AGENDA

NFPA Technical Committee on Lightning Protection
NFPA 780 First Draft Meeting (A2028)

Microsoft Teams Meeting
November 3 – 5, 2026

Virtual Meeting
To join the meeting, please contact scaldwell@nfpa.org

1. **Call to order.** Thomas Moore, Chair.
2. **Roll call and introductions.** See committee roster attached.
3. **Chair remarks.** Thomas Moore.
4. **Staff Liaison report.** Chris Coache.
5. **Previous meeting minutes.** November 2024. See attached.
6. **NFPA 780 First Draft.**
    a. **Public Inputs.** See attached.
    b. **Task Group reports.**
7. **Other business.**
8. **Future meetings.**
    a. **Continuation Meeting (if necessary)**
    b. **Second Draft TC Meeting – to be held by November 2027**
9. **Adjournment.**

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Lightning Protection

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Christopher Coache 4/12/2017
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PRELIMINARY MINUTES

NFPA Technical Committee on Lightning Protection (LIG-AAA)
NFPA 780 Second Draft Meeting (A2025)
November 18, 2024
10:00 am – 6:00 pm (Eastern)

Virtual Meeting

1. **Call to order.** Christine Porter, chair, called the meeting to order at 10:05 on November 18, 2024.
2. **Introductions.** Attendees introduced themselves and identified their affiliation and NFPA staff took attendance.
3. **Chair report.** Christine Porter welcomed attendees and provided an overview of the meeting.
4. **Staff liaison report.** Christopher Coache provided an overview of the standards development process and the revision cycle schedule.
5. **Technical Committee Representation.** There were no declarations of representing another company, organization, or interest category.
6. **Previous meeting minutes.** The minutes from October 25 - 27, 2023 virtual meeting were approved without revision.
7. **NFPA 780 Second Draft.**
   a. **Review of Public Comments.** The Technical Committee reviewed the public comments and developed second revisions and committee comments as necessary. These will be available in the Second Draft Report at www.nfpa.org/780.
   b. **Task group report(s).** The following task groups provided their reports and recommendations.
      i. **TG 10 Watercraft – Nonmetallic Masts**. TG Chair: Ewen Thomson. The task group provided a report on public inputs and proposed resolution or first revision as applicable. The task group was reconstituted to continue work.
      ii. **TG 11 Watercraft – Zone of Protection**. TG Chair: Ewen Thomson. The task group provided a report on public inputs and proposed resolution or first revision as applicable. The task group was reconstituted to continue work.
      iii. **TG 12 Effect of Inducing Potentials**. Scope: evaluate effects of LEMP on structures. **TG Chair:** John Tobias. Mitch Guthrie.

iv. **TG 13 Use of Terms (combustible/flammable)**. Scope: review use of combustible/flammable for consistency throughout standard. Investigate structures that produce but do not contain flammable materials. **TG Chair:** David Gerstetter.

v. **TG 14 Use of Piles**. Scope: determine the applicability of piles as grounding medium. **TG Chair:** Simon Larter. Mitch Guthrie.

vi. **TG 15 Class III Materials**. Scope: evaluate the use of Class III materials for lightning protection systems. **TG Chair:** Bruce Kaiser. Mitch Guthrie.

vii. **TG 16 Chapter 4 Correlation**. Scope: review Chapter 4 requirements for correlation throughout standard. **TG Chair:** John Tobias. Mitch Guthrie.

viii. **TG 17 Strike Termination Bracing**. Scope: evaluate side bracing requirements for strike termination devices.**TG Chair:** Sam Barrack.

ix. **TG 19 Copper Clad Steel**. Scope: review the use of copper clad steel with lightning protection systems and address concerns with viability and potential damages of CCS using connectors and fittings listed for use with lightning protection systems. **TG Chair:** Mitch Guthrie. Bryan Holland

x. **TG 20 Inspection and Maintenance (Chapter 1)**. Scope: recommend inspection and maintenance criteria for inclusion in standard. **TG Chair:** Bryan Holland. Mitch Guthrie

c. **Presentation(s).** Copper-Clad Steel

8. **Other Business.** None.

9. **Future meetings.** The next committee meeting will be Fall 2026. Proposed location if the meeting is Ashville, North Carolina. A meeting notification will be posted at www.nfpa.org/780next when the next meeting is scheduled.

10. **Adjournment.** The meeting was adjourned at 5:48 pm on November 18, 2024.

NFPA 780 Second Draft TC Attendance

X	**Porter, Christine**	Chair	Intertek Testing Services
X	**Ashton, Daniel**	Principal	Lumen Technologies, Inc./Centurylink
X	**Barrack, Samuel**	Principal	Consolidated Nuclear Security, LLC
X	**Batchelor, Christopher**	Principal	US Department of the Navy
X	**Caie, Matthew**	Principal	nVent/Pentair/ERICO, Inc.
X	**Campbell, Joanie**	Principal	US Department of the Air Force
X	**Covino, Josephine**	Principal	US Department of Defense
X	**Friend, Kenneth**	Principal	Jasper Thompson Lightning Protection,
X	**Gerstetter, David**	Principal	UL Solutions
X	**Graves, Chuck**	Principal	US Federal Aviation Administration
X	**Guthrie, Mitchell**	Principal	Engineering Consultant
	Harger, Mark	Principal	Harger Lightning & Grounding
X	**Harger, Timothy**	Principal	Lightning Protection Institute
	Heary, William	Principal	Heary Brothers Lightning Protection
X	**Hoffman, Joshua**	Principal	Institute of Makers of Explosives (IME)
X	**Holland, Bryan**	Principal	National Electrical Manufacturers
X	**Humeniuk, Stephen**	Principal	United Lightning Protection Association,
X	**Johnson, Carl**	Principal	AVCON, Inc.
X	**Kaiser, Bruce**	Principal	Lightning Master Corporation
	Larter, Simon	Principal	Dobbyn Lightning Protection
	McAfee, David	Principal	Lightning & Fire Protection Consultant
X	**McKinch, Terrance**	Principal	Signal Energy Constructors
	Melton, Robley	Principal	Alliance for Telecommunications Industry
X	**Morgan, Mark**	Principal	East Coast Lightning Equipment, Inc.
X	**Pettross, Luke**	Principal	Lightning Eliminators & Consultants Inc.
	Rapp, Robert	Principal	National Lightning Protection Corporation
X	**Santis, Lon**	Principal	Explosives Risk Managers, LLC
X	**Thomson, Ewen**	Principal	Marine Lightning Protection Inc.
X	**Tobias, John**	Principal	US Department of the Army
	Tietjen, Leah	Voting Alternate	Los Alamos National Laboratory
X	**Bas, Luis**	Alternate	Intertek Testing Services
X	**Boettcher, Eric**	Alternate	UL Solutions

NFPA 780 Second Draft TC Attendance

	Heary, Kenneth	Alternate	Heary Brothers Lightning Protection
	Lanzoni, Joseph	Alternate	Lightning Eliminators & Consultants Inc.
X	**McElroy, Andrew**	Alternate	Harger Lightning & Grounding
	Morgan, Jennifer	Alternate	East Coast Lightning Equipment
X	**Portfleet, George**	Alternate	United Lightning Protection Association,
X	**Svendsen, Paul**	Alternate	National Lightning Protection Corporation
X	**Coache, Christopher**	Staff Liaison	National Fire Protection Association

GUESTS
Michael Mentola
Diane Grajeda
Peter Lindahl
Greg Olsen
Jody Wages
Peter Graser

40% Copper-Clad Steel LP Conductors Compared to Copper LP Conductors

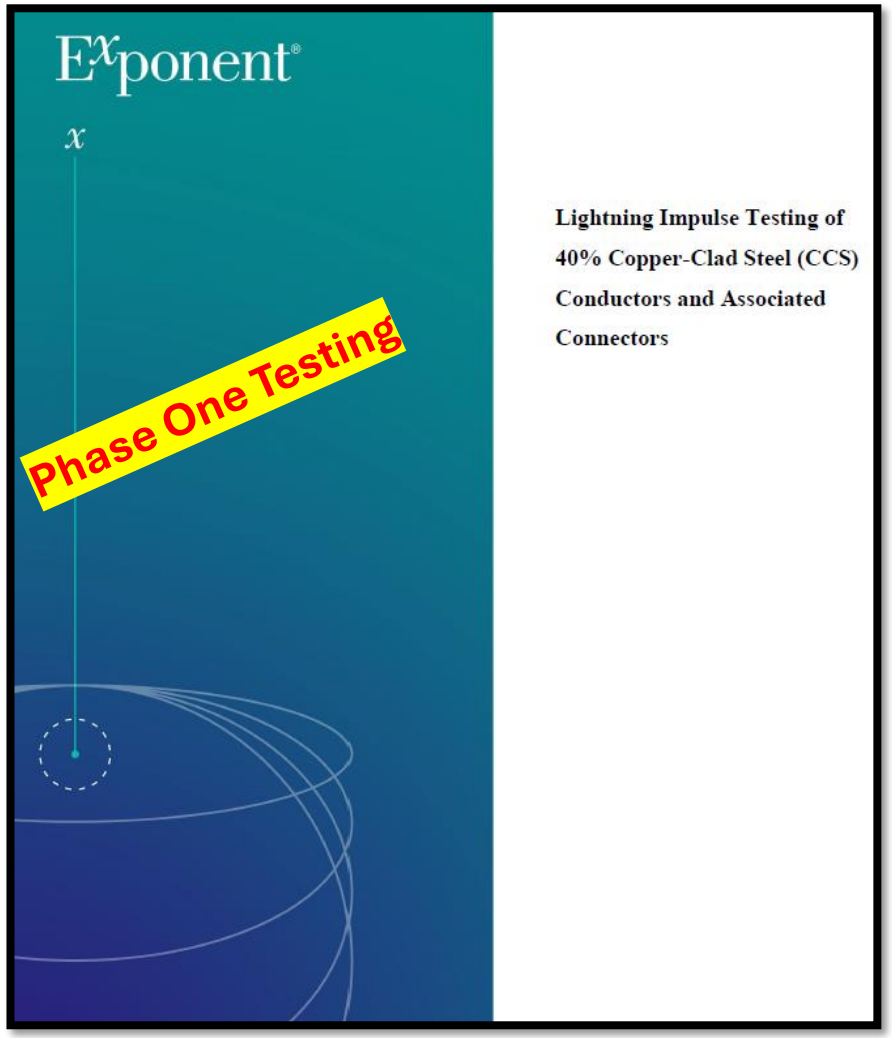
Lightning Impulse Testing Per IEC 62561-1

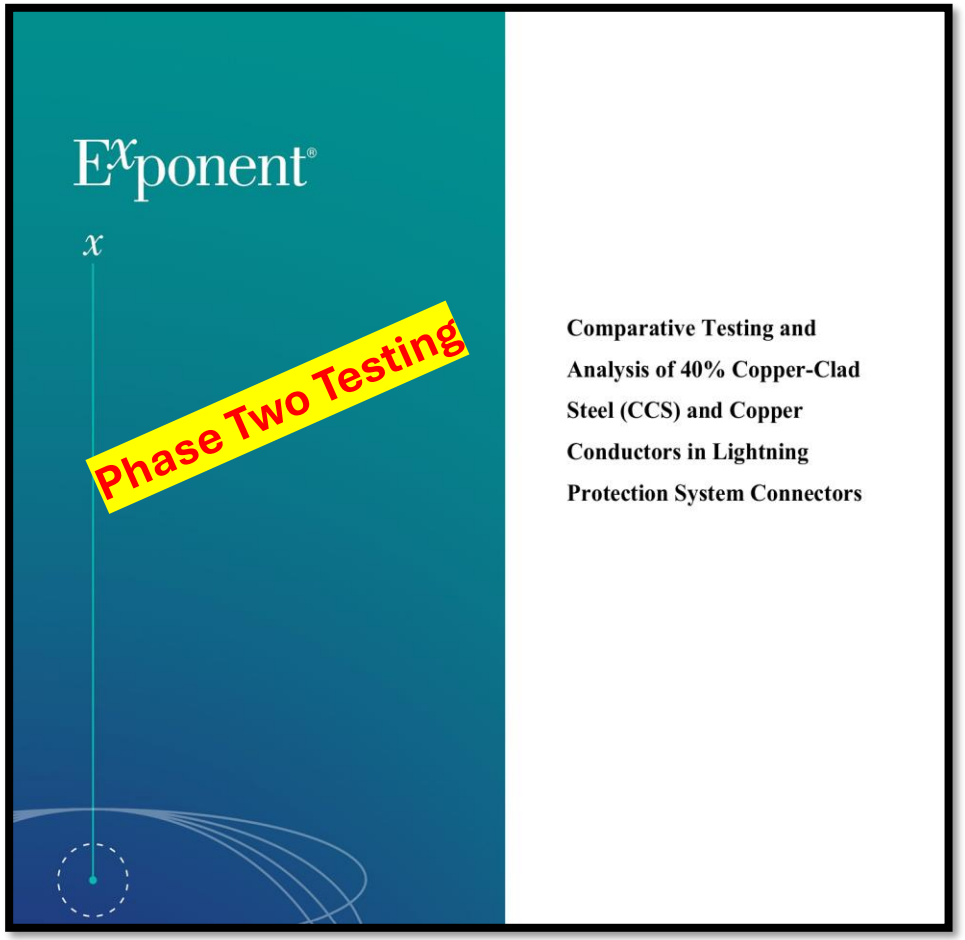
Performed by **Exponent** in Conjunction with the NFPA 780 CCS Task Group

Evaluation of the Electrical Connections



Connections made with 40% CCS LP conductors performed as well, and in some cases better than, identical connections made with copper LP conductors.





10/350 IMPULSE WAVE FORM:

PHASE ONE: 30 kA PEAK CURRENT. PHASE TWO: 100 kA PEAK CURRENT.

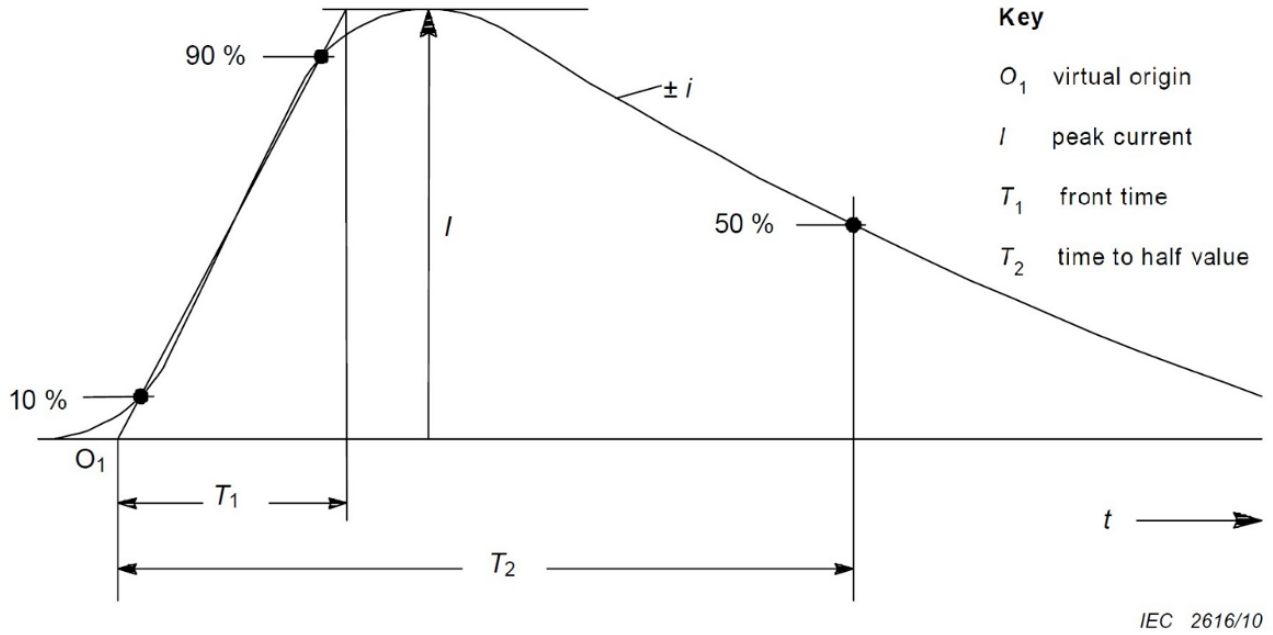


Figure 2. Representative impulse current shape defined by the front time, time to half value, and peak current parameters.[10]

PHASE ONE:

4/0 AWG 19 Strand

“Large LP Conductor”



Example cross connector assembly following the corrosion conditioning



Figure 9. Photograph of example cross-connector LPS assemblies prior to corrosion conditioning.

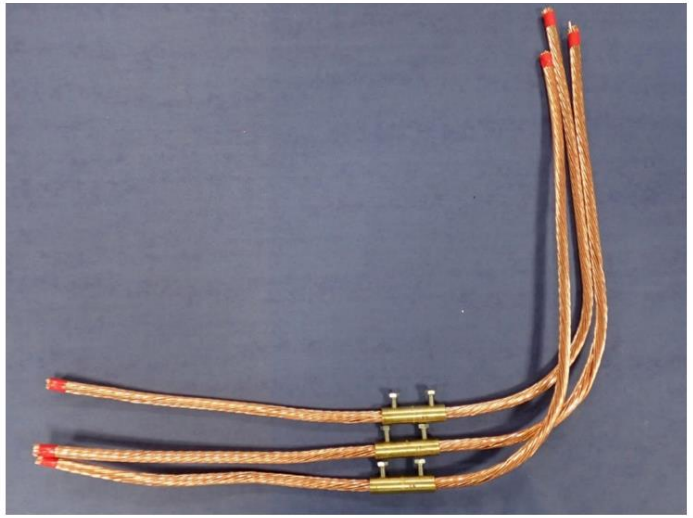


Figure 10. Photograph of example two-bolt straight connector LPS assemblies prior to corrosion conditioning.

PHASE ONE TESTING RESULTS

Table 1. Overall performance of 4/0 AWG copper conductor assemblies and 4/0 AWG CCS conductor assemblies based on the IEC 62561-1:2023 post-test evaluation requirements. Exponent notes that this testing used an impulse peak current of approximately 30 kA.

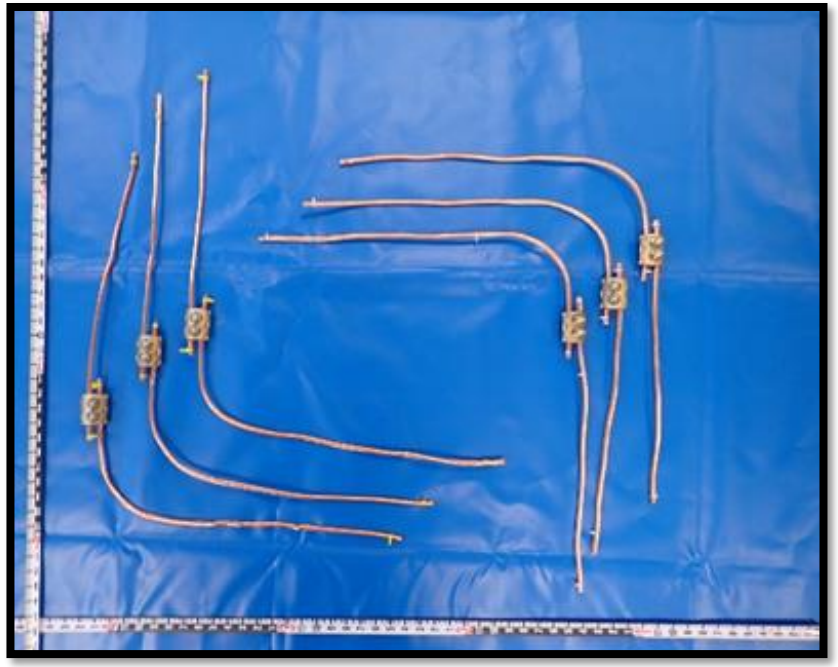
Conductor Type	Copper Conductor Assemblies					CCS Conductor Assemblies				
Connector Type	**IEC 62561-1 Overall Assessment**	Visual Assessment & No Cracking	Loosening Torque	Contact Resistance	Conductor Displacement	**IEC 62561-1 Overall Assessment**	Visual Assessment & No Cracking	Loosening Torque	Contact Resistance	Conductor Displacement
Cross *	**Fail**	Pass	Fail	Pass	Pass	**Fail**	Pass	Fail	Pass	Pass
Cross *	**Pass**	Pass	Pass	Pass	Pass	**Pass**	Pass	Pass	Pass	Pass
Straight *	**Pass**	Pass	Pass	Pass	Pass	**Pass**	Pass	Pass	Pass	Pass
Straight *	**Pass**	Pass	Pass	Pass	Pass	**Pass**	Pass	Pass	Pass	Pass

*** Neither the cross connector nor straight connector models used for this study are listed as complying with the IEC 62561-1 standard.**

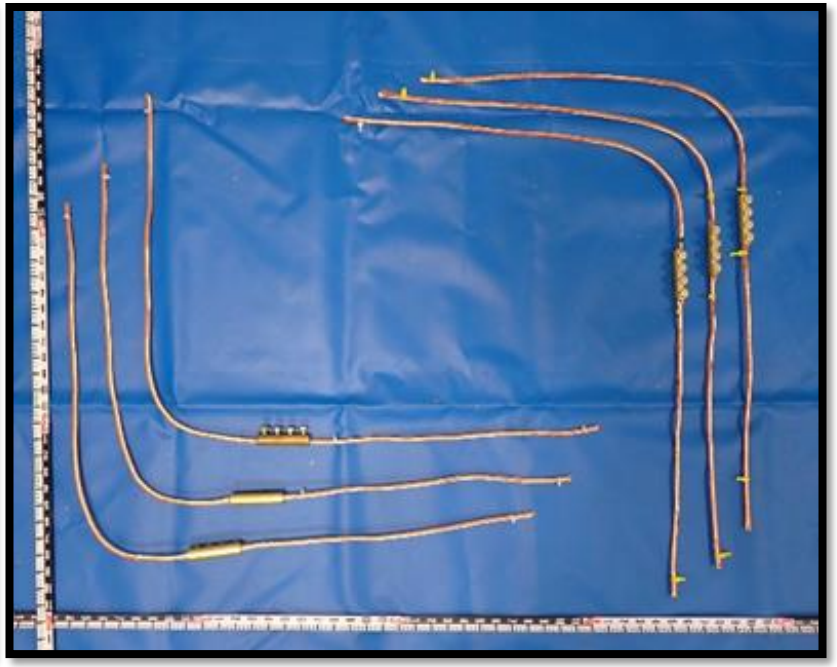
PHASE TWO:

3 AWG 19 Strand
“Small LP Conductor”

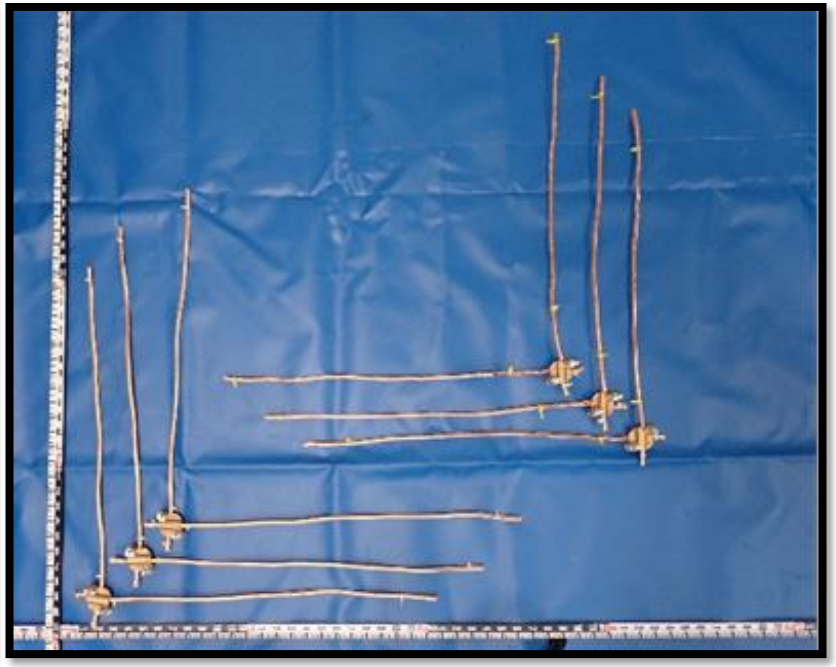
Parallel Connectors



Straight Connectors



Cross Connectors



PHASE TWO TESTING RESULTS

Table 1. Overall performance of copper conductor assemblies and CCS conductor assemblies based on the IEC 62561-1:2023 post-test evaluation requirements.

Conductor Type	Copper Conductor Assemblies					CCS Conductor Assemblies				
Connector Type	**IEC 62561-1 Overall Assessment**	Visual Assessment & No Cracking	Loosening Torque	Contact Resistance	Conductor Displacement	**IEC 62561-1 Overall Assessment**	Visual Assessment & No Cracking	Loosening Torque	Contact Resistance	Conductor Displacement
Parallel *	**Fail**	Pass	Fail	Pass	Fail	**Fail**	Pass	Fail	Pass	Fail
Parallel *	**Fail**	Pass	Fail	Pass	Pass	**Fail**	Pass	Fail	Pass	Pass
Straight	**Pass**	Pass	Pass	Pass	Pass	**Pass**	Pass	Pass	Pass	Pass
Straight	**Pass**	Pass	Pass	Pass	Pass	**Pass**	Pass	Pass	Pass	Pass
Cross *	**Fail**	Pass	Fail	Fail	Fail	**Pass**	Pass	Pass	Pass	Pass
Cross *	**Fail**	Pass	Fail	Fail	Fail	**Pass**	Pass	Pass	Pass	Pass

*** Neither the parallel cable connector nor cross connector models used for this study are listed as complying with the IEC 62561-1 standard.**

Per IEC 62561-1 all samples were conditioned and aged prior to testing in aggressive, accelerated atmospheric corrosive environments meant to simulate worst-case conditions with pollutants commonly encountered in marine, industrial and urban settings. These environments included exposure to salt spray, humid sulfur dioxide and ammonia. Yet, the electrical connections made with 40% CCS performed as well as the identical ones tested with copper conductors of identical aging, construction and diameter.



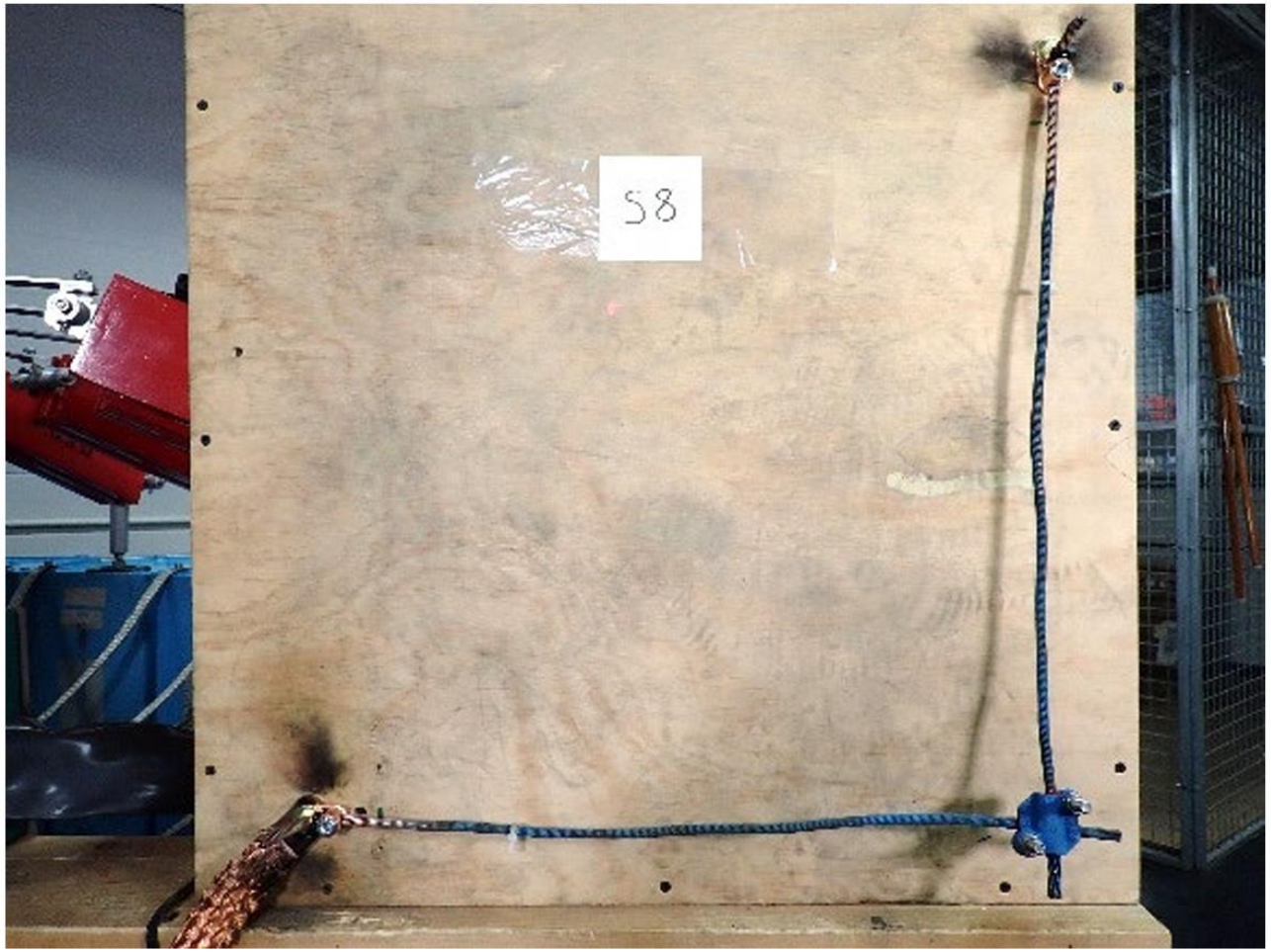


Figure 4. Example cross connector assembly following the corrosion conditioning process and installation onto the emulated lightning generator testing platform.

