 Minimum Class II Material Requirements

		-	-	Copper	-	Copper/Copper-Clad Steel	Alun
Type of Conductor	Parameter	US	SI	-	US	SI	
Air terminal, solid	Diameter	½ in.	12.7 mm	-	⅝ in.	15.9 mm	
Main conductor, cable	Size each strand	15 AWG	1.65 mm^2	-	13 AWG	2.62 mm^2	
	-	Weight per length	375 lb/1000 ft	558 g/m	-	190 lb/1000 ft	283 g/m
	-	Cross-section area	115,000 cir. mils	58 mm^2	-	192,000 cir. mils	97 mm^2
Bonding conductor, cable (solid or stranded)	Size each strand	17 AWG	1.04 mm^2	-	14 AWG	2.08 mm^2	
	Cross-section area	26,240 cir. mils	13.2 mm^2	-	41,100 cir. mils	20.8 mm^2	
Bonding conductor, solid strip	Thickness	0.051 in.	1.30 mm	-	0.064 in.	1.63 mm	
	-	Width	½ in.	12.7 mm	-	½ in.	12.7 mm
Main conductor, solid strip	Thickness	0.064 in.	1.63 mm	-	0.1026 in.	2.61 mm	
	-	Cross-section area	115,000 cir. mils	58 mm^2	-	192,000 cir. mils	97 mm^2

Statement of Problem and Substantiation for Public Input

Adding 40% Copper-Clad Steel to the section as a conductor material. This PI is one of 26 Public Inputs coordinated to provide the option of using 40% CCS as a conductor for electrical protection.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 08:26:54 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 48-NFPA 780-2023 [Section No. 4.1.1.1.2]

4.1.1.1.2

Structures ~~exceeding~~ equal to or greater than 75 ft (23 m) in height shall be protected with Class II materials as shown in Table 4.1.1.1.2.

Table 4.1.1.1.2 Minimum Class II Material Requirements

				Copper			Aluminum
Type of Conductor	Parameter	US	SI		US	SI	
Air terminal, solid	Diameter	½ in.	12.7 mm		⅝ in.	15.9 mm	
Main conductor, cable	Size each strand	15 AWG	1.65 mm^2		13 AWG	2.62 mm^2	
		Weight per length	375 lb/1000 ft	558 g/m		190 lb/1000 ft	283 g/m
		Cross-section area	115,000 cir. mils	58 mm^2		192,000 cir. mils	97 mm^2
Bonding conductor, cable (solid or stranded)	Size each strand	17 AWG	1.04 mm^2		14 AWG	2.08 mm^2	
	Cross-section area	26,240 cir. mils	13.2 mm^2		41,100 cir. mils	20.8 mm^2	
Bonding conductor, solid strip	Thickness	0.051 in.	1.30 mm		0.064 in.	1.63 mm	
		Width	½ in.	12.7 mm		½ in.	12.7 mm
Main conductor, solid strip	Thickness	0.064 in.	1.63 mm		0.1026 in.	2.61 mm	
		Cross-section area	115,000 cir. mils	58 mm^2		192,000 cir. mils	97 mm^2

Statement of Problem and Substantiation for Public Input

Existing text states:
"4.1.1.1.1 Structures not exceeding 75 ft (23 m) in height..."
"4.1.1.1.2 Structures exceeding 75 ft (23 m) in height...."
a structure exactly 75 feet in height is not addressed.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.

Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 10 06:27:13 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-23-NFPA 780-2023
Statement: The current language in 4.1.1.1.1 and 4.1.1.1.2 excludes structures exactly 75 ft. This corrects that gap adding those structure heights to Class II materials.

Public Input No. 9-NFPA 780-2023 [New Section after 4.2.2]

40% Copper-clad Steel

The wire consists of a core of homogeneous steel with a continuous outer cladding of copper thoroughly metallurgically bonded to the core throughout to have minimum copper thickness of 5% of the wire diameter.

Statement of Problem and Substantiation for Public Input

This is one of 26 Public Inputs to include 40% CCS as a conductor for lighting protection. Copper-clad steel is a long-proven material used for grounding and bonding. CCS is currently referenced by this code as a suitable material for over-head grounding conductors. 40% Copper-clad steel wire is 40% copper nominally by mass, all of which exists on the surface and outer perimeter of the diameter of the wire. High frequency (Hz) lighting currents travel at the perimeter of a conductor, where, in the case of 40% CCS, the most conductive material is located -- copper. The steel core of 40% CCS acts as reinforcement to the conductor, better withstanding the electromechanical forces of lightning strikes than the alternative materials in this code. What's more, CCS 40% solves other socio-economic problems: First, it conserves copper, using 60% less copper per foot of conductor than single-metal copper conductors. Copper is soon to be included on the list of critical minerals by the US Geological Survey due to its high demand for green initiatives for society. Second, CCS 40% is a proven theft deterrent due to its low scrap value relative to single-metal copper, as well as its increased shear strength relative to single-metal copper. Third, safety. If copper grounding conductors are stolen for scrap, property and people are at risk. The likelihood of CCS 40% being stolen is lower than that of copper. Copper scrap is approximately 25X higher in value than CCS Annealed 40%. This grade of CCS is the best suited for lightning protection applications. In final say, 40% CCS has been a long-standing conductor material of use in the utility world for lighting protection and direct burial grounding applications. There is no technical reason why it could not be included in NFPA 780.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	PI 10 Contains Technical Substantiation For 40% CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 07:44:06 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 137-NFPA 780-2023 [Section No. 4.2.2.3.1]

4.2.2.3.1*

Aluminum shall not be used within 18 in. (450 mm) of the point where the lightning protection system comes into contact with the ~~earth or~~ earth or soil on vegetative roofs or planters or where rapid deterioration is possible.

Statement of Problem and Substantiation for Public Input

This proposed change is to further address the installation of aluminum components in relation to earthen materials and avoid any issues related earth contact such as corrosion in the conductors. This language assists in determining the proper location for aluminum conductors to be installed to prevent premature failure of the lightning protection due to corrosion.

Submitter Information Verification

Submitter Full Name: Kelly Nicolello
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 11:01:16 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-13-NFPA 780-2023
Statement: Aluminum components of a lightning protection systems can exist in proximity to soil at other locations than at ground level.

Public Input No. 49-NFPA 780-2023 [New Section after 4.2.2.3.2]

4.2.2.3.3 Aluminum conductors shall not be installed where subject to continuous moisture.

Additional Proposed Changes

File Name	Description	Approved
PI-49_Alum_Wet_Concrete_IMG_4482.jpg	Photo of aluminum conductor exposed to continuous moisture, wet environment. PI-49 Alum Wet Concrete IMG_4482.jpg	

Statement of Problem and Substantiation for Public Input

There is currently no provision preventing an aluminum conductor from being installed in an area where moisture/water is continuously present. The continuous exposure to moisture/water accelerates corrosion.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 10 06:32:04 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The proposed text is redundant with existing 4.3.3.

Public Input No. 13-NFPA 780-2023 [Section No. 4.2.3]

4.2.3

Copper and copper-clad steel lightning protection materials shall not be installed on or in contact with aluminum roofing, aluminum siding, or other aluminum surfaces.

Statement of Problem and Substantiation for Public Input

Like Copper, CCS is a dissimilar metal to aluminum. This is one of 26 Public Inputs to include 40% CCS as a conductor for lighting protection.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains Technical Substantiation For 40% CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 08:31:37 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 14-NFPA 780-2023 [Section No. 4.2.5]

4.2.5*

Lightning protection systems shall be designed to minimize the effects caused by runoff from both copper, copper-clad steel and aluminum lightning protection materials to prevent the deterioration of incompatible materials and minimize the degradation of building aesthetics caused by staining.

Statement of Problem and Substantiation for Public Input

Adding CCS to materials. This is one of 26 Public Inputs to include 40% CCS as a conductor for lighting protection.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains Technical Substantiation for CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 08:34:08 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 15-NFPA 780-2023 [Section No. 4.3.2]

4.3.2

Copper or copper-clad components installed within 24 in. (600 mm) of the top of a chimney or vent emitting corrosive gases shall be protected by a hot-dipped lead or tin coating.

Statement of Problem and Substantiation for Public Input

Copper-cladding of components yields same corrosive properties as single-metal copper components.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 08:35:20 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 16-NFPA 780-2023 [Section No. 4.3.4.2]

4.3.4.2

Bimetallic connectors and fittings shall be used for splicing or bonding dissimilar metals.

Informational Note: Copper-clad still is dissimilar to aluminum, and not dissimilar to copper

Statement of Problem and Substantiation for Public Input

Copper-clad steel is considered by metallurgical science to be a similar material to copper.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains Technical Substantiation for CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 08:37:19 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 41-NFPA 780-2023 [Section No. 4.3.4.3]

4.3.4.3

~~Fittings~~ Connectors used for the connection of aluminum down conductors to copper or copper-clad grounding equipment shall be of the bimetallic type.

Statement of Problem and Substantiation for Public Input

Use of the word "connector" matches the definition added in the last revision.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 09 08:18:16 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-14-NFPA 780-2023
Statement: Section 4.3.4.3 is revised to be consistent with the intent of the overall 4.3.4 which encompasses both connectors and fittings.

Public Input No. 81-NFPA 780-2023 [New Section after 4.4.2]

4.4.2.1 A ferrous metal sleeve 8 in. or less in length shall require bonding on one end only.

4.4.2.2 A ferrous metal sleeve 2 in. or less in length shall not require bonding on either end.

Statement of Problem and Substantiation for Public Input

No minimum length of sleeve encircling a LPS conductor is provided. Sleeves thru floors and conduit hangers are typically omitted. If a down conductor is routed around the rebar in a tall concrete column what impact does the rebar encircling the conductor have on the impedance of the system or arcing within the concrete between the conductor and rebar. The vertical bars will be bonded top and bottom, what about the horizontal rings in between?
A short ferrous metal sleeve 8 in. or less in length will present a negligible effect and therefore needs to be bonded at only one end. A very short sleeve (less than 2 in.),i.e. ferrous metal conduit strap, and the like will present a negligible effect and will not require bonding.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 68-NFPA 780-2023 [New Section after A.4.4.1]	related material
Public Input No. 67-NFPA 780-2023 [New Section after A.4.8.8.1]	related material
Public Input No. 67-NFPA 780-2023 [New Section after A.4.8.8.1]	
Public Input No. 68-NFPA 780-2023 [New Section after A.4.4.1]	

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 15 15:53:21 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-15-NFPA 780-2023 Response to PI 67: The proposed annex material was incorporated into this revision.

Statement: The requirement to bond metal penetrations of LPS conductors is not explained elsewhere in the standard. Annex A.4.4.2 assists in correct implementation of the normative requirements.

Calculation of the potential for sideflash in down conductors routed through minimal length metal sleeve suggests little impact. The minimal length metal sleeve bonding rules can be relaxed.

Public Input No. 91-NFPA 780-2023 [Section No. 4.5.2.2.2]

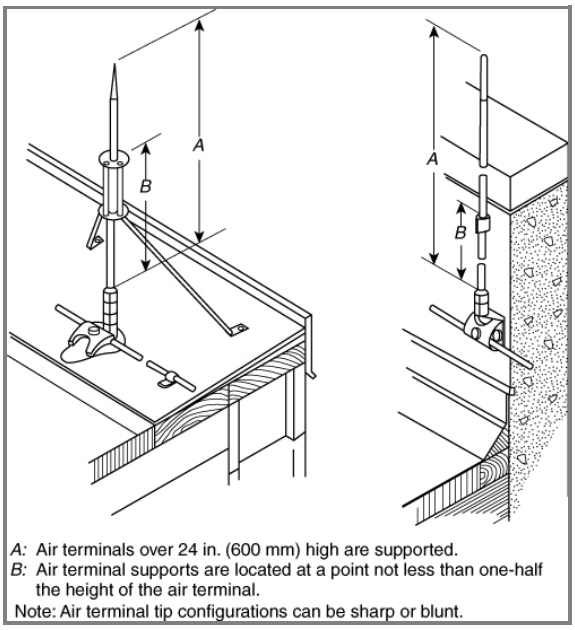
4.5.2.2.2

Air terminals exceeding 24 in. (600 mm) in height shall be ~~supported~~ braced at a point not less than one-half their height, as shown in Figure 4.5.2.2.2.

Side bracing shall not be required if an air terminal and its mounting base, as installed on steel or concrete, is capable of withstanding a tipping force of 2.2 lbs (0.9979032 kg) per foot (0.3048 m) of unbraced elevation conductor length at its tip.

An anchored, threaded base shall be considered as one location.

Figure 4.5.2.2.2 Air Terminal Support.



A: Air terminals over 24 in. (600 mm) high are supported.
B: Air terminal supports are located at a point not less than one-half the height of the air terminal.
Note: Air terminal tip configurations can be sharp or blunt.

Statement of Problem and Substantiation for Public Input

Side bracing requirements appear to have been instituted to apply to air terminals mounted on wood or other less stout materials. Air terminals used in industrial installations and mounted on concrete of steel are much more stable and therefore require less side bracing.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 19 15:38:46 EDT 2023

Committee: LIG-AAA

Committee Statement

Resolution: It is difficult to verify or confirm wind loading or force on the unsupported air terminal.

Public Input No. 127-NFPA 780-2023 [Section No. 4.5.4.4]

4.5.4.4

Overhead ground wires shall be ~~self-supporting with~~ able to provide minimum sag under all conditions.

Statement of Problem and Substantiation for Public Input

Overhead ground wires cannot be self-supporting. They must be supported by masts (with or without guys), parts of a structure, or some other item but do not hang in the air. The text of 4.5.4.4 seems to suggest that additional support such as guying is not allowed to be a required part of the overhead wire system design. Guy wires should be allowed to aid in the support of OVHD wires.
The ”self-supporting” requirement should be deleted. There is no metric given to define minimum sag. It is unrealistic to assume no sag under all conditions so maybe the entire clause should be revised and moved to Annex A. Perhaps the better design metric is that the maximum sag be considered in the calculation of the overhead wire system’s zone of protection.

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 15:32:45 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-16-NFPA 780-2023
Statement: This revision clarifies permissible sag in overhead ground wires.

Public Input No. 17-NFPA 780-2023 [Section No. 4.5.4.6]

4.5.4.6

Connections between galvanized steel overhead ground wires and copper or copper-clad steel conductors shall be made through a suitable component that does not permit direct contact between the two materials.

Statement of Problem and Substantiation for Public Input

CCS is a common material employed for over-head grounding conductors, so it should be included in the section.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Containers Technical Substantiation for CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 08:41:15 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 114-NFPA 780-2023 [Section No. 4.8.3.2]

4.8.3.2

Permanent exterior metal handrails ~~and ladders~~ , ladders and other metal components of a structure that are not subject to direct lightning strikes (e.g., ~~on roofs or between roofs~~ within a zone of protection) and are electrically continuous shall be permitted to be used as main and down conductors where the minimum thickness is 0.064 in. (1.63 mm).

Statement of Problem and Substantiation for Public Input

Allows use of metal components other than handrails or ladders as conductors where their thickness is 0.064" or greater.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 12:26:29 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The current language in 4.8.3.2 is a specific exception for ladders and handrails. The proposed text broadens the applicability of the exception, that is outside of the intent of the current language and creates conflict with the requirements of 4.18.1.

Public Input No. 139-NFPA 780-2023 [Section No. 4.8.4.3]

4.8.4.3

~~Conductors~~ All conductors shall be permitted to be routed in an upward coursing for a vertical distance of no greater than 8 in. (200 mm) at through-roof or through-wall connections only, in order to mitigate tripping hazards, provided that the coursing complies with 4.8.5.

Statement of Problem and Substantiation for Public Input

This proposed change aligns the text with the current text in UL 96A which uses the terms main or secondary conductor for the bend radius. This will help eliminate confusion between requirements in common installation standards.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 140-NFPA 780-2023 [Section No. 4.9 [Excluding any Sub-Sections]]	

Submitter Information Verification

Submitter Full Name: Kelly Nicolello
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 11:10:10 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The current language of 4.8.4.3 encompasses ‘conductors’ as defined in NFPA 780. Adding ‘all’ is unnecessary.

Public Input No. 52-NFPA 780-2023 [Section No. 4.8.7.2]

4.8.7.2

Conductors shall be coursed through or around obstructions (e.g., cupolas and ventilators) in a horizontal plane ~~with the main conductor~~ .

Statement of Problem and Substantiation for Public Input

There is no requirement that roof conductors be routed with main conductors.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 10 07:44:15 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-18-NFPA 780-2023
Statement: This clarifies that conductors should be routed in consideration of obstructions in the same horizontal plane as main conductors to avoid U or V pockets.