40% CCS LP Conductors Should Not Fuse

40% CCS conductors are capable of withstanding lightning energy levels categorized by the IEC standard 62561-1 as being the most extreme of lightning strokes found in nature (the top 95% in specific energy). This is demonstrated in the temperature rise within a minimum sized 40% CCS conductor in the presence of a Level 1 lightning stroke.

	LPL		
	III-IV	II	I
Specific Energy (MJ/Ω)	2.5	5.6	10.0
40% Copper-Clad Steel (CCS)			
Maximum Conductor Temperature (°C)	88	158	283
Copper (Cu), annealed, soft-drawn			
Maximum Conductor Temperature (°C)	60	87	129

Table 1. Maximum estimated temperatures reached by 3 AWG 19-strand 40% CCS and 3 AWG 19-strand annealed, soft-drawn Copper conductors during conduction of a lightning stroke with the specific energies corresponding to the listed LPLs.

[3] IEEE 837-2014, p.30.

2305824.001 - 1732

Melting/Fusing Temperatures:

Copper – 1,084°C

Steel – 1371 – 1540°C

Steel Is Stronger than Copper & Deforms Less After Lightning Impulses

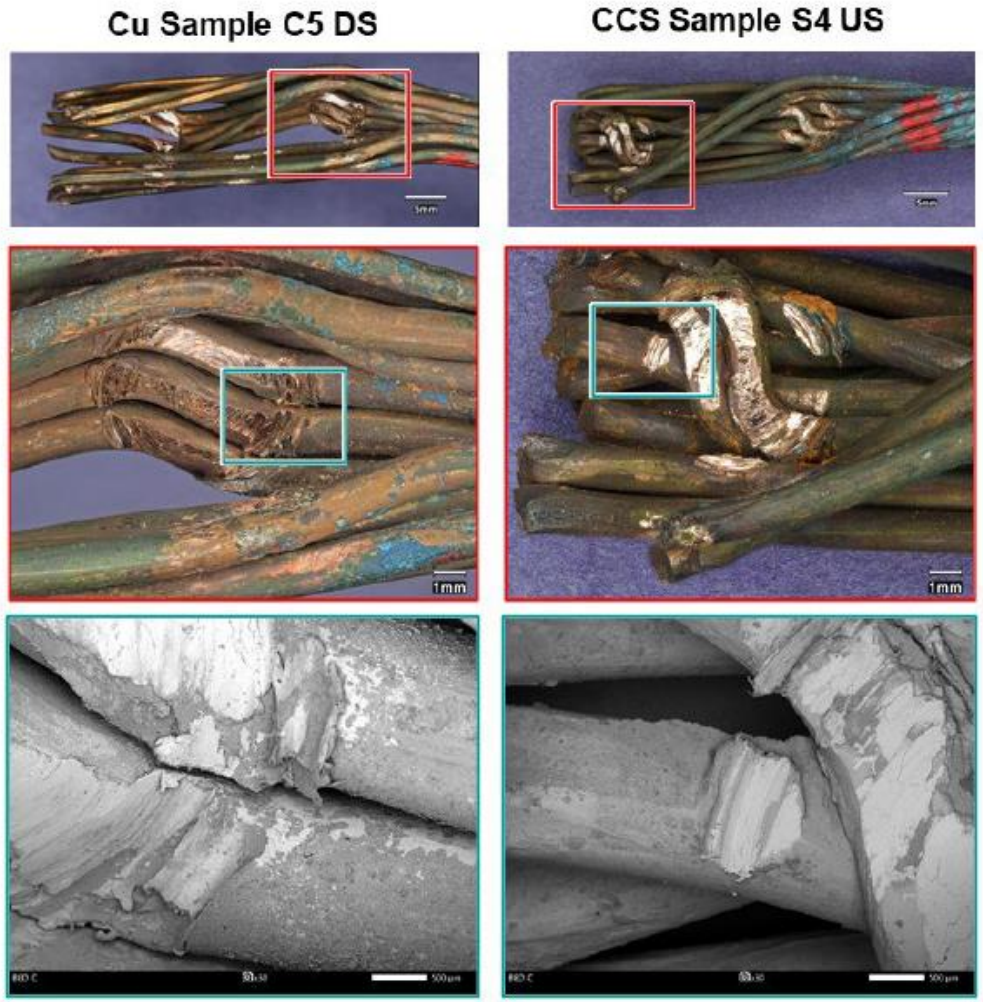


Figure A - 4. OM and backscatter electron SEM images of straight connector samples copper C5 DS and CCS S4 US. (Top Row) Overview OM images of each sample. The red marking is a paint pen marker. (Middle Row) Magnified OM image of each sample. (Bottom Row) Backscatter electron SEM images. EDS spectra within these regions are shown in the following image.

Public Input No. 1-NFPA 780-2025 [Global Input]

Section/Paragraph Reference:
Annex A, add new A.x.x

Proposed Annex Text:

A.x.x Integration of Autonomous Multidomain Safety Systems in Lightning Protection.
While NFPA 780 provides requirements for lightning protection system installation, autonomous multidisciplinary systems such as AIMSAFEGURD™ can add value by **monitoring and responding to secondary hazards caused by lightning events**.

AIMSAFEGURD™ provides:
– **Real-time surge and transient monitoring** in electrical networks.
– **Triple disconnection (MV/LV/DC)** to isolate systems vulnerable to arc flash or cascading failures.
– **Pressure, thermal, and smoke detection** to identify early arc flash or fire conditions following a strike.
– **Super-fast damper and valve shutdown** to contain fires or explosions triggered by lightning-induced surges.
– **AI-based hazard prediction**, correlating lightning data with equipment stress and degradation.
– **Event logging** for compliance, insurance, and forensic investigation.

These measures allow facilities to not only divert lightning energy, but also **autonomously detect and mitigate resulting hazards** across electrical, mechanical, structural, and civil domains.

Statement of Problem and Substantiation:

NFPA 780 ensures proper installation of lightning protection hardware, but it does not address **post-strike hazard monitoring**. Lightning often initiates **arc flash events, transformer failures, BESS thermal runaway, or fires in mechanical and structural systems**. AIMSAFEGURD™ supplements traditional lightning protection by providing **autonomous hazard isolation and predictive monitoring**. This creates a more resilient architecture for critical infrastructure, aligning safety with energy transition and grid reliability needs.

In addition to lightning protection hardware, autonomous systems such as AIMSAFEGURD™ may continuously monitor electrical installations for **overvoltage conditions**.

Functions include:
– Detecting **surge events and transient overvoltages** caused by lightning or switching.
– Executing **autonomous isolation (MV/LV/DC)** to prevent cascading failures.
– Monitoring **SPD health and performance degradation**.

– Providing event logging and AI-driven prediction to reduce long-term risk.

This ensures that lightning protection systems are supported by continuous monitoring of downstream hazards, reducing the risk of arc flash, fire, and equipment failure.

Statement of Problem and Substantiation for Public Input

NFPA 780 ensures proper installation of lightning protection hardware, but it does not address post-strike hazard monitoring. Lightning often initiates arc flash events, transformer failures, BESS thermal runaway, or fires in mechanical and structural systems. AIMSAFEGURD™ supplements traditional lightning protection by providing autonomous hazard isolation and predictive monitoring. This creates a more resilient architecture for critical infrastructure, aligning safety with energy transition and grid reliability needs.
In addition to lightning protection hardware, autonomous systems such as AIMSAFEGURD™ may continuously monitor electrical installations for overvoltage conditions.

Functions include:
– Detecting surge events and transient overvoltages caused by lightning or switching.
– Executing autonomous isolation (MV/LV/DC) to prevent cascading failures.
– Monitoring SPD health and performance degradation.
– Providing event logging and AI-driven prediction to reduce long-term risk.

This ensures that lightning protection systems are supported by continuous monitoring of downstream hazards, reducing the risk of arc flash, fire, and equipment failure.

Submitter Information Verification

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Affiliation: NFPA Member #1114021697
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State:
Zip:
Submittal Date: Fri Sep 26 21:33:49 EDT 2025
Committee: LIG-AAA

Public Input No. 3-NFPA 780-2025 [Global Input]

This submission proposes consideration of the AIM-SAFEGURD™ system within NFPA 780.
The system provides autonomous detection and mitigation of hazardous electrical events,
integrating predictive diagnostics, AI-driven monitoring, and independent mechanical isolation.
While NFPA 780 currently focuses on lightning protection infrastructure, AIM-SAFEGURD™
extends resilience by addressing both external lightning strikes and internal arc-flash or

transient overvoltage risks, ensuring continuity and safety in critical facilities.

Supporting Documentation:
Note: A supporting white paper with technical annex and certifications was submitted previously
under NFPA 502 Public Inputs and remains available on file with NFPA for committee reference.

Statement of Problem and Substantiation for Public Input

Current NFPA 780 provides requirements for lightning protection systems focusing primarily on external collection, grounding, and dissipation of strikes. However, it does not address secondary effects such as internal arc-flash, transient overvoltage propagation, or cascading failures in critical facilities that can result from lightning-induced surges or coupled electrical events. This leaves a gap in protection for tunnels, bridges, industrial plants, and mission-critical infrastructure where continuity of operation is essential.

Substantiation:
The proposed AIM-SAFEGURD™ system introduces an autonomous, predictive protection layer capable of detecting hazardous electrical phenomena, including arc-flash initiation and surge-induced transients, within fractions of a cycle. By integrating AI-supported diagnostics with independent mechanical isolation, the system provides an added layer of resilience beyond conventional lightning protection measures. Incorporating consideration of such architectures within NFPA 780 will ensure alignment with modern risk management practices and address evolving threats to public safety and infrastructure reliability.

Note: A supporting white paper with technical annex and professional certifications has already been submitted under NFPA 502 Public Input and remains on file with NFPA for committee reference.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1-NFPA 780-2025 [Global Input]	A supporting white paper with technical annex and professional certifications has already been submitted under NFPA 502 Public Input and remains on file with NFPA for committee reference.

Submitter Information Verification

Submitter Full Name: Oleg Tsyganok
Organization: AIM-SAFENET

Affiliation: NFPA Member #1114021697
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State:
Zip:
Submittal Date: Wed Oct 01 12:46:15 EDT 2025
Committee: LIG-AAA

Public Input No. 131-NFPA 780-2026 [New Section after 1.1.1]

1.1.2

A lightning protection system installed in compliance with this document shall be required for all of the following:

(1) Structures identified as an essential facility by the authority having jurisdiction

(2) When a risk assessment conducted in accordance with Annex L recommends protection

(3) When required by the authority having jurisdiction

Statement of Problem and Substantiation for Public Input

The purpose of NFPA 780 “shall be to provide for the safeguarding of persons and property from hazards arising from exposure to lightning,” however, the document does not require the installation of a lightning protection systems on any building or structure. This public input corrects this gap in the standard by adding LPS installation requirements to the scope of the document.

During the 2026 development cycle, the technical committee added section L.5.3 that identifies (13) critical facilities that should have a lightning protection system installed due to their importance to a community, especially after a natural disaster. These occupancy types would meet the proposed definition of “essential facility” included in the public input. When the local AHJ identifies a structure as an essential facility, additional building and fire code requirements go into effect to increase the structure’s resiliency to the extreme environmental condition to ensure continued operation of the facility during and after the event. By requiring these essential facilities to have an NFPA 780 compliant LPS, the hazards associated with a direct or nearby lightning strike will also be mitigated.

Additionally, requiring an LPS for structures that do not qualify as an essential facility, but are recommended to have an LPS installed by a risk assessment conducted in accordance with Annex L, will ensure these vulnerable structures are also protected. This includes structures that are located in regions with extremely high lightning strike density or when the loss of the structure due to damage or fire would have a significant negative economic, historical, or cultural impact on a community.

Adding LPS installation mandates to this standard will significantly reduce the billions of dollars in economic loss that communities experience each and every year from lightning strikes. Communities that effectively enforce these new requirements will also benefit from reduced insurance premiums and increased property appraisals.

Submitter Information Verification

Submitter Full Name: Bryan Holland

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Submittal Date: Tue Jun 02 14:55:45 EDT 2026

Committee: LIG-AAA

Public Input No. 132-NFPA 780-2026 [Section No. 1.1.2]

1.1.~~2~~ 3 *

This document shall address lightning protection of the structure but not the equipment or installation requirements for electric generating, transmission, and distribution systems except as given in Chapter 9 and Chapter 12.

Statement of Problem and Substantiation for Public Input

Renumbering to accommodate new 1.1.2

Submitter Information Verification

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Submittal Date: Tue Jun 02 14:59:08 EDT 2026
Committee: LIG-AAA

Public Input No. 133-NFPA 780-2026 [Section No. 1.1.3]

1.1.3 – 4 _

This document shall not cover lightning protection system installation requirements for early streamer emission systems or charge dissipation systems.

Statement of Problem and Substantiation for Public Input

Renumbering to accommodate new 1.1.2

Submitter Information Verification

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Submittal Date: Tue Jun 02 15:00:33 EDT 2026
Committee: LIG-AAA

Public Input No. 47-NFPA 780-2026 [Section No. 1.3.2]

1.3.2–

~~Listed or labeled equipment shall be installed and used in accordance with any limitations and instructions included in the listing or labeling~~

Any product listed for the purpose of Lightning Protection shall be allowed to be used in a Lightning Protection System as long as it meets the criteria for such use as is enumerated in this standard .

Statement of Problem and Substantiation for Public Input

Different component parts are often required to be used for specific applications for which they may not be listed. This is done to accomplish effective installations on facilities that present aesthetic challenges, or specific site concerns such as water intrusion. If the surface area of contact is met and the device is adequately sized to conduct the current for the application for which it is being used it should be permitted, unless specifically prohibited by the manufacturer.

Submitter Information Verification

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Submittal Date: Tue May 19 13:37:51 EDT 2026
Committee: LIG-AAA

Public Input No. 48-NFPA 780-2026 [New Section after 1.7]

TITLE OF NEW CONTENT

1.7.1 Inspections shall be conducted through a physical on-site review of the entire Lightning Protection System by a qualified organization acceptable to the authority having jurisdiction.

Statement of Problem and Substantiation for Public Input

The qualification of an inspector assures the quality and functionality of the Lightning Protection System.

Submitter Information Verification

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Submittal Date: Tue May 19 14:13:25 EDT 2026
Committee: LIG-AAA

Public Input No. 62-NFPA 780-2026 [Section No. 3.3]

3.3 General Definitions.

3.3.1* Air Terminal.

A manufactured strike termination device intended to provide an intentional attachment point for flashes to the lightning protection system.

3.3.2* Bonded, Inherently.

Bonding between metal bodies, building framework, and lightning protection system components that are joined through construction.

3.3.3 Bonding.

An electrical connection between an electrically conductive object and a component of a lightning protection system that is intended to significantly reduce potential differences created by lightning currents.

3.3.4* Cable.

A conductor formed of a number of wires stranded together.

3.3.5 Catenary Lightning Protection System.

A lightning protection system consisting of one or more overhead ground wires.

3.3.6 Chimney.

A construction containing one or more flues that does not meet the criteria defined for heavy-duty stack.

3.3.7* Combination Waveform Generator.

A surge generator with a 2-ohm internal impedance producing a 1.2/50 μs open circuit voltage and an 8/20 μs short-circuit current waveshape.

3.3.8* Conductive.

Any material that has an electrical relaxation time constant less than 100 ns.

3.3.9 Conductor.

3.3.9.1 Bonding Conductor.

A conductor used for potential equalization between grounded metal bodies or electrically conductive objects and a lightning protection system.

3.3.9.2 Counterpoise Conductor.

A bare underground electrical conductor providing an area of protection from the effects of lightning for underground raceway(s) or cable(s).

3.3.9.3 Down Conductor.

A main conductor used to connect roof conductors to grounding electrodes.

3.3.9.4* Ground Loop Conductor.

A main-size loop conductor installed within 12 ft (3.6 m) vertically of the base of the structure to provide a common ground potential.

3.3.9.5 Loop Conductor.

A main-sized conductor encircling a structure that is used to interconnect grounding electrodes, main conductors, or other electrically conductive bodies.

3.3.9.6* Main Conductor.

A conductor intended to be used to carry lightning currents between strike termination devices and grounding electrodes.

3.3.9.7 Roof Conductor.

A main conductor used to interconnect strike termination devices.

3.3.10 Connector.

A device to splice, tap, or terminate a conductor.

3.3.10.1* Bolted Connector.

A device that employs mechanical fasteners to maintain conductivity.

3.3.10.2* Crimp Connector.

A device that employs metal tabs (i.e., fingers) that enclose the conductor to maintain conductivity.

3.3.10.3* Exothermic Weld.

A welding process that employs molten metal to form a permanent connection.

3.3.10.4* High-Compression Connector.

A device that utilizes a high-tonnage compression tool to permanently deform the connector material to maintain conductivity.

3.3.11 Copper-Clad Steel.

Steel with a coating of copper bonded to it.

3.3.12 Discharge Current.

3.3.12.1 Maximum Discharge Current (I_{max}).

The maximum instantaneous value of a current through a surge-protective device (SPD) having an 8/20 µs waveform.

3.3.12.2 Nominal Discharge Current (I_n).

Peak value of 8/20 µs current waveform selected by the manufacturer for which a surge-protective device (SPD) remains functional after 15 surges.

3.3.13 Explosives 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.

3.3.14 Fastener.

An attachment device used to secure the conductor to the structure.

3.3.15 Flame Protection.

Self-closing gauge hatches, vapor seals, pressure-vacuum breather valves, flame arresters, or other effective means to minimize the possibility of flame entering the vapor space of a tank.

3.3.16* Flammable Air-Vapor Mixtures.

Flammable vapors mixed with air in proportions that will cause the mixture to burn rapidly when ignited.

3.3.17 Flammable Vapors.

A concentration of constituents in air that exceeds 25 percent of its lower flammable limit (LFL). [**115,** 2020]

3.3.18 Flash Point.

The minimum temperature at which a liquid or a solid emits vapor sufficient to form an ignitible mixture with air near the surface of the liquid or the solid.

3.3.19 Grounded (Grounding).

Connected (connecting) to ground or to a conductive body that extends the ground connection. [**70,** 2026]

3.3.20 Grounding Electrode.

A component of a lightning protection system installed for the purpose of transferring the current on the lightning conductors into the earth.

3.3.21 Hazard Division 1.4.

Ammunition and explosives that produce a moderate fire with no significant blast or fragment hazards.

3.3.22 Headwall.

A retaining wall at the outlet of an earth-covered magazine.

3.3.23 Heavy-Duty Stack.

A smoke or vent stack with a flue that has a cross-sectional area of the flue greater than 500 in.^{2} (0.3 m^2) and a height greater than 75 ft (23 m).

3.3.24 Integral Lightning Protection System.

A lightning protection system directly attached to the structure.

3.3.25* Light Base.

An enclosure used as a mounting base for airfield light fixtures, an isolation transformer housing, an electrical junction box, or any combination thereof.

3.3.26 Lightning Electromagnetic Pulse (LEMP).

Electromagnetic effects of lightning current, which includes conducted surges as well as radiated impulse electromagnetic field effects.

3.3.27 Lightning Event Monitoring System.

A site-specific device, instrument, or system installed for the purpose of determining whether lightning has affected a protected structure, protected area, or lightning protection system by detecting lightning events and creating retrievable records that include event date and time and associated measured or observed lightning-event characteristics.

3.3.28 * Lightning Protection System.

A complete system of strike termination devices, conductors (which could include conductive structural members), grounding electrodes, interconnecting conductors, surge protection, and other connectors and fittings required to complete the system.

3.3.~~28~~ 29 Liquid.

3.3.~~28~~ 29 .1 Class I Flammable Liquid.

Any liquid that has a closed-cup flash point below 100°F (37.8°C) and a Reid vapor pressure not exceeding an absolute pressure of 40 psi (276 kPa) at 100°F (37.8°C).

3.3.~~28~~ 29 .2 Combustible Liquid.

Any liquid that has a closed-cup flash point at or above 100°F (37.8°C).

3.3.~~29~~ 30 Magazine.

A structure specifically designed to store ammunition and explosives.

3.3.~~29~~ 30 .1 Earth-Covered Magazine (ECM).

An aboveground, earth-covered structure with a minimum of 24 in. (600 mm) soil cover depth and a slope of 2 horizontal and 1 vertical.

3.3.~~29~~ 30 .2 Portable Magazine.

A magazine that can be moved from one location to another.

3.3.~~30~~ 31 Magnetically Shielded.

All or part of an object enclosed in a metallic grid or continuous screen that reduces the effects of the lightning electromagnetic pulse (LEMP) and consequences relating to the failure or upset of electronic systems and their components.

3.3.~~31~~ 32 Mast-Type Lightning Protection System.

A lightning protection system using one or more masts that are remote from the structure to provide a zone of protection as described in this standard.

3.3.~~32~~ 33 Materials.

3.3.~~32~~ 33 .1* Class I Materials.

Lightning conductors, air terminals, grounding electrodes, connectors, and associated fittings required for the protection of structures not exceeding 75 ft (23 m) in height.

3.3.~~32~~ 33 .2* Class II Materials.

Lightning conductors, air terminals, grounding electrodes, connectors, and associated fittings required for the protection of structures exceeding 75 ft (23 m) in height.

3.3.~~33~~ 34 * Mounting Stake.

A steel angle iron driven vertically into the earth with provisions for the mounting of an elevated airfield lighting fixture.

3.3.~~34~~ 35 * Nonconductive.

Any material that has an electrical relaxation time constant greater than 100 ms.

3.3.~~35~~ 36 Pavement.

A hard, layered surface constructed to provide support for the loads imposed by airplanes and to produce a firm, stable, smooth, all-year, all-weather surface free of debris or other particles blown or picked up by propeller wash or jet blast.

3.3.~~35~~ 36 .1 Full Strength Pavement.

Pavement designed to provide support for an aircraft for continual operations of the aircraft.

3.3.~~35~~ 36 .2 Shoulder Pavement.

Pavement designed to provide support for an aircraft for unintentional or emergency operations of the aircraft.

3.3.~~36~~ 37 * Raceway.

An enclosed channel designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this standard. [**70,** 2026]

3.3.~~37~~ 38 Sideflash.

An electrical spark, caused by differences of potential, that occurs between conductive metal bodies or between conductive metal bodies and a component of a lightning protection system or ground.

3.3.~~38~~ 39 Smart Structure.

A structure that has a high degree of interconnected automatic systems for lighting, temperature control, multimedia systems, telecommunications, security, window and door operations, and other functions.

3.3.~~39~~ 40 Solar Array.

A group of photovoltaic (PV) modules or solar thermal collectors wired or connected together in a string or larger collection system.

3.3.~~40~~ 41 * Solar Panel.

A general term for thermal collectors or photovoltaic (PV) modules.

3.3.~~41~~ 42 Spark Gap.

Any short air space between two conductors that are electrically insulated from or remotely electrically connected to each other.

3.3.~~42~~ 43 Strike Termination Device.

A conductive component of the lightning protection system capable of receiving a lightning strike and providing a connection to a path to ground. Strike termination devices include air terminals, metal masts, permanent metal parts of structures as described in 4.5.1.4, and overhead ground wires installed in catenary lightning protection systems.

3.3.~~43~~ 44 Striking Distance.

The distance over which the final breakdown of the initial lightning stroke to ground or to a grounded object occurs.

3.3.~~44~~ 45 * Surge.

A transient wave of current, potential, or power in an electric circuit.

3.3.~~45~~ 46 * Surge Arrester.

A protective device for limiting surge voltages by discharging or bypassing the surge current.

3.3.~~46~~ 47 * Surge Protector.

A protective device for limiting excessive potential and current on signal, data, and communication circuits caused by lightning, contact with power conductors, power induction, and rises in ground potential, while also preventing the continued flow of the follow current while remaining capable of repeating these functions.

3.3.~~47~~ 48 * Surge-Protective Device (SPD).

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

3.3.~~48~~ 49 * Tank Battery.

A group of tanks and the associated process equipment for crude oil production or saltwater disposal.

3.3.~~49~~ 50 Transient.

A subcycle disturbance in the ac waveform that is evidenced by a sharp, brief discontinuity of the waveform.

3.3.~~50~~ 51 Turf Shoulder.

Grass, stabilized soil, or any other 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.

3.3.~~51~~ 52 Voltage.

3.3.~~51~~ 52 .1 Maximum Continuous Operating Voltage (MCOV).

The maximum designated root mean square (rms) value of the power frequency voltage that can be continuously applied to the mode of protection of a surge protective-device (SPD).

3.3.~~51~~ 52 .2 Maximum Permitted DC Voltage (V_{pvdc}).

The maximum permitted dc voltage rating across a photovoltaic surge-protective device (PV SPD).

3.3.~~51~~ 52 .3 Measured Limiting Voltage (MLV).

Maximum magnitude of voltage that is measured across the terminals of the surge-protective device (SPD) during the application of impulses of specified waveshape and amplitude.

3.3.~~51~~ 52 .4 Rated Impulse Withstand Voltage Level (Withstand Voltage) (U_W).

Impulse withstand voltage assigned by the manufacturer to wiring and equipment, or to a part of it, characterizing the specified withstand capability of its insulation against (transient) overvoltages.

3.3.~~52~~ 53 * Voltage Protection Rating (VPR).

A rating (or ratings) selected by the manufacturer based on the measured limiting voltage determined when the surge-protective device (SPD) is subjected to a combination waveform with an open circuit voltage of 6 kV and a short-circuit current of 3 kA.

3.3.~~53~~ 54 Watercraft.

All forms of boats and vessels up to 300 gross tons (272 metric tons) used for pleasure or commercial purposes, but excluding seaplanes, hovercraft, vessels with a cargo of flammable liquids, and submersible vessels.

3.3.~~54~~ 55 Zone of Protection.

The space adjacent to a lightning protection system that is substantially immune to direct lightning flashes.

Statement of Problem and Substantiation for Public Input

NFPA 780 currently contains inspection, maintenance, and reporting provisions that depend on identifying known or suspected lightning interaction with a protected structure or lightning protection system, but the standard does not define a technology-neutral term for systems that objectively detect and document such events.

Annex D recommends that a lightning protection system be inspected after any known lightning discharge to the system. Chapter 8 requires immediate documentation and reporting of any indication of damage produced by a lightning strike to a structure or its lightning protection system, and also requires surge protection to be inspected after any suspected lightning strike. These provisions establish the importance of post-event inspection and reporting, but the standard does not presently define a category of instrumentation that can be used to determine whether a lightning event affected the protected structure, protected area, or lightning protection system.

The proposed definition of Lightning Event Monitoring System resolves this gap by creating a generic, performance-based term that can be used in subsequent inspection, maintenance, reporting, and record-retention provisions. The term is intentionally technology-neutral and does not prescribe a specific manufacturer, sensor type, architecture, or installation method. It can include conductor-mounted lightning current recorders, optical lightning monitoring systems, electromagnetic-field or transient monitoring systems, or other instrumentation capable of creating retrievable records of lightning events.

The proposed definition also avoids use of the term “counter.” A simple counter might only indicate that a count changed and might not provide sufficient information to support post-event inspection, correlation with damage, maintenance records, or reporting to the authority having jurisdiction. By requiring retrievable records that include event date and time and associated measured or observed lightning-event characteristics, the proposed definition establishes a practical minimum level of event documentation while remaining open to current and future technologies.

This definition does not, by itself, impose a requirement to install such systems. It provides the necessary defined term for later sections of the standard where lightning event monitoring may be permitted or required for specific occupancies, structures, or risk conditions. This is consistent with the inspection and maintenance framework already present in NFPA 780 and with Annex J’s recognition that modern smart structures include interconnected systems and sensitive electronics that require coordinated lightning protection planning.

The proposed definition will improve clarity and consistency by giving the standard a neutral term for instrumentation used to objectively identify and document lightning events affecting protected structures, protected areas, or lightning protection systems.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 74-NFPA 780-2026 [Section No. D.1.1]	
Public Input No. 75-NFPA 780-2026 [Section No. D.1.4]	
Public Input No. 76-NFPA 780-2026 [Section No. D.1.5]	
Public Input No. 77-NFPA 780-2026 [Section No. D.2.2.2]	
Public Input No. 78-NFPA 780-2026 [Section No. D.2.3]	
Public Input No. 79-NFPA 780-2026 [New Section after J.8]	

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Submittal Date: Tue May 26 14:03:44 EDT 2026
Committee: LIG-AAA

Public Input No. 129-NFPA 780-2026 [Section No. 3.3.3]

3.3.3 Bonding.

An electrical connection between an electrically conductive object and a component of a lightning protection system, utilizing a bonding or main-size

conductor, that is intended to significantly reduce potential differences created by lightning currents.

Statement of Problem and Substantiation for Public Input

This public input clarifies that a bonding or main conductor can be used to make a required bonding connection.

Submitter Information Verification

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Submittal Date: Tue Jun 02 14:42:35 EDT 2026
Committee: LIG-AAA

Public Input No. 9-NFPA 780-2025 [New Section after 3.3.9]

40% Copper-Clad Steel Wire (40% CCS)

40% Copper-Clad Steel Wire (40% CCS) Wire consisting of a core of homogeneous steel with a continuous outer cladding of copper metallurgically bonded to the core throughout to have minimum copper thickness of 9%of the wire diameter.

Additional Proposed Changes

File Name	Description	Approved
780_PC1.pdf	780_PC1	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 1 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds a definition for 40% CCS as a permitted wiring method for use in this standard when the material is in compliance with ASTM B 910 and B 227. A minimum copper thickness of 9% of the wire diameter equates to 40% copper cladding. Copper-Clad Steel (CCS) has been widely used as a conductor material for lightning protection since the 1920s. It is referenced in NFPA 780 as an overhead ground wire to protect conductors and equipment positioned on distribution towers, providing evidence of its performance capability. 40% CCS is the commercially available grade of CCS with the highest copper content to ensure both maximum corrosion resistance and maximum conductivity. This PC defines 40% CCS in NFPA 780.

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Submittal Date: Fri Dec 19 12:38:30 EST 2025
Committee: LIG-AAA

Public Comment No. 1-NFPA 780-2024 [New Section after 3.3.9]

40% Copper-Clad Steel Wire (40% CCS)

40% Copper-Clad Steel Wire (40% CCS) Wire consisting of a core of homogeneous steel with a continuous outer cladding of copper metallurgically bonded to the core throughout to have minimum copper thickness of 9% of the wire diameter.

Statement of Problem and Substantiation for Public Comment

This adds a definition for 40% CCS as a permitted wiring method for use in this standard when the material is in compliance with ASTM B 910 and B 227. A minimum copper thickness of 9% of the wire diameter equates to 40% copper
cladding. Copper-Clad Steel (CCS) has been widely used as a conductor material for lightning protection since the 1920s. It is referenced in NFPA 780 as an overhead ground wire to protect conductors and equipment positioned on distribution towers, providing evidence of its performance capability. 40% CCS is the commercially available grade of CCS with the highest copper content to ensure both maximum corrosion resistance and maximum conductivity. This PC defines 40% CCS in NFPA 780.

Related Item

• Public Input 10 NFPA 780-2023

Submitter Information Verification

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Submittal Date: Sun May 12 07:09:24 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

Copyright Assignment

I, Peter Graser, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Comment (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Comment in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Comment and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Peter Graser, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 39-NFPA 780-2026 [New Section after 3.3.9.7]

3.3.9.8 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. Type your content here ...

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. This aligns with the product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

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Submittal Date: Mon Mar 30 10:23:58 EDT 2026
Committee: LIG-AAA

Public Input No. 81-NFPA 780-2026 [New Section after 3.3.9.7]

TITLE OF NEW CONTENT

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. 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. This aligns with product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

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Submittal Date: Wed May 27 09:10:58 EDT 2026
Committee: LIG-AAA

Public Input No. 87-NFPA 780-2026 [New Section after 3.3.9.7]

TITLE OF NEW CONTENT

Type your content here ...

3.3.9.8 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

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. This aligns with product standard for electrically insulated lightning protection per IEC 62561-8.

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Submittal Date: Wed May 27 16:09:30 EDT 2026
Committee: LIG-AAA

Public Input No. 49-NFPA 780-2026 [New Section after 3.3.11]

Critical/ Essential Structures

Structures where an imminent threat to life safety for members of the community would be caused by a lightning event if that structure was unable to function for the purpose for which it was created.

renumber the entire section accordingly

Statement of Problem and Substantiation for Public Input

Damage to facilities such as Emergency Medical Service Dispatch Centers, care facilities, hospitals and prisons are essential. The loss of these services would present a threat to the community at large. Steps should be taken to prevent any down-time that may be caused by a lightning event.

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Submittal Date: Tue May 19 14:29:40 EDT 2026
Committee: LIG-AAA

Public Input No. 135-NFPA 780-2026 [New Section after 3.3.12.2]

3.3.13 Essential Facility*

Buildings and other structures that are intended to remain operational in the event of extreme environmental conditions.

A.3.3.13 Essential Facility

See the list of facilities identified in section L.5.3.1 of Annex L that are considered essential facilities. Extreme environmental conditions include but are not limited to lightning, tropical cyclones, snowstorms, earthquakes, and flooding events.

Additional Proposed Changes

File Name	Description	Approved
NFPA_780-29_Section_1.1.2_3.3.13_PI.docx	NFPA 780 NEMA Public Input 3.3.13	

Statement of Problem and Substantiation for Public Input

The purpose of NFPA 780 “shall be to provide for the safeguarding of persons and property from hazards arising from exposure to lightning,” however, the document does not require the installation of a lightning protection systems on any building or structure. This public input corrects this gap in the standard by adding LPS installation requirements to the scope of the document.

During the 2026 development cycle, the technical committee added section L.5.3 that identifies (13) critical facilities that should have a lightning protection system installed due to their importance to a community, especially after a natural disaster. These occupancy types would meet the proposed definition of “essential facility” included in the public input. When the local AHJ identifies a structure as an essential facility, additional building and fire code requirements go into effect to increase the structure’s resiliency to the extreme environmental condition to ensure continued operation of the facility during and after the event. By requiring these essential facilities to have an NFPA 780 compliant LPS, the hazards associated with a direct or nearby lightning strike will also be mitigated.

Additionally, requiring an LPS for structures that do not qualify as an essential facility, but are recommended to have an LPS installed by a risk assessment conducted in accordance with Annex L, will ensure these vulnerable structures are also protected. This includes structures that are located in regions with extremely high lightning strike density or when the loss of the structure due to damage or fire would have a significant negative economic, historical, or cultural impact on a community.

Adding LPS installation mandates to this standard will significantly reduce the billions of dollars in economic loss that communities experience each and every year from lightning strikes. Communities that effectively enforce these new requirements will also benefit from reduced insurance premiums and increased property appraisals.

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Zip:
Submittal Date: Tue Jun 02 15:12:45 EDT 2026
Committee: LIG-AAA

NEMA NFPA Public Input Form

Please complete this form for all proposed NFPA Public Inputs, submitting a separate form for each input. Once approved by the NEMA Codes & Standards Committee, the information provided in this form will be submitted to NFPA.

<table>
<tr><td colspan="2">NEMA Section:</td><td colspan="2">ICS-BW, ICS-CC, ICS-VS</td><td>CMP Number:</td><td>780 TC</td></tr>
<tr><td rowspan="2">1.</td><td>(a) Title of NFPA Standard</td><td colspan="2">Standard for the Installation of Lightning Protection Systems</td><td>NFPA No. & Year</td><td>780-2029</td></tr>
<tr><td>(b) Section/Paragraph</td><td colspan="4">1.1.2 and 3.3.13</td></tr>
<tr><td>2.</td><td colspan="2">Public Input Recommends (Check one)</td><td colspan="3">☒New Text
☐Revised Text
☐Deleted Text</td></tr>
<tr><td>3.</td><td colspan="5">Proposed Text of Public Input (Include proposed new or revised wording, or identification of wording to be deleted): [Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike through to denote wording to be deleted (~~deleted wording~~).]</td></tr>
<tr><td></td><td colspan="5">1.1.2
A lightning protection system installed in compliance with this document shall be required for all of the following:

(1) Structures identified as an essential facility by the authority having jurisdiction
(2) When a risk assessment conducted in accordance with Annex L recommends protection
(3) When required by the authority having jurisdiction

3.3.13 Essential Facility*
Buildings and other structures that are intended to remain operational in the event of extreme environmental conditions.

A.3.3.13 Essential Facility
See the list of facilities identified in section L.5.3.1 of Annex L that are considered essential facilities. Extreme environmental conditions include but are not limited to lightning, tropical cyclones, snowstorms, earthquakes, and flooding events.</td></tr>
<tr><td>4.</td><td colspan="5">Statement of Problem and Substantiation for Public Input: (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Public Input, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)</td></tr>
<tr><td></td><td colspan="5">The purpose of NFPA 780 “shall be to provide for the safeguarding of persons and property from hazards arising from exposure to lightning,” however, the document does not require the installation of a lightning protection systems on any building or structure. This public input corrects this gap in the standard by adding LPS installation requirements to the scope of the document.

During the 2026 development cycle, the technical committee added section L.5.3 that identifies (13) critical facilities that should have a lightning protection system installed due to their importance to a community, especially after a natural disaster. These occupancy</td></tr>
</table>

	types would meet the proposed definition of "essential facility" included in the public input. When the local AHJ identifies a structure as an essential facility, additional building and fire code requirements go into effect to increase the structure's resiliency to the extreme environmental condition to ensure continued operation of the facility during and after the event. By requiring these essential facilities to have an NFPA 780 compliant LPS, the hazards associated with a direct or nearby lightning strike will also be mitigated. Additionally, requiring an LPS for structures that do not qualify as an essential facility, but are recommended to have an LPS installed by a risk assessment conducted in accordance with Annex L, will ensure these vulnerable structures are also protected. This includes structures that are located in regions with extremely high lightning strike density or when the loss of the structure due to damage or fire would have a significant negative economic, historical, or cultural impact on a community. Adding LPS installation mandates to this standard will significantly reduce the billions of dollars in economic loss that communities experience each and every year from lightning strikes. Communities that effectively enforce these new requirements will also benefit from reduced insurance premiums and increased property appraisals.
5.	**Copyright Assignment**
	(a) ☒ I am the author of the text or other material (such as illustrations, graphs) proposed in the Public Input.
	(b) ☐Some or all of the text or other material proposed in this Public Input was not authored by me. Its source is as follows: (please identify which material and provide complete information on its source)

Public Input No. 40-NFPA 780-2026 [New Section after 3.3.12.2]

3.3.13 Electrically Insulated Lightning Protection System

A lightning protection system with an 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 a solution to meet equivalent bonding distance. Type your content here ...

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. This aligns with the product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

Submitter Full Name: Tom Wettermann
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Submittal Date: Mon Mar 30 10:34:19 EDT 2026
Committee: LIG-AAA

Public Input No. 82-NFPA 780-2026 [New Section after 3.3.12.2]

TITLE OF NEW CONTENT

A lightning protection system with an 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 a solution to meet equivalent bonding 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. This aligns with product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

Submitter Full Name: Andy Parks
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Submittal Date: Wed May 27 11:10:11 EDT 2026
Committee: LIG-AAA

Public Input No. 102-NFPA 780-2026 [New Section after 3.3.13]

TITLE OF NEW CONTENT

3.3.13 Electrically Insulated Lightning Protection System

A lightning protection system with an 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 a solution to meet equivalent bonding distance.

Type your content here ...

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. This aligns with product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

Submitter Full Name: sam chreiteh
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Submittal Date: Fri May 29 14:13:50 EDT 2026
Committee: LIG-AAA

Public Input No. 103-NFPA 780-2026 [New Section after 3.3.24]

TITLE OF NEW CONTENT

Type yo

3.3.25 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.

ur content here ...

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. This aligns with product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

Submitter Full Name: sam chreiteh
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Submittal Date: Fri May 29 14:16:26 EDT 2026
Committee: LIG-AAA

Public Input No. 41-NFPA 780-2026 [New Section after 3.3.24]

3.3.25 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 and introduces electrically insulated lightning protection systems to achieve separation distance. This aligns with the product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

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Submittal Date: Mon Mar 30 10:50:57 EDT 2026
Committee: LIG-AAA

Public Input No. 83-NFPA 780-2026 [New Section after 3.3.25]

TITLE OF NEW CONTENT

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 and introduces electrically insulated lightning protection systems to achieve separation distance. This aligns with product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

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Submittal Date: Wed May 27 11:12:16 EDT 2026
Committee: LIG-AAA

Public Input No. 147-NFPA 780-2026 [New Section after 3.3.36]

TITLE OF NEW CONTENT

3.3.37 Roof Edge System. A component or system of components at the perimeter of a low-slope roof that is integrated into the roofing structure for the purpose of flashing and securing the roof membrane. Type your content here ...

Statement of Problem and Substantiation for Public Input

Metal Edge Systems are installed on many types of buildings. These systems have certain requirements in order to function properly. This definition and section added in another PI will provide guidance to the lightning protection industry in the installation that meets the requirements of this standard and does not affect the functionality of the the roof edge system.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 148-NFPA 780-2026 [New Section after 4.6.13.2]	

Submitter Information Verification

Submitter Full Name: Mark Morgan
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Submittal Date: Wed Jun 03 13:00:44 EDT 2026
Committee: LIG-AAA

Public Input No. 42-NFPA 780-2026 [New Section after 3.3.36]

3.3.37 Separation Distance

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

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. This aligns with the product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

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Submittal Date: Mon Mar 30 10:53:10 EDT 2026
Committee: LIG-AAA

Public Input No. 84-NFPA 780-2026 [New Section after 3.3.36]

TITLE OF NEW CONTENT

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 introduces electrically insulated lightning protection systems to achieve separation distance. This aligns with product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

Submitter Full Name: Andy Parks
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Zip:

Submittal Date: Wed May 27 11:20:35 EDT 2026
Committee: LIG-AAA

Public Input No. 104-NFPA 780-2026 [New Section after 3.3.37]

TITLE OF NEW CONTENT

Type your content here ...

3.3.37 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 introduces electrically insulated lightning protection systems to achieve separation distance. This aligns with product standard for electrically insulated lightning protection per IEC 62561-8.

Related Input
Public Input No. NFPA 780-2023 [New Section after 3.3.9.7]
Public Input No. NFPA 780-2023 [New Section after 3.3.12.2]
Relationship
Insulated Lightning Protection Systems
Insulated Lightning Protection Systems

Submitter Information Verification

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Zip:

Submittal Date: Fri May 29 14:17:56 EDT 2026
Committee: LIG-AAA

Public Input No. 134-NFPA 780-2026 [Section No. 3.3.38]

3.3.38 Smart Structure.

A structure ~~that has a high degree of interconnected automatic systems for lighting, temperature control, multimedia systems, telecommunications, security, window and door operations, and other functions~~ containing interconnected electronic, electrical, communication, information technology, monitoring, control, automation, or energy management systems that support the operation, safety, security, occupancy, or functionality of the structure .

Statement of Problem and Substantiation for Public Input

The existing definition of Smart Structure is outdated. Modern structures increasingly incorporate extensive interconnected electronic and digital systems, including information technology infrastructure, distributed control systems, sensor networks, power electronics, renewable energy systems, battery energy storage systems, and other connected technologies.

Submitter Information Verification

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Organization: East Coast Lightning Equipment
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Submittal Date: Tue Jun 02 15:10:38 EDT 2026
Committee: LIG-AAA

Public Input No. 141-NFPA 780-2026 [New Section after 3.3.52]

Volatile Substance

A substance that is not an explosive but is capable of exploding.

Renumber the entire section accordingly.

Statement of Problem and Substantiation for Public Input

A definition for Volatile Substance needed to address new technologies such as lithium-ion Batteries and fuel cells.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
Organization: Warren Lightning Rod Company
Affiliation: United Lightning Protection Association
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Submittal Date: Wed Jun 03 09:46:48 EDT 2026
Committee: LIG-AAA

Public Input No. 2-NFPA 780-2025 [Section No. 3.3.54]

3.3.54 Zone of Protection.

The space adjacent to a lightning protection system that is substantially immune to direct lightning flashes. The zone of protection applies only to protection of structures and equipment and shall not be used to determine areas of human safety, since additional risks to people exist beyond direct lightning flashes.

Statement of Problem and Substantiation for Public Input

The current definition of Zone of Protection has led to misapplication in practice. Engineers and designers are incorrectly using the zone of protection determined by the rolling sphere method to establish areas where people are assumed to be safe from lightning. For example, in parking lots and open areas, light poles are often evaluated using zone of protection principles, and individuals standing or walking within those zones are presumed to be protected. This interpretation is dangerous and technically unsound.

The zone of protection concept addresses only the interception of direct lightning flashes to structures or equipment. It does not account for the additional hazards to people from step and touch potentials, side flashes, or other lightning-related effects. Treating the zone of protection as a measure of human safety creates a false sense of security and exposes the public to serious risk of injury or death.

The proposed clarification makes explicit that the zone of protection is a structural/equipment protection concept only, and shall not be used to infer or designate safe zones for people. This removes ambiguity, prevents unsafe design practices, and aligns the standard with the actual physics of lightning hazards to humans.

Submitter Information Verification

Submitter Full Name: Carlos Mata
Organization: Scientific Lightning Solutions
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Zip:
Submittal Date: Wed Oct 01 12:42:35 EDT 2025
Committee: LIG-AAA

Public Input No. 63-NFPA 780-2026 [Chapter 4]

Chapter 4 General Requirements

4.1 General.

This chapter provides general requirements for the protection of structures against lightning.

4.1.1 Material Class Requirements.

4.1.1.1*

Structures shall be protected according to 4.1.1.1.1 or 4.1.1.1.2.

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				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	

*A tolerance of -4 percent is permitted for solid and tubular air terminal raw stock, threaded to receive Unified National Coarse (UNC) thread for that size rod (i.e., 3/8 in. x 16, 1/2 in. x 13), which will meet the requirements of this table.

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			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

*A tolerance of -4 percent is permitted for solid air terminal raw stock threaded to receive UNC thread for that size rod (i.e., 1/2 in. x 13, 5/8 in. x 11), which will meet the requirements of this table.

4.1.1.2

If part of a structure is equal to or greater than 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.

4.1.1.3*

Class II conductors from the higher portion as described in 4.1.1.2 shall be extended to ground and interconnected with the balance of the system.

4.1.1.4 Additions to Existing Structures.

An existing structure requiring Class I materials on which a new addition requires Class II materials shall be permitted to use the existing ground ring conductor installed and determined to be suitable for continued service.

4.2 Materials.

Protection systems shall be made up of materials that are resistant to or protected against corrosion.

4.2.1

Combinations of materials that form electrolytic couples that, in the presence of moisture, accelerate corrosion shall not be used *(see also Section 4.3)*.

4.2.2

One or more of the materials in 4.2.2.1 through 4.2.2.3 shall be used.

4.2.2.1 Copper.

Copper shall be of the grade required for commercial electrical work and shall be of 95 percent conductivity when annealed.

4.2.2.2 Copper Alloys.

Copper alloy shall be as resistant to corrosion as copper is.

4.2.2.3 Aluminum.

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, soil on vegetative roofs, or planters, or where rapid deterioration is possible.

4.2.2.3.2

Conductors shall be of electrical-grade aluminum with a minimum chemical composition of 99 percent aluminum.

4.2.3

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

4.2.4*

Aluminum lightning protection materials shall not be installed on or in contact with copper roofing materials or other copper surfaces, or where exposed to runoff from copper surfaces.

4.2.5*

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

4.3 Corrosion Protection.

4.3.1

Protection shall be provided against the deterioration of lightning protection components caused by local atmospheric conditions.

4.3.2

Copper 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.

4.3.3

An aluminum conductor shall not be attached to a surface coated with alkaline-based paint, embedded in concrete or masonry, or installed in a location subject to excessive moisture.

4.3.4 Connectors and Fittings.

4.3.4.1

Connectors and fittings shall be compatible for use with the conductor and surfaces on which they are installed.

4.3.4.2

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

4.3.4.3

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

4.4 Mechanical Damage or Displacement.

4.4.1*

Any part of a lightning protection system that is subject to mechanical damage or displacement shall be protected with a protective molding or covering.

4.4.2*

Where a conductor is encircled by a metallic component, pipe, raceway, or sleeve, the conductor shall be bonded to the component, pipe, raceway, or sleeve at both ends.

4.4.2.1

A metallic component, pipe, raceway, or sleeve that is 8 in. (20.3 cm) or less in length shall require bonding on one end only.

4.4.2.2

A metallic component, pipe, raceway, or sleeve that is 2 in. (5.0 cm) or less in length shall not require bonding on either end.

4.5 Strike Termination Devices.

4.5.1 General.

4.5.1.1

Strike termination devices shall include air terminals, metal masts, permanent metal parts of structures as described in 4.5.1.4, and overhead ground wires.

4.5.1.2

Combinations of these strike termination devices shall be permitted.

4.5.1.3

Strike termination devices shall be provided where required by other sections of this standard.

4.5.1.4

Metal parts of a structure that are exposed to direct lightning flashes and that have a metal thickness of 3⁄16 in. (4.8 mm) or greater shall only require connection to the lightning protection system in accordance with Section 4.8.

4.5.1.5*

Metal rails outside a zone of protection having a wall thickness of 1⁄8 in. (3.2 mm) thick or greater shall only require connection to the lightning protection system in accordance with Section 4.8.

4.5.1.6

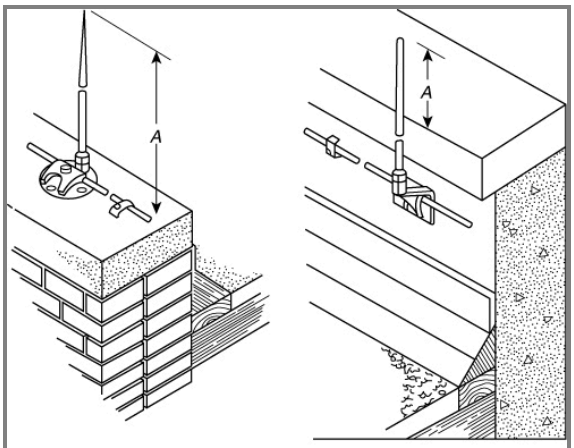
Strike termination devices shall be permitted but not required for those parts of a structure located within a zone of protection.

4.5.2 Air Terminals.

4.5.2.1*

The tip of an air terminal shall be not less than 10 in. (254 mm) above the object or area it is to protect, as shown in Figure 4.5.2.1.

Figure 4.5.2.1 Air Terminal Height.



A: 10 in. (254 mm)
Note: Air terminal tip configurations can be sharp or blunt.

4.5.2.2 Air Terminal Support.

4.5.2.2.1

Air terminals shall be secured against overturning or displacement by at least one of the following methods:

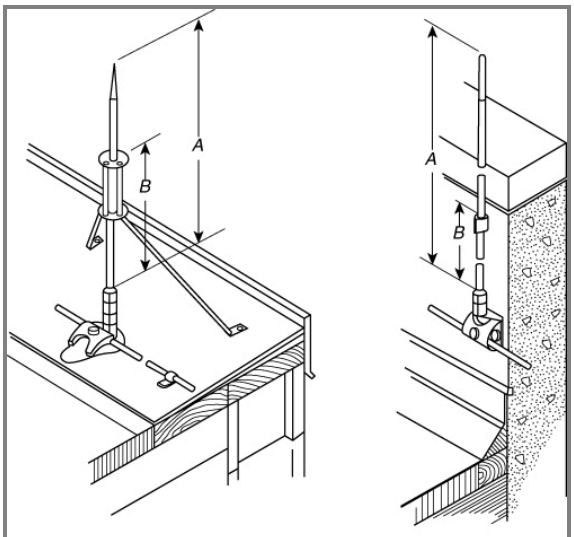
(1) Attachment to the object to be protected

(2) Braces that are permanently and rigidly attached to the structure

4.5.2.2.2

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

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.

4.5.2.3 Ornaments.

4.5.2.3.1

An ornament or decoration on a freestanding, unbraced air terminal shall not present, in any plane, a wind-resistance area in excess of 20 $in.^2$ (0.01 m^2).

4.5.2.3.2

The requirement of 4.5.2.3.1 shall permit the use of an ornamental ball 5 in. (127 mm) or less in diameter.

4.5.3 Lightning Protection Masts.

4.5.3.1

Lightning protection masts shall be permitted to provide a zone of protection.

4.5.3.2

Metal masts shall comply with 4.5.1.4 or be protected with a strike termination device.

4.5.3.3

Nonmetallic masts shall be provided with at least one strike termination device.

4.5.3.4

The top of the metallic mast shall have a metal thickness of $\frac{3}{16}$ in. (4.8 mm) or greater or be provided with at least one strike termination device.

4.5.3.5

The mast shall be permitted to serve as the down conductor, provided it is electrically continuous and has a wall thickness of 0.064 in. (1.63 mm) minimum.

4.5.4 Overhead Ground Wires.

4.5.4.1

Overhead ground wires shall be permitted to provide a zone of protection.

4.5.4.2

Overhead ground wire material shall be constructed of aluminum, copper, stainless steel, galvanized steel, or protected steel such as copper-clad, aluminum-clad, or aluminum conductor steel reinforced (ACSR).

4.5.4.3

The overhead ground wire material shall be chosen to minimize corrosion from conditions at the site.

4.5.4.4

Overhead ground wires shall be self-supporting with the ability to maintain calculated sag to preserve the intended zone of protection under all conditions.

4.5.4.5 Overhead Ground Wire Conductor Size.

4.5.4.5.1

Overhead ground wires shall have a minimum cross-sectional area equal to that of a main conductor.

4.5.4.5.2

When steel or stainless-steel cable is used for the overhead ground wire, it shall have a minimum diameter of ½ in. (12.7 mm).

4.5.4.6

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

4.5.5* Isolated Masts and Overhead Ground Wires.

To prevent sideflashes, the minimum distance between a mast or overhead ground wire and the structure to be protected shall be calculated.