Public Input No. 140-NFPA 780-2023 [Section No. 4.9 [Excluding any Sub-Sections]]

~~Conductors~~ All conductors shall be fastened to the structure upon which they are placed at intervals not exceeding 3 ft (1 m).

Statement of Problem and Substantiation for Public Input

This proposed change aligns the text with the current text in UL 96A which uses the terms main or secondary conductor for the bend radius. This will help eliminate confusion between requirements in common installation standards.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 139-NFPA 780-2023 [Section No. 4.8.4.3]	

Submitter Information Verification

Submitter Full Name: Kelly Nicolello
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 11:12:27 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The current language of Section 4.9 encompasses ‘conductors’ as defined in NFPA 780. Adding ‘all’ is unnecessary.

Public Input No. 42-NFPA 780-2023 [Section No. 4.11.2]

4.11.2

~~Fittings~~ Connectors used for required connections to metal bodies in or on a structure shall be secured to the metal body by bolting, brazing, welding, screwing, or high-compression connectors listed for the purpose.

Statement of Problem and Substantiation for Public Input

Use of the word "connectors" matches the definition of the term connector added in the last revision.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 09 08:22:07 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-19-NFPA 780-2023
Statement: The language is changed to a defined item in NFPA 780 and makes 4.11.2 consistent with the rest of Section 4.11.

Public Input No. 117-NFPA 780-2023 [Section No. 4.12.1.1]

4.12.1.1*

Each down conductor shall terminate to one of the following:

(1) One or more grounding electrodes dedicated to the lightning protection system

(2)* A grounding electrode system of a building, structure, or facility that has multiple grounding electrodes bonded together ~~with a ground ring electrode meeting the requirements of 4.12.4~~

Statement of Problem and Substantiation for Public Input

In many plants, the grounding system may not encircle some or all structures, yet is more than adequate to act as the lightning protection system ground.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 13:27:55 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The existing text permits all of the grounding electrodes described in the standard.

Public Input No. 18-NFPA 780-2023 [Section No. 4.12.3.2]

4.12.3.2*

The concrete-encased electrode shall consist of one of the following:

(1) Not less than 20 ft (6 m) of bare copper or copper-clad steel main-size conductor

(2) At least 20 ft (6 m) of one or more bare or electrically conductive coated steel reinforcing bars or rods not less than ½ in. (12.7 mm) in diameter that have been effectively bonded together by welding, structural mechanical coupling, or overlapping 20 diameters and wire tying

Statement of Problem and Substantiation for Public Input

Adding CCS to section as a conductor material type

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains Technical Substantiation for CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 09:14:31 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 19-NFPA 780-2023 [New Section after 4.12.4]

40% Copper-Clad Steel for Grounding Ring Electrode.

Conductor material type 40% copper-clad steel may be used as a ground ring electrode

Statement of Problem and Substantiation for Public Input

Adding 40% CCS as a suitable material for direct burial ground rings. 40% CCS has been a mainstay for decades for grounding grids for utility substations. The thick copper cladding adds both corrosion resistance and conductivity to the conductor. Lightning currents occur at high frequency hertz where skin effect comes into play.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains Technical Substantiation for 40% CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 09:19:09 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 146-NFPA 780-2023 [New Section after 4.12.6]

Metallic Piles

Where a building foundation consists of driven metallic piles, the piles may be used as part of the grounding electrode system.

Where a metallic pile is used as a grounding electrode, the down conductor shall be connected to it using in accordance with the requirements of 4.18.3.

Statement of Problem and Substantiation for Public Input

Well, the problem is that the committee rejected my proposal last cycle (*cough*). In reality, however, are you really going to tell a building owner with 30 ft., 1/2" thick cylindrical steel piles that he needs to put a 1/2" x 9' ground rod next to his foundation because that's the best way of grounding out lightning?

Sure, the wording of the addition could be massaged, or qualified in some way, but it doesn't make sense to disallow steel piles as a grounding mechanism.

Submitter Information Verification

Submitter Full Name: Simon Larter
Organization: Dobbyn Lightning Protection
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 13:55:09 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The PI does not address key issues (for example, new construction, non-conductive coating or passivation of the piles), involved with implementing metallic piles as part of the grounding electrode system.

Public Input No. 107-NFPA 780-2023 [Section No. 4.13.6.1]

4.13.6.1

Where bonding of the lightning protection grounding system, grounded media, and buried metallic conductors has not been accomplished at a common point, interconnection shall be provided according to the following:

(1) Grounded media and buried metallic conductors shall be bonded to the lightning protection grounding system below a height 12 ft (3.6 m) vertically above the base of the structure.

(2)* Where grounded media and buried metallic conductors are inherently bonded through construction to the lightning protection grounding system, additional bonding shall be permitted but is not required.

(3) The continuous metal framework of a structure shall be connected to the lightning protection system *(see 4.8.13 and Section 4.18).*

(4) Main-size lightning conductors shall be used for direct connection of grounded media and buried metallic conductors to the lightning protection system.

(5) A continuous metal water pipe system providing interconnection of building grounded systems shall be connected to the lightning protection system.

(6)* Interconnection to a gas line shall be made on the customer's side of the meter.

Statement of Problem and Substantiation for Public Input

This proposal is editorial. It simply inserts "is" before "not required."

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 29 22:56:08 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The addition of 'is' in the text is not necessary.

Public Input No. 93-NFPA 780-2023 [New Section after 4.15.2.4]

4.15.2.5

An electrically insulated lightning protection system may be employed to provide the separation distance required in 4.15.2.4.

Statement of Problem and Substantiation for Public Input

The addition of this content harmonizes NFPA 780 directly to IEC 62305-3 Clause 6.3.2 and introduces electrically insulated lightning protection systems to achieve separation distance.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 36-NFPA 780-2023 [New Section after 3.3.8.7]	Insulated Lightning Protection Systems
Public Input No. 39-NFPA 780-2023 [New Section after 3.3.11.2]	Insulated Lightning Protection Systems

Submitter Information Verification

Submitter Full Name: Michael Boyd
Organization: DEHN Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 22 11:11:46 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: No limits, specifications, use of listed components, etc., exist for electrically insulated lightning protection system components. The proposed text is insufficient to provide guidance for implementing electrical insulation for modifying the separation distance expressed in 4.15.2.4.

Public Input No. 109-NFPA 780-2023 [Section No. 4.15.2.5.1]

4.15.2.5.1

~~Grounded metal bodies shall be bonded to~~
Dangerous sideflash between components of the lightning protection

~~system where located within a calculated bonding distance, *D* , as determined~~
system and grounded metal bodies can be prevented by providing a separation distance, s, between the parts. The general equation for the calculation of s is given by the following formula:

$$D = \frac{h}{6n} \times K_m$$ [

[Insert sideflash - separation calculation formula from IEC 62305-3, Clause 6.3.2 (simplified procedure)]

[4.15.2.5.1]

where:

~~*D*~~ *s* = calculated ~~bonding~~ separation distance

~~*h*~~ *l* = vertical distance between the bond under consideration and the nearest interconnection to the lightning protection system or ground

n = value related to the number of down conductors that are spaced at least 25 ft (7.6 m) apart, located within a zone of 100 ft (30 m) from the bond in question and where bonding is required within 60 ft (18 m) from the top of any structure

K_m = 1 if the flashover is through air; 0.50 if through dense material such as concrete, brick, wood, and so forth

K_i = 0.04

K_c = 1 / n

Additional Proposed Changes

File Name	Description	Approved
4.15.2.5.1_Sideflash_proof_DEHN_Inc.jpg		

Statement of Problem and Substantiation for Public Input

Public input to NFPA 780 on separation / sideflash distance calculation to align NFPA 780 with 62305-3 simplified procedure in 6.3.2, as will be published in Edition 3.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 108-NFPA 780-2023 [New Section after 3.3.34]	Definition of separation distance

Submitter Information Verification

Submitter Full Name: Michael Boyd

Organization: DEHN Inc
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 30 11:25:41 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-84-NFPA 780-2023

Statement: Sideflash voltage is influenced by the impedance of the total distance between the point of consideration and the grounding point or the closest equipotential bonding point. Annex material has been added to point out the similarities between the standards and reasons for the differences. Existing text of 4.15.2.5.2 was moved to the proper location for “n” in equation 4.15.2.5.1.

Public Input No. 110-NFPA 780-2023 [Section No. 4.15.2.6.1]

4.15.2.6.1

~~Grounded metal bodies shall be bonded to~~
Dangerous sideflash between components of the lightning protection

~~system where located within a calculated bonding distance, *D* , as determined~~
system and grounded metal bodies can be prevented by providing a separation distance, s, between the parts. The general equation for the calculation of s is given by the following formula:

$$D = \frac{h}{6n} \times K_m$$ [

[Insert sideflash - separation calculation formula from IEC 62305-3, Clause 6.3.2 (simplified procedure)]

[4.15.2.6.1]

where:

~~*D*~~
s = calculated
~~bonding~~
separation distance
~~*h*~~
l =
~~either the height of the building or the~~
vertical distance
~~from~~
between the
~~nearest bonding connection from the grounded metal body~~
bond under consideration and the nearest interconnection to the lightning protection system
~~and the point on the down conductor where the bonding connection is being considered~~
or
ground

n = value related to the number of down conductors that are spaced at least 25 ft (7.6 m) apart
~~and~~
, located within a zone of 100 ft (30 m) from the bond in question

~~*K m*~~
Km = 1 if the flashover is through air; 0.50 if through dense material such as concrete, brick, wood, and so forth

Ki = 0.04

Kc = 1 / n

Additional Proposed Changes

File Name	Description	Approved

4.15.2.5.1_Sideflash_proof_DEHN_Inc.jpg

Statement of Problem and Substantiation for Public Input

Public input to NFPA 780 on separation / sideflash distance calculation to align NFPA 780 with 62305-3 simplified procedure in 6.3.2, as will be published in Edition 3.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 108-NFPA 780-2023 [New Section after 3.3.34]	Definition of separation distance

Submitter Information Verification

Submitter Full Name: Michael Boyd
Organization: DEHN Inc
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 30 11:58:14 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-85-NFPA 780-2023
Statement: Sideflash voltage is influenced by the impedance of the total distance between the point of consideration and the grounding point or the closest equipotential bonding point. Existing text of 4.15.2.6.2 was moved to the proper location for “n” in equation 4.15.2.6.1.

Public Input No. 94-NFPA 780-2023 [Section No. 4.18.1]

4.18.1 General.

The metal framework or other permanent metal components of a structure shall be permitted to be utilized as the main ~~conductor~~ and down conductors of a lightning protection system if it is equal to or greater than **3**/~~**16** in~~ 0 .064 (4 1 ~~.8 mm~~ 63 mm) ~~in~~ in thickness and is electrically continuous, or it is made electrically continuous by methods specified in 4.18.3.

Statement of Problem and Substantiation for Public Input

Brings thickness requirement into agreement with that of a conductor (per 4.8.3.2, and 4.5.3.5) not strike termination device.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 24 14:02:29 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The general requirement for structural LPS components should not be relaxed based on the exceptions in 4.8.3.2 (handrails & ladders) and 4.5.3.5 (masts). The proposed material specification creates a conflict with the general material specifications of 4.1.1 without additional specification with regard to cross-sectional area, resistance and other material properties.

Public Input No. 95-NFPA 780-2023 [Section No. 4.18.4.1]

4.18.4.1

Grounding electrodes shall be connected to the structural metal framework at intervals around the perimeter averaging not more than ~~60 ft~~ 100 ft (~~18 m~~ 30 m).

Statement of Problem and Substantiation for Public Input

Brings this section into agreement with down conductor and ground electrode spacing found elsewhere in this standard. There is no reason to require more grounding on a structural metallic system than on any other system.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 24 14:18:35 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: There is insufficient technical substantiation that this provides equal or better protection as the existing requirement to permit relaxing the existing requirements. The existing requirement is consistent with other standards (e.g. UL96A) and is consistent with construction methods with typical vertical frame spacing of 30 ft., grounding every other beam. Also accounted for in the existing language is the need to ground based on current division, where each beam in the metal framework down conductor system is effectively a current-carrying conductor.

Public Input No. 82-NFPA 780-2023 [Section No. 4.19.2.11]

4.19.2.11

~~SPDs shall be made inaccessible to unqualified persons unless the SPDs are listed for installation in accessible locations.~~

Statement of Problem and Substantiation for Public Input

This public input deletes 4.19.2.11 as the listing of an SPD per UL 1449 does not include certification for installation in accessible locations. SPDs are either enclosed or of the open-type that are additionally required to be within a suitable enclosure in accordance with NEC, therefore do not represent a hazard where accessible to unqualified persons.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 17 09:26:53 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-26-NFPA 780-2023
Statement: This deletes the section as the listing of an SPD per UL 1449 does not include certification for installation in accessible locations.

Public Input No. 83-NFPA 780-2023 [Section No. 4.19.2.12.1]

4.19.2.12.1

~~A surge-protective device~~ SPDs shall be permitted to be connected between any two conductors — ungrounded conductors, grounded conductors, equipment ~~grounded~~ grounding conductors, or grounding electrode conductors.

Statement of Problem and Substantiation for Public Input

This public input makes two editorial corrections. The spelled-out term “surge-protective device” is shortened to “SPDs” to align with the rest of the sections in 4.19.2 that only use the anacronym. The term “equipment grounded conductors” is changed to “equipment grounding conductors” to align with the defined term in NFPA 70.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 17 09:32:14 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-27-NFPA 780-2023
Statement: This editorial revision matches the section with the rest of Section 4.19. The correct terminology is an equipment grounding conductor.

Public Input No. 84-NFPA 780-2023 [Section No. 4.19.2.13]

4.19.2.13* ~~Earth~~ Grounding Electrode Conductor Connections .

~~The resistance of the earth electrode system used in the grounding of SPDs shall comply with~~ SPD grounding connections shall comply with Article 250 of *NFPA 70*.

Statement of Problem and Substantiation for Public Input

This public input makes editorial revisions to the section to align the standard with section 242.32 of NFPA 70. This change ensures that all GEC connection requirements in Article 250 of the NEC are complied with and not just the circuit impedance.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 17 09:41:09 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-28-NFPA 780-2023
Statement: This removes the term “earth” and adds “system” to better correlate with NFPA 70.

Public Input No. 74-NFPA 780-2023 [New Section after 4.19.2.14.2]

4.19.2.15 SPD's shall be accessible for inspection and maintenance.

Statement of Problem and Substantiation for Public Input

SPD's are not currently required to be accessible for inspection and maintenance.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 13 11:46:42 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-29-NFPA 780-2023
Statement: This adds a requirement for SPDs to be installed where they can be accessed for inspection and maintenance which is currently not addressed in the standard.

Public Input No. 85-NFPA 780-2023 [New Section after 4.19.2.14.2]

4.19.2.15 Indicating.

An SPD shall provide indication that it is functioning properly.

Statement of Problem and Substantiation for Public Input

This public input adds a new section to align NFPA 780-2026 with section 242.9 that was added to NFPA 70-2023. This also ensures that SPDs being installed to comply with or as permitted in NFPA 70 can also qualify as the SPD required or permitted by NFPA 780.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 17 09:45:14 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-30-NFPA 780-2023
Statement: This harmonizes the standard with NFPA 70 and ensures the functionality of the SPD has visual indication.

Public Input No. 70-NFPA 780-2023 [Section No. 4.19.3.7]

4.19.3.7

The conductor between the surge arrester and the line and the surge arrester and the grounding connection shall be not smaller than 6 AWG copper or 4 AWG aluminum, or it shall utilize a conductive material that has a capacity and withstand rating equivalent to at least a 6 AWG copper conductor.

Statement of Problem and Substantiation for Public Input

A 6 AWG aluminum conductor does not have the equivalent ampacity to a 6 AWG copper conductor. Revised section to add an aluminum conductor with ampacity equivalent to a 6 AWG copper conductor.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 13 11:08:56 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-31-NFPA 780-2023
Statement: This adds a corresponding AWG size for aluminum conductors and ensures an alternative conductive material has a withstand rating at least 6 AWG of the copper type conductor.

Public Input No. 75-NFPA 780-2023 [New Section after 4.19.3.8]

4.19.3.9 Surge arresters shall be accessible for inspection and maintenance.

Statement of Problem and Substantiation for Public Input

Surge arresters are not currently required to be accessible for inspection and maintenance.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 13 11:49:33 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-32-NFPA 780-2023
Statement: This adds a requirement for surge arresters to be installed where they can be accessed for inspection and maintenance which is currently not addressed in the standard.

Public Input No. 71-NFPA 780-2023 [Section No. 4.19.4.3]

4.19.4.3*

Surge protectors shall have a maximum discharge current (I_{max}) rating of at least 10 kA 8/20 µs when installed at the ~~entrance~~ service equipment .