4.5.5.1

The sideflash distance from a point on a mast shall be calculated from the following formula and units shall be consistent (e.g., either all feet or all meters):

$$D = \frac{h}{6} \qquad \textbf{[4.5.5.1]}$$

where:

D = sideflash distance from a mast

h = height of structure (or object being calculated)

4.5.5.2*

The sideflash distance from a point on an overhead ground wire shall be calculated as follows and units shall be consistent (e.g., either all feet or all meters):

$$D = \frac{l}{6n} \qquad \textbf{[4.5.5.2]}$$

where:

D = sideflash distance from a mast or overhead ground wire

l = length of lightning protection conductor between the nearest grounded point and the point being calculated (In the calculation of spacing from an overhead wire supported by a metal mast, it shall be permitted to consider the grounded point to be the attachment point on the metal mast where the overhead wire is electrically connected. For calculations of sideflash from a mast and the calculations for overhead wires supported by nonmetallic masts, the grounded point shall be considered the grounding system connection.)

n = 1 where there is one overhead ground wire that exceeds 100 ft (30 m) in horizontal length

n = 1.5 where there are one or two down conductors connected to the overhead ground wire spaced greater than 25 ft (7.6 m) and less than 100 ft (30 m) apart along the length of the overhead ground wire

n = 2.25 where there are more than two down conductors connected to the overhead ground wires spaced more than 25 ft (7.6 m) apart and less than 100 ft (30 m) apart along the length of the overhead ground wire

4.6 Strike Termination Devices on Roofs.

4.6.1 Roof Types.

The zone of protection for the following roof types shall include the roof and appurtenances where protected in accordance with Section 4.6:

(1) Pitched roofs

(2) Flat or gently sloping roofs

(3) Dormers

(4) Domed roofs

(5) Roofs with ridges, wells, chimneys, or vents

4.6.1.1

Pitched roofs shall be defined as roofs having a span of 40 ft (12 m) or less and a slope ⅛ or greater and roofs having a span of more than 40 ft (12 m) and a slope ¼ or greater.

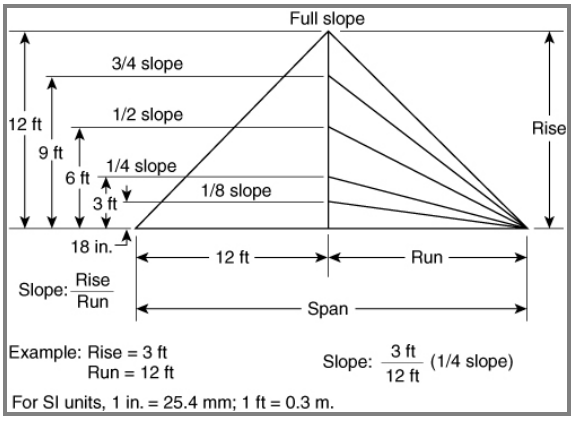
4.6.1.2

A flat or gently sloping roof is defined as a roof with a slope less than a pitched roof.

4.6.1.3

For the purposes of this standard, roof slopes shall be as shown in Figure 4.6.1.3.

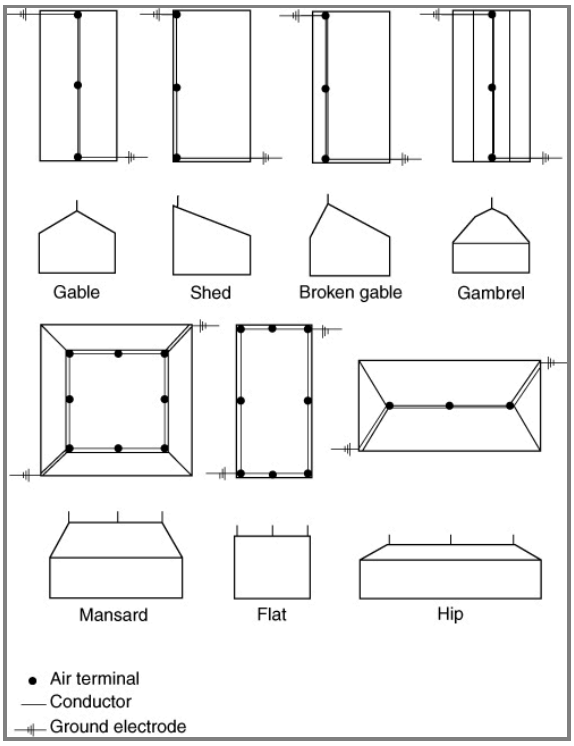
Figure 4.6.1.3 Roof Slope.



4.6.1.4

Protection for typical roof types shall be as illustrated in Figure 4.6.1.4.

Figure 4.6.1.4 Protection Measures for Various Roof Types. (Drawings are top and end views of each roof type.)



4.6.1.5

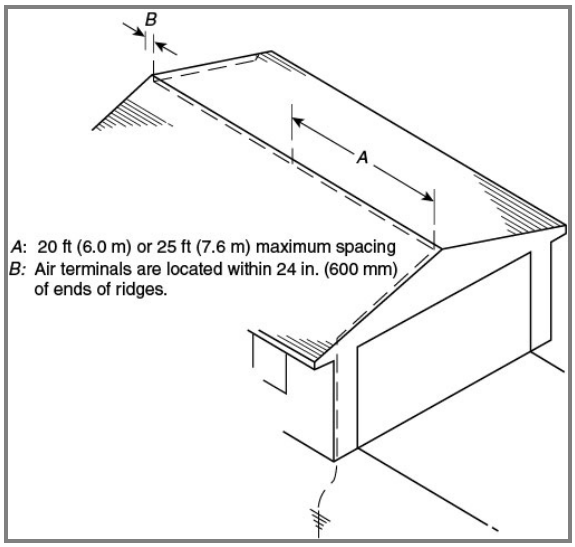
Roof hips shall not be considered as ridges for the protection of these types of roofs.

4.6.2 Location of Devices.

4.6.2.1*

As shown in Figure 4.6.2.1, the distance from strike termination devices to ridge ends on pitched roofs or to edges and outside corners of flat or gently sloping roofs shall not exceed 24 in. (600 mm).

Figure 4.6.2.1 Air Terminals on a Pitched Roof.



4.6.2.2

Strike termination devices shall be placed on ridges of pitched roofs and around the perimeter of flat or gently sloping roofs at intervals not exceeding 20 ft (6 m).

4.6.2.3

Strike termination devices 24 in. (600 mm) or more above the object or area to be protected shall be permitted to be placed at intervals not exceeding 25 ft (7.6 m).

4.6.3 Pitched Roof Areas.

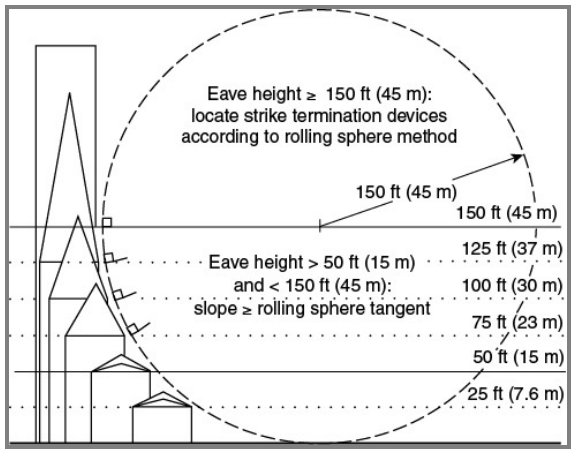
4.6.3.1

Strike termination devices shall not be required around the perimeters of pitched roofs with eave heights less than or equal to 50 ft (15 m) above grade.

4.6.3.2

For pitched roofs with a span of 100 ft (30 m) or less and eave heights greater than or equal to 50 ft (15 m) but less than 150 ft (45 m) above grade, it shall be permitted to omit strike termination devices at the eaves if the slope of that roof is equal to or steeper than the tangent of the arc at the eave elevation of a rolling sphere having a 150 ft (45 m) radius. *(See Figure 4.6.3.2.)*

Figure 4.6.3.2 Illustration of Tangent of Rolling Sphere Method.



4.6.3.2.1

Except for the gutter, any portion of the building that extends beyond that tangent shall be protected.

4.6.3.2.2

Eaves over 150 ft (45 m) above grade shall be protected in accordance with 4.6.2.

4.6.3.2.3*

The tangent of the rolling sphere arc shall be considered as a vertical line over 150 ft (45 m) above grade.

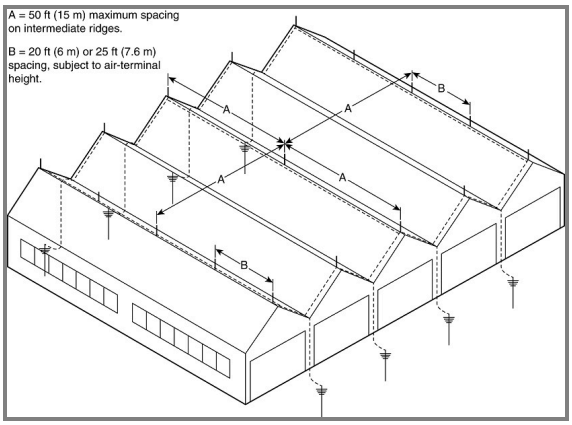
4.6.3.3

Pitched roofs not meeting the criteria of 4.6.3.1 and 4.6.3.2 shall be treated in the same manner as flat or gently sloping roofs.

4.6.4 Roofs with Intermediate Ridges.

Strike termination devices shall be located along the outermost ridges of buildings that have a series of intermediate ridges at the same intervals as required by 4.6.2, as shown in Figure 4.6.4.

Figure 4.6.4 Air Terminals on Intermediate Ridges.



4.6.4.1

Strike termination devices shall be located on the intermediate ridges in accordance with the requirements for the spacing of strike termination devices on flat or gently sloping roofs.

4.6.4.2

If any intermediate ridge is higher than the outermost ridges, it shall be treated as a main ridge and protected according to 4.6.2.

4.6.5 Flat or Gently Sloping Roof Area.

4.6.5.1

Flat or gently sloping roofs that exceed 50 ft (15 m) in width or length shall have additional strike termination devices located at intervals not to exceed 50 ft (15 m) on the flat or gently sloping areas, as shown in Figure 4.6.5.1(a) and Figure 4.6.5.1(b).

Figure 4.6.5.1(a) Air Terminals on a Flat Roof.

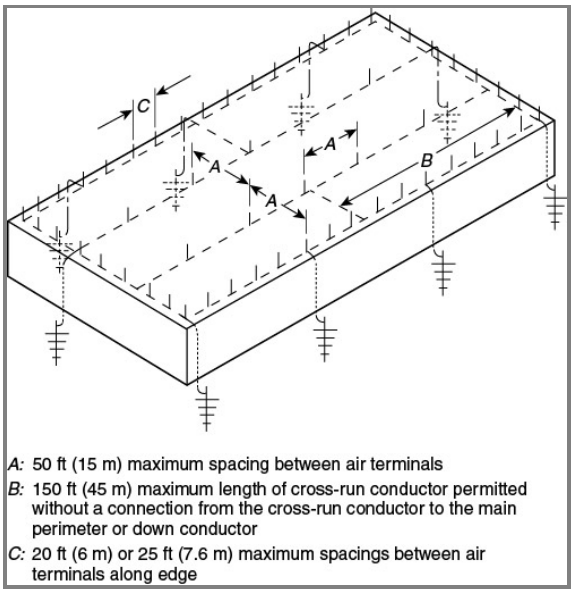
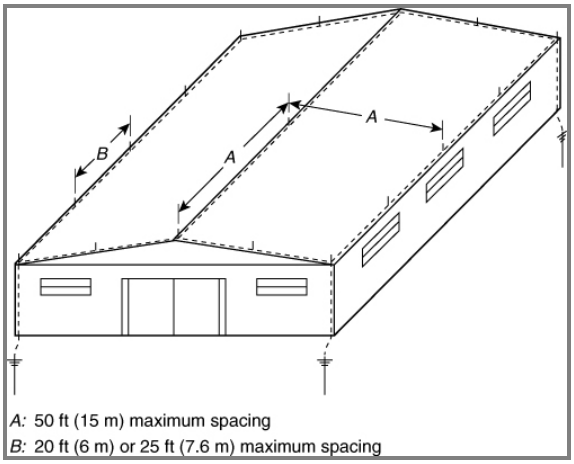


Figure 4.6.5.1(b) Air Terminals on a Gently Sloping Roof.



4.6.5.2

Such areas shall be permitted to be protected using taller strike termination devices that create zones of protection using the rolling sphere method.

4.6.6 Flat or Gently Sloping Roofs with Irregular Perimeters.

Structures that have exterior wall designs that result in irregular roof perimeters shall be treated on an individual basis.

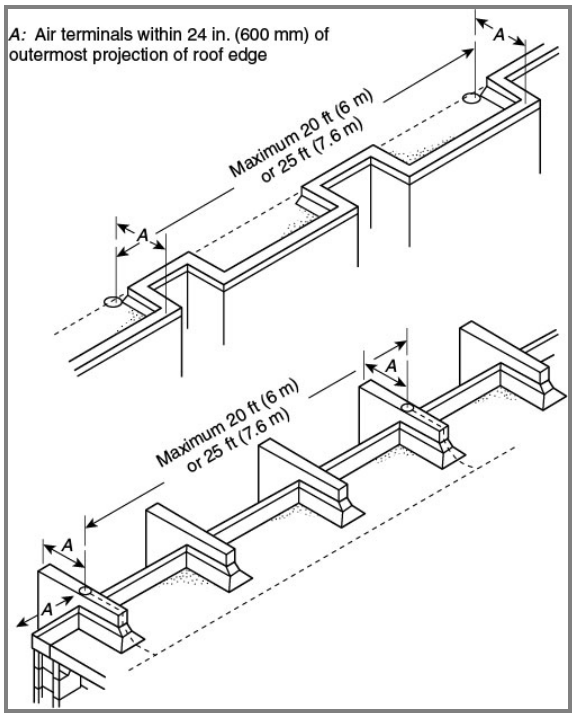
4.6.6.1

The imaginary roof edge formed by the outermost projections shall be used to locate the strike termination devices in accordance with 4.6.2.

4.6.6.2

In all cases, strike termination devices shall be located in accordance with Section 4.6, as shown in Figure 4.6.6.2.

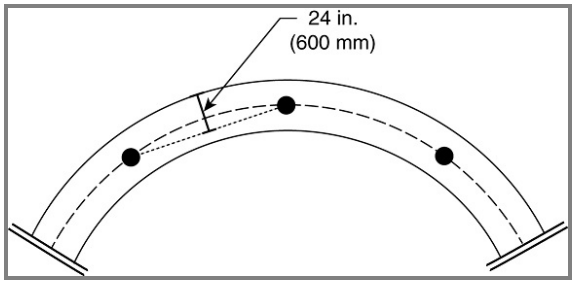
Figure 4.6.6.2 Flat or Gently Sloping Roof with an Irregular Perimeter.



4.6.6.3

A curved perimeter of a structure shall be protected so that the outer edge of the structure is less than 24 in. (600 mm) from a straight line or chord between two adjacent air terminals, as shown in Figure 4.6.6.3.

Figure 4.6.6.3 Flat or Gently Sloping Roof with a Curved Perimeter.



4.6.7* Dormers.

4.6.7.1

Dormers as high as or higher than the main roof ridge shall be protected with strike termination devices, conductors, and grounds.

4.6.7.2

Dormers and projections below the main ridge shall require protection only on those areas extending outside a zone of protection.

4.6.8 Strike Termination Devices Installed on Vertical Roof Members.

Strike termination devices installed on vertical roof members shall be permitted to use a single main-size cable to connect to a main roof conductor.

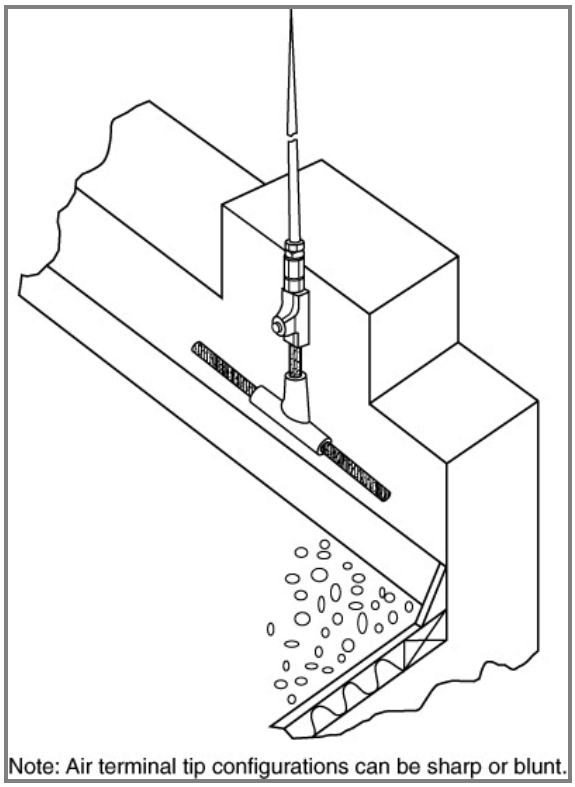
4.6.8.1

The main roof conductor shall be run adjacent to the vertical roof members so that the single cable from the strike termination device is as short as possible and in no case longer than 16 ft (4.9 m).

4.6.8.2

The connection of the single cable to the down conductor shall be made with a tee splice or other connector listed for the purpose, as shown in Figure 4.6.8.2.

Figure 4.6.8.2 Strike Termination Devices Installed on Vertical Roof Members.



Note: Air terminal tip configurations can be sharp or blunt.

4.6.9 Open Areas in Flat Roofs.

The perimeter of open areas, such as light or mechanical wells, shall be protected if the open area perimeter exceeds 300 ft (90 m), provided both rectangular dimensions exceed 50 ft (15 m).

4.6.10 Domed or Rounded Roofs.

Strike termination devices shall be located so that no portion of the structure is located outside a zone of protection, as set forth in Section 4.7.

4.6.11 Chimneys, Vents, and Other Objects on Roofs Not in a Zone of Protection.

Strike termination devices shall be required on all objects not located within a zone of protection, including metal objects having a metal thickness of less than $\frac{3}{16}$ in. (4.8 mm) except as permitted in 4.6.11.1 through 4.6.11.4.

4.6.11.1

Metal objects having a metal thickness of 3⁄16 in. (4.8 mm) or more not located in a zone of protection shall require connection to the lightning protection system in accordance with the following:

(1) The metal object shall be connected to the lightning protection system using a main-size lightning conductor.

(2) The main-size conductor connecting the metal object shall provide two or more paths in accordance with Section 4.8.

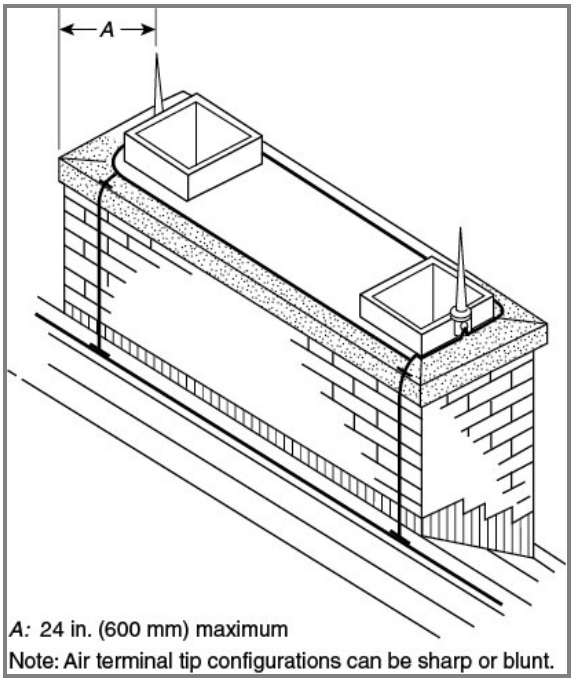
(3) The main-size conductor shall be connected to the metal object with a main-size connector having a surface contact area of not less than 3 $in.^2$ (1940 mm^2) or a minimum of 1½ in. (38 mm) of contact along the axis of a round surface.

(4) The main-size conductor shall be permitted to be connected to the metal object in accordance with the provisions for connection to framework in 4.18.3.1, 4.18.3.2, and 4.18.3.3.

4.6.11.2*

Required strike termination devices shall be installed on objects, as shown in Figure 4.6.11.2, so that the distance from a strike termination device to an outside corner or the distance perpendicular to an outside edge is not greater than 24 in. (600 mm).

Figure 4.6.11.2 Air Terminals on a Chimney.



4.6.11.3

Where only one strike termination device is required on an object, at least one main-size conductor shall connect the strike termination device to a main conductor providing two or more paths to ground from that location in accordance with Section 4.8 and 4.8.2.

4.6.11.4

Objects on roofs that are less than 10 in. (254 mm) above the surface of the roof shall not require strike termination devices unless they are located within 3 ft (1 m) of the ridge or roof edge.

4.6.12 Metal Rooftop Units.

Strike termination devices shall be required in accordance with 4.6.12.1 through 4.6.12.3.3 on all rooftop mechanical units with continuous metal housings less than 3⁄16 in. (4.8 mm) thick, such as air-conditioning/heating units, metal air intake/exhaust housings, and cooling towers, that are not located in a zone of protection.

4.6.12.1

Air terminals shall be installed in accordance with 4.6.2 through 4.6.5.

4.6.12.2

Air terminals shall be mounted to metal rooftop units by using one of the following methods:

(1) Adhered with adhesive bases to the metal units housing.

(2) Secured on bases having a minimum contact area of 3 $in.^2$ (1940 mm^2), each to the bare metal of the unit's housing using mechanical fasteners.

(3) Drilled, tapped, and screwed directly into the unit's frame in accordance with 4.18.3.2 and 4.18.3.3.

4.6.12.3

Where the air terminal is mounted in accordance with 4.6.12.2(2) or 4.6.12.2(3), the unit's metal housing shall be permitted to be used as a main conductor where the housing minimum thickness is 0.064 in. (1.63 mm) and is electrically continuous.

4.6.12.3.1

At least two main-size conductors shall be installed to connect the unit to the lightning protection system.

4.6.12.3.2

The connection shall be made to bare metal at the base or lower edges of the unit using main-size lightning conductors and bonding devices that have a surface contact area of not less than 3 $in.^2$ (1940 mm^2) and shall provide two or more paths to ground, as is required for strike termination devices.

4.6.12.3.3

The two main bonding plates shall be located as far apart as practicable at the base or lower edges of the unit's electrically continuous metal housing and connected to the lightning protection system.

4.6.13* Movable or Rotating Objects on Roofs.

Movable or rotating metal objects on roofs shall be protected in accordance with 4.6.13.1 or 4.6.13.2.

4.6.13.1

Where practicable, movable or rotating objects on roofs shall be placed in a zone of protection by using strike termination devices.

4.6.13.2

Movable or rotating metal objects outside a zone of protection shall be connected as follows:

(1) The fixed portion of movable or rotating metal objects on roofs shall be connected to the lightning protection system in accordance with 4.6.11.1.

(2) A bonding jumper connecting the metal movable or rotating portion to the fixed portion shall be permitted.

4.7 Zones of Protection.

The geometry of the structure shall determine the zone of protection.

4.7.1

One or more of the following methods shall be used to determine the overall zone of protection:

(1) Air terminal placements, as described in Section 4.6

(2) The angle method, as described in 4.7.2

(3) The rolling sphere method, as described in 4.7.3

4.7.2 Multiple-Level Roofs.

4.7.2.1

For structures with multiple-level roofs no more than 50 ft (15 m) in height, the zone of protection shall include areas as identified in 4.7.2.3 and 4.7.2.4.

4.7.2.2

The zone of protection shall be permitted to be delineated as a cone, with the apex located at the highest point of the strike termination device and its surface formed by a 45-degree or 63-degree angle from the vertical, based on the height of the strike termination device above the ground as defined in 4.7.2.3 and 4.7.2.4.

4.7.2.3*

Structures that do not exceed 25 ft (7.6 m) above earth shall be considered to protect lower portions of a structure located within a one-to-two zone of protection as shown in Figure 4.7.2.3(a) and Figure 4.7.2.3(b).

Figure 4.7.2.3(a) Lower Roof Protection for Flat-Roof Buildings 25 ft (7.6 m) or Less in Height.

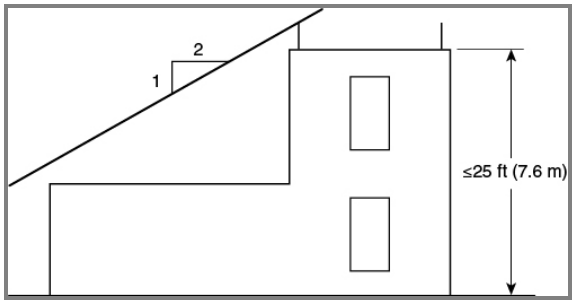
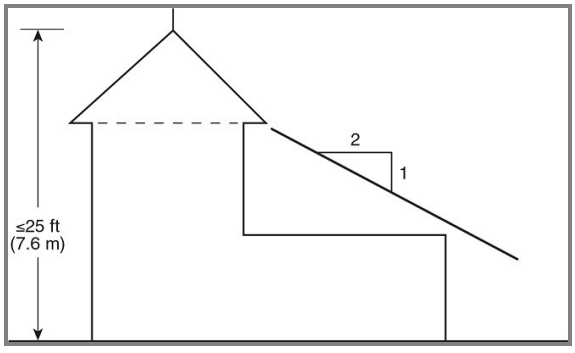


Figure 4.7.2.3(b) Lower Roof Protection Provided by Pitched-Roof Buildings 25 ft (7.6 m) or Less in Height.



4.7.2.4*

Structures that do not exceed 50 ft (15 m) above the earth shall be considered to protect lower portions of a structure located within a one-to-one zone of protection, as shown in Figure 4.7.2.4(a) and Figure 4.7.2.4(b).

Figure 4.7.2.4(a) Lower Roof Protection for Buildings 50 ft (15 m) or Less in Height.

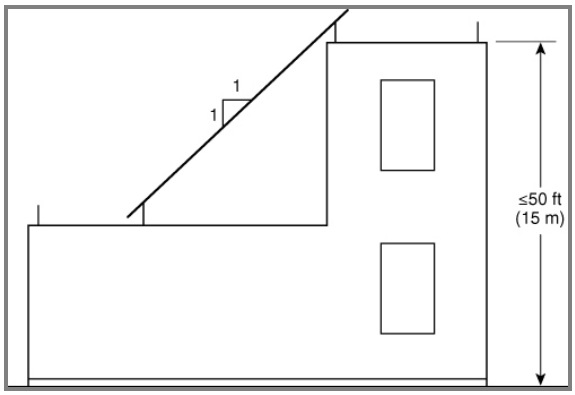
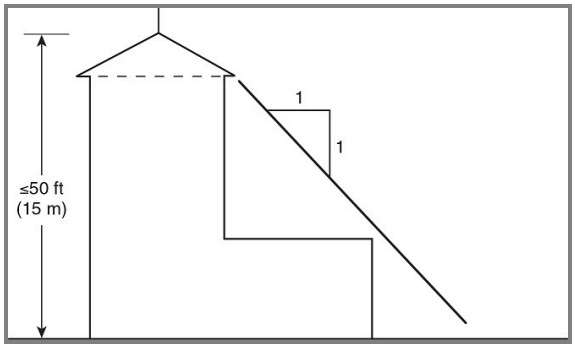


Figure 4.7.2.4(b) Lower Roof Protection Provided by Pitched-Roof Buildings 50 ft (15 m) or Less in Height.

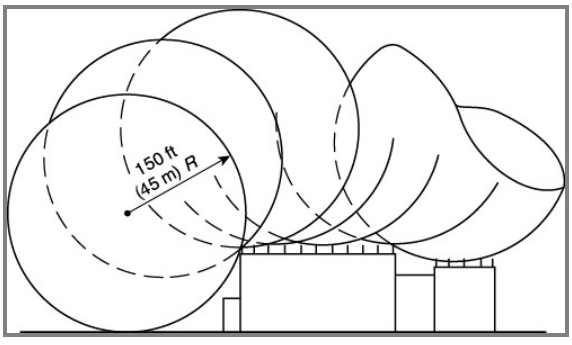


4.7.3 Rolling Sphere Method.

4.7.3.1*

The zone of protection shall include the space not intruded by a rolling sphere having a radius of the striking distance determined for the type of structure being protected, as shown in Figure 4.7.3.1.

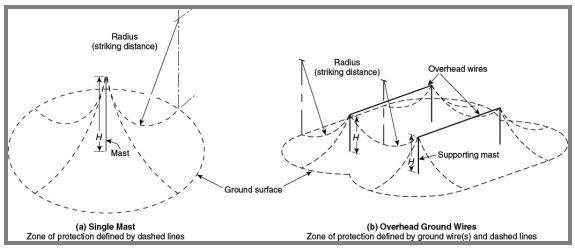
Figure 4.7.3.1 Zone of Protection Depicting Rolling Sphere Method.



4.7.3.1.1

Where the sphere is tangent to earth and resting against a strike termination device, all space in the vertical plane between the two points of contact and under the sphere shall be considered to be in the zone of protection. *(See Figure 4.7.3.1.1.)*

Figure 4.7.3.1.1 Single Mast Zone of Protection (a) and Overhead Ground Wires Zone of Protection (b).