Statement of Problem and Substantiation for Public Input

the term "service equipment" is defined in the NEC and NFPA Glossary. "Entrance" is not defined in this application.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 13 11:16:07 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-33-NFPA 780-2023
Statement: Transient energy on communication and signal systems is present on all locations not just at the entrance.

Public Input No. 72-NFPA 780-2023 [Section No. 4.19.4.5]

4.19.4.5* – _

Surge protectors shall be grounded.

4.19.4.5.1– _*

Surge protectors that perform their protection function through isolation shall not be required to be grounded.

4.19.4.5.2*

Surge protectors that do not perform their surge protection function through isolation shall be grounded in accordance with Chapter 8 of *NFPA 70*.

Statement of Problem and Substantiation for Public Input

Annex material applies to ungrounded SPD application

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 73-NFPA 780-2023 [Section No. A.4.19.4.5]	related section in Annex A
Public Input No. 73-NFPA 780-2023 [Section No. A.4.19.4.5]	

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 13 11:27:27 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-34-NFPA 780-2023
Statement: This aligns the annex material with the correct section in 4.19.4.5.1.

Public Input No. 86-NFPA 780-2023 [Sections 4.19.5, 4.19.6]

~~**Sections 4.19.5, 4.19.6**~~

~~**4.19.5** – Communications Surge Protection.~~

~~**4.19.5.1** –~~

~~SPDs shall be provided for all communications systems (including, but not limited to, CATV, alarm, and data systems) and antenna systems at facility entrances.~~

~~**4.19.5.2** –~~

~~SPDs protecting communications systems shall be grounded, with the exception of devices that perform their surge protection function through isolation.~~

~~**4.19.5.2.1** * –~~

~~SPDs for data and signal line protection shall provide common mode protection, with the exception of devices that perform their surge protection function through isolation.~~

~~**4.19.5.3** – Utility-Owned Communication Equipment.~~

~~**4.19.5.3.1** –~~

~~SPDs shall be provided on all proprietary equipment by communication utility providers or tenant communication utilities.~~

~~**4.19.6** – Installation.~~

~~**4.19.6.1** –~~

~~Installation of surge suppression hardware shall conform to the requirements of *NFPA 70* .~~

Statement of Problem and Substantiation for Public Input

This public input deletes sections 4.19.5, 4.19.5.1, 4.19.5.2, 4.19.5.2.1, A.4.19.5.2.1, 4.19.5.3, 4.19.5.3.1, 4.19.6, and 4.19.6.1. These sections were intended to be deleted under balloted and accepted Global FR-17 during the 2023 standards development cycle as the new section 4.19.4 covers all the requirements associated with surge protectors on signal, data, and communications systems that enter or exit a building or structure or supply equipment including proprietary equipment from communication utility providers or the tenant communication utilities.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 17 09:49:50 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-35-NFPA 780-2023

Statement: This deletes legacy language intended to be removed during the last revision cycle. All the corresponding language is included in 4.19.4.

Public Input No. 118-NFPA 780-2023 [Section No. 5.8.3]

5.8.3

Where lights are installed at the perimeter of the pad and extend above the edge of the helipad, air terminals shall be installed ~~adjacent to the fixture~~ to include each light in a zone of protection .

Statement of Problem and Substantiation for Public Input

Clarifies that the purpose of an adjacent air terminal is to include any such lights in a zone of protection.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 13:31:46 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-48-NFPA 780-2023
Statement: This clarifies to the section and helps the user implement this requirement.

Public Input No. 150-NFPA 780-2023 [New Section after 5.9.4.3]

5.10 Outdoor Athletic Scoreboards

The lightning protection systems for outdoor athletic scoreboards that are integrated with egress lighting, and audio mass notification systems shall be examined annually as required in other sections. That examination should include a record of historic activation in nearby lightning protection systems to confirm placement of the sensing components and performance of the integrated systems in the event of a power outage.

Additional Proposed Changes

File Name	Description	Approved
.1685652204608 Looking-west-northwest-from-Virginia-Techs-Lane-Stadium-as-lightning-strikes-at-a_actual_photo.png		

Statement of Problem and Substantiation for Public Input

Large scoreboards installed in outdoor athletic facilities are a central feature of the experience of education community sporting events such as football. This concept should track in this section, at the very least because apart from the wiring fundamentals, many of these scoreboards are integrated with life safety systems,

Submitter Information Verification

Submitter Full Name: Michael Anthony
Organization: Standards Michigan LLC
Affiliation: Standards Michigan, LLC
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 16:31:56 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-49-NFPA 780-2023
Statement: This adds specific requirements and guidance to Chapter 5 along with annex material to add information regarding systems that were not previously addresses and that may be present in athletic field locations.

Public Input No. 20-NFPA 780-2023 [Section No. 6.2.2 [Excluding any Sub-Sections]]

Copper, copper-clad steel and bronze materials used on the upper 25 ft (7.6 m) of a stack shall have a continuous covering of lead having a minimum thickness of 0.064 in. (1.63 mm) to resist corrosion by flue gases.

Statement of Problem and Substantiation for Public Input

Copper-clad steel is a similar material metallugically to copper and bronze.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains Technical Substantiation for CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 13:27:11 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 21-NFPA 780-2023 [Section No. 6.4.1.1]

6.4.1.1

Conductors shall be copper or copper-clad steel , weighing not less than 375 lb per 1000 ft (558 g per m) without the lead coating, or approved corrosion-resistant material or coating.

Statement of Problem and Substantiation for Public Input

Copper-clad steel being added to the section. Copper-clad steel 40% is approximately 9% lighter in weight than single-metal copper. CCS is metallurgically not dissimilar to copper.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 13:29:47 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 101-NFPA 780-2023 [Section No. 7.1.1]

7.1.1*

This chapter shall apply to the protection of structures containing flammable vapors, flammable gases, or liquids that give off flammable vapors. This Chapter does not address threats due to the electromagnetic effects of lightning, such as Lightning Electromagnetic Pulse (LEMP).

Statement of Problem and Substantiation for Public Input

The only way to protect an object from LEMP related-sparking is to provide that object with means of electromagnetic shielding. Rather than make vague recommendations that are difficult to implementation such as “minimize the presence of those vapors in locations that are vulnerable to a source of ignition” as per 7.2.1.1, those sources of ignition should simply be provided with means of EM shielding to eliminate the problem. This chapter does not make any recommendation related to EM Shielding therefore does not address threats due to the electromagnetic effects of lightning such as LEMP but rather gives end users a false sense of security by making ambiguous references to LEMP

Zones of protection as provided by strike termination devices, grounding/bonding and SPDs have no beneficial effect in preventing hazardous sparking due to LEMP.

Consider Fig. 3 of a paper that is referenced in NFPA 780, Annex O, O.1.2.7, Other Publications, “Lightning Rod Improvement Studies”, by Moore et, where corona discharges/currents from grounded lightning rods due to the field effects of nearby lightning strikes (LEMP) are measured. The fact that the lightning rods were grounded did not prevent corona discharges due to LEMP. And there are countless other examples of this phenomenon.

Had the grounded lightning rods in Moore’s paper been grounded pipes at a petrochemical facility, corona discharge could have occurred at the edges of those pipes. Had those pipes been venting flammable vapor and the corona discharge was of sufficient energy to ignite that vapor; a fire could have started. Furthermore, protecting such grounded pipes/vents and storage tanks with strike termination devices, further bonding/grounding and SPDs would have no beneficial effect in preventing corona discharges due to LEMP.

The only way to protect objects that are sensitive to inducing potentials, such as LEMP is to provide them with means of electromagnetic shielding. That’s one reason why sensitive electronics are put in metal enclosures. Despite being connected to SPDs and being shielded from direct strikes, without a metal enclosure, which provides EM shielding, they would be exposed to external interference/inducing potentials including LEMP

Submitter Information Verification

Submitter Full Name: amir rizk
Organization: Lightning Electrotechnologies
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 29 07:01:51 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The proposed text may imply that NFPA 780 does not consider the concerns associated with LEMP. Whereas Chapter 7 does include a number of requirements for which LEMP is a consideration e.g. 7.1.2, 7.2.2, 7.3.5, 7.5, and 7.6.2.

Public Input No. 143-NFPA 780-2023 [Section No. 7.1.2]

7.1.2–

This chapter shall not apply to the protection of structures that have utilization or production equipment with no containment vessels or tanks.

7.1.3

This chapter shall not apply to the protection of nonmetallic tanks containing flammable vapors, flammable gases, or liquids that give off flammable vapors. *(See Annex N.)*

Statement of Problem and Substantiation for Public Input

The title of this chapter and wording throughout discuss structures that “contain” flammables and primarily in tanks or vessels. A new chapter should be written if needed to address the specific concerns regarding structures that produce but do not contain the flammables (ie. production with external tanks from the structure).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 142-NFPA 780-2023 [Global Input]	

Submitter Information Verification

Submitter Full Name: Kelly Nicolello
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 12:45:44 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The existing annex material for 7.1 and 7.1.1 clarifies where this chapter does and does not apply. No additional verbiage is necessary.

Public Input No. 87-NFPA 780-2023 [Section No. 7.3.1]

7.3.1 Materials and Installation.

Conductors, strike termination devices, surge protection ~~devices~~ , and grounding connections shall be selected and installed in accordance with the requirements of Chapter 4 except as modified in this chapter.

Statement of Problem and Substantiation for Public Input

This public input makes an editorial revision to restore the section back to the language used in the 2020 edition of the standard. PI-94 did not recommend adding this term and there appears to be no FR that was created to make this change. The section applies to all surge protection recognized by section 4.19 (SPDs, arresters, and protectors).

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 17 09:51:51 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-37-NFPA 780-2023
Statement: The section is revised to apply to all types of surge protection permitted or required by Section 4.19 and not just SPDs.

Public Input No. 88-NFPA 780-2023 [Section No. 7.3.6.2]

7.3.6.2

Surge ~~protective devices~~ protection means shall be installed outside hazardous (classified) locations where practicable.

Statement of Problem and Substantiation for Public Input

This public input makes an editorial revision to .2 to align with the terminology used in the section title, .1, and .3. All forms of surge protection recognized by section 4.19 (SPDs, arresters, and protectors) should be installed outside HAZ-LOC where practical and not just SPDs. Terminology alignment for this section was intended under FR-19 and PI-95 during the 2023 development cycle.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 17 09:54:25 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-36-NFPA 780-2023
Statement: This ensures all surge protection permitted or required in Section 4.19 is installed outside the hazardous location.

Public Input No. 55-NFPA 780-2023 [Section No. 7.3.7.1]

7.3.7.1

Except as specified in 7.3.7.2 and 7.3.7.3, a ground ring electrode or ground loop conductor supplemented by one or more grounding electrodes, as identified in 4.12.2 through 4.12.7, shall be provided for structures, such as buildings and containers, containing flammable vapors, flammable gases, or liquids that can give off flammable vapors. This shall not apply to tanks and petroleum production, processing, and storage structures.

Statement of Problem and Substantiation for Public Input

The requirement for a group loop conductor for tanks and other production and storage structures makes no sense and is not consistent with grounding requirements in the petroleum industry (see API 2003, 5.4.1 and API 545 A.2 (if available) or with industry practices. This change brings 780 into conformity with API and industry practices. A tank or process vessel is a large steel structure with a large flat bottom pressed to earth with the weight of the tank and its contents. Chapter 7 suggests that a tank be grounded in the same manner as a wood gazebo in somebody's garden. A building, container or similar structure containing flammables should probably be surrounded with a buried ground ring, but not a metal tank. If 780 is to be taken seriously by the petroleum industry, we need to acknowledge industry specific requirements.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 56-NFPA 780-2023 [Section No. 7.3.7.3]	
Public Input No. 89-NFPA 780-2023 [Section No. 7.3.7.4]	

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 16:26:15 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-5-NFPA 780-2023 The information proposed is not necessary in the body of the standard.

Statement: The addition of annex material indicates that 7.3.7.1 does not apply to tanks and petroleum production, processing, and storage structures.

Public Input No. 56-NFPA 780-2023 [Section No. 7.3.7.3]

7.3.7.3

A metal tank shall be grounded using one or more of the following methods:

(1) * The tank shall be connected without insulated joints to a grounded metallic piping system.

(2) The vertical ~~cylindrical~~ , flat-bottom metal tank shall rest on the earth ~~or concrete and shall be at least 20 ft (6 m) in diameter, or it shall rest on bituminous pavement and be at least 50 ft (15 m) in diameter~~ , bitumen, or concrete .

(3) The tank shall be grounded through a minimum of two grounding electrodes, as described in Section 4.12, at a maximum of 100 ft (30 m) intervals along the perimeter of the tank.

(4) The tank shall be grounded at a minimum of two locations along the perimeter of the tank to a site grounding system.

Statement of Problem and Substantiation for Public Input

While any of these methods may be appropriate for a house, barn, or building, a steel tank or process vessel is different with different properties and requirements. There are tens of thousands of flat-bottom steel tanks in the world that are living happy and undamaged lives through inherent self-grounding. Petroleum industry standards acknowledge this fact (see API 2003, 5.4.1 and API 545 A.2 (if available). The petroleum industry will not adopt NFPA 780 if we presume to tell them that they have to ground tanks like a building. This change brings 780 into conformity with API and industry practices.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 55-NFPA 780-2023 [Section No. 7.3.7.1]	tank grounding

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 16:28:43 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-69-NFPA 780-2023

Statement: There is no known technical justification to maintain the minimum diameter requirement for the tanks within the methods recommended for grounding metal tanks provided in 7.3.7.3. The addition of item 4 introduces an alternative grounding method.

The annex material is necessary on account the removal of 7.3.7.4 in the body of NFPA

780 which had addressed the use of insulating membranes.

Public Input No. 92-NFPA 780-2023 [New Section after 7.3.7.4]

TITLE OF NEW CONTENT

Additional grounding considerations

Type your content here ...

Grounding for purposes other than lightning protection is not addressed or included in this section, but shall be considered by the owner/operator.

Statement of Problem and Substantiation for Public Input

Cautions that lightning protection grounding may not meet grounding requirements for other purposes.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 19 16:10:30 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-8-NFPA 780-2023
Statement: New Section 7.3.7.5 cautions that lightning protection grounding may not meet grounding requirements for other purposes.

Public Input No. 89-NFPA 780-2023 [Section No. 7.3.7.4]

7.3.7.4

Where a tank is installed over an insulating membrane for environmental or other reasons, it shall be grounded as described in 7.3.7.3 (1) ~~or~~ , 7.3.7.3 (2), 7. 3.7.3 (3), or 7 . 3.7.3.(4).

Statement of Problem and Substantiation for Public Input

Petroleum industry standards impose no additional or special grounding requirements for tanks or other structures installed over containment or other liners. While it may seem counter-intuitive to those in the lightning rod industry, there are tens of thousands of flat-bottom steel tanks in the world that are living happy and undamaged lives through inherent self-grounding over membranes. Petroleum industry standards acknowledge this fact. They will not adopt NFPA 780 if we presume to tell them that they have to do other than what has been working effectively for many years. Containment or other membranes do not effect inherent self-grounding and field experience of many tanks over many years supports this.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 55-NFPA 780-2023 [Section No. 7.3.7.1]	tank grounding

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 19 14:27:35 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-7-NFPA 780-2023

Statement: The topic of how to ground tanks installed upon insulating membranes is relocated to A.7.3.7.3 and 7.3.7.3. Insulating membranes are considered to have no effect on the selection of a particular grounding method.

Public Input No. 90-NFPA 780-2023 [Section No. 7.4]

7.4 Operating Facilities (~~Non-~~ Storage Applications).

7.4.1*

Structures containing hazardous (classified) locations used for ~~non-~~ storage applications shall comply with the requirements of Section 7.3 unless justified by a lightning risk assessment.

Statement of Problem and Substantiation for Public Input

Brings this section into conformance with petroleum industry standards and practices by eliminating such studies for non-storage facilities.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 19 14:46:53 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Section 7.4 addresses non-storage structures. Therefore the “non” should remain in 7.4 and 7.4.1.

Public Input No. 58-NFPA 780-2023 [Section No. 7.4.1]

7.4.1*

Structures containing hazardous (classified) locations used for ~~non-~~ storage applications shall comply with the requirements of Section 7.3 unless justified by a lightning risk assessment.

Statement of Problem and Substantiation for Public Input

Petroleum industry standards and practices do not require this for non-storage facilities.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 16:38:57 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Section 7.4 addresses non-storage structures. Therefore the “non” should remain in 7.4 and 7.4.1.

Public Input No. 59-NFPA 780-2023 [Section No. 7.6.2.1.1]

7.6.2.1.1

Metallic primary shoe seals shall be electrically bonded to the floating roof either inherently — through design and construction — or by a minimum of one Class I lightning protection conductor or an equivalent~~- at each end of each shoe~~ .

Statement of Problem and Substantiation for Public Input

Because of bonding provided by the shoe hanger structure along a metallic primary shoe seal, only one bonding jumper should be required.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 16:41:32 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-9-NFPA 780-2023
Statement: Adequate bonding can be achieved by using only one bonding jumper.

Public Input No. 102-NFPA 780-2023 [Section No. 7.6.2.2]

~~**7.6.2.2** * – Fixed Contacts.~~

~~**7.6.2.2.1** –~~

~~The tank's floating roof shall be bonded to the tank shell by a direct electrical connection using a bypass conductor with a minimum cross-sectional area equivalent to that of a main-size conductor.~~

~~**7.6.2.2.2** –~~

~~Each conductor, including the connectors, shall have a maximum end-to-end electrical resistance of 0.03 ohm.~~

~~**7.6.2.2.3** –~~

~~The bypass conductor shall be of the minimum length necessary to permit full movement of the floating roof.~~

~~**7.6.2.2.4** –~~

~~Bypass conductors shall be installed as follows:~~

(1) ~~A minimum of two bypass conductors shall be installed.~~

(2) ~~Bypass conductors shall be installed for every 100 ft (30 m) of the tank perimeter or portion thereof.~~

(3) ~~Conductors shall be evenly spaced around the tank circumference.~~

~~**7.6.2.2.5** –~~

~~Where there is a rolling ladder, one of the required bypass conductors shall be installed along and bonded to the rolling ladder.~~

~~**7.6.2.2.6** –~~

~~The bypass conductor bonded to the rolling ladder shall be a continuous conductor bonded at one end to the floating roof and at the other end to the tank shell.~~

~~**7.6.2.2.7** * –~~

~~The bypass conductors and terminations shall be positioned and of sufficient flexibility, cross-sectional area, and corrosion resistance to maximize service life.~~

Statement of Problem and Substantiation for Public Input

Section 7.6.2.2 "Fixed Contacts" contradicts Section C.2.2 "Inductive Effect" of NFPA 780, and can increase the risk of lightning related fires.

If one considers the implications of the magnetic field component of lightning related waves/fields as explained in C.2.2 of NFPA 780, one should see why 7.6.2.2 is potentially hazardous. 7.6.2.2 of NFPA 780 amounts to installing a conducting loop onto the tank that could enhance sparking at the unavoidable gaps between the floating roof and tank shell. A loop such as BCDEF of Fig C.2 from C.2.2 of NFPA 780 is created, where BC is the tank wall, EF is the tank roof and CDE is the bypass conductor. The magnetic fields generated by a nearby strike could penetrate this loop creating a potential difference at the unavoidable gaps between the floating roof and tank wall BF.

This section originates from the deeply flawed API 545 "Recommended Practice for Lightning Protection of Aboveground Storage Tanks for Flammable or Combustible Liquids" . The basic

understanding of lightning expressed in API 545 is principally rooted in pre WW1 concepts whereby the effects of nearby strikes are expressed as current flows and it excludes any actual consideration for the existence of lightning electromagnetic fields/waves produced by the return stroke. The claimed benefit of conducting the intermediate and long component of the lightning current waveform because the fast component is too fast to start a fire is not technically justified. A negative streamer can grow several meters in length in 1 microsecond, with more than enough thermal energy to ignite a wide range of flammable materials.

Submitter Information Verification

Submitter Full Name: amir rizk
Organization: Lightning Electrotechnologies
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 29 07:10:16 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Section 7.6.2.2 addressing fixed contacts was not removed from the standard as it provides valuable information to users of the standard.

Public Input No. 60-NFPA 780-2023 [Section No. 7.8.4]

7.8.4

Ground-level potential equalization shall be established within the tank battery through interconnection of metallic components, ~~underground~~ piping, and grounding systems.

Statement of Problem and Substantiation for Public Input

Piping needs to be bonded whether above ground or buried. Above ground piping provides the same bonding qualities as underground piping and therefore should be allowed.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 16:45:44 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-10-NFPA 780-2023
Statement: Metallic piping needs to be bonded whether the piping is above the ground or buried below the ground. Piping above the ground provides the same bonding qualities as underground piping and therefore should be allowed.

Public Input No. 61-NFPA 780-2023 [Section No. 7.8.5]

7.8.5*

In locations where direct strikes or arcing is likely to occur, operating techniques and engineering methods shall be used to minimize the accumulation of flammable vapors in areas where a source of ignition is likely to be present.

Statement of Problem and Substantiation for Public Input

Operating techniques probably have a greater, more immediate, and easier to implement effect on controlling ignitions.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 16:46:24 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-11-NFPA 780-2023
Statement: Operating and maintenance techniques in addition to proper engineering methods also help to minimize the accumulation of flammable vapors.

Public Input No. 99-NFPA 780-2023 [Section No. 8.2.2]

8.2.2 Electromagnetic Coupling.

Where the effects of electromagnetic coupling are of concern, ~~a mast or overhead wire (catenary) system shall be installed.~~ see 8.3.2.

Statement of Problem and Substantiation for Public Input

Per my understanding, the threat of electromagnetic coupling would typically mean that the object to be protected is sensitive to electromagnetic fields/waves. The more hazardous lightning related EM waves are comparable to AM radio waves in the 1 MHz range. A catenary system would do as much to protect an object from the threat of electromagnetic coupling as it would in preventing AM radio waves from reaching a radio underneath that catenary system. A catenary system is an effective means of protection from direct lightning strikes but it has no meaningful effect on threats due to electromagnetic coupling, neither does grounding/bonding or SPDs. None of these methods do anything to prevent radio waves from reaching the radio.

The only way to protect objects that are sensitive to electromagnetic coupling/inducing potentials, such as LEMP is to provide them with means of electromagnetic shielding. That's one reason why sensitive electronics are put in metal enclosures. Despite being connected to SPDs and being shielded from direct strikes, without a metal enclosure, which provides EM shielding, they would be exposed to external interference/inducing potentials including LEMP. Section 8.3.2 makes reference to some kind of EM shielding

Submitter Information Verification

Submitter Full Name: amir rizk
Organization: Lightning Electrotechnologies
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 29 06:43:12 EDT 2023
Committee: LIG-AAA

Committee Statement

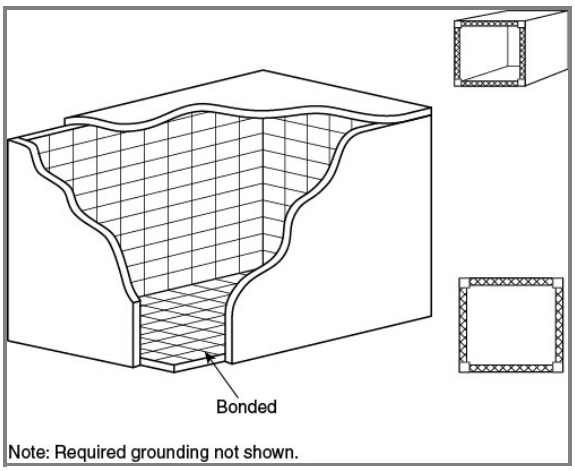
Resolution: FR-42-NFPA 780-2023
Statement: The need for the Faraday caged LPS is dependent on the sensitivity of the explosives operations conducted. In some cases, the separation accomplished by the mast or catenary system is sufficient.

Public Input No. 100-NFPA 780-2023 [Section No. 8.3.2]

8.3.2* Metallic (Faraday-Like) Cage.

Where optimum protection for structures housing explosives is required, such as protection from electromagnetic coupling or inducing potentials such as LEMP (as determined by the AHJ), a grounded, continuously conductive enclosure of adequate thickness , as shown in Figure 8.3.2, shall be used.

Figure 8.3.2 Metallic (Faraday-Like) Cage.



Statement of Problem and Substantiation for Public Input

I clarified that this section describes a form of protection against EM coupling. I did this because I included a reference in section 8.2.2 to this section. Although “a continuously conductive enclosure” may be a very effective means of EM shielding if properly executed, it’s a vague description that might not be the most economical or practical design.

Submitter Information Verification

Submitter Full Name: amir rizk
Organization: Lightning Electrotechnologies
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 29 06:49:41 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-43-NFPA 780-2023
Statement: This revision highlights the protective characteristics of a Faraday LPS system against the effects of LEMP.

Public Input No. 22-NFPA 780-2023 [Section No. 8.4.2.4]

8.4.2.4*

Ground ring electrodes shall be bare 40% copper or copper-clad steel conductors meeting or exceeding 105,000 circular mils.

Statement of Problem and Substantiation for Public Input

Adding CCS 40% as grounding electrode ring material.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains Technical Substantiation on CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 13:45:16 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 6-NFPA 780-2023 [Section No. 8.10.7 [Excluding any Sub-Sections]]

The lightning protection system ~~shall be tested electrically~~ on explosives facilities shall have bond resistance and earth to grounding electrode resistance tests performed at least every 14 months.

Statement of Problem and Substantiation for Public Input

The current language in this statement does not specify the type of electrical tests to be performed. Even though the subsections below imply that these two tests be performed, it can be interpreted that the tests are optional and if performed meet the 200 milli-ohms for bond resistance and use the three point fall of potential test for ground to electrode resistance test. Putting the proposed language specifies what tests are to be performed and the existing language will support those tests.

Submitter Information Verification

Submitter Full Name: Samuel Garcia
Organization: Triad LLC (LANL)
Affiliation: Department of Energy
Street Address:
City:
State:
Zip:
Submittal Date: Wed Apr 26 17:55:12 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The proposed substantive changes to 8.10.7 are already included in the daughter sections of 8.10.7.

Public Input No. 7-NFPA 780-2023 [New Section after 8.10.7.6]

Testing on Other than Single Ground Rod Electrode Systems

Performing the three point fall of potential test on other than single ground rod electrodes is permissible.

Statement of Problem and Substantiation for Public Input

The three point fall of potential test is meant for single ground rod electrodes. It can be interpreted by personnel who understand this that performing this test on other than single rod electrodes is not acceptable or permissible. It is important to perform this test to be able assess the condition of the electrode system and having this allowance will facilitate this.

Submitter Information Verification

Submitter Full Name: Samuel Garcia
Organization: Triad LLC (LANL)
Affiliation: Department of Energy (DOE)
Street Address:
City:
State:
Zip:
Submittal Date: Wed Apr 26 18:12:38 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: The current wording of 8.10.7.6 requires the three-point-fall test method to be conducted for grounding systems, this is inclusive of “other than single ground rods”.

Public Input No. 8-NFPA 780-2023 [Section No. 8.10.7.6]

8.10.7.6

The three-point fall-of-potential test method shall be used when measuring the resistance to earth of grounding systems for explosives facilities. When space or other issues prevent ability to drive test stakes/rods to properly perform the three-point fall-of potential test, it is permissible to use a clamp on ground resistance meter to perform the test.

Statement of Problem and Substantiation for Public Input

There are cases where it is not possible to perform three-point fall-of-potential ground resistance test due to space limitations e.g. other structures or other reasons inability to drive test rods due to concrete, streets etc. Allowing the ability to use a clamp-on ground resistance meter will allow the ground resistance test to be performed in these situations.

Submitter Information Verification

Submitter Full Name: Samuel Garcia
Organization: Triad LLC (LANL)
Affiliation: Department of Energy
Street Address:
City:
State:
Zip:
Submittal Date: Thu Apr 27 11:40:42 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-44-NFPA 780-2023
Statement: The implementation of the clamp on style meter will require AHJ to ensure the proper use for this application.

Public Input No. 23-NFPA 780-2023 [Section No. 10.2.2.1]

10.2.2.1

Copper ~~conductors~~ and 40% copper-clad steel conductors shall be tinned.

Statement of Problem and Substantiation for Public Input

Copper-clad steel 40% is approximately 9% lighter than copper, not dissimilar metallurgically to copper (equivalent galvanic corrosion potentials), and has a long history of use in marine environments.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 13:56:02 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 24-NFPA 780-2023 [Section No. 10.2.2.2]

10.2.2.2

All copper and 40% copper-clad steel conductors shall be of the grade required for commercial electrical work~~ and shall have at least 95 percent of the conductivity of pure copper~~ .

Statement of Problem and Substantiation for Public Input

Electrical currents from lightning strikes occur at extremely high frequencies. At such frequencies, the current travels at the perimeter and surface of the conductor, and not at the conductor's core. The conductivity IACS of the total conductor is of little consequence when considering CCS 40%. What matters is that the surface and perimeter of the conductor is 95% minimum IACS. At frequencies in the range of lightning strikes, CCS 40% has equivalent resistance to single-metal copper.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains Technical Substantiation on CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 14:00:04 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 25-NFPA 780-2023 [Section No. 10.2.2.3]

10.2.2.3

The use of conducting materials other than copper, such as 40% copper-clad steel, aluminum, stainless steel, and bronze, shall be permitted, provided they meet all requirements in this chapter.

Statement of Problem and Substantiation for Public Input

Adding CCS 40% as an alte

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 14:13:28 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 26-NFPA 780-2023 [Section No. 10.4.1.1]

10.4.1.1*

A main conductor made of copper ~~shall~~ or 40% copper-clad steel shall have a cross-sectional area of at least 0.033 in.^{2} (21 mm^2).

Statement of Problem and Substantiation for Public Input

Adding 40% copper-clad steel as an alternative.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains Technical Substantiation on 40% CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 14:15:24 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 27-NFPA 780-2023 [Section No. 10.4.2.1]

10.4.2.1

A bonding conductor made of copper ~~shall~~ or 40% copper-clad steel shall have a cross-sectional area of at least 0.013 in.^{2} (8.3 mm^2).

Statement of Problem and Substantiation for Public Input

Adding CCS 40% as an alternative.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains Technical Substantiation of CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 14:16:56 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 28-NFPA 780-2023 [Section No. 10.4.5.2.1]

10.4.5.2.1

The minimum contact area for a connection in a main conductor shall be given by 10.4.1.1 (for copper or 40% copper-clad steel), 10.4.1.2 (for aluminum), or 10.4.1.3 (for other metals).

Statement of Problem and Substantiation for Public Input

Adding 40% copper-clad steel as an alternative.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains Technical Substantiation on CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 14:19:09 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 29-NFPA 780-2023 [Section No. 11.4.1.1]

11.4.1.1*

The counterpoise conductor shall be a bare, annealed, or soft drawn, solid copper ~~conductor~~ or 40% copper-clad steel conductor not smaller than 6 AWG.

Statement of Problem and Substantiation for Public Input

Adding CCS 40% as an alternative.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains Technical Substantiation on CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 14:22:27 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 30-NFPA 780-2023 [Section No. 11.4.1.2]

11.4.1.2*

In locations where bare copper ~~counterpoise~~ or 40% copper-clad steel counterpoise conductors will be adversely affected by the environment, corrosion-resistant materials (e.g., tinned copper, stainless steel) as permitted by the AHJ shall be utilized.

Statement of Problem and Substantiation for Public Input

Adding CCS 40% as an alternative.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 14:24:00 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 31-NFPA 780-2023 [Section No. 11.4.2.5]

11.4.2.5

Reinforcing steel, where used as part of the light base installation, shall be bonded to the metallic light base using a minimum 6 AWG bare solid copper ~~conductor~~ or 40% copper-clad steel conductor .

Statement of Problem and Substantiation for Public Input

Adding CCS 40% as an alternative.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains technical substantiation on CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 14:25:19 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 32-NFPA 780-2023 [Section No. 11.4.2.6.2.2]

11.4.2.6.2.2*

Each light base or mounting stake shall be provided with a grounding electrode in accordance with one of the following methods:

(1) Where a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a minimum 6 AWG bare, annealed, or soft drawn, solid copper or 40% copper-clad steel conductor.

(2) Where a nonmetallic light base is used, the grounding electrode shall be bonded to the metallic light fixture or metallic base plate with a minimum 6 AWG bare, annealed, or soft drawn, solid copper ~~conductor~~ or 40% copper-clad steel conductor .

Statement of Problem and Substantiation for Public Input

Adding CCS 40% as an alternative.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains the technical substantiation for CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 14:27:52 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel

portion of the CCS and at exposed ends of the conductor.

Public Input No. 33-NFPA 780-2023 [Section No. 11.4.6 [Excluding any Sub-Sections]]

A minimum 6 AWG stranded copper or 40% copper-clad steel green insulated bonding jumper shall be installed between the following items:

(1) In-pavement airfield lighting fixture and the metallic light base

(2) Elevated fixture base plate and metallic light base

(3) Surge arresters and metallic light base

Statement of Problem and Substantiation for Public Input

Adding CCS 40% as an alternative. Annealed CCS 40% strand has long been the backbone of utility grounding.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains the technical substantiation for CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 14:30:12 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 46-NFPA 780-2023 [Section No. A.3.3.24]

A.3.3.24 Light Base.