4.7.3.1.2

A zone of protection shall also be formed where such a sphere is resting on two or more strike termination devices and shall include the space in the vertical plane under the sphere and between those devices, as shown in Figure 4.7.3.1.

4.7.3.1.3

All possible placements of the sphere shall be considered when determining the overall zone of protection using the rolling sphere method.

4.7.3.1.4

The striking distance shall not exceed 150 ft (45 m).

4.7.3.2*

For structure heights exceeding the striking distance above earth or above a lower strike termination device, the zone of protection shall be the space in the vertical plane between the points of contact and also under the sphere where the sphere is resting against a vertical surface of the structure and the lower strike termination device(s) or earth.

4.7.3.3

Under the rolling sphere method, the horizontal protected distance found geometrically by Figure A.4.7.3.1 also shall be permitted to be calculated using the following formula (units shall be consistent, ft or m):

$$d = \sqrt{h_1\left(2R - h_1\right)} - \sqrt{h_2\left(2R - h_2\right)} \qquad \textbf{[4.7.3.3]}$$

where:

d = horizontal protected distance (ft or m)

h_1 = height of the higher roof (ft or m)

R = rolling sphere striking distance radius (ft or m)

h_2 = height of the lower roof (top of the object) (ft or m)

4.7.3.3.1

For the formula to be valid, the sphere shall be either tangent to the lower roof or in contact with the earth and in contact with the vertical side of the higher portion of the structure.

4.7.3.3.2

In addition, the difference in heights between the upper and lower roofs or earth shall be the striking distance or less.

4.8 Conductors.

Main conductors shall comply with all of the following:

(1) Interconnect all strike termination devices

(2) Form two or more paths from each strike termination device downward, horizontally, or rising at no more than ¼ slope to connections with grounding electrodes, except as permitted by 4.8.1 and 4.8.2

(3) Permit one rising path not to exceed 50 ft (15 m) in length on pitched roofs

(4) Permit one rising path not exceeding ¼ slope on flat or gently sloping roofs

4.8.1* One-Way Path.

Strike termination devices on a lower roof level that are interconnected by a conductor run from a higher roof level shall require only one horizontal or downward path to ground, provided the lower level roof conductor run does not exceed 40 ft (12 m).

4.8.2 Dead Ends.

A “dead ended” main conductor shall be permitted between a single strike termination device, connector, or fitting and a main conductor run under all of the following conditions:

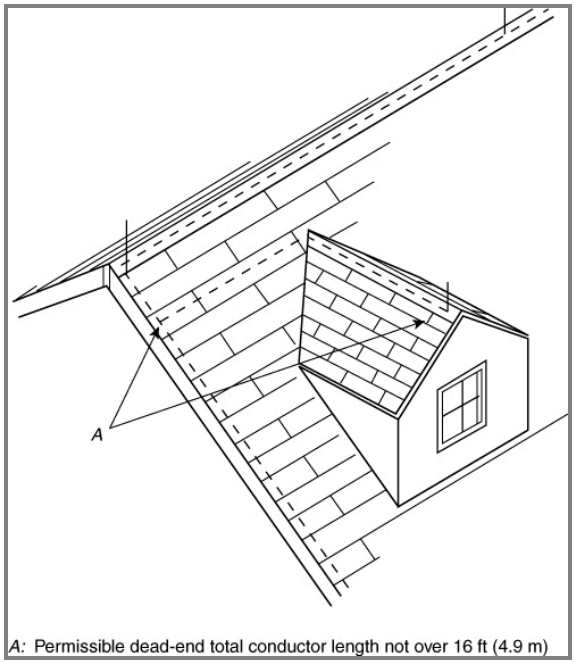
(1) Where the main-size conductor run to which the dead end is connected has a two-way path to ground

(2) At a main protected roof level, where the horizontal portion of the dead-end conductor is not more than 8 ft (2.4 m) in total length

(3) On a roof below the main protected roof level, where the dead-end conductor is not more than 16 ft (4.9 m) in total length, as shown in Figure 4.8.2

(4) Where all dead-end conductor runs maintain a horizontal or downward course from the strike termination device to the connection point with the main conductor run

Figure 4.8.2 Dead End.



A: Permissible dead-end total conductor length not over 16 ft (4.9 m)

4.8.3 Substitution of Main Conductor.

4.8.3.1

Ancillary metal parts of a structure, such as eave troughs, downspouts, ladders, chutes, or other metal parts except as permitted in 4.18.1, shall not be substituted for the main conductor.

4.8.3.2

Permanent exterior metal handrails and ladders that are subject to direct lightning strikes (e.g., on roofs or between roofs) and are electrically continuous shall be permitted to be used as main conductors where the minimum thickness is 0.064 in. (1.63 mm).

4.8.3.3

Metal roofing or siding having a thickness of less than 3⁄16 in. (4.8 mm) shall not be substituted for main conductors.

4.8.4* "U" or "V" Pockets.

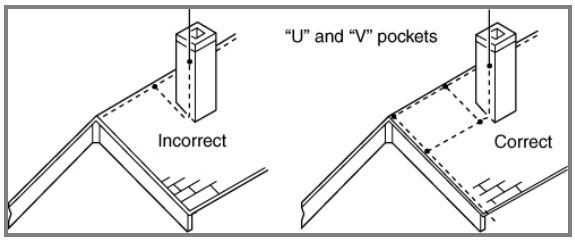
4.8.4.1

Conductors shall maintain coursing free from "U" or "V" (down and up) pockets.

4.8.4.2

"U" and "V" pockets shall be provided with a down conductor from the base of the pocket to ground or to an adjacent down conductor, as shown in Figure 4.8.4.2.

Figure 4.8.4.2 Pockets.



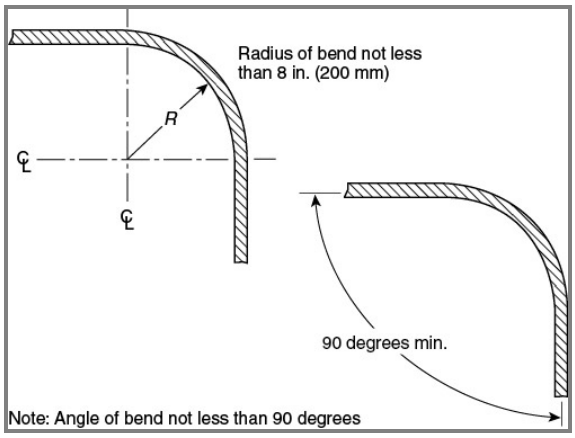
4.8.4.3

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.

4.8.5 Conductor Bends.

No bend of a conductor shall form an included angle of less than 90 degrees, nor shall it have a radius of bend less than 8 in. (200 mm), as shown in Figure 4.8.5.

Figure 4.8.5 Conductor Bends.



4.8.6 Conductor Supports.

4.8.6.1

Conductors shall be permitted to be coursed through air without support for a distance of 3 ft (1 m) or less.

4.8.6.2

Conductors that must be coursed through air for distances longer than that permitted in 4.8.6.1 shall be provided with a positive means of support that will prevent damage or displacement of the conductor.

4.8.7 Roof Conductors.

4.8.7.1

Roof conductors shall be coursed along ridges of gable, gambrel, and hip roofs; around the perimeter of flat roofs; behind or on top of parapets; and across flat or gently sloping roof areas as required to interconnect all strike termination devices.

4.8.7.2

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

4.8.8 Cross-Run Conductors.

4.8.8.1*

Cross-run conductors (main conductors) shall be required to interconnect the strike termination devices on flat or gently sloping roofs that exceed 50 ft (15 m) in width.

4.8.8.2

Cross-run conductors shall be connected to the main perimeter cable at intervals not exceeding 150 ft (45 m), as shown in Figure 4.6.5.1(a).

4.8.9 Down Conductors.

4.8.9.1

Down conductors shall be as widely separated as practicable.

4.8.9.2

The location of down conductors shall depend on considerations such as the following:

(1) Placement of strike termination devices

(2) Most direct coursing of conductors

(3) Earth conditions

(4) Security against displacement

(5) Location of large metallic bodies

(6) Location of underground metallic piping systems

4.8.10 Number of Down Conductors.

At least two down conductors shall be provided on any kind of structure, including steeples.

4.8.10.1

Structures exceeding 250 ft (76 m) in perimeter shall have a down conductor for every 100 ft (30 m) of perimeter or fraction thereof.

4.8.10.2

The total number of down conductors on structures having flat or gently sloping roofs shall be such that the average distance between all down conductors along the perimeter of the structure does not exceed 100 ft (30 m).

4.8.10.3

Irregularly shaped structures shall have additional down conductors as necessary to provide a two-way path from each strike termination device.

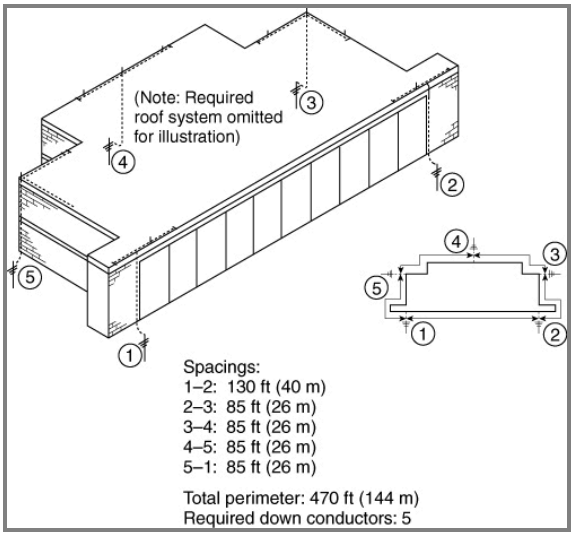
4.8.10.4

For a flat or gently sloping roof structure, only the perimeter of the roof areas requiring protection shall be measured.

4.8.10.5

When determining the perimeter of a pitched roof structure, the horizontal projection (footprint) of the protected roof shall be measured as shown in Figure 4.8.10.5.

Figure 4.8.10.5 Quantity of Down Conductors.



4.8.10.6

Lower roofs or projections that are located within a zone of protection shall not be required to be included in the perimeter measurement.

4.8.11 Protecting Down Conductors.

Down conductors located where subject to physical damage or displacement shall be guarded.

4.8.11.1

Metallic guards shall be bonded at each end.

4.8.11.2

The down conductor shall be protected for a minimum distance of 6 ft (1.8 m) above grade level.

4.8.12 Down Conductors Entering Corrosive Soil.

Down conductors entering corrosive soil shall be protected against corrosion by a protective covering beginning at a point 3 ft (1 m) above grade level and extending for their entire length below grade.

4.8.13* Down Conductors and Structural Columns.

Down conductors coursed in reinforced concrete columns or coursed on or within the calculated bonding distance of reinforced concrete columns or structural steel columns in accordance with 4.15.2.5 or 4.15.2.6 shall be bonded to the reinforcing steel or the structural steel member at its upper and lower extremities.

4.8.13.1

In the case of long, vertical, metallic members, an additional connection shall be made at intervals not exceeding 200 ft (60 m).

4.8.13.2

The connections for 4.8.13.1 shall be made using listed clamps or listed bonding plates or by welding or brazing.

4.8.13.3

Where the bonding requirements of 4.8.13.1 and 4.8.13.2 are not satisfied, provisions shall be made to ensure the required interconnection of these parallel vertical paths.

4.8.14 Down Conductors in Nonmetallic Enclosures.

The use of PVC conduit or other nonmetallic chase shall not eliminate the need to satisfy the bonding requirements of Sections 4.14 and 4.15.

4.9 Conductor Fasteners.

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

4.9.1

Attachment by nails, screws, bolts, or adhesive shall be permitted to be used as necessary.

4.9.2

The fasteners shall not be subject to breakage.

4.9.3

Roofing membrane strapped over the conductor shall not be considered a suitable fastener.

4.9.4

Fasteners shall be of the same materials as the conductor or of a material equally resistant to corrosion as that of the conductor.

4.9.5

No combination of materials shall be used that will form an electrolytic couple of such a nature that, in the presence of moisture, corrosion will be accelerated.

4.10 Masonry Anchors.

Masonry anchors used to attach lightning protection materials shall have a minimum outside diameter of ¼ in. (6.4 mm).

4.10.1

Holes made to receive the body of the anchor shall be of the correct size and made in the brick, stone, or other masonry unit rather than in mortar joints.

4.10.2

Where the anchors are installed, the fit shall be tight against moisture, thus reducing the possibility of damage due to freezing.

4.11 Connectors.

Connectors shall be used at all “end-to-end,” “tee,” “Y,” or parallel splices of lightning conductors.

4.11.1

Connectors shall be attached so as to withstand a pull test of 200 lb (890 N).

4.11.2

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

4.11.3

Conductor connections shall be of the bolted, exothermically welded, high-compression, or crimp type.

4.11.4

Crimp connections shall not be used with Class II conductors.

4.12 Grounding Electrodes.

4.12.1* General.

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

4.12.1.2

The design, size, and depth of grounding electrodes shall comply with 4.12.2 through 4.12.8.

4.12.1.3

Underground metallic piping or ground rod–type electrodes for electrical, communications, or other systems shall not be used in lieu of lightning grounding electrodes.

4.12.1.4

The down conductor(s) shall be attached permanently to the grounding electrode system by bolting, brazing, welding, or high-compression connectors listed for the purpose.

4.12.1.5

Where practicable, grounding electrodes shall be installed below the frost line (excluding shallow topsoil conditions).

4.12.1.6*

In corrosive environments, the use of stainless-steel alloy grounding electrodes shall be permitted.

4.12.2 Ground Rods.

4.12.2.1*

Ground rods shall be not less than ½ in. (12.7 mm) in diameter and 8 ft (2.4 m) long.

4.12.2.2

Ground rods shall be copper-clad steel, solid copper, or stainless steel.

4.12.2.3

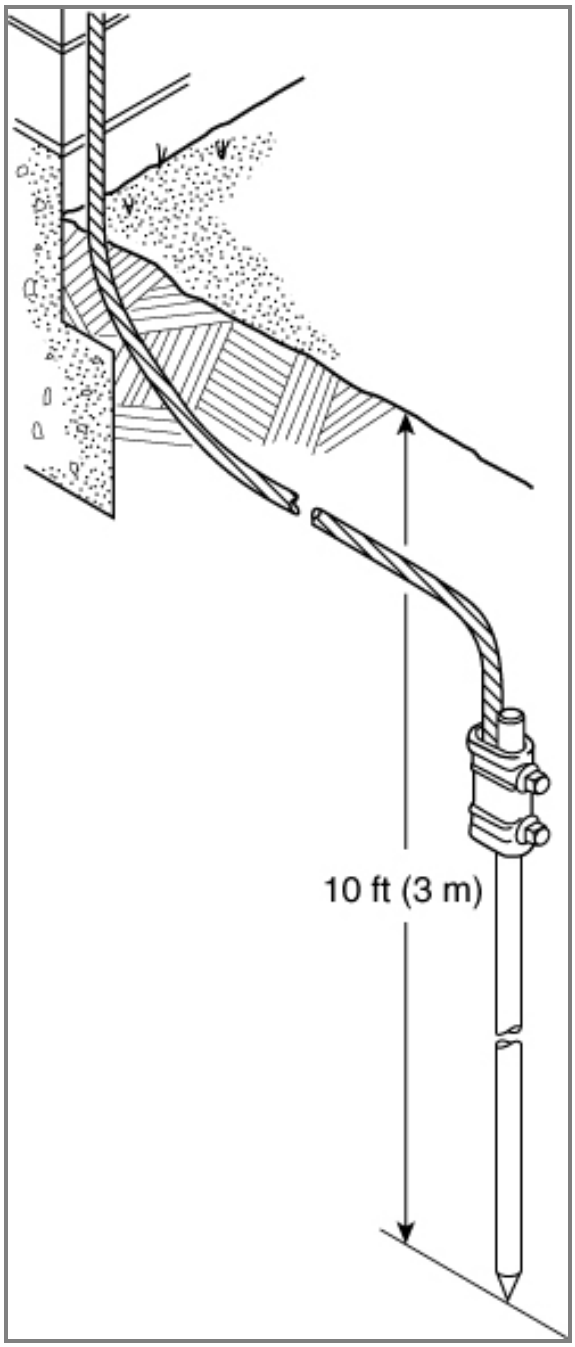
Rods shall be free of paint or other nonconductive coatings.

4.12.2.4 Ground Rod Depth.

4.12.2.4.1

The ground rods shall extend vertically not less than 10 ft (3 m) into the earth, as illustrated in Figure 4.12.2.4.1.

Figure 4.12.2.4.1 Typical Single Ground Rod Installation.



4.12.2.4.2

The earth shall be compacted and made tight against the length of the conductor and ground rod.

4.12.2.5* Multiple Ground Rods.

Where multiple connected ground rods are used, the separation between any two ground rods shall be at least the sum of their driven depths, where practicable.

4.12.3* Concrete-Encased Electrodes.

Concrete-encased electrodes shall be used only in new construction.

4.12.3.1

The electrode shall be located near the bottom of a concrete foundation or footing that is in direct contact with the earth and shall be encased by not less than 2 in. (50 mm) of concrete.

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 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

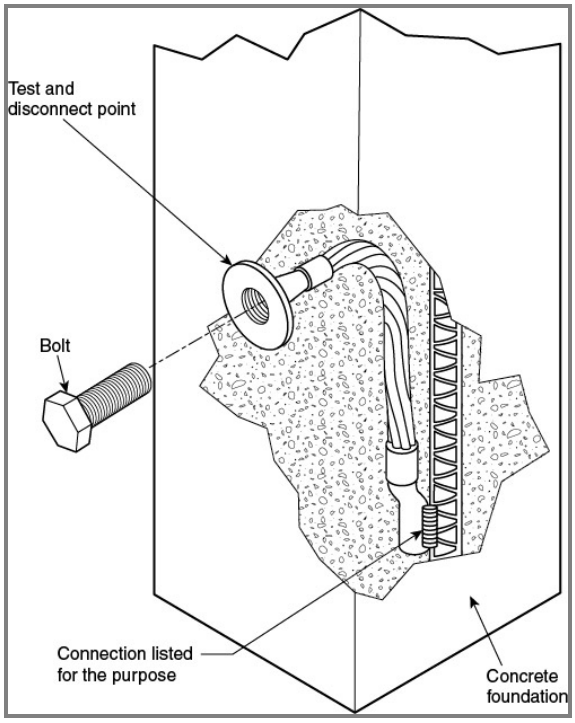
4.12.3.3

Nonconductive or resistive coatings on steel reinforcing bars shall not be permitted.

4.12.3.4

A test or connection point shall be provided on each concrete-encased electrode to enable periodic maintenance and testing of the ground system. *(See Figure 4.12.3.4.)*

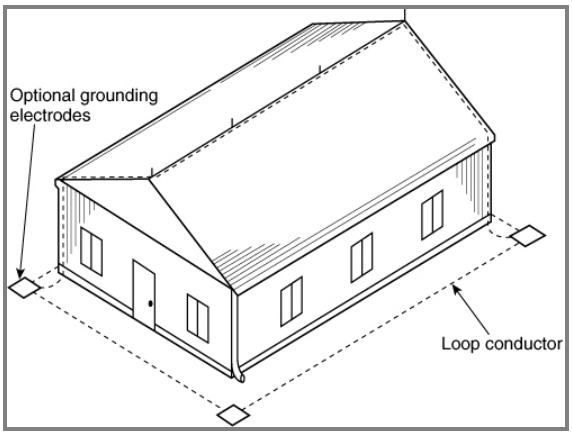
Figure 4.12.3.4 Typical Concrete-Encased Electrode Test and Disconnect Point.



4.12.4 Ground Ring Electrode.

A ground ring electrode encircling a structure shall be as shown in Figure 4.12.4.

Figure 4.12.4 Typical Ground Ring Electrode Installation.



4.12.4.1*

The ground ring electrode shall be in direct contact with earth at a depth of not less than 18 in. (450 mm) or encased in a concrete footing in accordance with 4.12.3.

4.12.4.2

The ground ring electrode shall be a main-size (lightning) conductor or a grounding conductor of equivalent or greater cross-sectional area.

4.12.5* Radials.

4.12.5.1

A radial electrode system shall consist of one or more main-size conductors, each in a separate trench extending outward from the location of each down conductor.

4.12.5.2

Each radial electrode shall be not less than 12 ft (3.6 m) in length.

4.12.5.3*

The radial electrode shall be buried not less than 18 in. (450 mm) below grade.

4.12.6 Plate Electrode or Ground Plate Electrode.

4.12.6.1*

A ground plate or plate electrode shall have a minimum thickness of 0.032 in. (0.8 mm) and a minimum surface area of 2 ft^2 (0.18 m^2).

4.12.6.2*

The ground plate electrode shall be buried not less than 18 in. (450 mm) below grade.

4.12.7 Combinations.

Combinations of the grounding electrodes in Section 4.12 shall be permitted.

4.12.8 Grounding Electrode Selection Criteria.

The site limitations and soil conditions shall determine the selection of the type or combinations of types of grounding electrodes used.

4.12.8.1* Shallow Topsoil.

The methods in 4.12.3 through 4.12.7 shall be used in shallow topsoil conditions where practicable.

4.12.8.1.1

Where topsoil depth is less than 18 in. (450 mm), it shall be permitted to provide a ground ring electrode, radials, and/or ground plate electrodes buried at the maximum depth of topsoil available.

4.12.8.1.2*

The grounding electrode for shallow topsoil shall be one or more of the following, buried to the maximum depth of topsoil available:

(1) A ground ring electrode, in accordance with 4.12.4, a minimum distance of 24 in. (600 mm) from the foundation or exterior footing

(2) Radial(s) in accordance with 4.12.5

(3) A plate electrode in accordance with 4.12.6, a minimum distance of 24 in. (600 mm) from the foundation or exterior footing

4.12.8.1.3 Bedrock.

4.12.8.1.3.1

Where use of the methods in 4.12.8.1.2 is not possible, radial(s) shall be permitted to be laid directly on bedrock and extend a minimum distance of 12 ft (3.6 m) from the foundation or exterior footing.

4.12.8.1.3.2

A ground loop conductor encircling the structure shall be permitted to be laid directly on bedrock a minimum distance of 24 in. (600 mm) from the foundation or exterior footing.

4.12.8.1.3.3

In those cases where the grounding conductor is laid directly on bedrock, the conductor shall be secured to the bedrock every 3 ft (1 m) with nails, conductive cement, or a conductive adhesive to ensure electrical contact and protect against movement.

4.12.8.2 Sandy Soil Conditions.

Multiple grounding electrodes shall be used to augment the lightning grounding electrode system in installations characterized by high soil resistivity, such as in sandy or gravelly soil conditions.

4.12.8.3 Zero Property Line Conditions.

The lack of access to property outside the building footprint shall require additional considerations for grounding electrodes.

4.12.8.3.1*

Grounding electrodes located under basement slabs or in crawl spaces shall be installed as near as practicable to the outside perimeter of the structure.

4.12.8.3.2

Ground rods in accordance with 4.12.2, ground ring electrodes in accordance with 4.12.4, radials in accordance with 4.12.5, or ground plate electrodes in accordance with 4.12.6 shall be installed below the structure in compacted earth, tight against the electrode.

4.12.8.3.3

Where earth depth under the building is insufficient to meet electrode placement requirements, concrete-encased electrodes or the requirements for shallow topsoil shall be used.

4.13 Common Bonding of Grounded Systems.

4.13.1* General.

All grounded media and buried metallic conductors (including underground metallic piping systems) that can assist in providing a path for lightning currents in or on a structure shall be interconnected to the lightning protection system within 12 ft (3.6 m) vertically of the base of the structure to provide a common ground potential.

4.13.2*

For structures exceeding 60 ft (18 m) in height, the interconnection of the lightning protection system grounding electrodes and other grounded media shall be in the form of a ground loop conductor.

4.13.3*

This interconnection shall include all building grounding electrode systems, including lightning protection, electric service, communication, and antenna system grounding electrodes.

4.13.4 Underground Metallic Piping Systems.

4.13.4.1

Underground metallic piping systems requiring interconnection to the lightning protection system shall include, but not be limited to, the following:

(1) Water service

(2) Well casings located within 25 ft (7.6 m) of the lightning protection grounding system

(3) Gas piping

(4) Underground conduits

(5) Underground liquefied petroleum gas piping systems

4.13.4.2

If a water pipe is not electrically continuous due to the use of nonconductive pipe sections or for any other reason, the nonconductive sections shall be bridged with main-size conductors or the connection shall be made at a point where the required electrical continuity can be ensured.

4.13.5*

Where the building grounded systems noted in 4.13.1 are interconnected at a common accessible point in or on the structure, the lightning protection system shall have only one main-size conductor connected to the common bonding point. This common bonding point shall be permitted to include a ground bar, a section of water pipe, or the metallic structural frame in accordance with *NFPA 70*.

4.13.6 Bonding Interconnections.

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 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.

4.13.6.2*

Where galvanic corrosion is a concern or where a direct bond is prohibited by local code, an isolating spark gap shall be permitted.

4.14 Potential Equalization.

4.14.1 Ground-Level Potential Equalization.

Ground-level potential equalization shall be required in accordance with Section 4.13.

4.14.2* Roof-Level Potential Equalization.

For structures exceeding 60 ft (18 m) in height, all grounded media in or on the structure shall be interconnected within 12 ft (3.6 m) of the main roof level.

4.14.3 Intermediate-Level Potential Equalization.

Intermediate-level potential equalization shall be accomplished by the interconnection of the lightning protection system down conductors and other grounded media at the intermediate levels between the roof and the base of a structure in accordance with 4.14.3.1 through 4.14.3.3.

4.14.3.1 Steel-Framed Structures.

Intermediate-loop conductors shall not be required for steel-framed structures where the framing is electrically continuous.

4.14.3.2 Reinforced Concrete Structures Where the Reinforcement Is Interconnected and Grounded in Accordance with 4.17.3.

Down conductors and other grounded media shall be interconnected with a loop conductor at intermediate levels not exceeding 200 ft (60 m).

4.14.3.3 Other Structures.

Down conductors and other grounded media shall be interconnected with a loop conductor at intermediate levels not exceeding 60 ft (18 m).

4.14.4 Materials.

Horizontal loop conductors used for the interconnection of lightning protection system down conductors, grounding electrodes, or other grounded media shall be sized no smaller than the size required for the main conductor, as listed in Table 4.1.1.1.1 and Table 4.1.1.1.2.

4.15* Bonding of Metal Bodies.

Metal bodies not covered by other sections of this standard, located outside or inside a structure, that contribute to lightning hazards because they are grounded or assist in providing a path to ground for lightning currents shall be bonded to the lightning protection system in accordance with Section 4.15.

4.15.1 Long, Vertical Metal Bodies.

Long, vertical metal bodies shall be bonded in accordance with 4.15.1.1 through 4.15.1.3.

4.15.1.1 Steel-Framed Structures.

Grounded and ungrounded metal bodies exceeding 60 ft (18 m) in vertical length shall be bonded to structural steel members as near as practicable to their extremities unless inherently bonded through construction at those locations.

4.15.1.2 Reinforced Concrete Structures.

Grounded and ungrounded metal bodies exceeding 60 ft (18 m) in vertical length in or on reinforced concrete structures, where the reinforcement is interconnected and grounded in accordance with 4.17.3, shall be bonded to the lightning protection system as near as practicable to their extremities unless inherently bonded through construction at those locations.

4.15.1.3 Other Structures.

Bonding of grounded or ungrounded long, vertical metal bodies shall be determined by 4.15.2 or 4.15.4, respectively.

4.15.2 Grounded Metal Bodies.

Bonding of grounded metal bodies not covered in 4.15.1 shall be accomplished in accordance with 4.15.2.1 through 4.15.2.6.

4.15.2.1

Where grounded metal bodies have been connected to the lightning protection system at only one extremity, the formula shown in 4.15.2.5 or 4.15.2.6 shall be used to determine whether additional bonding is required.

4.15.2.2

Branches of grounded metal bodies connected to the lightning protection system at their extremities shall require bonding to the lightning protection system in accordance with the formula shown in 4.15.2.5 or 4.15.2.6 if they change vertical direction by more than 12 ft (3.6 m).

4.15.2.3

Grounded metal bodies shall not require additional bonding if the measured dc resistance between the inherently bonded, electrically conductive materials and the nearest lightning protection component is less than 200 milliohms.