The light base is cylindrically shaped with a closed bottom and a top flange to mate with an airfield fixture or cover. Currently available light bases have provisions for cable or conduit entry and exit and provisions for bonding.

Type L-867 light bases and extensions are used for applications subject to occasional light vehicular loading but no aircraft or other heavy vehicular loading. Type L-868 light bases and extensions are used for applications subject to aircraft and other heavy vehicular loading. Light bases, which can be fabricated from metallic or nonmetallic materials, serve as a connection point for the raceway and housing for mounting the light fixture. Light bases are subject to direct earth burial with or without concrete backfill. Drain connections, load rings, and other options are available for the light base.

Additional information can be found in FAA Advisory Circular 150/5345-42J, 42K, *Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories*.

Statement of Problem and Substantiation for Public Input

Confirm 150/5345-42J is still current edition. Typical all FAA Advisory Circular references throughout document.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 09 08:53:27 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FAA Advisory Circular 150/5345-42K is in the draft stage. Its status should be reviewed at the NFPA 780 Second Draft stage.

Public Input No. 34-NFPA 780-2023 [Section No. A.4.1.1.1]

A.4.1.1.1

Main-size lightning conductors are not manufactured to standard American Wire Gauge (AWG) sizes. Bare AWG conductors are not typically “listed for the purpose” for lightning protection by any listing authority. Table A.4.1.1.1 provides comparisons between lightning protection conductors and the closest AWG sizes from Table 8 in Chapter 9 of *NFPA 70*.

Table A.4.1.1.1 Lightning Protection Conductors

Lightning Conductor	Area
Class I main-size copper ~~lightning~~ or 40% copper-clad steel lightning conductor	57,400 cir. mils
#2 AWG	66,360 cir. mils
#3 AWG	52,620 cir. mils
Class I main-size aluminum lightning conductor	98,600 cir. mils
#1 AWG	83,690 cir. mils
#1/0 AWG	105,600 cir. mils
Class II main-size copper or 40% copper-clad steel lightning conductor	115,000 cir. mils
#1/0 AWG	105,600 cir. mils
#2/0 AWG	133,100 cir. mils
Class II main-size aluminum lightning conductor	192,000 cir. mils
#3/0 AWG	167,800 cir. mils
#4/0 AWG	211,600 cir. mils
Lightning bonding conductor	-
~~Copper~~ Copper or 40% Copper-clad steel	26,240 cir. mils
#6 AWG	26,240 cir. mils
Lightning bonding conductor	-
Aluminum	41,100 cir. mils
#4 AWG	41,740 cir. mils

Statement of Problem and Substantiation for Public Input

Adding CCS 40% as an alternative. Regardless of the conductor material, the Main size will be the same.

Related Public Inputs for This Document

Related Input	Relationship

Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	Contains the technical substantiation for CCS
Public Input No. 10-NFPA 780-2023 [New Section after 3.3.9]	

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Sat Apr 29 14:38:34 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Insufficient technical data has been provided to consider 40% CCS 100% equivalent to copper in characteristics and performance. The equivalency to copper is more than conductivity. IEC 62561-1 testing should be performed to assess outstanding issues. Testing should address abrasion during installation, compatibility with connectors permitted by NFPA 780. Exothermic welding, high compression connectors, crimp connectors and bolted connections may damage the copper coating. Equivalency must also be demonstrated with CCS ability to withstand mechanical forces exerted by lightning and must demonstrate frequency response to adequately address lightning environments. Testing should address corrosion where a connector penetrates the steel portion of the CCS and at exposed ends of the conductor.

Public Input No. 121-NFPA 780-2023 [New Section after A.4.2.2.3.1]

A.4.1.1.3

Where Class II conductors are required, the impedance of the current path to ground is an important factor in limiting the voltage at upper parts of the structure. For multi-level structures that contain both Class I and Class II components, the impedance of the Class II conductors must be maintained throughout its path to ground. This may be achieved through a continuous path of Class II conductors or through current division using some components of the current dissipation systems that are equipped with Class I materials.

Statement of Problem and Substantiation for Public Input

There appears to be a conflict between the requirements of 4.1.1.2 and 4.1.1.3 for conductors. In 4.1.1.2, if part of a structure exceeds 75 ft (23 m) in height (e.g., a steeple) and the remaining portion does not exceed 75 ft (23 m) in height, the requirements for Class II air terminals and conductors shall apply only to that portion exceeding 75 ft (23 m) in height. However, 4.1.1.3 requires that Class II conductors from the higher portion shall be extended to ground and shall be interconnected with the balance of the system. This seems to infer that Class II conductors extend to the ground and interconnect with the grounding electrode(s) and existing potential equalization network, etc.
The proposed new A.4.1.1.3 attempts to clarify the conflict and explain the process to be followed where there is a mixture of Class I and Class II requirements on a structure.

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 13:52:43 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-12-NFPA 780-2023
Statement: The new annex clarifies that the Class I components in a mixed class I and II structure share in the current division during conduction of lightning current to ground, thus lowering overall system impedance.

Public Input No. 68-NFPA 780-2023 [New Section after A.4.4.1]

A.4.4.2 Whenever a ferrous metal sleeve encloses/encircles a lightning protection conductor the LPS conductor should be bonded to the sleeve at each end. Skin effect will keep the higher frequency components of the lightning impulse current on the outer sleeve while the lower frequency currents flow through the lower resistance LPS conductor. The bond eliminates arcing that can damage the conductor. . .

Additional Proposed Changes

File Name	Description	Approved
Alum_Wet_Concrete_IMG_4456.jpg	un-bonded ferrous metal sleeve in parking garage deck	

Statement of Problem and Substantiation for Public Input

No minimum length of sleeve encircling a LPS conductor is provided. Sleeves thru floors and conduit hangers are typically omitted. If a down conductor is routed around the rebar in a tall concrete column what impact does the rebar encircling the conductor have on the impedance of the system or arcing within the concrete between the conductor and rebar. The vertical bars will be bonded top and bottom, what about the horizontal rings in between?
A short ferrous metal sleeve 8 in. or less in length will present a negligible effect and therefore needs to be bonded at only one end. A very short sleeve (less than 2 in.),i.e. ferrous metal conduit strap, and the like will present a negligible effect and will not require bonding

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 67-NFPA 780-2023 [New Section after A.4.8.8.1]	same topic different section
Public Input No. 81-NFPA 780-2023 [New Section after 4.4.2]	related material
Public Input No. 67-NFPA 780-2023 [New Section after A.4.8.8.1]	
Public Input No. 81-NFPA 780-2023 [New Section after 4.4.2]	

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 13 10:34:51 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-15-NFPA 780-2023 Response to PI 67: The proposed annex material was incorporated into this revision.

Statement: The requirement to bond metal penetrations of LPS conductors is not explained elsewhere in the standard. Annex A.4.4.2 assists in correct implementation of the normative requirements.

Calculation of the potential for sideflash in down conductors routed through minimal length metal sleeve suggests little impact. The minimal length metal sleeve bonding rules can be relaxed.

Public Input No. 50-NFPA 780-2023 [New Section after A.4.5.2.1]

A.4.5.4.4 Need help with this text. Minimum sag is not defined in standard. How much sag is permissable, how does conductor movement impact the zone of protection?

Statement of Problem and Substantiation for Public Input

"minimum sag under all conditions" is a catch all term and needs to be defined. How do we enforce this requirement?

Style manual states:
3.2.2 Expressing Maximum and Minimum Limits. Maximum and minimum limits shall be expressed with the types of wording shown in the following examples:
Examples:
Shall not exceed 300 volts to ground . . .
Shall have a clearance of not less than 5 cm (2 in). . .
Shall be supported at intervals not exceeding 1.5 m (5 ft.). . .

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 10 06:56:18 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-16-NFPA 780-2023
Statement: This revision clarifies permissible sag in overhead ground wires.

Public Input No. 51-NFPA 780-2023 [Section No. A.4.7.2.3]

A.4.7.2.3

The purpose of Figure 4.7.2.4 3 (b) is to provide a graphical representation of the area protected by the upper roof. The reference point is the eave because the criteria in 4.7.3 have been met and, thus, air terminals are not required on the ~~ridge~~ eave . It has been determined that this area is not susceptible to a direct strike.

Statement of Problem and Substantiation for Public Input

first change corrects figure reference and the 2 to 1 slope is referenced to the eave.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 10 07:34:26 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-17-NFPA 780-2023
Statement: The explanatory annex material is corrected by referring to the correct figure and to the correct nomenclature in the figure (i.e., eave, not ridge).

Public Input No. 67-NFPA 780-2023 [New Section after A.4.8.8.1]

A.4.8.11 Whenever a ferrous metal sleeve encloses/encircles a lightning protection conductor the LPS conductor should be bonded to the sleeve at each end. Skin effect will keep the higher frequency components of the lightning impulse current on the outer sleeve while the lower frequency currents flow through the lower resistance LPS conductor. The bond eliminates arcing that can damage the conductor.

Additional Proposed Changes

File Name	Description	Approved
Alum_Wet_AlumIMG_4473.jpg	ferrous metal sleeve through parking garage deck - not bonded	
PVC_Conduit_with_metal_strap_encircling_down_cond_IMG_4322.jpg	down conductor in PVC conduit encircled by ferrous metal conduit strap and hamger	

Statement of Problem and Substantiation for Public Input

No minimum length of sleeve encircling a LPS conductor is provided. Sleeves thru floors and conduit hangers are typically omitted. If a down conductor is routed around the rebar in a tall concrete column what impact does the rebar encircling the conductor have on the impedance of the system or arcing within the concrete between the conductor and rebar. The vertical bars will be bonded top and bottom, what about the horizontal rings in between?
A short ferrous metal sleeve 8 in. or less in length will present a negligible effect and therefore needs to be bonded at only one end. A very short sleeve (less than 2 in.),i.e. ferrous metal conduit strap, and the like will present a negligible effect and will not require bonding.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 68-NFPA 780-2023 [New Section after A.4.4.1]	related material
Public Input No. 81-NFPA 780-2023 [New Section after 4.4.2]	related material
Public Input No. 68-NFPA 780-2023 [New Section after A.4.4.1]	
Public Input No. 81-NFPA 780-2023 [New Section after 4.4.2]	

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 13 10:14:04 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-15-NFPA 780-2023 Response to PI 67: The proposed annex material was incorporated into this revision.

Statement: The requirement to bond metal penetrations of LPS conductors is not explained elsewhere in the standard. Annex A.4.4.2 assists in correct implementation of the normative requirements.

Calculation of the potential for sideflash in down conductors routed through minimal length metal sleeve suggests little impact. The minimal length metal sleeve bonding rules can be relaxed.

Public Input No. 5-NFPA 780-2023 [Section No. A.4.13.3]

A.4.13.3

The definitions in *NFPA 70(NEC)* and in this standard for *bonded (bonding)*, *grounded*, *grounding*, and *grounding electrode* are similar. The actual sections in the *NEC* and in this standard that define what constitutes these various items point to differences in application, equipment, and requirements.

Section 250.50 of the *NEC* requires that all electrodes present at each building or structure be bonded together to form the grounding electrode system, which coordinates with the requirements of Section 4.13 of this standard. The differences occur in 250.52 of the *NEC*, which describes grounding electrode devices not shown in Section 4.12. Grounding electrode devices described in 250.52 of the *NEC* but not referenced in this document include the following:

(1) 250.52(A)(1): 10 ft (3 m) of metallic underground water pipe that extends from the structure in contact with earth.

(2) 250.52(A)(2): The 10 ft (3 m) metal in-ground support structure with or without concrete encasement that is in contact with earth.

(3) 250.52(A)(3)(2): The concrete-encased electrode described as #4 AWG, which would need to be a main-size conductor per 4.12.3.2.

(4) 250.52(A)(4): The ground ring electrode not smaller than 2 AWG that is acceptable for Class I but would not be acceptable for Class II *(see Table 4.1.1.1.2)*.

(5) 250.52(A)(5): Pipe electrodes described in item (a), which are not included, and rod electrodes described in item (b) as zinc-coated steel, which are not covered *(see 4.12.2.2)*.

(6) 250.52(A)(6): Other listed electrodes, which would need to comply with the various paragraphs of Section 4.12.

(7) 250.52(A)(7): Plate electrodes, which would need to comply with 4.12.6.

(8) 250.52(A)(8): “Other local metal underground systems or structures,” which are not referenced as grounding electrodes in this standard.

The lightning protection system designer must be familiar with these differences to coordinate interconnection with other building grounding electrodes or the structural grounding electrode system as required by 4.13.3.

Where separate but adjacent buildings or facilities are interconnected directly (not through a utility) by electric, CATV, CCTV, data, or communications wiring, the grounding systems of those buildings should be directly interconnected with a main-size conductor. The need for this interconnection can be eliminated with the use of fiber-optic cable, shielded wire, wire run in grounded metallic conduit, or cascading surge protection [surge arresters, surge protective devices (SPDs), or surge protectors installed at the entrance(s) and exit(s) of buildings or facilities].

Statement of Problem and Substantiation for Public Input

Added the 10' (3 m) with or without concrete encasement requirement to add clarity to this grounding electrode permitted by NFPA 70, National Electric Code.

Submitter Information Verification

Submitter Full Name: Christine Porter

Organization: Intertek Testing Services
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 14 13:55:04 EST 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-20-NFPA 780-2023
Statement: The text is revised for consistency with the NEC and that the interconnections could be minimized as opposed to eliminated.

Public Input No. 69-NFPA 780-2023 [Section No. A.4.13.3]

A.4.13.3

The definitions in *NFPA 70(NEC)* and in this standard for *bonded (bonding)*, *grounded*, *grounding*, and *grounding electrode* are similar. The actual sections in the *NEC* and in this standard that define what constitutes these various items point to differences in application, equipment, and requirements.

Section 250.50 of the *NEC* requires that all electrodes present at each building or structure be bonded together to form the grounding electrode system, which coordinates with the requirements of Section 4.13 of this standard. The differences occur in 250.52 of the *NEC*, which describes grounding electrode devices not shown in Section 4.12. Grounding electrode devices described in 250.52 of the *NEC* but not referenced in this document include the following:

(1) 250.52(A)(1): 10 ft (3 m) of metallic underground water pipe that extends from the structure in contact with earth.

(2) 250.52(A)(2): The metal in-ground support structure that is in contact with earth.

(3) 250.52(A)(3)(2): The concrete-encased electrode described as #4 AWG, which would need to be a main-size conductor per 4.12.3.2.

(4) 250.52(A)(4): The ground ring electrode not smaller than 2 AWG that is acceptable for Class I but would not be acceptable for Class II *(see Table 4.1.1.1.2)*.

(5) 250.52(A)(5): Pipe electrodes described in item (a), which are not included, and rod electrodes described in item (b) as zinc-coated steel, which are not covered *(see 4.12.2.2)*.

(6) 250.52(A)(6): Other listed electrodes, which would need to comply with the various paragraphs of Section 4.12.

(7) 250.52(A)(7): Plate electrodes, which would need to comply with 4.12.6.

(8) 250.52(A)(8): “Other local metal underground systems or structures,” which are not referenced as grounding electrodes in this standard.

The lightning protection system designer must be familiar with these differences to coordinate interconnection with other building grounding electrodes or the structural grounding electrode system as required by 4.13.3.

Where separate but adjacent buildings or facilities are interconnected directly (not through a utility) by electric, CATV, CCTV, data, or communications wiring, the grounding systems of those buildings should be directly interconnected with a main-size conductor. The need for this interconnection can be ~~eliminated~~ minimized with the use of fiber-optic cable, shielded wire, wire run in grounded metallic conduit, or cascading surge protection [surge arresters, surge protective devices (SPDs), or surge protectors installed at the entrance(s) and exit(s) of buildings or facilities].

Statement of Problem and Substantiation for Public Input

Fiber optic cable (with or w/o a metallic strength member), shielded cable and rigid metal conduit unless properly bonded can minimize the hazard but will not eliminate the hazard. It is difficult to find a construction electrician and or EE that is familiar with the requirements for this type of bonding and to have it properly installed. By the time the LPS contractor is called much of the underground is complete.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 13 10:54:10 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-20-NFPA 780-2023
Statement: The text is revised for consistency with the NEC and that the interconnections could be minimized as opposed to eliminated.

Public Input No. 106-NFPA 780-2023 [Section No. A.4.19.2.4]

A.4.19.2.4

The requirements of 4.19.2.4 is not intended to restrict the owner or LPS designer/installer from specifying or installing SPDs when they determine it to be of benefit..

Most services to facilities require discrete surge suppression devices to protect against damaging surges. Occasionally, services might be located in an area or manner for which the threat from lightning-induced surges and overvoltage transients is negligible. For example, the requirement in 4.19.2.2*(see also A.4.19.4.2)* exempts services less than 100 ft (30 m) in length that are run in grounded metal conduit between buildings requiring surge protection. Other examples where SPDs might not be required at each service entrance are those applications for which fiber optic transmission lines (with no conducting members) are used. The standard recognizes that there might be some exceptions. Consequently, the standard allows for such exceptions to the requirements for surge suppression on electrical utility, data, and other signal lines provided a competent engineering authority determines that the threat is negligible or that the system is protected in a manner equivalent to surge suppression protection.

The allowance in this standard for the exemption of surge suppression protection at specific locations is not intended to provide a broad exemption simply because surge suppression equipment might be inconvenient to install. Rather, this allowance recognizes that all possible circumstances and configurations, particularly those in specialized industries, cannot be covered by this standard.

Determinations made by an engineering authority for exempting the installation of SPDs should focus on the likelihood of lightning activity in a region, the level of damage that might be incurred, and the potential loss of human life or essential services due to inadequate overvoltage protection.

The following four methods of analysis are commonly used for this determination, although other equivalent analysis can be used:

(1) A *risk assessment* can be performed in accordance with IEC 62305-2, *Protection Against Lightning — Part 2: Risk Management*, and surge protection requirements can be waived if justified by the assessment.

(2) A *lightning flash density/risk analysis* can be performed to determine the frequency of lightning activity in the geographic area of a facility. As a rule of thumb, if the flash density exceeds one flash per square kilometer per year, surge suppression or other physical protection should be considered. Lightning energy can indirectly couple to services at ranges greater than 0.6 mi (1 km) to create potentially damaging overvoltage.

(3) *Plant/facility statistical or maintenance records* can be used for risk analysis, if they demonstrate the lack of damage on a service caused by surges, as well as to justify low risk of surge damage in particular systems or facilities.

(4) A *lightning electromagnetic environment analysis* can take the threat of an electromagnetic field from a nearby lightning strike and compute the magnitude and rise-time characteristics of transients coupled into services feeding a structure or facility. Based on the computed threat, SPDs can be sized appropriately or omitted, as warranted. This analysis is typically performed in critical communications facilities and for military applications. Electromagnetic environments for such an analysis can be found in MIL-STD-464C, *Interface Standard Electromagnetic Environmental Effects Requirements for Systems*, and IEC 62305-4, *Protection Against Lightning — Part 4: Electrical and Electronic Systems Within Structures*.

In all cases, the criticality of continued operation, potential hazard to persons and essential services, and consequences of facility damage or shutdown should be considered. If a hazardous condition results from a surge causing temporary shutdown without permanent damage (e.g., due to the disabling of a computer or communication system), then the requirements for surge suppression as articulated by Section 4.19 should not be exempted.

Statement of Problem and Substantiation for Public Input

The purpose of the proposed additional text to Annex A is to make it clear that the intent of the wording of 4.19.2.4 is not to prohibit the installation of SPDs, but instead to indicate that they may be excluded

when the criteria is met. It is never a bad idea to exceed the minimum requirements of the standard.

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 29 21:14:53 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-25-NFPA 780-2023
Statement: This clarifies that SPDs are not prohibited from being installed.

Public Input No. 73-NFPA 780-2023 [Section No. A.4.19.4.5]

A.4.19.4.5— .1

Additional information on the surge parameters of isolating transformers can be found in IEEE C62.69-2016, *Standard for the Surge Parameters of Isolating Transformers Used in Networking Devices and Equipment*; IEEE C62.36-2016, *Standard Test Methods for Surge Protectors and Protective Circuits Used in Information and Communications Technology (ICT) Circuits, and Smart Grid Data Circuits*; and IEEE C62.43-2005, *Guide for the Application of Surge Protectors Used in Low-Voltage (Equal to or Less than 1000 Vrms or 1200 Vdc) Data, Communications, and Signaling Circuits*.

Statement of Problem and Substantiation for Public Input

annex material relates to 4.19.4.5.1 better than 4.19.4.5

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 72-NFPA 780-2023 [Section No. 4.19.4.5]	referenced section
Public Input No. 72-NFPA 780-2023 [Section No. 4.19.4.5]	

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 13 11:30:04 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-34-NFPA 780-2023
Statement: This aligns the annex material with the correct section in 4.19.4.5.1.

Public Input No. 76-NFPA 780-2023 [Section No. A.11.1.1]

A.11.1.1

Chapter 11 pertains to lightning protection of airfield lighting systems. These systems are installed underground in both paved (e.g., full-strength pavement and shoulder pavement) and unpaved areas. The protected components include in-pavement fixtures, elevated fixtures, airfield signs, underground power systems, communications systems, control and signal circuits, and components of runway, taxiway, and apron lighting systems. These systems are installed in the portions of an airport that encompass the approach, departure, landing, takeoff, taxiing, and parking areas for aircraft. These areas include runways, taxiways, and other parts of an airport used for taxiing, takeoff, and landing of aircraft; loading ramps; and parking areas exclusive of building-mounted helipads, approach light structures, and antennas. This chapter could also apply to other areas with airfield lighting systems.

There are two generally accepted methods for providing lightning protection for airfield lighting circuits: equipotential and isolation. The equipotential method, which is described in 11.4.2.6.1, is shown in Figure A.11.1.1(a). The isolation method, which is described in 11.4.2.6.2, is shown in Figure A.11.1.1(b). The two methods should not be employed on a single circuit. The designer should select the installation method based on sound engineering practices and the success of the selected method in previous installations. An Equipotential lightning protection system is typically more economical to install and provides excellent protection from the effects of lightning in ares of high lightning flash density.

Figure A.11.1.1(a) Equipotential Method.

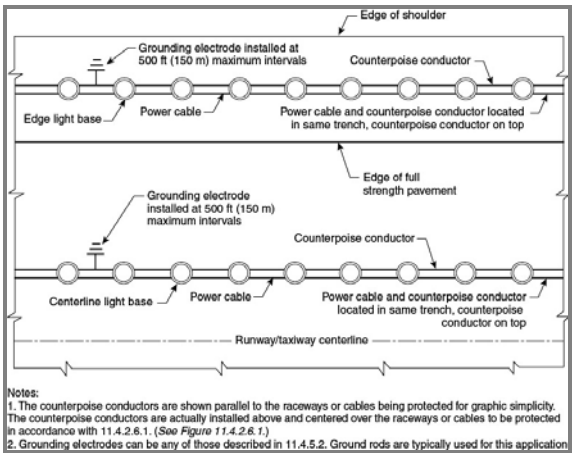
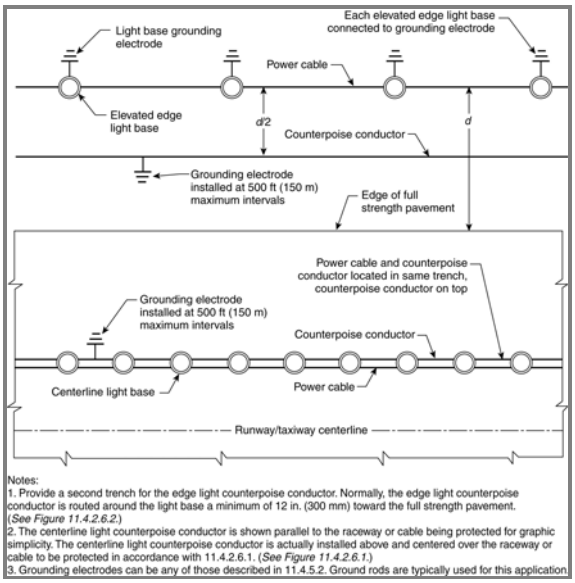


Figure A.11.1.1(b) Isolation Method for Elevated Edge Lights Installed in Turf or Stabilized Soil.



Statement of Problem and Substantiation for Public Input

Provides cost input comparison for the engineer, AHJ and Owner. An equipotential method lightning protection system is more economical to install than a isolation method since the isolation method requires a separate trench for the counterpoise. Additionally, an additional grounding electrode is not required at each light base when using the equipotential method. The comment about quality of lightning protection was included so the reader would not imply that a more economical system would provide less protection.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 15 07:20:44 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: Statements about economic issues are not appropriate in a standard. With the economic issues as a choice factor, the statement favors one method over the other.

Public Input No. 77-NFPA 780-2023 [Section No. A.11.4.1.1]

A.11.4.1.1

The copper counterpoise conductor size should be determined by the Engineer of Record based upon sound engineering practices. A 2 AWG bare, solid copper counterpoise conductor is recommended.

The following factors should be evaluated when considering a larger size counterpoise conductor:

(1) The airport's ability to maintain airport operations after an airfield lighting circuit or system failure

(2) Accessibility of the copper counterpoise conductor for testing or repair (e.g., if the counterpoise conductor is installed in or under pavement)

(3) Availability of qualified persons to perform airfield lighting system repairs

(4) Life cycle cost of the larger size counterpoise conductor, including consideration of counterpoise conductor replacement prior to the end of an expected 20-year life

(5) Results of a lightning risk assessment performed in accordance with Annex L

(6) Past performance of the airfield lighting counterpoise system at the airport or geographic area

The AHJ can determine and approve the size of the copper counterpoise conductor.

A #2 AWG solid copper conductor is 66,360 CM. The #2 AWG is a few thousand circular mils larger than the required Class I conductor (57,400 CM). However a #2 AWG is the smallest standard size AWG conductor that complies with the NFPA 780 Class I requirements (#4 AWG = 41,740 CM, #3 AWG = 52,620 CM).

Statement of Problem and Substantiation for Public Input

Provides additional information why the 2 AWG copper conductor is recommended in paragraph 1.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 15 07:34:01 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-24-NFPA 780-2023

Statement: This annex material provides the user of the standard some guidance and rationale for upsizing the conductor.

Public Input No. 78-NFPA 780-2023 [Section No. A.11.4.2.6]

A.11.4.2.6

~~The two methods are not listed in preferred order.~~

Statement of Problem and Substantiation for Public Input

11.4.2.6 does not imply that one method is preferred over the other.

Other sections of the document allowing choices do not include such language.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 15 07:43:19 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-59-NFPA 780-2023
Statement: By removing the annex, this now correlates with other sections in the document and is understood that a list in the document is not in preferential order.

Public Input No. 79-NFPA 780-2023 [Section No. A.11.4.2.6.1.2]

A.11.4.2.6.1.2

Airfield pavement systems design is an intricate engineering solution involving a large number of complex variables. Operating aircraft and pavement systems interact with each other. This interaction must be addressed by the pavement design process. Structural designs of airfield pavement systems include the determination of the overall pavement system thickness to achieve the final design objectives. Airfield pavement systems are normally constructed in courses or layers.

Many factors influence the pavement system layer thicknesses required to provide satisfactory pavement system design. Two key components that affect the structural design of the pavement system are the type of pavement and the load-bearing capacity of the supporting materials.

A typical pavement system design might consist of the following layers:

(1) Conditioned and compacted earth fill and subgrade below the pavement system (typically 100 percent compaction required)

(2) Enhanced sub-base course material, including additional layering, or enhanced existing subgrade

(3) Pavement base course (flexible or semi-rigid materials to support the pavement surface materials)

(4) Final pavement surface, either hot mix asphalt (HMA), a flexible pavement typically installed in multiple layers, or Portland cement concrete (PCC), a rigid pavement typically installed in one layer

The thickness of each of the overall pavement layers is determined ~~based on~~ by the structural requirements of the pavement system ~~based~~ contingent on existing conditions, aircraft sizes and weights, number of aircraft operations, environmental factors, and other features.

The airfield lighting system is incorporated into the airfield pavement system. The design of the depth and height of the various airfield lighting system components, including light bases, light base accessories, conduits, and counterpoise conductors, must be adjusted to integrate the components into the varying pavement system layer thicknesses. Although reasonable effort should be made to comply with the 8 in. (200 mm) requirement contained in 11.4.2.6.1.1, it is for these reasons that the variation described in 11.4.2.6.1.2 is necessary.

Statement of Problem and Substantiation for Public Input

The term "based on" was used twice within the same sentence. New wording makes the sentence more readable while maintaining the original intent.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:

Submittal Date: Mon May 15 07:58:08 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-50-NFPA 780-2023
Statement: The edit clarifies the language in the section.

Public Input No. 80-NFPA 780-2023 [Section No. A.11.4.5.1]

A.11.4.5.1

The grounding electrode can be installed in the same excavation or trench as the counterpoise conductor or light base .

Statement of Problem and Substantiation for Public Input

adds clarity to the intent of the sentence and adds a permitted location for the installation of the grounding electrode.

Submitter Information Verification

Submitter Full Name: Carl Johnson
Organization: AVCON, Inc.
Affiliation: none
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 15 08:17:08 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-51-NFPA 780-2023
Statement: The grounding electrode can be installed in the same excavation as the counterpoise conductor. The additional language makes this clear to the user.

Public Input No. 123-NFPA 780-2023 [Section No. B.2.3]

B.2.3

Metal parts of a structure can be used as part of the lightning protection system in some cases. For example, the structural metal framing, which has sufficient cross-sectional area to equal the conductivity of main conductors, and which is electrically continuous, can be used in lieu of separate down conductors. In such cases, air terminals can be bonded to the framework at the top, and grounding electrodes can be provided at the bottom, as described elsewhere in this standard. Structures with ~~3/16~~ ~~-~~ in ~~.~~ (~~4~~ 1 ~~.8 mm~~ 63 mm) thick, or thicker, metal shells or skins that are electrically continuous might not require a system of air terminals and down conductors.

Statement of Problem and Substantiation for Public Input

Allows use of thinner materials that may not meet the requirements to serve as strike termination devices but do meet the requirements to serve as conductors.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 13:58:59 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-60-NFPA 780-2023
Statement: The word steel was added to narrow the scope of this paragraph in Annex B that is covering the principles of lightning protection.

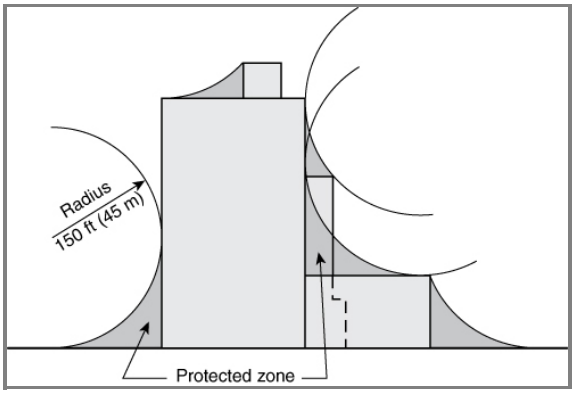
Public Input No. 105-NFPA 780-2023 [Section No. B.3.2.2]

B.3.2.2 Rolling Sphere Method.

The rolling sphere method was incorporated into NFPA 780 in the 1980 edition. It originated from the electric power transmission industry (lightning strike attachment to phase and shield wires of lines) and is based on the simple electrogeometric model. To apply the method, an imaginary sphere is rolled over the structure. All surface contact points are deemed to require protection, while the unaffected surfaces and volumes are deemed to be protected, as shown in Figure B.3.2.2.

The physical basis for the rolling sphere method is the electrogeometric model. Consider a particular peak lightning current I_p (kA) and the corresponding striking distance d_S (m), where $d_S = 10\ I_p^{0.65}$. For a typical peak current of 10 kA, the striking distance is approximately 150 ft (45 m). This is the distance at which a downward leader results in the initiation of an upward leader from the structure.

Figure B.3.2.2 Lightning Protection Design Using the Rolling Sphere Method.



Note that a smaller striking distance (implying a lower peak current of the lightning event) results in a smaller sphere that can intrude upon the standard 150 ft (45 m) zone of protection. Thus, a more conservative design is to size the sphere using a lower lightning peak current. Lightning peak currents below 5 kA to 7 kA are not common. Ten kA peak current represents 91 percent of all lightning events.

The advantage of the rolling sphere method is that it is relatively easy to apply, even to buildings with complicated shapes. However, since it is a simplification of the physical process of lightning attachment to a structure, it has some limitations. The main limitation is that it assigns an equal leader initiation ability to all contact points on the structure; no account is taken of the influence of electric fields in ~~initiating return streamers~~ initiating streamers , so it does not distinguish between likely and unlikely lightning strike attachment points. ~~In other words, for~~ For a given prospective peak stroke current, the striking distance d_S is a *constant value*. This simplification stems from the RSM's origins in the electrical power transmission industry, where there is considerable uniformity in the parameters of transmission lines (diameters, heights, etc.). In reality, lightning could preferentially strike the corner of a building rather than the vertical flat surface halfway down the side of the building. The same claims apply to the flat roof of a structure.