4.15.2.4

Grounded metal bodies that maintain a separation distance from the lightning protection system components that is greater than the distance calculated using the bonding distance formulas in 4.15.2.5 or 4.15.2.6 shall be considered isolated and require no further bonding except for that required by Sections 4.13 and 4.14.

4.15.2.5 Structures More Than 40 ft (12 m) in Height.

4.15.2.5.1

Grounded metal bodies shall be bonded to the lightning protection system where located within a calculated bonding distance, *D*, as determined by the following formula:

$$D = \frac{l}{6n} \times K_{\mathrm{m}} \qquad \textbf{[4.15.2.5.1]}$$

where:

D = calculated bonding distance

l = length of conductor between the bond in question and the nearest grounding electrode or intermediate level equipotential bonding point

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

= 1 where there is only one down conductor in this zone

= 1.5 where there are only two down conductors in this zone

= 2.25 where there are three or more down conductors in this zone

K_m = 1 if the flashover is through air

= 0.50 if the flashover is through dense material (e.g., concrete, brick, wood)

4.15.2.5.2

Where bonding is required below a level 60 ft (18 m) from the top of a structure, *n* shall be the total number of down conductors in the lightning protection system.

4.15.2.6 Structures 40 ft (12 m) or Less in Height.

4.15.2.6.1

Grounded metal bodies shall be bonded to the lightning protection system where located within a calculated bonding distance, *D*, as determined by the following formula:

$$D = \frac{l}{6n} \times K_{\mathrm{m}} \qquad \textbf{[4.15.2.6.1]}$$

where:

D = calculated bonding distance

l = length of conductor between the bond in question and the nearest grounding electrode

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 and where bonding is required within 60 ft (18 m)

= 1 where there is only one down conductor in this zone

= 1.5 where there are only two down conductors in this zone

= 2.25 where there are three or more down conductors in this zone

K_m = 1 if the flashover is through air

= 0.50 if the flashover is through dense material (e.g., concrete, brick, wood)

4.15.3 Long Horizontal Metal Bodies on Roofs.

Long horizontal grounded metal bodies on roofs shall be bonded in accordance with 4.15.3.1 through 4.15.3.3.

4.15.3.1

Grounded metal bodies on roofs exceeding 60 ft (18 m) in horizontal length shall be bonded to the lightning protection system as near as practicable to their extremities unless inherently bonded through construction at those locations.

4.15.3.2

Horizontal grounded metal bodies that are parallel to a main lightning conductor and within the bonding distance calculated in 4.15.2.5 or 4.15.2.6 shall be bonded to the main conductor at intervals averaging not more than 100 ft (30 m) along the main conductor unless inherently bonded through construction at those locations.

4.15.3.3

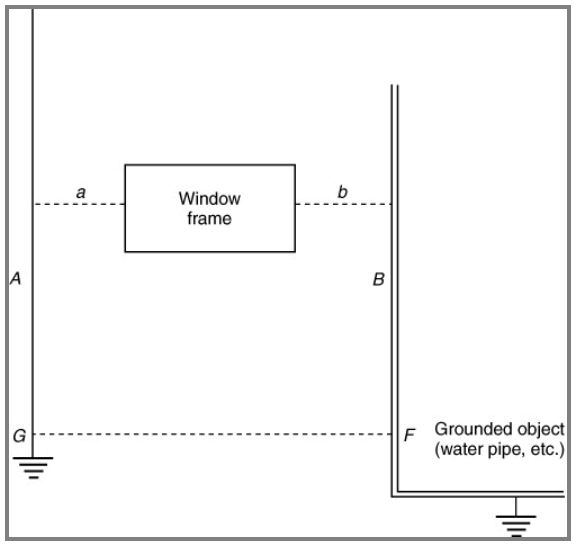
Horizontal grounded metal bodies that cross a main conductor shall be bonded to the main conductor where they cross the conductor unless inherently bonded through construction at that location.

4.15.4* Ungrounded Metallic Bodies.

4.15.4.1

The effect due to ungrounded metallic bodies shall be determined by using Figure 4.15.4.1 according to either 4.15.4.1.1 or 4.15.4.1.2.

Figure 4.15.4.1 Effect of Ungrounded Metallic Bodies, Such as a Window Frame, in Nonconductive Media.



4.15.4.1.1

If *a* + *b* is less than the calculated bonding distance, then *A* shall be bonded to *B* directly.

4.15.4.1.2

If *a* + *b* is greater than the calculated bonding distance, bonds shall not be required.

4.15.4.2

A bonding connection shall be required where the total of the shortest distance between the lightning conductor and the ungrounded metal body and the shortest distance between the ungrounded metal body and the grounded metal body is equal to or less than the bonding distance as calculated in accordance with 4.15.2.

4.15.4.3

Bonding connections shall be made between the lightning protection system and the grounded metal body.

4.15.4.3.1

The bonding connection shall be permitted to be made directly to the grounded metal body.

4.15.4.3.2

The bonding connection shall be permitted to be made from the lightning protection system to the ungrounded metal body and from the ungrounded metal body to the grounded metal body.

4.15.5* Metallic Fences.

4.15.5.1 Grounding.

4.15.5.1.1

Fences shall be grounded where located within 6 ft (1.8 m) of a structure by interconnection with the grounding system of the structure.

4.15.5.1.2

Fences meeting the criteria of 4.15.5.1.1 shall also be grounded within 100 ft (30 m) on both sides of where overhead power lines cross the fence.

4.15.5.1.3

Gate posts through which vehicles or personnel will pass shall be grounded in accordance with 4.15.5.3.

4.15.5.1.4

Metal single-strand fences with nonconductive posts requiring grounding in accordance with 4.15.5.1 shall use a main-size conductor extending the full height of the post.

4.15.5.1.5

The main-size conductor discussed in 4.15.5.1.4 shall be bonded to each single strand to form a continuous path to ground.

4.15.5.2 Bonding.

4.15.5.2.1

Fences shall be bonded across gates and other discontinuities in accordance with the requirements of 4.15.5.3.

4.15.5.2.2

Fencing mesh covered with nonconductive material shall be bonded to posts requiring grounding by 4.15.5.1.

4.15.5.3 Gates and Gate Posts.

4.15.5.3.1

All gate posts through which vehicles or personnel will pass shall be provided with a grounding electrode meeting the requirements of Section 4.12 using a main-size conductor.

4.15.5.3.2

Class I main-size conductors buried not less than 18 in. (450 mm) in depth shall interconnect posts on opposite sides of a gate.

4.15.5.3.3

Gates shall be bonded to their grounded support posts using a flexible secondary-size jumper.

4.15.6 Materials.

4.15.6.1

Conductors used for the bonding of grounded or ungrounded metal bodies requiring connection to the lightning protection system shall be sized in accordance with the bonding conductor requirements in Table 4.1.1.1.1 and Table 4.1.1.1.2.

4.15.6.2

Connectors for equipotential bonding shall have a minimum surface contact area of 0.021 in^2 (0.133 cm^2) for copper and 0.032 in^2 (0.208 cm^2) for aluminum.

4.16* Metal Antenna Masts and Supports.

Metal antenna masts or supports located on a protected structure shall be connected to the lightning protection system using main-size conductors and listed fittings and connectors unless they are within a zone of protection.

4.17 Concealed Systems.

4.17.1 General.

4.17.1.1

Requirements covering exposed systems also shall apply to concealed systems, except conductors shall be permitted to be coursed under roofing materials, under roof framing, behind exterior wall facing, between wall studding, in conduit chases, or embedded directly in concrete or masonry construction.

4.17.1.2

Where a conductor is run in metal conduit, it shall be bonded to the conduit at the point where it enters the conduit, at the point where it emerges from the conduit, and at all locations where the conduit is not electrically continuous.

4.17.2 Masonry Chimneys.

Chimney strike termination devices and conductors shall be permitted to be concealed within masonry chimneys or to be attached to the exterior of masonry chimneys and routed through the structure to concealed main conductors.

4.17.3 Concealment in Steel-Reinforced Concrete.

Conductors or other components of the lightning protection system concealed in steel-reinforced concrete units shall be connected to the reinforcing steel.

4.17.3.1

Concealed down conductors shall be connected to the vertical reinforcing steel in accordance with 4.8.13.

4.17.3.2

Roof conductors or other concealed horizontal conductor runs shall be connected to the reinforcing steel at intervals not exceeding 100 ft (30 m).

4.17.4 Grounding Electrodes.

Grounding electrodes for concealed systems shall comply with Section 4.12.

4.18 Structural Metallic Systems.

4.18.1 General.

The metal framework of a structure shall be permitted to be utilized as the main conductor of a lightning protection system if it is equal to or greater than 3⁄16 in. (4.8 mm) in thickness and is electrically continuous, or it is made electrically continuous by methods specified in 4.18.3.

4.18.2 Strike Termination Devices.

4.18.2.1

Strike termination devices shall be connected to the structural metal framing by direct connection, by use of individual conductors routed through the roof or parapet walls to the steel framework, or by use of an exterior conductor that interconnects all strike termination devices and that is connected to the metal framework.

4.18.2.2

Where an exterior conductor is used in lieu of through-roof penetrations for the interconnection of strike termination devices, it shall be connected to the metal framework of the structure as follows:

(1) Conductors along a ridge at intervals not exceeding an average distance of 100 ft (30 m), as widely spaced as practicable and at each end in accordance with Section 4.8

(2) Perimeter roof conductors at intervals not exceeding an average distance of 100 ft (30 m), as widely spaced as practicable and at ends in accordance with Section 4.8

(3) Cross-run conductors at intervals not exceeding a distance of 150 ft (45 m) in lieu of the requirements of 4.8.8

4.18.3 Connections to Framework.

Conductors shall be connected to areas of the structural metal framework that have been cleaned to base metal, by use of one of the following methods:

(1) Bonding plates having a surface contact area of not less than 8 $in.^2$ (5200 mm^2)

(2) Welding

(3) Brazing

(4) Drilling and tapping

4.18.3.1

Bonding plates shall have bolt-pressure cable connectors and shall be bolted, welded, or brazed to the structural metal framework so as to maintain electrical continuity.

4.18.3.2

A threaded connector drilled and tapped in the metal framework shall be installed with at least five threads fully engaged and secured with a jam nut or equivalent.

4.18.3.3

The threaded portion of the connector shall be not less than the diameter of a ½ in. x 13 UNC threaded ½ in. diameter rod.

4.18.3.4

A tolerance of -4 percent shall be permitted.

4.18.3.5*

Where corrosion-protective paint or coatings are removed as part of the bonding process, the completed electrical connection shall have corrosion protection equivalent to the original coating.

4.18.4 Grounding Electrodes.

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 (18 m).

4.18.4.2

Connections shall be made as close as practicable to the base of the structural metal framework in accordance with the requirements in 4.18.3.

4.18.5 Bonding Connections.

Where metal bodies located within a steel-framed structure are inherently bonded to the structure through the construction, separate bonding connections shall not be required.

4.19 Surge Protection.

4.19.1* General.

Surge protection shall comply with the following:

(1) Type 1 or Type 2 listed surge-protective devices (SPDs) permanently installed on premises wiring systems operating at 1,000 volts or less in accordance with 4.19.2

(2) Surge arresters permanently installed on circuits, equipment, or systems operating over 1,000 V in accordance with 4.19.3

(3) Listed surge protectors permanently installed for signal, data, and communication systems in accordance with 4.19.4

4.19.2* Surge-Protective Device (SPD) Requirements.

4.19.2.1

SPDs shall be installed at all power services supplying a building, structure, or equipment.

4.19.2.1.1

SPDs shall be an integral part of the service equipment or located immediately adjacent thereto.

4.19.2.2

SPDs shall be installed at all points of supply where a service, feeder, or branch circuit conductor or cable enters or exits a building or structure to supply another building or structure and where the conductors or cables are run over 100 ft (30 m).

4.19.2.3*

SPDs shall be permitted to be installed anywhere on the load side of a service disconnect overcurrent device or at the point of utilization on the load side of a branch circuit overcurrent protection device up to the equipment served; this protection is in addition to that required by 4.19.2.1 and 4.19.2.2.

4.19.2.4*

SPDs shall not be required where, under engineering supervision, it is determined that the surge threat is negligible, the lines are equivalently protected, or installation would compromise safety.

4.19.2.5

The SPD shall protect against surges produced by a 1.2/50-μs and 8/20-μs combination waveform generator.

4.19.2.6*

SPDs at the service entrance shall have a nominal discharge current (I_n) rating of at least 20 kA 8/20 μs per phase.

4.19.2.7*

The published voltage protection rating (VPR) of the SPD for each mode of protection shall be no greater than that given in Table 4.19.2.7 for the different power distribution systems to which they can be connected.

Table 4.19.2.7 Maximum Allowed Voltage Protection Rating per Mode of Protection Provided for Different Power Distribution Systems to Which the SPD Can Be Connected

Power Distribution System	Line-to-Neutral	Line-to-Ground	Neutral-to-Ground	Line-to-Line
120 2W + ground	700	700	700	—
240 2W + ground	1000	1000	1000	—
120/240 3W + ground	700	700	700	1200
120/208 WYE 4W + ground	700	700	700	1200
277/480 WYE 4W + ground	1200	1200	1200	1800
277/480 WYE 4W + HRG (high-resistance ground)	1200	1800	1200	1800
347/600 WYE 4W + ground	1800	1800	1800	4000
240 DELTA 3W + ground (corner grounded)	—	1000	—	1000
240 DELTA 3W (ungrounded)	—	1000	—	1000
480 DELTA 3W + ground (corner grounded)	—	1800	—	1800
480 DELTA 3W (ungrounded)	—	1800	—	1800

4.19.2.8

The SPD shall be marked with a short-circuit current rating.

4.19.2.8.1

The requirement for a short-circuit current rating marking shall not apply to receptacles.

4.19.2.8.2

SPDs shall not be installed at a point on the system where the available fault current is in excess of the SPD rating.

4.19.2.9

The maximum continuous operating voltage (MCOV) of the SPD shall be selected to ensure that it is greater than the upper tolerance of the utility power system to which it is connected.

4.19.2.10

SPDs shall be permitted to be located indoors or outdoors.

4.19.2.11*

Where used at a point on a circuit, an SPD shall be connected to each ungrounded conductor.

4.19.2.11.1

SPDs shall be permitted to be connected between any two conductors — ungrounded conductors, grounded conductors, equipment grounding conductors, or grounding electrode conductors.

4.19.2.11.2

The conductors used to connect the SPD to the line or bus and to ground shall not be any longer than necessary and shall have no unnecessary bends.

4.19.2.12* Grounding Electrode System.

The resistance of the grounding electrode system used in the grounding of SPDs shall comply with *NFPA 70*.

4.19.2.13 Physical Characteristics.

4.19.2.13.1

SPDs shall be protected with consideration for the operational environment conditions and according to the manufacturer's installation instructions.

4.19.2.13.2*

Enclosures shall be marked with environmental rating(s) by type.

4.19.2.14

SPDs shall be installed such that they are accessible for inspection and maintenance.

4.19.2.15 Indicating.

An SPD shall provide visual indication that it is functioning properly.

4.19.3* Surge Arrester Requirements.

4.19.3.1

Surge arresters shall be installed in accordance with 4.19.2.1 and 4.19.2.2 when a building, structure, or equipment operates over 1,000 V.

4.19.3.2*

The duty cycle rating of a surge arrester shall be not less than 125 percent of the maximum system voltage available at the point of application.

4.19.3.3

Surge arresters shall be permitted to be located indoors or outdoors.

4.19.3.4

Surge arresters shall be made inaccessible to unqualified persons unless the surge arresters are listed for installation in accessible locations.

4.19.3.5

Where used at a point on a circuit, a surge arrester shall be connected to each ungrounded conductor.

4.19.3.5.1

A single installation of surge arresters shall be permitted to protect a number of interconnected circuits if no circuit is exposed to surges while disconnected from the surge arresters.

4.19.3.6

The conductor used to connect a surge arrester to a line, bus, or equipment and to an equipment grounding conductor or grounding electrode connection point shall not be any longer than necessary and shall have no unnecessary bends.

4.19.3.7

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

4.19.3.8

A surge arrester protecting a transformer that supplies a secondary distribution system shall be interconnected in accordance with Part III of Article 242 of *NFPA 70 (NEC)*.

4.19.3.9

Surge arresters shall be installed such that they are accessible for inspection and maintenance.

4.19.4 Surge Protector Requirements.

4.19.4.1*

Surge protectors shall be installed on all signal, data, and communications systems that enter or exit a building or structure or supply equipment, including proprietary equipment from communication utility providers or tenant communication utilities.

4.19.4.1.1

Surge protectors shall not be required if a service provider has made other provisions for lightning surge threats.

4.19.4.2*

Surge protectors shall be installed where signal, data, or communications system conductors or cables enter or exit a building or structure to supply another building or structure and where the conductors or cables are run over 100 ft (30 m).

4.19.4.3*

Surge protectors shall have a maximum discharge current (I_{max}) rating of at least 10 kA 8/20 µs.

4.19.4.4

The selection of surge protectors shall take into consideration aspects such as frequency, bandwidth, and voltage.

4.19.4.4.1

Losses (such as returns loss, insertion loss, impedance mismatch, or other attenuation) introduced by the surge protector shall be within acceptable operational limits.

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*.

4.19.4.6

Where the point of grounding referenced in 4.19.4.5 is more than 20 ft (6 m) away, a supplementary ground reference point shall be installed at the surge protector location.

4.19.4.6.1

Supplementary ground reference points shall be permitted as follows:

(1) Equipotential ground bus bar

(2) Structural metal framework in accordance with 4.18.1

(3) Ground reference at a secondary power distribution panel

4.19.4.7

Surge protectors shall not be grounded through a down conductor of the lightning protection system.

4.19.4.8*

Surge protectors shall be located and installed so as to minimize lead length, and interconnecting leads shall be routed so as to avoid sharp bends, coils, or kinks.

4.19.4.9

The surge protector grounding conductor, if provided, shall be installed in accordance with the manufacturer's installation instructions.

4.19.4.10*

Surge protectors shall be accessible for inspection and maintenance.

4.20* Lightning Event Monitoring Systems

4.20.1 Lightning event monitoring systems shall be permitted to be installed to detect, observe, monitor, or record lightning events affecting a protected structure, protected area, or lightning protection system.

4.20.2 Lightning event monitoring systems shall be installed in accordance with the manufacturer's instructions and in a manner that does not compromise the electrical continuity, current-carrying capacity, bonding, corrosion protection, surge protection, required separation, integrity of the structure being protected, integrity of components of the structure being protected, or zone of protection of the lightning protection system.

4.20.3 Where lightning event monitoring systems are installed, lightning event records shall be made available for use in inspection, testing, maintenance, reporting, and record retention.

Statement of Problem and Substantiation for Public Input

NFPA 780 currently contains inspection, maintenance, and reporting provisions that depend on identifying known or suspected lightning interaction with a protected structure or lightning protection system, but Chapter 4 does not provide general provisions recognizing the installation of lightning event monitoring systems.

Chapter 8 states that lightning protection shall be installed as specified in Chapter 4 except as modified by Chapter 8, making Chapter 4 the appropriate location for general requirements applicable to lightning protection systems before occupancy-specific provisions are added elsewhere. Adding this section to Chapter 4 establishes a general, technology-neutral permission for lightning event monitoring systems without requiring their use on all lightning protection systems.

The proposed text is intentionally permissive. It does not mandate installation of lightning event monitoring systems for all structures. Instead, it recognizes that such systems can be installed where desired by the owner, designer, AHJ, or project specification to support inspection, testing, maintenance, reporting, and record retention, as required in the corresponding structure maintenance and inspection plan.

The proposed language also ensures that such systems do not compromise the lightning protection system. This is important because monitoring devices or sensors can be installed on or near LPS conductors, grounding systems, protected structures, or monitored areas. The installation should not reduce electrical continuity, current-carrying capacity, bonding integrity, corrosion protection, surge protection, required separation, or the zone of protection. The lightning event monitoring systems

cannot compromise the protection of the structure being protected either.

This change provides a general Chapter 4 foundation for later occupancy-specific requirements, including potential requirements for structures where post-event inspection and reporting are especially important. It also avoids limiting the standard to simple lightning counters by using the defined term “Lightning Event Monitoring System,” which requires retrievable lightning-event records rather than only a numerical count.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 64-NFPA 780-2026 [New Section after A.4.19.4.10]	

Submitter Information Verification

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Submittal Date: Tue May 26 14:33:00 EDT 2026
Committee: LIG-AAA

Public Input No. 10-NFPA 780-2025 [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		Alur
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 172 lb/1000 ft*	278 g/m - 256 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	

*A tolerance of -4 percent is permitted for solid and tubular air terminal raw stock, threaded to receive Unified National Coarse (UNC) thread for that size rod (i.e., 3/8 in. x 16, 1/2 in. x 13), which will meet the requirements of this table.

*Relevant to Copper-Clad Steel

Additional Proposed Changes

File Name	Description	Approved
780_PC2.pdf	780_PC2	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 2 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS to the table as an acceptable material type. History of usage as a conductor material employed in lightning protection applications, and the laboratory work of the CCS 780 Task Group has provided sufficient evidence that 40% CCS meets the minimum requirements for performance.

Submitter Information Verification

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Submittal Date: Fri Dec 19 12:44:17 EST 2025
Committee: LIG-AAA

Public Comment No. 2-NFPA 780-2024 [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	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 172 lb/1000 ft *	278 g/m - 256 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

* Relevant to Copper-Clad Steel

Statement of Problem and Substantiation for Public Comment

This adds 40% CCS to the table as an acceptable material type. History of usage as a conductor material employed in lightning protection applications, and the laboratory work of the CCS 780 Task Group has provided sufficient evidence that 40% CCS meets the minimum requirements for performance.

Related Item

• Public Input NO. 11-NFPA 780-2023

Submitter Information Verification

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Submittal Date: Sun May 12 07:41:34 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

Copyright Assignment

I, Peter Graser, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Comment (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Comment in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Comment and that I have full power and authority to enter into this copyright assignment.

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Public Input No. 93-NFPA 780-2026 [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 or Copper-clad Steel		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	

*A tolerance of -4 percent is permitted for solid and tubular air terminal raw stock, threaded to receive Unified National Coarse (UNC) thread for that size rod (i.e., 3/8 in. x 16, 1/2 in. x 13), which will meet the requirements of this table.

Statement of Problem and Substantiation for Public Input

This PI is one of 11 Public Inputs coordinated to provide the option of using 21% CCS as a conductor for electrical protection.

1) CCS conductors are permitted in NFPA 780, Section 4.5.4.2 for overhead ground wires.
2) CCS conductors have been demonstrated to perform equivalently to copper in terms of connections under lightning testing (i.e., Exponent lightning tests 1 and 2).
3) 21% CCS is more appropriate than 40% CCS for lightning protection down conductors because it is not subjected to corrosive soils and is installed in open air.
4) 21% CCS can be sized smaller than both aluminum and copper because of its mechanical properties.
A proposal request was submitted to UL to create requirements for the addition of Copper-clad steel (CCS) to UL 96, Lightning Protection Components, Edition 7 (UL PR44947).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	Addition of CCS conductors to NFPA 780
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	Addition of CCS conductors to NFPA 780
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	Addition of CCS conductors to NFPA 780
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	Addition of CCS conductors to NFPA 780
Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]	Addition of CCS conductors to NFPA 780
Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]	Addition of CCS conductors to NFPA 780
Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]	Addition of CCS conductors to NFPA 780
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	
Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]	
Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]	
Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]	

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Committee: LIG-AAA

Public Input No. 11-NFPA 780-2025 [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		Alu
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 345 lb/1000 ft*	558 g/m - 513 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	

*A tolerance of -4 percent is permitted for solid air terminal raw stock threaded to receive UNC thread for that size rod (i.e., 1/2 in. x 13, 5/8 in. x 11), which will meet the requirements of this table.

*Revelant to CCS 40% Conductor Material

Additional Proposed Changes

File Name	Description	Approved
780_PC3.pdf	780_PC3	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 3 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS to the table along with copper (CU) as an acceptable alternative material type. History of usage as a conductor material employed in lightning protection applications, and the laboratory work of the CCS 780 Task Group has provided sufficient evidence that 40% CCS meets the minimum requirements for performance.

Submitter Information Verification

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Submittal Date: Fri Dec 19 14:30:21 EST 2025

Committee: LIG-AAA

Public Comment No. 3-NFPA 780-2024 [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	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 345 lb/1000 ft *	558 g/m - 513 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

* Revelant to CCS 40% Conductor Material

Statement of Problem and Substantiation for Public Comment

This adds 40% CCS to the table along with copper (CU) as an acceptable alternative material type. History of usage as a conductor material employed in lightning protection applications, and the laboratory work of the CCS 780 Task Group has provided sufficient evidence that 40% CCS meets the minimum requirements for performance.

Related Item

• Public Input 12

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld Bimetallics, LLC.
Affiliation: American Bimetallic Association
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Submittal Date: Sun May 12 08:14:58 EDT 2024

Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 94-NFPA 780-2026 [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 or 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	

*A tolerance of -4 percent is permitted for solid air terminal raw stock threaded to receive UNC thread for that size rod (i.e., 1/2 in. x 13, 5/8 in. x 11), which will meet the requirements of this table.

Statement of Problem and Substantiation for Public Input

This PI is one of 11 Public Inputs coordinated to provide the option of using 21% CCS as a conductor for electrical protection.

1) CCS conductors are permitted in NFPA 780, Section 4.5.4.2 for overhead ground wires.
2) CCS conductors have been demonstrated to perform equivalently to copper in terms of connections under lightning testing (i.e., Exponent lightning tests 1 and 2).

3) 21% CCS is more appropriate than 40% CCS for lightning protection down conductors because it is not subjected to corrosive soils and is installed in open air.
4) 21% CCS can be sized smaller than both aluminum and copper because of its mechanical properties.
A proposal request was submitted to UL to create requirements for the addition of Copper-clad steel (CCS) to UL 96, Lightning Protection Components, Edition 7 (UL PR44947).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	Addition of CCS conductors to NFPA 780
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	Addition of CCS conductors to NFPA 780
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	Addition of CCS conductors to NFPA 780
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	Addition of CCS conductors to NFPA 780
Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]	Addition of CCS conductors to NFPA 780
Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]	Addition of CCS conductors to NFPA 780
Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]	Addition of CCS conductors to NFPA 780
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	
Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]	
Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]	
Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]	

Submitter Information Verification

Submitter Full Name: Robert Schuermann
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Submittal Date: Fri May 29 11:42:19 EDT 2026
Committee: LIG-AAA

Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]

4.2.2.3 Copper-clad steel

Copper-clad steel shall be at least a 21% conductivity (IACS) with a minimum 5% diameter of high grade copper molecularly bonded to the steel per ASTM B910 and ASTM B228.

Statement of Problem and Substantiation for Public Input

Adding CCS 21% to materials. The minimum copper thickness of 5% of the diameter of the wire defines 21% CCS in ASTM B910, Standard Specification for Annealed Copper-Clad Steel (CCS) Wire.

This PI is one of 11 Public Inputs coordinated to provide the option of using 21% CCS as a conductor for electrical protection.
1) CCS conductors are permitted in NFPA 780, Section 4.5.4.2 for overhead ground wires.
2) CCS conductors have been demonstrated to perform equivalently to copper in terms of connections under lightning testing (i.e., Exponent lightning tests 1 and 2).
3) 21% CCS is more appropriate than 40% CCS for lightning protection down conductors because it is not subjected to corrosive soils and is installed in open air.
4) 21% CCS can be sized smaller than both aluminum and copper because of its mechanical properties.
A proposal request was submitted to UL to create requirements for the addition of Copper-clad steel (CCS) to UL 96, Lightning Protection Components, Edition 7 (UL PR44947).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	Addition of CCS conductors to NFPA 780
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	Addition of CCS conductors to NFPA 780
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	Addition of CCS conductors to NFPA 780
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	Addition of CCS conductors to NFPA 780
Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]	Addition of CCS conductors to NFPA 780
Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]	Addition of CCS conductors to NFPA 780
Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]	Addition of CCS conductors to NFPA 780
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	
Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]	

Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]

Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]

Submitter Information Verification

Submitter Full Name: Robert Schuermann

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Submittal Date: Fri May 29 11:27:37 EDT 2026

Committee: LIG-AAA

Public Input No. 13-NFPA 780-2025 [Section No. 4.2.3]

4.2.3

Copper and 40% CCS lightning protection materials shall not be installed on or in contact with aluminum roofing, aluminum siding, or other aluminum surfaces.