~~Some qualitative indication of the probability of strike attachment to any particular point can be obtained if the sphere is supposed to be rolled over the building in such a manner that its center moves at constant speed. Then the length of time that the sphere dwells on any point of the building gives a qualitative indication of the probability of that point being struck. Thus, for a simple rectangular building with a flat roof, the dwell time would be large at the corners and edges and small at any point on the flat part of the roof, correctly indicating a higher probability of the corners or edges being struck and a low probability that a point on the flat part of the roof will be struck.~~

Where the RSM is applied to a building of height greater than the selected sphere radius, the sphere ~~touches the vertical edges~~ will touch vertical walls without protrusions on the sides of the building at all points above a height equal to the sphere radius. This indicates the possibility of strikes to the sides of the building and raises the question of the need for an air terminal network in these locations. Studies show that strikes to vertical edges on the sides of tall buildings do occur but are not very common. There are theoretical reasons for believing that

only flashes with low I_p, and consequently low d_S, values are likely to be able to penetrate below the level of the roof of a building and strike the sides. Hence, the consequences of a strike to the sides of a building could result in damage of a minor nature. Unless there are specific reasons for side protection, as ~~would~~ could be the case of a structure containing explosives, ~~it is considered that the cost of side protection would not normally be justified~~ a lightning risk assessment may be justified to determine whether the risk in such areas justifies protection .

Statement of Problem and Substantiation for Public Input

The proposed revision contains both editorial and technical revisions. Some text is proposed to be deleted because it is incorrect and/or misleading. In paragraph 4, “return” is deleted before streamers. A streamer is produced as a result of the electric field gradient. If the streamer connects to a leader, a return stroke is produced.
The revision proposes the deletion of the 5th paragraph as it is misleading and adds little to the discussion. The rolling sphere is a model used to determine the areas likely to provide an attachment point. There is no actual ball that rolls at a given velocity, constant or not. It has no dwell time, but instead has an increased “collection area.” This appears to be an observation from ZOP software and not particularly relevant to the physics of the process. The discussion should focus on the geometry of structure and concentration of electric field gradients if such a discussion is needed.
In the final paragraph, a revision is added to indicate that the discussion is relevant to flat vertical surfaces and can change if there are protrusions off the vertical surfaces. The revision at the end of the paragraph suggests that if an attachment to a vertical surface is of concern, a risk assessment should be performed to determine whether protection should be provided.
An alternative to this proposal could be to address the area above where the rolling sphere is exceeded and the top 20% of the structure in the same manner it is covered in IEC 62305-3. A proposal could be provided to the committee for consideration if requested (perhaps through an NFPA 780 Task Group).

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 29 20:11:26 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-61-NFPA 780-2023
Statement: The deleted paragraph is specific to a zone of protection software. This revision also makes some editorial changes.

Public Input No. 147-NFPA 780-2023 [Section No. D.1.2]

D.1.2 Visual Inspection.

Visual inspections are made to ascertain the following:

(1) The system is in good repair.

(2) There are no loose connections that might result in high-resistance joints.

(3) No part of the system has been weakened by corrosion or vibration.

(4) All down conductors and grounding electrodes are intact (not severed).

(5) All conductors and system components are fastened securely to their mounting surfaces and are protected against accidental mechanical displacement as required.

(6) There have not been additions or alterations to the protected structure that would require additional protection.

(7) There is no visual indication of damage to SPDs and ~~confirm~~ status lights, where provided, are still functioning .

(8) The system complies in all respects with the current edition of this standard.

Statement of Problem and Substantiation for Public Input

I fixed the grammar, y'all. It's what I do.

Submitter Information Verification

Submitter Full Name: Simon Larter
Organization: Dobbyn Lightning Protection
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 14:03:13 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-62-NFPA 780-2023
Statement: The revision to Item 7 clarifies what specifically should be inspected on the SPD.

Public Input No. 98-NFPA 780-2023 [Section No. L.1.3]

L.1.3

This risk assessment method is a guide that takes into account the ~~lightning threat parameters and the following factors:~~

(1) ~~Building environment~~

(2) ~~Type of construction~~

(3) ~~Structure occupancy~~

(4) ~~Structure contents~~

(5) ~~Lightning stroke consequences~~

following sources and causes of lightning damage:

L.1.3.1 Source of damage

The lightning current is the primary source of damage. The following sources are distinguished by the point of strike:

S1: flashes to the structure,

S2: flashes near the structure,

S3: flashes to a line connected to the structure,

S4: flashes near a line connected to the structure.

L.1.3.2 Cause of damage

A lightning flash may cause damage in different ways depending on the characteristics of the structure being assessed. Some of the most important characteristics are: type of construction, contents and application, type of service and damage protection measures provided.

As a result, four causes of damage may be distinguished:

D1 D : electric shock to human beings resulting from direct strike to those beings,

D1 T : electric shock to human beings resulting from resistive and inductive coupling,

D2: dangerous sparking inside the structure triggering fire or explosion and/or leading to mechanical and chemical effects which may also endanger the environment,

D3: surges due to all sources of damage causing failures of internal systems.

The damage to a structure due to lightning may be limited to a part of the structure or may extend to the entire structure. It may also involve surrounding structures or the environment (e.g. through chemical dispersion, toxic fumes or radioactive emissions).

Statement of Problem and Substantiation for Public Input

Revise Clause L.1.3 to provide more details on the 4 primary sources of damage associated with lightning threats and 3 primary causes of damage that require assessment and resulting protection

methods.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 97-NFPA 780-2023 [Section No. L.1.4]	Provide additional detail and resulting usefulness of detailed assessments as well as incorporation of internationally-accepted terminology

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 27 01:27:15 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-83-NFPA 780-2023
Statement: New L.1.3 provides a more general description of the sources of damage and causes of damage, as well as justify the risk components addressed in L.6. This also provides coordination with international and other national lightning risk assessment standards.

Public Input No. 97-NFPA 780-2023 [Section No. L.1.4]

L.1.4

Lightning risk for a structure is the product of the lightning ~~frequency~~ ground strike density , the exposure ~~vulnerability,~~ of the structure, the probability of damage and the consequence of ~~the~~ a strike to or nearby the structure or object.

Statement of Problem and Substantiation for Public Input

The proposed revision better defines the relevant parameters to address the assessment of the risk to a structure against the threats produced by lightning activity. It also aligns the terminology used in the annex with that used worldwide in the scientific community to describe and assess the risks of lightning activity to structures and their contents.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 98-NFPA 780-2023 [Section No. L.1.3]	
Public Input No. 128-NFPA 780-2023 [Section No. L.2]	
Public Input No. 129-NFPA 780-2023 [Section No. L.3]	

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 26 22:55:11 EDT 2023
Committee: LIG-AAA

Committee Statement

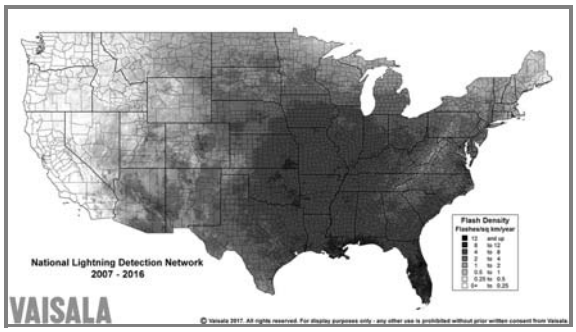
Resolution: FR-77-NFPA 780-2023
Statement: This revision introduces the transition from flash density to ground-strike density in determining the frequency of damage.

Public Input No. 128-NFPA 780-2023 [Section No. L.2]

L.2 Lightning ~~Flash~~ Ground Strike Density ($N_{~~G~~}$ SG).

Lightning ~~flash~~ ground strike density, the yearly number of ~~flashes~~ strike points to ground per square kilometer, can be found in Figure L.2. A color version of this map with resolution of 2 km can be found at www.vaisala.com/en/products/data/data-sets/nldn.

Figure L.~~2 2007–2016 Average~~ 2 Average US Lightning ~~Flash~~ Ground Strike Density Map (~~Flashes~~ Ground Strikes per Square Kilometer per Year). *(Courtesy Vaisala, Inc.)*



Statement of Problem and Substantiation for Public Input

The proposal updates this clause based on acceptance of the revision identified in PI 97.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 97-NFPA 780-2023 [Section No. L.1.4]	
Public Input No. 129-NFPA 780-2023 [Section No. L.3]	

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 17:58:03 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-78-NFPA 780-2023
Statement: This revision introduces the transition from flash density to ground-strike density in determining the frequency of damage.

Public Input No. 129-NFPA 780-2023 [Section No. L.3]

L.3 Annual Threat of Occurrence (N_D).

The yearly annual threat of occurrence (N_D) to a structure is determined by the following equation:

$$N_D = (N_G)(A_D)(C_D)(10^{-6}) = \text{events/year} \quad \text{[L.3]}$$

where:

N_D = average lightning strike frequency to the structure or object

~~N_G~~ SG = lightning ground flash density in flashes/km^2/year

A_D = the equivalent collection area of the structure (m^2)

C_D = location factor

Statement of Problem and Substantiation for Public Input

Updates Ground Strike Density in equation for ND. Equation must also be changed

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 128-NFPA 780-2023 [Section No. L.2]	
Public Input No. 97-NFPA 780-2023 [Section No. L.1.4]	

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 18:17:11 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-79-NFPA 780-2023
Statement: This revision introduces the transition from flash density to ground-strike density in determining the frequency of damage.

Public Input No. 131-NFPA 780-2023 [Section No. L.4.2]

L.4.2

The location factor accounts for the topography of the site of the structure and any objects located within the distance 3*H* from the structure that can affect the collection area. Location factors for structures and adjacent structures are given in Table L.4.2.

Table L.4.2 Location Factor, C_D D /C DJ

Relative Structure Location	C_D/C_{DJ}
Structure surrounded by taller structures or trees within a distance of 3*H*	0.25
Structure surrounded by structures of equal or lesser height within a distance of 3*H*	0.5
Isolated structure, with no other structures located within a distance of 3*H*	1
Isolated structure on hilltop	2

Statement of Problem and Substantiation for Public Input

Revise Table L.4.2 to add consideration of the effect of adjacent structures.

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 23:13:38 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-80-NFPA 780-2023
Statement: Table L.4.2 is revised to add consideration of the effect of adjacent structures.

Public Input No. 113-NFPA 780-2023 [New Section after L.6]

L.5.3 Critical Facilities

L.5.3.1 General

The following facilities are identified as critical facilities as outlined by the Federal Emergency Management Agency (FEMA):

(1) Emergency Operations Centers (EOCs)

(2) Fire and Police Stations

(3) Hospitals and other medical facilities

(4) Public Works facilities (e.g. water treatment plants, wastewater treatment plants, and transportation facilities)

(5) Telecommunications facilities (e.g. telephone and internet service providers)

(6) Hazardous material storage facilities

(7) Government buildings (e.g. courthouses, city halls, and other administrative facilities)

(8) Educational institutions (e.g. schools and universities)

(9) Energy facilities (e.g. power plants, fuel refineries, and natural gas facilities)

(10) Financial institutions (e.g. banks and stock exchanges)

(11) Retail facilities (e.g. grocery stores and pharmacies)

(12) Transportation facilities (e.g. airports, seaports, and bus/train stations)

L.5.3.2

Critical facilities located in a geographical area with a flash density greater or equal to 4 flashes per square Kilometer per year should have a lightning protection system installed that is in compliance with this standard.

..

Statement of Problem and Substantiation for Public Input

L.5.3 Critical Facilities
L.5.3.1 General
The following facilities are identified as critical facilities as outlined by the Federal Emergency Management Agency (FEMA):

1. Emergency Operations Centers (EOCs)
2. Fire and Police Stations
3. Hospitals and other medical facilities
4. Public Works facilities (e.g. water treatment plants, wastewater treatment plants, and transportation facilities)
5. Telecommunications facilities (e.g. telephone and internet service providers)
6. Hazardous material storage facilities

7. Government buildings (e.g. courthouses, city halls, and other administrative facilities)
8. Educational institutions (e.g. schools and universities)
9. Energy facilities (e.g. power plants, fuel refineries, and natural gas facilities)
10. Financial institutions (e.g. banks and stock exchanges)
11. Retail facilities (e.g. grocery stores and pharmacies)
12. Transportation facilities (e.g. airports, seaports, and bus/train stations)

L.5.3.2
Critical facilities located in a geographical area with a flash density greater or equal to 4 flashes per square Kilometer per year should have a lightning protection system installed that is in compliance with this standard.

Submitter Information Verification

Submitter Full Name: Timothy Harger
Organization: Lightning Protection Institute
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 12:06:29 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-70-NFPA 780-2023 FEMA was removed as source of the list because it could not be confirmed as the source and retail facilities was removed because lightning damage affects smaller areas than wildfires, floods or hurricanes/tornados.

Statement: This annex identifies facilities that may have greater need for a lightning protection system.

Public Input No. 130-NFPA 780-2023 [Section No. L.6.6.1.2]

L.6.6.1.2

The annual threat of occurrence due to strikes near a structure (N_M) is given by the following equation *(see Figure L.6.6.1.2)*:

$$N_M = N_G (A_M - A_D)(C_D)10^{-6} \text{events/year} \qquad \textbf{[L.6.6.1.2]}$$

where:

N_G ~~G~~ SG = lightning ground flash density in flashes/km^2/year *(see Section L.2)*

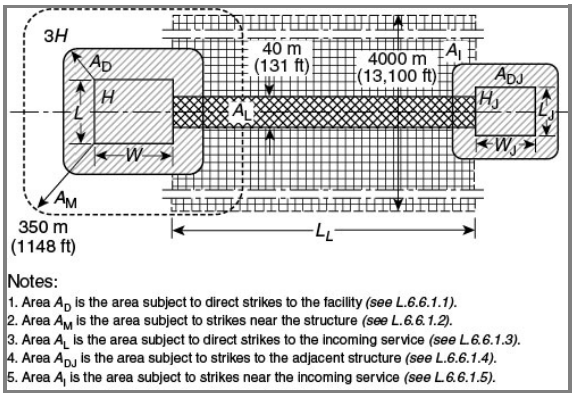
A_M = collection area of flashes near the structure (m^2) *(see Figure L.6.6.1.2)*

A_D = equivalent collection area of the structure (m^2) *(see Figure L.6.6.1.2)*

C_D = environmental coefficient *(see Table L.4.2)*

The collection area for flashes near the structure (A_M) includes the area extending a distance of 350 m (1148 ft) around the perimeter of the structure. For cases where N_M is negative, a value of 0 is assigned to N_M.

Figure L.6.6.1.2 Collection Areas (A_D, A_M, A_L, A_{DJ}, A_I). *(Source: IEC.)*



Notes:
1. Area A_D is the area subject to direct strikes to the facility *(see L.6.6.1.1)*.
2. Area A_M is the area subject to strikes near the structure *(see L.6.6.1.2)*.
3. Area A_L is the area subject to direct strikes to the incoming service *(see L.6.6.1.3)*.
4. Area A_{DJ} is the area subject to strikes to the adjacent structure *(see L.6.6.1.4)*.
5. Area A_I is the area subject to strikes near the incoming service *(see L.6.6.1.5)*.

Additional Proposed Changes

File Name	Description	Approved
Revised_Fig_L-6-6-1-2.jpg	Figure L.6.6.1.2	

Statement of Problem and Substantiation for Public Input

Replace figure with the revised L.6.6.1.2. Change NG in the equation to NSG.

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:

State:
Zip:
Submittal Date: Wed May 31 22:47:36 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-71-NFPA 780-2023
Statement: The revision introduces the transition from flash density to ground-strike density in determining the frequency of damage. Flash density underestimates total strike density to earth. Ground strike density is a more accurate estimate of total threat.

Public Input No. 132-NFPA 780-2023 [Section No. L.6.6.1.3]

L.6.6.1.3

The annual threat of occurrence due to a strike to an incoming service (N_L) is characterized by the following formula:

$$N_L = N_G A_L C_E C_T 10^{-6} \text{ events/year} \quad \textbf{[L.6.6.1.3]}$$

where:

N_{SG} = lightning ground flash density in flashes/km^2/year *(see Section L.2)*

A_L = collection area of flashes striking the service (m^2) *(see Figure L.6.6.1.2)*

C_E = environmental coefficient of the incoming service *(see Table L.6.7.1)*

C_T = correction factor for the presence of an HV/LV transformer located between the point of strike and the structure

where:

$A_L = 40 \times L_L$

L_L = the length of the incoming service *(see Figure L.6.6.1.2)*

Where the value of L_L is not known, a value of 1 km should be assumed for the assessment.

If the installation incorporates underground cables run underneath a ground mesh, A_I could be assumed to be 0 for that cable set ($N_L = 0$).