Additional Proposed Changes

File Name	Description	Approved
780_PC5.pdf	780_PC5	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 5 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS to the table along with copper (CU) as an acceptable alternative material type. History of usage as a conductor material employed in lightning protection applications, and the laboratory work of the CCS 780 Task Group has provided sufficient evidence that 40% CCS meets the minimum requirements for performance.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
Street Address:
City:
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Submittal Date: Fri Dec 19 14:36:13 EST 2025
Committee: LIG-AAA

Public Comment No. 5-NFPA 780-2024 [Section No. 4.2.3]

4.2.3

Copper and 40% CCS 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 Comment

This adds 40% CCS to the table along with copper (CU) as an acceptable alternative material type. History of usage as a conductor material employed in lightning protection applications, and the laboratory work of the CCS 780 Task Group has provided sufficient evidence that 40% CCS meets the minimum requirements for performance.

Related Item

• Public Input 13 NFPA 780

Submitter Information Verification

Submitter Full Name: Peter Graser
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Street Address:
City:
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Submittal Date: Sun May 12 08:36:45 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 96-NFPA 780-2026 [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 PI is one of 11 Public Inputs coordinated to provide the option of using 21% CCS as a conductor for electrical protection.

1) CCS conductors are permitted in NFPA 780, Section 4.5.4.2 for overhead ground wires.
2) CCS conductors have been demonstrated to perform equivalently to copper in terms of connections under lightning testing (i.e., Exponent lightning tests 1 and 2).
3) 21% CCS is more appropriate than 40% CCS for lightning protection down conductors because it is not subjected to corrosive soils and is installed in open air.
4) 21% CCS can be sized smaller than both aluminum and copper because of its mechanical properties.
A proposal request was submitted to UL to create requirements for the addition of Copper-clad steel (CCS) to UL 96, Lightning Protection Components, Edition 7 (UL PR44947).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	Addition of CCS conductors to NFPA 780
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	Addition of CCS conductors to NFPA 780
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	Addition of CCS conductors to NFPA 780
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	Addition of CCS conductors to NFPA 780
Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]	Addition of CCS conductors to NFPA 780
Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]	Addition of CCS conductors to NFPA 780
Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]	Addition of CCS conductors to NFPA 780
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	

Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]

Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]

Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]

Submitter Information Verification

Submitter Full Name: Robert Schuermann

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Submittal Date: Fri May 29 11:53:36 EDT 2026

Committee: LIG-AAA

Public Input No. 4-NFPA 780-2025 [Section No. 4.2.4]

4.2.4*

Aluminum lightning protection materials shall not be installed ABOVE, on or in contact with copper roofing materials or other copper surfaces, or where exposed to runoff from copper surfaces.

Additional Proposed Changes

File Name	Description	Approved
copper_wash.jpeg	Picture shows how the aluminum siding did corroded.	

Statement of Problem and Substantiation for Public Input

Ned to add proper wording.

Submitter Information Verification

Submitter Full Name: Lizardo Lopez
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Submittal Date: Tue Dec 02 14:58:46 EST 2025
Committee: LIG-AAA

Public Input No. 17-NFPA 780-2026 [Section No. 4.2.5]

4.2.5*

Lightning protection systems shall be designed to minimize the effects caused by runoff from ~~both~~ copper, 40% CCS and aluminum lightning protection materials to prevent the deterioration of incompatible materials and minimize the degradation of building aesthetics caused by staining.

Additional Proposed Changes

File Name	Description	Approved
780_PC6.pdf	780_PC6	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 6 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS to the table along with copper (CU) as an acceptable alternative material type. History of usage as a conductor material employed in lightning protection applications, and the laboratory work of the CCS 780 Task Group has provided sufficient evidence that 40% CCS meets the minimum requirements for performance.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
Street Address:
City:
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Zip:
Submittal Date: Mon Feb 09 10:53:20 EST 2026
Committee: LIG-AAA

Public Comment No. 6-NFPA 780-2024 [Section No. 4.2.5]

4.2.5*

Lightning protection systems shall be designed to minimize the effects caused by runoff ~~from both copper~~ from copper, 40% CCS 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 Comment

This adds 40% CCS to the table along with copper (CU) as an acceptable alternative material type. History of usage as a conductor material employed in lightning protection applications, and the laboratory work of the CCS 780 Task Group has provided sufficient evidence that 40% CCS meets the minimum requirements for performance.

Related Item

• Public Input 14 2023 NFPA 780

Submitter Information Verification

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Submittal Date: Sun May 12 08:38:45 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]

4.2.5*

Lightning protection systems shall be designed to minimize the effects caused by runoff from ~~both copper and aluminum~~ copper, copper-clad steel, or 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

This PI is one of many Public Inputs coordinated to provide the option of using 21% CCS as a conductor for electrical protection.

1) CCS conductors are permitted in NFPA 780, Section 4.5.4.2 for overhead ground wires.
2) CCS conductors have been demonstrated to perform equivalently to copper in terms of connections under lightning testing (i.e., Exponent lightning tests 1 and 2).
3) 21% CCS is more appropriate than 40% CCS for lightning protection down conductors because it is not subjected to corrosive soils and is installed in open air.
4) 21% CCS can be sized smaller than both aluminum and copper because of its mechanical properties.

A proposal request was submitted to UL to create requirements for the addition of Copper-clad steel (CCS) to UL 96, Lightning Protection Components, Edition 7 (UL PR44947).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	Addition of CCS conductors to NFPA 780
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	Addition of CCS conductors to NFPA 780
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	Addition of CCS conductors to NFPA 780
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	Addition of CCS conductors to NFPA 780
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	Addition of CCS conductors to NFPA 780
Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]	Addition of CCS conductors to NFPA 780
Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]	Addition of CCS conductors to NFPA 780
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	

Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]

Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]

Submitter Information Verification

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Submittal Date: Fri May 29 11:55:43 EDT 2026

Committee: LIG-AAA

Public Input No. 19-NFPA 780-2026 [Section No. 4.3.2]

4.3.2

Copper or 40% CCS 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.

Additional Proposed Changes

File Name	Description	Approved
780_PC8.pdf	780_PC8	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 8 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This ensures both CU and 40% CCS are properly protected from chimney or vent emitting corrosive gases.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
Street Address:
City:
State:
Zip:

Submittal Date: Mon Feb 09 12:04:14 EST 2026
Committee: LIG-AAA

Public Comment No. 8-NFPA 780-2024 [Section No. 4.3.2]

4.3.2

Copper or 40% CCS 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 Comment

This ensures both CU and 40% CCS are properly protected from chimney or vent emitting corrosive gases.

Related Item

• Public Input No. 15-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld Bimetallics, LLC.
Affiliation: American Bimetallic Association
Street Address:
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Submittal Date: Sun May 12 08:44:04 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 20-NFPA 780-2026 [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 steel is dissimilar to aluminum, and not dissimilar to copper.

Additional Proposed Changes

File Name	Description	Approved
780_PC9.pdf	780_PC9	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 9 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

Information guidance offered to users regarding the galvanic corrosion properties of CCS.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
Street Address:
City:
State:
Zip:

Submittal Date: Mon Feb 09 12:07:00 EST 2026
Committee: LIG-AAA

Public Comment No. 9-NFPA 780-2024 [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 steel is dissimilar to aluminum, and not dissimilar to copper

Statement of Problem and Substantiation for Public Comment

Information guidance offered to users regarding the galvanic corrosion properties of CCS.

Related Item

• Public Input No. 16-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld Bimetallics, LLC.
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:

Submittal Date: Sun May 12 08:48:42 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

Copyright Assignment

I, Peter Graser, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Comment (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Comment in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Comment and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Peter Graser, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 98-NFPA 780-2026 [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 steel 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.

This PI is one of many Public Inputs coordinated to provide the option of using 21% CCS as a conductor for electrical protection.

1) CCS conductors are permitted in NFPA 780, Section 4.5.4.2 for overhead ground wires.
2) CCS conductors have been demonstrated to perform equivalently to copper in terms of connections under lightning testing (i.e., Exponent lightning tests 1 and 2).
3) 21% CCS is more appropriate than 40% CCS for lightning protection down conductors because it is not subjected to corrosive soils and is installed in open air.
4) 21% CCS can be sized smaller than both aluminum and copper because of its mechanical properties.

A proposal request was submitted to UL to create requirements for the addition of Copper-clad steel (CCS) to UL 96, Lightning Protection Components, Edition 7 (UL PR44947).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	Addition of CCS conductors to NFPA 780
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	Addition of CCS conductors to NFPA 780
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	Addition of CCS conductors to NFPA 780
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	Addition of CCS conductors to NFPA 780
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	Addition of CCS conductors to NFPA 780
Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]	Addition of CCS conductors to NFPA 780
Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]	Addition of CCS conductors to NFPA 780
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	

Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]

Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]

Submitter Information Verification

Submitter Full Name: Robert Schuermann

Organization: Copperweld

Street Address:

City:

State:

Zip:

Submittal Date: Fri May 29 11:59:00 EDT 2026

Committee: LIG-AAA

Public Input No. 50-NFPA 780-2026 [New Section after 4.5.1.4]

TITLE OF NEW CONTENT

4.5.1.4 Metal parts 3/16 in. or greater shall have a surface area equal to or greater than that of an air terminal suitable for use in that location.

Statement of Problem and Substantiation for Public Input

The current requirement allows for a metal cube of 3/16 in. X 3/16 in. X 3/16 in. to be used as a Strike Termination Device. These changes add clarity by requiring additional dimensions equal to that of an air terminal.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
Organization: Warren Lightning Rod Company
Affiliation: United Lightning Protection Association
Street Address:
City:
State:
Zip:

Submittal Date: Tue May 19 14:58:39 EDT 2026
Committee: LIG-AAA

Public Input No. 21-NFPA 780-2026 [Section No. 4.5.4.6]

4.5.4.6

Connections between galvanized steel overhead ground wires and copper or 40% CCS conductors shall be made through a suitable component that does not permit direct contact between the two materials.

Additional Proposed Changes

File Name	Description	Approved
780_PC10.pdf	780_PC10	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 10 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

The use of 40% CCS would have the same corrosive concerns as copper conductors have so needs to be added to this rule.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
Street Address:
City:
State:
Zip:

Submittal Date: Mon Feb 09 12:37:24 EST 2026
Committee: LIG-AAA

Public Comment No. 10-NFPA 780-2024 [Section No. 4.5.4.6]

4.5.4.6

Connections between galvanized steel overhead ground wires and copper or 40% CCS 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 Comment

The use of 40% CCS would have the same corrosive concerns as copper conductors have so needs to be added to this rule

Related Item

• Public Input No. 17-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld Bimetallics, LLC.
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:

Submittal Date: Sun May 12 08:52:33 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

Copyright Assignment

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☑ By checking this box I affirm that I am Peter Graser, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 99-NFPA 780-2026 [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 overhead grounding conductors, so it should be included in the section.

This PI is one of many Public Inputs coordinated to provide the option of using 21% CCS as a conductor for electrical protection.

1) CCS conductors are permitted in NFPA 780, Section 4.5.4.2 for overhead ground wires.
2) CCS conductors have been demonstrated to perform equivalently to copper in terms of connections under lightning testing (i.e., Exponent lightning tests 1 and 2).
3) 21% CCS is more appropriate than 40% CCS for lightning protection down conductors because it is not subjected to corrosive soils and is installed in open air.
4) 21% CCS can be sized smaller than both aluminum and copper because of its mechanical properties.

A proposal request was submitted to UL to create requirements for the addition of Copper-clad steel (CCS) to UL 96, Lightning Protection Components, Edition 7 (UL PR44947).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	
Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]	
Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]	
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	
Public Input No. 95-NFPA 780-2026 [Section No. 4.12.3.2]	
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	
Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]	
Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]	

Submitter Information Verification

Submitter Full Name: Robert Schuermann
Organization: Copperweld

Street Address:
City:
State:
Zip:
Submittal Date: Fri May 29 12:00:21 EDT 2026
Committee: LIG-AAA

Public Input No. 8-NFPA 780-2025 [New Section after 4.6.5]

TITLE OF NEW CONTENT

4.6.5.3: Mandatory Minimum Height and Support for Mid-Roof Air Terminals.

This standard requires the installation of mid-roof air terminals that are al least 5 feet (1.5 m) tall and be mounted on secure tripod supports.

Additional Proposed Changes

File Name	Description	Approved
Midroof_5_feet.pdf	Mid-roof A-T5 feet high	
MId_roof_AT_1.jfif	MId roof no parapet	

Statement of Problem and Substantiation for Public Input

Doing this the height of the air terminal will ensure that the terminals will comply with the rolling sphere method, so that the air terminals will provide the proper protection of the roof, allowing not the sphere to touch the roof in accordance with the principal of roof coverage principles of all LPS.

Submitter Information Verification

Submitter Full Name: Lizardo Lopez
Organization: Retired Installer
Affiliation: www.LALENet.org
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 03 18:26:25 EST 2025
Committee: LIG-AAA

Public Input No. 51-NFPA 780-2026 [New Section after 4.6.12.2]

TITLE OF NEW CONTENT

New 4.6.12.2 (2) Where adhesive is used to secure an air terminal base, the adhesive shall not be present in the fitting where the conductor makes contact with the base in order to ensure the continuity of the air terminal to the conductor through the base.

Renumber (2) to (3)

Renumber (3) to (4)

Statement of Problem and Substantiation for Public Input

The presence of adhesive in the fitting where the conductor fastens to air terminal base interrupts continuity and may lead to profound failure.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
Organization: Warren Lightning Rod Company
Affiliation: United Lightning Protection Association
Street Address:
City:
State:
Zip:

Submittal Date: Tue May 19 15:47:21 EDT 2026
Committee: LIG-AAA

Public Input No. 52-NFPA 780-2026 [New Section after 4.6.12.2]

TITLE OF NEW CONTENT

New 4.6.12.2 (5) Where more than one air terminal is installed on a roof top unit, that unit shall be bonded with at least two main sized conductors with each secured into a 3 sq. in. bonding plate.

Statement of Problem and Substantiation for Public Input

The number and size of bonding plates for adhered systems is not enumerated. Adding the requirement clarifies the intent.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
Organization: Warren Lightning Rod Company
Affiliation: United Lightning Protection Association
Street Address:
City:
State:
Zip:

Submittal Date: Tue May 19 16:31:56 EDT 2026
Committee: LIG-AAA

Public Input No. 115-NFPA 780-2026 [Section No. 4.6.12.3.2]

4.6.12.3.2

The connection shall ~~be~~ :

(1) Be made to bare metal

(2) Be at the base or lower edges of the unit ~~using main~~ .

(3) Use main -size lightning conductors ~~and bonding~~

(4) Use bonding devices that have a surface contact area of not less than 3 $in.^2$ (1940 mm^2) ~~and shall provide~~

(5) Provide two or more paths to ground, as is required for strike termination devices.

Statement of Problem and Substantiation for Public Input

Change made to comply with the Manual of Style. This section has more than one requirement.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
Organization: Warren Lightning Rod Company
Affiliation: United Lightning Protection Association
Street Address:
City:
State:
Zip:

Submittal Date: Mon Jun 01 15:11:56 EDT 2026
Committee: LIG-AAA

Public Input No. 148-NFPA 780-2026 [New Section after 4.6.13.2]

TITLE OF NEW CONTENT

4.6.14 Roof Edge System

4.6.14.1 Installation of air terminals on metal edge systems shall be installed in accordance with 4.6.2 through 4.6.5.

4.6.14.2 Installation of air terminals, bases and fasteners on metal edge systems shall be mounted using compatible adhesive to limit any penetration of the metal edge system.

4.6.14.3 Installation of lightning protection components on metal edge systems shall not be installed directly on any joint or seam of the metal edge system that would limit the expansion/contraction of the metal edge system.

Additional Proposed Changes

File Name	Description	Approved
wtsc_with_lps.pdf		
wtsc_without_lp_sys.pdf		

Statement of Problem and Substantiation for Public Input

This PI provides the guidance for the lightning protection industry for the installation of air terminals, bases and fasteners that will meet the requirements of section 4.6 and also not interfere with the requirements of the metal edge system. The Lightning Protection Institute conducted testing in accordance with ANSI/SPRI FM 4435 ES-1 and the results are submitted with this PI. The testing results concluded that there was no negative impact on the metal edge system when tested with and without lighting protection components installed. This proposal provides the necessary guidance for installation on these systems.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 147-NFPA 780-2026 [New Section after 3.3.36]	

Submitter Information Verification

Submitter Full Name: Mark Morgan
Organization: East Coast Lightning Equipment
Street Address:
City:
State:
Zip:

Submittal Date: Wed Jun 03 13:07:07 EDT 2026
Committee: LIG-AAA

WTSC
WIND TESTING SERVICES CORPORATION

Testing your perimeter before Mother Nature does.

PERFORMANCE TEST REPORT

Rendered to:

Company: Lightning Protection Institute
Address: 333 Peterson Rd Ste F
City/State/Zip: Libertyville, IL 60048
Date: December 17, 2025

Project Summary: **Wind Testing Services Corporation** was contracted by Lightning Protection Institute to conduct ANSI/SPRI FM 4435 ES-1 testing on their formed Coping Cap product. The results obtained are as documented in the following report.

Test Procedure: The formed Coping Cap was tested in accordance with the following test method as referenced in ANSI/SPRI FM 4435 ES-1, *Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems*:

> ***Test RE-3**, Test Method for Dependently Terminated or Independently Terminated Coping Systems.* This test method is used to evaluate coping systems utilized with all roofing system assemblies.

Tested Coping Cap Detail: The tested formed Coping Cap assembly consisted of a preformed (from flat stock) .032 aluminum Coping Cap cover and a 22-gauge steel front cleat, each furnished in 10'-0" lengths. The Coping Cap was furnished with a 6-inch outside face, 18-inch top, and 3-inch inside face. Prior to the testing, lightning protection was mounted to the coping cap by trained professionals. The front cleat was top fastened to the nailer with 1-inch Stainless Steel Panel Screws, in the nail flange's middle, 12-inches on center. It was also face fastened to the nailer 1.25-inches from the bottom, 8-inches on center, with the same screws. The Coping Cap was hooked over the front cleat, pulled back over the roof, and fastened across on the inside face's middle, 12-inches on center, with the same screws.

Test Results: The following test results were recorded. Since testing was conducted on a .032 aluminum 6-inch vertical outside face height, 18-inch top width, and 3-inch vertical inside face height coping cap assembly, the results are applicable for any similarly fabricated coping profile up to a maximum of 6-inch outside face, 18-inch top width, and 3-inch inside face, utilizing a .032 aluminum coping cap cover, and 22-gauge steel front in the same material thicknesses OR GREATER.

Test Method	Rating Achieved, psf
RE-2 Gravel Stop/Fascia	--
RE-3 Coping	**240**

ANSI/SPRI FM 4435 ES-1 tested to: 240 pounds per square foot

Vertical Design Pressure (Top): 360 pounds per foot
Horizontal Design Pressure (Face): 120 pounds per foot

Discussion: Coping systems used on ballasted and mechanically fastened roofing system assemblies need to be evaluated using the RE-3 test method. The lowest rating achieved using the RE-3 test after utilizing "separate" yet identical 10'-0" product samples on the top/face, and then testing the top/back is the maximum allowable design pressure certified in this document.

ES-1 Compliance: The maximum design pressure for this Lightning Protection Institute formed Coping Cap profile utilizing a .032 aluminum coping cap cover, and 22-gauge steel front cleat (as determined by the RE-3 test methodology) is **240 psf.**

Report By:
Wind Testing Services Corporation

Ben Kweton, President

Wind Testing Services Corporation • 156 Pine Street • Grayslake, IL 60030
Office: 844.WTSC.ES1 (844.987.2371) • www.windtestingservices.com

Date of Test: 4/11/23

Description of Metal being tested: (Coping)

032 ALU. COPING W/ MOUNTED LIGHTNING PROTECTION W/ 226A FRONT CLEAT

Description of How Installed:

SAME INSTALLATION AS PREV. COPING

PPSF	PPF - Top 18 "	PPF - Face 6 "	Result
15	22.5	7.5	
30	45	15	
45	67.5	22.5	
60	90	30	
75	112.5	37.5	
90	135	45	
105	157.5	525	
120	180	60	
135	202.5	67.5	
150	225	75	
160	240	80	
170	255	85	
180	270	90	
190	285	95	
200	300	100	
210	315	105	
220	330	110	
230	345	115	
240	360	120	
250	375	125	X

RESULTS: TEST MAXED OUT @ 250 PSF

WTSC

WIND TESTING SERVICES CORPORATION

Testing your perimeter before Mother Nature does.

Certificate of ANSI/SPRI FM 4435 ES-1 Compliance

Authorized Fabricator: Sheet Metal Supply for – Lightning Protection Institute

Wind Testing Services Corporation hereby certifies that the Product(s) listed below have been tested in accordance with the protocols of the ANSI/SPRI FM 4435 ES-1 Roof Edge Standard, and when installed as required will withstand the Design Pressures as calculated using ES-1 (RE-3 methodology) for the below listed project, and as prescribed by Section 1504.5 of the 2012 International Building Code.

Product(s) Certified: **Coping Cap**
Building Location:
Architect:
Building Owner:
Completion Date:
Installing Contractor:
Material: **.032 Aluminum Coping & 22-gauge Front Cleat**

Building Height:
Building Exposure:
Importance Classification:
Design Wind Speed:
Vertical Design Pressure (Top): **360 ppf**
Horizontal Design Pressure (Face): **120 ppf**
Product Size: **6" Outside Face, 18" Top, 3" Inside Face**

Certificate Number: 171225-2

ES-1 CERTIFIED TO: 240 psf

Date: December 17, 2025
Expiration/Renewal Date: December 16, 2026

Authorized Signature for Wind Testing Services Corporation by B K as President **President**

Disclaimer

All basic wind speed velocities and velocity pressure calculations are based on the maps and formulas provided in the document ANS/SPRI ES-1 2003 "Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems" and the SEI/ACSE 7-02 standard. Although every care has been taken to ensure that the information based on state and county is accurate according to the standards, official wind speed requirements can vary based on local and county jurisdiction. It is highly recommended that any information regarding wind speed velocity provided be verified with local and county officials before any action is taken. No liability is accepted or implied by Wind Testing Services Corporation for such information and advice.

Wind Testing Services Corporation.● 156 Pine Street ● Grayslake, IL 60030
Office: 844.WTSC.ES1 (844.987.2371)● www.windtestingservices.com

WTSC
WIND TESTING SERVICES CORPORATION

Testing your perimeter before Mother Nature does.

PERFORMANCE TEST REPORT

Rendered to:

Company: Lightning Protection Institute
Address: 333 Peterson Rd Ste F
City/State/Zip: Libertyville, IL 60048
Date: December 17, 2025

Project Summary: **Wind Testing Services Corporation** was contracted by Lightning Protection Institute to conduct ANSI/SPRI FM 4435 ES-1 testing on their formed Coping Cap product. The results obtained are as documented in the following report.

Test Procedure: The formed Coping Cap was tested in accordance with the following test method as referenced in ANSI/SPRI FM 4435 ES-1, *Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems*:

> ***Test RE-3**, Test Method for Dependently Terminated or Independently Terminated Coping Systems.* This test method is used to evaluate coping systems utilized with all roofing system assemblies.

Tested Coping Cap Detail: The tested formed Coping Cap assembly consisted of a preformed (from flat stock) .032 aluminum Coping Cap cover and a 22-gauge steel front cleat, each furnished in 10'-0" lengths. The Coping Cap was furnished with a 6-inch outside face, 18-inch top, and 3-inch inside face. The front cleat was top fastened to the nailer with 1-inch Stainless Steel Panel Screws, in the nail flange's middle, 12-inches on center. It was also face fastened to the nailer 1.25-inches from the bottom, 8-inches on center, with the same screws. The Coping Cap was hooked over the front cleat, pulled back over the roof, and fastened across on the inside face's middle, 12-inches on center, with the same screws.

Test Results: The following test results were recorded. Since testing was conducted on a .032 aluminum 6-inch vertical outside face height, 18-inch top width, and 3-inch vertical inside face height coping cap assembly, the results are applicable for any similarly fabricated coping profile up to a maximum of 6-inch outside face, 18-inch top width, and 3-inch inside face, utilizing a .032 aluminum coping cap cover, and 22-gauge steel front in the same material thicknesses OR GREATER.

Test Method	Rating Achieved, psf
RE-2 Gravel Stop/Fascia	--
RE-3 Coping	**240**

ANSI/SPRI FM 4435 ES-1 tested to: 240 pounds per square foot

Vertical Design Pressure (Top): 360 pounds per foot
Horizontal Design Pressure (Face): 120 pounds per foot

Discussion: Coping systems used on ballasted and mechanically fastened roofing system assemblies need to be evaluated using the RE-3 test method. The lowest rating achieved using the RE-3 test after utilizing "separate" yet identical 10'-0" product samples on the top/face, and then testing the top/back is the maximum allowable design pressure certified in this document.

ES-1 Compliance: The maximum design pressure for this Lightning Protection Institute formed Coping Cap profile utilizing a .032 aluminum coping cap cover, and 22-gauge steel front cleat (as determined by the RE-3 test methodology) is **240 psf**.

Report By:
Wind Testing Services Corporation

Ben Kweton, President

Wind Testing Services Corporation • 156 Pine Street • Grayslake, IL 60030
Office: 844.WTSC.ES1 (844.987.2371) • www.windtestingservices.com

Company Name: LIGHTNING PROTECTION INSTITUTE

Date of Test: 12/17/25

Description of Metal being tested: (Coping)

.032 ALUMINUM COPING W/ 22 GA GALV FRONT CLEAT

Description of How Installed:

PPSF	PPF - Top 18 "	PPF - Face 6 "	Result
15	22.5	7.5	
30	45	15	
45	67.5	22.5	
60	90	30	
75	112.5	37.5	
90	135	45	
105	157.5	52.5	
120	180	60	
135	202.5	67.5	
150	225	75	
160	240	80	
170	255	85	
180	270	90	
190	285	95	
200	300	100	
210	315	105	
220	330	110	
230	345	115	
240	360	120	
250	375	125	X

RESULTS: TEST MAXED OUT @ 250 PSF

WTSC

WIND TESTING SERVICES CORPORATION

Testing your perimeter before Mother Nature does.

Certificate of ANSI/SPRI FM 4435 ES-1 Compliance

Authorized Fabricator: Sheet Metal Supply for – Lightning Protection Institute

Wind Testing Services Corporation hereby certifies that the Product(s) listed below have been tested in accordance with the protocols of the ANSI/SPRI FM 4435 ES-1 Roof Edge Standard, and when installed as required will withstand the Design Pressures as calculated using ES-1 (RE-3 methodology) for the below listed project, and as prescribed by Section 1504.5 of the 2012 International Building Code.

Product(s) Certified: **Coping Cap**
Building Location:
Architect:
Building Owner:
Completion Date:
Installing Contractor:
Material: **.032 Aluminum Coping & 22-gauge Front Cleat**

Building Height:
Building Exposure:
Importance Classification:
Design Wind Speed:
Vertical Design Pressure (Top): **360 ppf**
Horizontal Design Pressure (Face): **120 ppf**
Product Size: **6" Outside Face, 18" Top, 3" Inside Face**

Certificate Number: 171225-1

ES-1 CERTIFIED TO: 240 psf

Date: December 17, 2025
Expiration/Renewal Date: December 16, 2026

Authorized Signature for Wind Testing Services Corporation by [signature] as President / **President**

Disclaimer

All basic wind speed velocities and velocity pressure calculations are based on the maps and formulas provided in the document ANS/SPRI ES-1 2003 "Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems" and the SEI/ACSE 7-02 standard. Although every care has been taken to ensure that the information based on state and county is accurate according to the standards, official wind speed requirements can vary based on local and county jurisdiction. It is highly recommended that any information regarding wind speed velocity provided be verified with local and county officials before any action is taken. No liability is accepted or implied by Wind Testing Services Corporation for such information and advice.

Wind Testing Services Corporation.● 156 Pine Street ● Grayslake, IL 60030
Office: 844.WTSC.ES1 (844.987.2371)● www.windtestingservices.com

Public Input No. 5-NFPA 780-2025 [New Section after 4.8.3]

TITLE OF NEW CONTENT

4.8.3.4 Vertical Fixed Metal Ladders as Down Conductors

4.8.3.4.1 Permanently installed exterior fixed vertical metal ladders that are electrically continuous and provide a vertical path to ground or to a lower roof level are permitted for use as down conductors, provided they meet the following conditions

1.- The ladder shall have a minimum thickness of 0.064 inches (1.63 mm), be electrically continuous throughout its length, and have any mechanical discontinuity bonded.