C_T applies to line sections between the transformer and the structure. A value of 0.2 is applicable for installations having a transformer located between the strike and the structure. Otherwise, a value of 1 is assigned to this variable.

Statement of Problem and Substantiation for Public Input

In addition to the proposed, change NG to NSG in Equation L.6.6.1.3. This modification proposes to bring Annex L in line with internationally accepted terminology and accepted technical literature on lightning risk assessment.

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 23:30:04 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-72-NFPA 780-2023

Statement: The revision introduces the transition from flash density to ground-strike density in determining the frequency of damage. Flash density underestimates total strike density to earth. Ground strike density is a more accurate estimate of total threat.

Public Input No. 133-NFPA 780-2023 [Section No. L.6.6.1.5]

L.6.6.1.5

The annual threat of occurrence due to flashes near a service (N_I) can be estimated using the following equation:

$$N_I = N_G A_I C_E C_T 10^{-6} \text{events/year} \qquad \textbf{[L.6.6.1.5]}$$

where:

$N_S G$ = lightning ground flash density in flashes/km^2/year *(see Section L.2)*

A_I = equivalent collection area of flashes to ground near the service (m^2) *(see Figure L.6.6.1.2)*

C_E = service environmental coefficient *(see Table L.6.7.1 where A_I = 4000 × L_L and L_L = the length of the incoming service)*

C_T = correction factor for the presence of an HV/LV transformer located between the point of strike and the structure

Statement of Problem and Substantiation for Public Input

Change NG in the equation to NSG. The proposal is part of the revision from Ng to NSG

Submitter Information Verification

Submitter Full Name: Mitchell Guthrie
Organization: Engineering Consultant
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 23:54:29 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-73-NFPA 780-2023

Statement: The revision introduces the transition from flash density to ground-strike density in determining the frequency of damage. Flash density underestimates total strike density to earth. Ground strike density is a more accurate estimate of total threat.

Public Input No. 53-NFPA 780-2023 [Section No. N.1]

N.1 General.

The protection of nonmetallic tanks that might contain flammable vapors, flammable gases, or liquids that can give off flammable vapors requires measures above and beyond protection of other structures discussed in this standard. It is recommended that nonmetallic tanks not be used in applications where flammable vapors might be present. The recommendations in this annex are provided to identify methods that can be used to mitigate, but not eliminate, lightning-related damage. ~~It is critical that the lightning protection address the threat of coupling of lightning electromagnetic impulse (LEMP) onto conductors in or on the nonmetallic tank.When nonmetallic tanks are employed, the lightning protection system design must be studied to ensure that the installation does not create an unintentional hazard. Given the complexity and varied geometries of the systems involved, an in-depth study should be completed to account for all ignition sources that can arise from the installation of the lightning protection system and the interaction with other associated systems. These include direct strikes, LEMP, internal arcing based on the induced voltages, and the associated thermal energies. It must be ensured that these threats are reduced to a level that does not exceed the autoignition properties of the fuel-air mixture that accumulates in the~~ Among the benefits associated with non-metallic tanks are cost, resistance to corrosion and ease of transportation and installation. Among the problems associated with non-metallic tanks are electrical insulation properties, the accumulation and retention of static charge, thermal energy transmission, and transparency to LEMP. Therefore, it is critical that the lightning protection address the thermal and physical effects of direct lightning attachment, and the threat of arcing caused by induced voltages and differences in electrical potential caused by direct attachment, secondary effect and coupling of lightning electromagnetic impulse (LEMP) onto electrical masses and conductors in or on the nonmetallic tank.

The owner/operator should determine the use of nonmetallic tanks based on the risks identified in the study.

Statement of Problem and Substantiation for Public Input

This proposal helps to clarify the pros and cons of non-conductive tanks and clarifies ignition causes.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 15:51:31 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-1-NFPA 780-2023
Statement: This revision clarifies the pros and cons of non-conductive tanks and clarifies ignition causes.

Public Input No. 103-NFPA 780-2023 [Section No. N.2]

~~**N.2** – Zone of Protection.~~

~~To protect against direct strikes to nonmetallic tanks containing flammable vapors, flammable gases, or liquids that can give off flammable vapors, the radius of the rolling sphere should be 100 ft (30 m) or less.~~

Statement of Problem and Substantiation for Public Input

The October 27, 2022 ICLP statement regarding N.4, stated that the Inductive neutralizer was potentially hazardous in the event of direct strikes since the grounded inductive neutralizer could be electrically connected to the lightning protection system and thus a potential rise comparable to the one impressed onto the lightning rod, would be impressed onto the inductive neutralizer suspended inside the nonmetallic tank.

However, any conducting object that protrudes into the tank and which is electrically connected to the lightning protection system would pose a similar hazard. Since these tanks are typically located in areas of high soil resistivity, when the lightning protection system is struck, significant potentials will appear on the metallic components particularly at or near the top of the tank which are electrically connected to the lightning protection system. Since the tank is nonconducting, any sparking from those metal objects could be generated in any direction, including into the tank. The inductive neutralizer as per N4 merely poses the most severe hazard since it would have the lowest corona onset potential, meaning that it will produce the longest, hottest streamers under the same circumstances. Or produce hazardous streamers when no other metal component could produce such streamers given the intensity of the inducing or applied potential.

Connecting any of the tanks's metallic components to the lightning protection system is hazardous and should be avoided. However if you don't connect such components to the lightning protection system, you may create side flash hazards. Such systems are therefore problematic, inadequate and should not be recommended.

Additionally, the intense fields generated by the down conductors, when the system is struck by lightning, can induce enormous potentials that can generate hazardous sparking inside the tank. This would also be true for any masts or the down conductors of a catenary system.

Anything that can provide a protective zone from direct lightning strikes, if struck will itself become a source of intense fields that can generate hazardous sparking within the nonconducting tank. Therefore, air terminals should not be installed on nonmetallic tanks and masts or catenary systems should not be used to protect such tanks.

The only way to protect such structures, which are sensitive to inducing potentials, such as LEMP is to provide them with means of electromagnetic shielding. That's one reason why sensitive electronics are put in metal enclosures. Despite being connected to SPDs and being shielded from direct strikes, without a metal enclosure, which provides EM shielding, they would be exposed to external interference/inducing potentials including LEMP.

Submitter Information Verification

Submitter Full Name: amir rizk
Organization: Lightning Electrotechnologies
Street Address:
City:

State:
Zip:
Submittal Date: Mon May 29 07:18:23 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-2-NFPA 780-2023
Statement: This clarifies that the rolling sphere method for a zone of protection is not the only approach to be considered or a required method per N.1.

Public Input No. 104-NFPA 780-2023 [Section No. N.4]

~~**N.4** – Charge Neutralization.~~

~~Reduction of differences in potential between the bound charge on the contained product and metallic components internal to the tank should be considered in parallel with and complementary to lightning protection. Accelerating the relaxation of differences in potential can reduce the likelihood of arcing.~~

~~One technique is to install an inductive neutralizer as described in NFPA 77. This type of device could serve to increase the availability of ions to equalize charge between areas of different charge within the contained product and between charges on the contained product and tank metallic appurtenances.~~

~~This appliance could take the form of a low-impedance, conductive appliance suspended from and electrically bonded to the thief hatch or other grounded tank appurtenance and extending to the bottom of the tank so it penetrates the surface of the fluid at all fill levels. This appliance will not equalize the potential in all areas of the tank but can serve to equalize potential local to the appliance.~~

Statement of Problem and Substantiation for Public Input

On October 27, 2022 the Scientific Committee of the International Conference on Lightning Protection issued a public statement on their website recommending the removal of this section of NFPA 780 on the grounds that it is potentially hazardous in the event of both direct and indirect lightning strikes. The ICLP Statement confirmed the technical validity of the public comments calling for the removal of this section, which the TC of 780 has ignored since 2018.

Regarding the reference to NFPA 77, section A.3.3.17.3 “Corona Discharge” of Annex A of NFPA 77 identifies corona discharge as a hazard in the presence of flammable gases and yet NFPA 780 recommends putting corona generating devices in nonconducting tanks that contain flammable vapor and cites NFPA 77!

This section describes a commercial product marketed by members of the TC of 780 for years prior to its inclusion in NFPA 780. A commercial product that is not supported by any peer reviewed publications, laboratory or field testing or even any scientifically plausible or coherent operating principle. These commercial products have likely been involved in many lightning related fires at petrochemical facilities and the members of the TC of 780 knew or had abundant reason to know of the hazards posed to the end user.

The repeated inclusion of this section in an NFPA standard contradicts the mission of the NFPA and may violate FTC rules on unfair competitive practices.

This section should be completely removed.

Submitter Information Verification

Submitter Full Name: amir rizk
Organization: Lightning Electrotechnologies
Street Address:
City:
State:
Zip:

Submittal Date: Mon May 29 07:25:11 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-3-NFPA 780-2023
Statement: The material provided in N.4 regarding charge neutralization is revised to directly point the reader to the applicable documents that discuss charge neutralization.

Public Input No. 54-NFPA 780-2023 [New Section after N.5]

TITLE OF NEW CONTENT

N.6. LEMP mitigation. To mitigate coupling of EMP onto conductive masses and conductors on and in a tank, it may be advantageous to coat the exterior of a non-metallic tank with a conductive paint. This paint should cover the entire tank, electrically bonding all tank appurtenances. Alternatively, such LEMP protection could take the form of conductive panels attached to the exterior of the tank and electrically bonded together, to tank appurtenances, and to ground.

Statement of Problem and Substantiation for Public Input

This new section addresses the problems of LEMP and suggests potential methods of addressing them.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 16:09:38 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-4-NFPA 780-2023
Statement: This new section addresses the problems of LEMP and suggests a potential approach to addressing them.

Public Input No. 124-NFPA 780-2023 [Section No. O.1.2.1]

O.1.2.1 API Publications.

American Petroleum Institute, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001-5571.

API RP ~~545~~ 2003 , *Recommended Practice for* ~~Lightning~~ *Protection* ~~of Aboveground Storage Tanks for Flammable or Combustible Liquids, October 2009.~~ *Against Ignitions Arising Out of Static, Lightning, and Stray Currents,* current edition.

API 650, *Welded Steel Tanks for Oil Storage*, November 1998; Errata, April 2007.

Statement of Problem and Substantiation for Public Input

API 545 committee no longer exists.

API 2003 is the current RP.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 14:08:21 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-52-NFPA 780-2023
Statement: The change updates the API publications to reflect changes since the last cycle and adds API 12P which in now referenced in the standard.

Public Input No. 125-NFPA 780-2023 [Section No. O.1.2.6]

O.1.2.6 UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 96, *Standard for Safety, Lightning Protection Components* , current edition.

UL 96A, *Standard for Safety, Installation Requirements for Lightning Protection Systems,* current edition.

UL 497, *Safety Protectors for Paired-Conductor Communications Circuits*, 2013.

UL 497A, *Standard for Secondary Protectors for Communications Circuits*, 2019.

UL 497B, *Standard for Protectors for Data Communications and Fire-Alarm Circuits*, 2004.

UL 497C, *Standard for Protectors for Coaxial Communications Circuits*, 2001.

UL 497D, *Outline of Investigation for Component Secondary Protectors for Communications Circuits Used with Specified Voltage Suppression*, 2007.

UL 497E, *Outline of Investigation for Protectors for Antenna Lead-In Conductors*, 2007.

UL 1449, *Safety for Surge Protective Devices*, 2018.

Statement of Problem and Substantiation for Public Input

Adds reference to UL documents derived from this standard.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 14:13:10 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-53-NFPA 780-2023
Statement: This updates all the UL documents that are applicable to this standard and incorporates the removing the word “Standard” from the title.

Public Input No. 136-NFPA 780-2023 [Section No. O.1.2.6]

O.1.2.6 UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 497, *Safety Protectors for Paired-Conductor Communications Circuits*, ~~2013~~ 2001, revisedd 2022 .

UL 497A, ~~*Standard for*~~ *Secondary Protectors for Communications Circuits*, 2001, revised 2019.

UL 497B, ~~*Standard*~~ *Protectors for* ~~*Protectors for*~~ *Data Communications and Fire-Alarm Circuits*, 2004, revised 2021 .

UL 497C, ~~*Standard*~~ *Protectors for* ~~*Protectors for*~~ *Coaxial Communications Circuits*, 2001, revised 2021 .

UL 497D, *Outline of Investigation for Component Secondary Protectors for Communications Circuits Used with Specified Voltage Suppression*, 2007.

UL 497E, *Outline of Investigation for Protectors for Antenna Lead-In Conductors*, ~~2007~~ 2011 .

UL 1449, *Safety for Surge Protective Devices*, ~~2018~~ 2021, revised 2022 .

Statement of Problem and Substantiation for Public Input

Update UL standards to the current edition and revision.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 135-NFPA 780-2023 [Global Input]	
Public Input No. 141-NFPA 780-2023 [Section No. O.2.4]	

Submitter Information Verification

Submitter Full Name: Kelly Nicolello
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 10:55:22 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: FR-53-NFPA 780-2023
Statement: This updates all the UL documents that are applicable to this standard and incorporates the removing the word “Standard” from the title.

Public Input No. 151-NFPA 780-2023 [Section No. O.1.2.6]

O.1.2.6 UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 497, *Safety Protectors for Paired-Conductor Communications Circuits*, 2013.

UL 497A, *Standard for Secondary Protectors for Communications Circuits*, 2019.

UL 497B, *Standard for Protectors for Data Communications and Fire-Alarm Circuits*, 2004.

UL 497C, *Standard for Protectors for Coaxial Communications Circuits*, 2001.

UL 497D, *Outline of Investigation for Component Secondary Protectors for Communications Circuits Used with Specified Voltage Suppression*, 2007.

UL 497E, *Outline of Investigation for Protectors for Antenna Lead-In Conductors*, 2007.

UL 1449, *Safety for Surge Protective Devices*, 2018.

UL Marking and Application Guide: Lightning Protection July 2016

Statement of Problem and Substantiation for Public Input

Link to original source of this content:

https://code-authorities.ul.com/wp-content/uploads/2014/04/LightningProtectionAG.pdf

Link to related research into the subject of lightning protection "30-30" Rule of Thumb which seems to track anecdotally in the literature:

https://standardsmichigan.com/the-30-30-rule/

Submitter Information Verification

Submitter Full Name:	Michael Anthony
Organization:	Standards Michigan LLC
Affiliation:	I work closely with the IEEE Education & Healthcare Facilities Committee -- where this concept has been vetted for years -- but this is not an endorsed IEEE position.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Thu Jun 01 16:52:53 EDT 2023
Committee:	LIG-AAA

Committee Statement

Resolution: FR-53-NFPA 780-2023

Statement: This updates all the UL documents that are applicable to this standard and incorporates the removing the word “Standard” from the title.

Public Input No. 126-NFPA 780-2023 [Section No. O.2.4]

O.2.4 UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 96, *Standard for Safety, Lightning Protection Components* , current edition.

UL 96A, *Standard for Safety, Installation Requirements for Lightning Protection Systems,* current edition.

UL 497, *Protectors for Paired Conductor Communications Circuits*, revision 2017.

UL 497A, *Secondary Protectors for Communications Circuits*, revision 2019.

UL 497B, *Protectors for Data Communications and Fire Alarm Circuits*, revision 2017.

UL 497C, *Protectors for Coaxial Communications Circuits*, revision 2017.

UL 497E, *Outline of Investigation for Protectors for Antenna Lead-In Conductors*, revision 2011.

Statement of Problem and Substantiation for Public Input

Adds reference to UL documents derived from this standard.

Submitter Information Verification

Submitter Full Name: Bruce Kaiser
Organization: Lightning Master Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 31 14:17:24 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: This section was deleted under a separate revision.

Public Input No. 141-NFPA 780-2023 [Section No. O.2.4]

O.2.4 UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 497, *Protectors for Paired Conductor Communications Circuits*, revision ~~2017~~ 2001, revised 2022 .

UL 497A, *Secondary Protectors for Communications Circuits*, revision 2001, revised 2019.

UL 497B, *Protectors for Data Communications and Fire Alarm Circuits*, 2004, revision ~~2017~~ 2021 .

UL 497C, *Protectors for Coaxial Communications Circuits*, revision ~~2017~~ 2001, revised 2021 .

UL 497E, *Outline of Investigation for Protectors for Antenna Lead-In Conductors*, revision 2011.

Statement of Problem and Substantiation for Public Input

Update UL standards to the current edition and revision.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 136-NFPA 780-2023 [Section No. O.1.2.6]	

Submitter Information Verification

Submitter Full Name: Kelly Nicolello
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 01 11:19:41 EDT 2023
Committee: LIG-AAA

Committee Statement

Resolution: This section was deleted under a separate revision.