2.- The ladder shall be permanently affixed to the structure and shall contain no folding or retractable sections.

3.- A main-sized lightning protection conductor shall be installed at the base of the ladder rails to provide a main-sized connection, without interfering with public access or risking damage

Additional Proposed Changes

File Name	Description	Approved
Vertical_ladder_2.jpeg	Vertical ladders.	

Statement of Problem and Substantiation for Public Input

The standard already allows certain exterior metal parts—like handrails or other steel elements—to act as main conductors. Fixed vertical ladders often run straight from the roof down to the ground and are firmly attached to the structure. Using them the same way avoids having to install extra down-conductors that may not be needed.

Submitter Information Verification

Submitter Full Name: Lizardo Lopez
Organization: Retired installer
Affiliation: www.LALENet.org
Street Address:
City:
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Submittal Date: Tue Dec 02 16:29:14 EST 2025
Committee: LIG-AAA

Public Input No. 7-NFPA 780-2025 [New Section after 4.8.5]

TITLE OF NEW CONTENT

4.8.5.1 Down conductor rover overhangs. The conductor shall follow the profile of the structure without offsets or free-air spans, maintaining minimum bend radius of 8 in. (200 mm)_

Additional Proposed Changes

File Name	Description	Approved
OVERHAHG_routing_cable.mp4	Video showing how to layout or route tjhe cable.	
TURNS.pdf	Isometric picture	

Statement of Problem and Substantiation for Public Input

Section 4.8.5 does not provide a guidance for routing a down lead like overhangs. Therefore, the installations are made with sharp bends, which increases the impedance and the risk of side=flashing

Submitter Information Verification

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Submittal Date: Wed Dec 03 16:35:24 EST 2025
Committee: LIG-AAA

Public Input No. 15-NFPA 780-2025 [New Section after 4.8.13]

TITLE OF NEW CONTENT

4.8.13.4 Internal Routing of Down Conductors: Down conductors and main conductors shall be permitted to be routed within the building structure,under roofing materials, including within walls, service chases, attics, or concealed spaces,. Provided that its:

a. electrical continuity is maintained. The internal routing of conductors, shall not be considered a significant fire hazard due to thermal effects of lightning currents if it's securely fastened and protected against mechanical damage; also adequate separation is

b..maintained from non-bonded metallic systems. Its routing minimizes sharp bends, loops, and low impedance.

.

Additional Proposed Changes

File Name	Description	Approved
Copy_of_DSCN0213.jpg		
DSCN1452.JPG		
IMG_0365.JPG		

Statement of Problem and Substantiation for Public Input

Current editions do not explicitly state whether lightning protection conductors may be routed within building structures, despite widespread and long-standing industry practice, that has been employed for decades in wood-frame residential and light commercial buildings without documented fire incidents attributable to conductor heating.

Lightning currents are characterized by extremely short impulse durations with microsecond rise times, which do not permit sufficient thermal energy accumulation to ignite surrounding building materials.

Supporting Data
U.S. installation practice in wood-frame construction without evidence of fire initiation due to concealed down conductors.
- Established lightning physics demonstrating negligible thermal ignition risk from impulse lightning currents.
- Alignment with industry inspection and guidance documents (e.g., LPI-175).

Inconsistent interpretations by authorities having jurisdiction (AHJs), inspectors, and insurers, despite the fact that internal routing has been widely used for decades in the United States without documented fire incidents when systems.

Likewise, some roofing contractors request that the main lightning conductor be insulated from the roof using concrete blocks or other insulating elements, which unnecessarily increases the cost of the installation.

Submitter Information Verification

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Submittal Date: Tue Dec 30 14:35:11 EST 2025
Committee: LIG-AAA

Public Input No. 6-NFPA 780-2025 [Section No. 4.11.2]

4.11.2

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

Statement of Problem and Substantiation for Public Input

Brazed joints don't seam suitable for high transient currents. Normally used in refrigeration tubes and pluming exothermic welding provides a more robust and permanent bond.

Submitter Information Verification

Submitter Full Name: Lizardo Lopez
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Submittal Date: Tue Dec 02 17:27:03 EST 2025
Committee: LIG-AAA

Public Input No. 22-NFPA 780-2026 [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 40% CCS 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

Additional Proposed Changes

File Name	Description	Approved
780_PC11.pdf	780_PC11	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 11 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

40% CCS is added to the section as the criteria for a copper concrete-encased electrode is the same for 40% CCS.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
Street Address:
City:
State:
Zip:
Submittal Date: Mon Feb 09 12:57:25 EST 2026
Committee: LIG-AAA

Public Comment No. 11-NFPA 780-2024 [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 40% CCS 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 Comment

40% CCS is added to the section as the criteria for a copper concrete-encased electrode is the same for 40% CCS.

Related Item

• Public Input No. 18-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld Bimetallics, LLC.
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:

Submittal Date: Sun May 12 09:18:19 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

Copyright Assignment

I, Peter Graser, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Comment (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Comment in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Comment and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Peter Graser, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 95-NFPA 780-2026 [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

This PI is one of 11 Public Inputs coordinated to provide the option of using 21% CCS as a conductor for electrical protection.

1) CCS conductors are permitted in NFPA 780, Section 4.5.4.2 for overhead ground wires.
2) CCS conductors have been demonstrated to perform equivalently to copper in terms of connections under lightning testing (i.e., Exponent lightning tests 1 and 2).
3) 21% CCS is more appropriate than 40% CCS for lightning protection down conductors because it is not subjected to corrosive soils and is installed in open air.
4) 21% CCS can be sized smaller than both aluminum and copper because of its mechanical properties.

A proposal request was submitted to UL to create requirements for the addition of Copper-clad steel (CCS) to UL 96, Lightning Protection Components, Edition 7 (UL PR44947).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	Addition of CCS conductors to NFPA 780
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	Addition of CCS conductors to NFPA 780
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	Addition of CCS conductors to NFPA 780
Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]	Addition of CCS conductors to NFPA 780
Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]	Addition of CCS conductors to NFPA 780
Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]	Addition of CCS conductors to NFPA 780
Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]	Addition of CCS conductors to NFPA 780
Public Input No. 91-NFPA 780-2026 [New Section after 4.2.2.2]	
Public Input No. 93-NFPA 780-2026 [Section No. 4.1.1.1.1]	
Public Input No. 94-NFPA 780-2026 [Section No. 4.1.1.1.2]	

Public Input No. 96-NFPA 780-2026 [Section No. 4.2.3]

Public Input No. 97-NFPA 780-2026 [Section No. 4.2.5]

Public Input No. 98-NFPA 780-2026 [Section No. 4.3.4.2]

Public Input No. 99-NFPA 780-2026 [Section No. 4.5.4.6]

Submitter Information Verification

Submitter Full Name: Robert Schuermann

Organization: Copperweld

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Zip:

Submittal Date: Fri May 29 11:43:52 EDT 2026

Committee: LIG-AAA

Public Input No. 53-NFPA 780-2026 [Section No. 4.15 [Excluding any Sub-Sections]]

Metal bodies not covered by other sections of this standard, located outside or inside a structure, that contribute to lightning hazards because they are grounded or assist in providing a path to ground for lightning currents shall be bonded to the lightning protection system in accordance with Section 4.15.unless bonded inherently through construction.

Statement of Problem and Substantiation for Public Input

Many metal bodies are grounded inherently due to their mounting to building steel, connection to building systems through electric conduit, the electric ground or threaded piping. No further bonding is necessary.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
Organization: Warren Lightning Rod Company
Affiliation: United Lightning Protection Association
Street Address:
City:
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Zip:

Submittal Date: Tue May 19 16:40:14 EDT 2026
Committee: LIG-AAA

Public Input No. 43-NFPA 780-2026 [New Section after 4.15.2.4]

4.15.2.5

An electrically insulated lightning protection system may be employed to provide a solution for bonding distance required in 4.15.2.4. An isolated lightning protection system or an electrically insulated lightning protection system should also be considered if partial lightning currents entering the structure can interfere with or destroy sensitive electrical or electronic equipment.

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. This aligns with the product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

Submitter Full Name: Tom Wettermann
Organization: DEHN
Street Address:
City:
State:
Zip:

Submittal Date: Mon Mar 30 10:56:03 EDT 2026
Committee: LIG-AAA

Public Input No. 105-NFPA 780-2026 [New Section after 4.15.2.5]

TITLE OF NEW CONTENT

Type your content here ...

4.15.2.5

An electrically insulated lightning protection system may be employed to provide a solution for bonding distance required in 4.15.2.4. An isolated lightning protection system or an electrically insulated lightning protection system should also be considered if partial lightning currents entering the structure can interfere with or destroy sensitive electrical or electronic equipment.

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. This aligns with product standard for electrically insulated lightning protection per IEC 62561-8.
Related Public Inputs for This Document
Related Input
Public Input No. NFPA 780-2023 [New Section after 3.3.9.7]
Public Input No. NFPA 780-2023 [New Section after 3.3.12.2]
Relationship
Insulated Lightning Protection Systems
Insulated Lightning Protection Systems

Submitter Information Verification

Submitter Full Name: sam chreiteh
Organization: CSCG
Street Address:
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Zip:

Submittal Date: Fri May 29 14:19:34 EDT 2026
Committee: LIG-AAA

Public Input No. 44-NFPA 780-2026 [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 by the following formula:~~
and grounded metal bodiescan 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:

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

$$D = \frac{l}{6n} \times K_{\mathrm{m}} \qquad \textbf{[4.15.2.5.1]}$$

where:

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

l = ~~length of conductor~~ vertical distance between the bond ~~in question~~ under consideration and the nearest ~~grounding electrode or intermediate level equipotential bonding point~~ 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

= ~~1 where there is only one down conductor in this zone~~

= ~~1.5 where there are only two down conductors in this zone~~

= ~~2.25 where there are three or more down conductors in this zone~~

K_m = 1 if the flashover is through air

= 0.50 if the flashover is through dense material (e.g., concrete, brick, wood)

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	Separation calculation formula from IEC 62305-3, Clause 6.3.2 (simplified procedure)	

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. This aligns with the product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

Submitter Full Name: Tom Wettermann
Organization: DEHN
Street Address:
City:
State:
Zip:
Submittal Date: Mon Mar 30 11:39:58 EDT 2026
Committee: LIG-AAA

$$s = \frac{k_{\mathrm{i}}}{k_{\mathrm{m}}} \times k_{\mathrm{c}} \times l \quad (\mathrm{m})$$

Public Input No. 45-NFPA 780-2026 [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 by the~~ 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:

$$D = \frac{l}{6n} \times K_{\mathrm{m}} \qquad \textbf{[4.15.2.6.1]}$$

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

where:

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

l = ~~length of conductor~~ vertical distance between the bond ~~in question~~ under consideration and the nearest ~~grounding electrode~~ 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 and located within a zone of 100 ft (30 m) from the bond in question ~~and where bonding is required within 60 ft (18 m)~~

= ~~1 where there is only one down conductor in this zone~~

= ~~1.5 where there are only two down conductors in this zone~~

= ~~2.25 where there are three or more down conductors in this zone~~

K_m = 1 if the flashover is through air

= 0.50 if the flashover is through dense material (e.g., concrete, brick, wood)

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	Separation calculation formula from IEC 62305-3, Clause 6.3.2 (simplified procedure)	

Statement of Problem and Substantiation for Public Input

Public input to NFPA 780 on separation / sideflash distance calculation to align NFPA 780 with IEC 62305-3 simplified procedure in 6.3.2 of this standard. This aligns with the product standard for electrically insulated lightning protection per IEC 62561-8.

Submitter Information Verification

Submitter Full Name: Tom Wettermann

Organization: DEHN

Street Address:
City:
State:
Zip:
Submittal Date: Mon Mar 30 12:11:23 EDT 2026
Committee: LIG-AAA

$$s = \frac{k_{\mathrm{i}}}{k_{\mathrm{m}}} \times k_{\mathrm{c}} \times l \quad (\mathrm{m})$$

Public Input No. 107-NFPA 780-2026 [New Section after 4.15.5]

4.15.5.1.2 Metallic Fence Around Structures Containing Volatile substances

The Authority Having Jurisdiction shall consider protecting fences surrounding structures containing volatile substance in accordance with Section 8.8.

Statement of Problem and Substantiation for Public Input

Reference chapter 8 where the application of Lighting Protection to fences around structures containing volatile substances is essential.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
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Affiliation: United Lighting Protection Association
Street Address:
City:
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Zip:

Submittal Date: Fri May 29 14:53:32 EDT 2026
Committee: LIG-AAA

Public Input No. 109-NFPA 780-2026 [Section No. 4.15.5]

Relocate section 4.15. ~~5~~ * – ~~Metallic Fences.~~

~~**4.15.5.1** – Grounding.~~

~~**4.15.5.1.1** –~~

~~Fences shall be grounded where located within 6 ft (1.8 m) of a structure by interconnection with the grounding system of the structure.~~

~~**4.15.5.1.2** –~~

~~Fences meeting the criteria of 4.15.5.1.1 shall also be grounded within 100 ft (30 m) on both sides of where overhead power lines cross the fence.~~

~~**4.15.5.1.3** –~~

~~Gate posts through which vehicles or personnel will pass shall be grounded in accordance with 4.15.5.3 .~~

~~**4.15.5.1.4** –~~

~~Metal single-strand fences with nonconductive posts requiring grounding in accordance with 4.15.5.1 shall use a main-size conductor extending the full height of the post.~~

~~**4.15.5.1.5** –~~

~~The main-size conductor discussed in 4.15.5.1.4 shall be bonded to each single strand to form a continuous path to ground.~~

~~**4.15.5.2** – Bonding.~~

~~**4.15.5.2.1** –~~

~~Fences shall be bonded across gates and other discontinuities in accordance with the requirements of 4.15.5.3 .~~

~~**4.15.5.2.2** –~~

~~Fencing mesh covered with nonconductive material shall be bonded to posts requiring grounding by 4.15.5.1 .~~

~~**4.15.5.3** – Gates and Gate Posts.~~

~~**4.15.5.3.1** –~~

~~All gate posts through which vehicles or personnel will pass shall be provided with a grounding electrode meeting the requirements of Section 4.12 using a main-size conductor.~~

~~**4.15.5.3.2** –~~

~~Class I main-size conductors buried not less than 18 in. (450 mm) in depth shall interconnect posts on opposite sides of a gate.~~

~~**4.15.5.3.3** –~~

~~Gates shall be bonded to their grounded support posts using a flexible secondary-size jumper.~~

5 back to section 8.8 where lightning protection on fences is essential and could be a life safety issue.

Statement of Problem and Substantiation for Public Input

Placing this requirement is chapter 4 makes it a mandatory requirement for Ordinary Structures. Relocate section 4.15.5 back to section 8.8 where lightning protection on fences is essential and could

be a life safety issue.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
Organization: Warren Lightning Rod Company
Affiliation: Unite Lightning Protectcion Association
Street Address:
City:
State:
Zip:

Submittal Date: Fri May 29 15:37:36 EDT 2026
Committee: LIG-AAA

Public Input No. 123-NFPA 780-2026 [Section No. 4.15.5]

4.15.5* Metallic Fences.

4.15.5.1 ~~– Grounding.~~

~~**4.15.5.1.1** –~~

~~Fences~~

Fences shall be grounded where located within 6 ft (1.8 m) of a structure by interconnection with the grounding system of the structure.

~~**4.15.5.1.2** –~~

~~Fences meeting the criteria of 4.15.5.1.1 shall also be grounded within 100 ft (30 m) on both sides of where overhead power lines cross the fence.~~

~~**4.15.5.1.3** –~~

~~Gate posts through which vehicles or personnel will pass shall be grounded in accordance with 4.15.5.3 .~~

~~**4.15.5.1.4** –~~

~~Metal single-strand fences with nonconductive posts requiring grounding in accordance with 4.15.5.1 shall use a main-size conductor extending the full height of the post.~~

~~**4.15.5.1.5** –~~

~~The main-size conductor discussed in 4.15.5.1.4 shall be bonded to each single strand to form a continuous path to ground.~~

~~**4.15.5.2** – Bonding.~~

~~**4.15.5.2.1** –~~

~~Fences shall be bonded across gates and other discontinuities in accordance with the requirements of 4.15.5.3 .~~

~~**4.15.5.2.2** –~~

~~Fencing mesh covered with nonconductive material shall be bonded to posts requiring grounding by 4.15.5.1 .~~

~~**4.15.5.3** – Gates and Gate Posts.~~

~~**4.15.5.3.1** –~~

~~All gate posts through which vehicles or personnel will pass shall be provided with a grounding electrode meeting the requirements of Section 4.12 using a main-size conductor.~~

~~**4.15.5.3.2** –~~

~~Class I main-size conductors buried not less than 18 in. (450 mm) in depth shall interconnect posts on opposite sides of a gate.~~

~~**4.15.5.3.3** –~~

~~Gates shall be bonded to their grounded support posts using a flexible secondary-size jumper.~~

Statement of Problem and Substantiation for Public Input

Chapter 4.1 General, states "This chapter provides general requirements for the protection of structures against lightning." The move of the entire section 8.8 to section 4.15.5 in the 2026 edition imposes stringent requirements designed for a specific type of structures that house explosive

materials. This proposal keeps the the interconnection of fences within 6 feet of a structure to the structures grounding system in chapter 4 to mitigate any difference of potential. In a separate public input, the deleted section will be moved back into chapter 8 for the additional requirements that structures.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 126-NFPA 780-2026 [Section No. 4.15.5]	

Submitter Information Verification

Submitter Full Name: Mark Morgan
Organization: East Coast Lightning Equipment
Street Address:
City:
State:
Zip:

Submittal Date: Tue Jun 02 13:36:57 EDT 2026
Committee: LIG-AAA

Public Input No. 126-NFPA 780-2026 [Section No. 4.15.5]

~~4~~ 8 ~~.15.5~~ 8 * Metallic Fences.

~~4~~ 8 ~~.15~~ 8 ~~.5.~~ 1 Grounding.

~~4~~ 8 ~~.15~~ 8 ~~.5.~~ 1.1

Fences shall be grounded where located within 6 ft (1.8 m) of a structure by interconnection with the grounding system of the structure.

~~4~~ 8 . ~~15~~ 8 . ~~5.~~ 1.2 –

Fences meeting the criteria of 4.15.5.1.1 shall also be grounded within 100 ft (30 m) on both sides of where overhead power lines cross the fence.

~~4~~ 8 ~~.15~~ 8 ~~.5.~~ 1.3

Gate posts through which vehicles or personnel will pass shall be grounded in accordance with 4.15.5.3.

~~4~~ 8 ~~.15~~ 8 ~~.5.~~ 1.4

Metal single-strand fences with nonconductive posts requiring grounding in accordance with 4.15.5.1 shall use a main-size conductor extending the full height of the post.

~~4~~ 8 ~~.15~~ 8 ~~.5.~~ 1.5

The main-size conductor discussed in 4.15.5.1.4 shall be bonded to each single strand to form a continuous path to ground.

~~4~~ 8 ~~.15~~ 8 ~~.5.~~ 2 Bonding.

~~4~~ 8 ~~.15~~ 8 ~~.5.~~ 2.1

Fences shall be bonded across gates and other discontinuities in accordance with the requirements of 4.15.5.3.

~~4~~ 8 ~~.15~~ 8 ~~.5.~~ 2.2

Fencing mesh covered with nonconductive material shall be bonded to posts requiring grounding by 4.15.5.1.

~~4~~ 8 ~~.15~~ 8 ~~.5.~~ 3 Gates and Gate Posts.

~~4~~ 8 ~~.15~~ 8 ~~.5.~~ 3.1

All gate posts through which vehicles or personnel will pass shall be provided with a grounding electrode meeting the requirements of Section 4.12 using a main-size conductor.

~~4~~ 8 ~~.15~~ 8 ~~.5.~~ 3.2

Class I main-size conductors buried not less than 18 in. (450 mm) in depth shall interconnect posts on opposite sides of a gate.

~~4~~ 8 ~~.15~~ 8 ~~.5.~~ 3.3

Gates shall be bonded to their grounded support posts using a flexible secondary-size jumper.

Statement of Problem and Substantiation for Public Input

This public input moves the 2026 edition section 4.15.5 back to section 8.8 where it had previously been in the 2023 edition. This section is specific to Structures Housing Explosive Materials and ensures that metallic fences, gates and posts are addressed as part of the lightning protection system

for these structures and removes any confusion that might have been caused by having this section in the general requirements.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 123-NFPA 780-2026 [Section No. 4.15.5]	

Submitter Information Verification

Submitter Full Name: Mark Morgan
Organization: East Coast Lightning Equipment
Street Address:
City:
State:
Zip:

Submittal Date: Tue Jun 02 14:09:36 EDT 2026
Committee: LIG-AAA

Public Input No. 60-NFPA 780-2026 [Section No. 4.15.5]

~~**4.15.5** * – Metallic Fences.~~

~~**4.15.5.1** – Grounding.~~

~~**4.15.5.1.1** –~~

~~Fences shall be grounded where located within 6 ft (1.8 m) of a structure by interconnection with the grounding system of the structure.~~

~~**4.15.5.1.2** –~~

~~Fences meeting the criteria of 4.15.5.1.1 shall also be grounded within 100 ft (30 m) on both sides of where overhead power lines cross the fence.~~

~~**4.15.5.1.3** –~~

~~Gate posts through which vehicles or personnel will pass shall be grounded in accordance with 4.15.5.3 .~~

~~**4.15.5.1.4** –~~

~~Metal single-strand fences with nonconductive posts requiring grounding in accordance with 4.15.5.1 shall use a main-size conductor extending the full height of the post.~~

~~**4.15.5.1.5** –~~

~~The main-size conductor discussed in 4.15.5.1.4 shall be bonded to each single strand to form a continuous path to ground.~~

~~**4.15.5.2** – Bonding.~~

~~**4.15.5.2.1** –~~

~~Fences shall be bonded across gates and other discontinuities in accordance with the requirements of 4.15.5.3 .~~

~~**4.15.5.2.2** –~~

~~Fencing mesh covered with nonconductive material shall be bonded to posts requiring grounding by 4.15.5.1 .~~

~~**4.15.5.3** – Gates and Gate Posts.~~

~~**4.15.5.3.1** –~~

~~All gate posts through which vehicles or personnel will pass shall be provided with a grounding electrode meeting the requirements of Section 4.12 using a main-size conductor.~~

~~**4.15.5.3.2** –~~

~~Class I main-size conductors buried not less than 18 in. (450 mm) in depth shall interconnect posts on opposite sides of a gate.~~

~~**4.15.5.3.3** –~~

~~Gates shall be bonded to their grounded support posts using a flexible secondary-size jumper.~~

Delete entire section and move to Chapter 8.

Statement of Problem and Substantiation for Public Input

Adding metallic fences into chapter 4 left the impression that placing Lightning Protection on fences is a requirement for all Lightning Protection installations where fences are present within 6 feet of a structure with Lightning Protection. Lightning Protection on fences is not a general requirement !

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
Organization: Warren Lightning Rod Company
Affiliation: United Lightning Protection Association
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 22 16:23:18 EDT 2026
Committee: LIG-AAA

Public Input No. 59-NFPA 780-2026 [Section No. 4.15.5.1.1]

4.15.5.1.1

Fences shall be ~~grounded~~ bonded where located within 6 ft (1.8 m) of ~~a structure by interconnection with the grounding system of the structure~~ any strike termination device, conductor, or any part of a Lightning Protection System .

Statement of Problem and Substantiation for Public Input

This is the only part of protecting fences that should be mandated in Chapter 4. Protecting fences should be at the discretion of the Authority Having Jurisdiction.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
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Affiliation: United Lightning Protection Association
Street Address:
City:
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Submittal Date: Fri May 22 16:11:00 EDT 2026
Committee: LIG-AAA

Public Input No. 137-NFPA 780-2026 [New Section after 4.19.2.2]

4.19.2.3*

For essential facilities, SPDs shall be installed in or adjacent to the next point of distribution equipment on the load side of the service equipment protected by 4.19.2.1.

A.4.19.2.3

Cascading, multi-level, or hierarchical SPDs provide an enhanced level of surge protection for circuits, devices, and equipment within a structure by installing SPDs integral to or immediately adjacent to all switchgear, switchboards and panelboards. Additional information can be found in NEMA BI 50093-2026, Cascade, Multi-Level, or Hierarchical Surge Protection Systems.

Additional Proposed Changes

File Name	Description	Approved
NFPA_780-29_Section_4.19.2.3_O.1.2.7_PI.docx	NFPA 780 NEMA Public Input 4.19.2.3	

Statement of Problem and Substantiation for Public Input

Essential facilities have electrical systems that are expected to tolerate and withstand transient energy above and beyond the systems installed for ordinary structures. This public input adds this extra layer of surge protection for electrical systems installed at essential facilities by requiring cascading, multi-level, or hierarchal surge protection on the electrical distribution system. A definition of “essential facility” is being proposed in an alternate public input, and the term is defined by the International Building Code (IBC).

Submitter Information Verification

Submitter Full Name: Bryan Holland
Organization: National Electrical Manufacturers Association
Street Address:
City:
State:
Zip:

Submittal Date: Tue Jun 02 15:43:15 EDT 2026
Committee: LIG-AAA

NEMA NFPA Public Input Form

Please complete this form for all proposed NFPA Public Inputs, submitting a separate form for each input. Once approved by the NEMA Codes & Standards Committee, the information provided in this form will be submitted to NFPA.

<table>
<tr><td colspan="2">NEMA Section:</td><td colspan="2">ICS-BW, ICS-CC, ICS-VS</td><td>CMP Number:</td><td>780 TC</td></tr>
<tr><td rowspan="2">1.</td><td>(a) Title of NFPA Standard</td><td colspan="2">Standard for the Installation of Lightning Protection Systems</td><td>NFPA No. & Year</td><td>780-2029</td></tr>
<tr><td>(b) Section/Paragraph</td><td colspan="4">4.19.2.3 and O.1.2.7</td></tr>
<tr><td>2.</td><td colspan="2">Public Input Recommends (Check one)</td><td colspan="3">☒New Text
☐Revised Text
☐Deleted Text</td></tr>
<tr><td rowspan="2">3.</td><td colspan="5">Proposed Text of Public Input (Include proposed new or revised wording, or identification of wording to be deleted): [Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike through to denote wording to be deleted (~~deleted wording~~).]</td></tr>
<tr><td colspan="5">4.19.2.3*
For essential facilities, SPDs shall be installed in or adjacent to the next point of distribution equipment on the load side of the service equipment protected by 4.19.2.1.
A.4.19.2.3
Cascading, multi-level, or hierarchical SPDs provide an enhanced level of surge protection for circuits, devices, and equipment within a structure by installing SPDs integral to or immediately adjacent to all switchgear, switchboards and panelboards. Additional information can be found in NEMA BI 50093-2026, Cascade, Multi-Level, or Hierarchical Surge Protection Systems.
4.19.2.3.1*
SPDs shall be permitted to be installed anywhere on the load side of a service disconnect overcurrent device or at the point of utilization on the load side of a branch circuit overcurrent protection device up to the equipment served; this protection is in addition to that required by 4.19.2.1, ~~and~~ 4.19.2.2, and 4.19.2.3.
O.1.2.7 Other Publications
NEMA 500093, Cascade, Multi-Level, or Hierarchical Surge Protection Systems, 2026</td></tr>
<tr><td rowspan="2">4.</td><td colspan="5">Statement of Problem and Substantiation for Public Input: (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Public Input, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)</td></tr>
<tr><td colspan="5">Essential facilities have electrical systems that are expected to tolerate and withstand transient energy above and beyond the systems installed for ordinary structures. This public input adds this extra layer of surge protection for electrical systems installed at essential facilities by requiring cascading, multi-level, or hierarchal surge protection on the electrical distribution system. A definition of “essential facility” is being proposed in an alternate public input, and the term is defined by the International Building Code (IBC).</td></tr>
<tr><td rowspan="2">5.</td><td colspan="5">Copyright Assignment</td></tr>
<tr><td colspan="5">(a) ☒ I am the author of the text or other material (such as illustrations, graphs) proposed in the Public Input.</td></tr>
</table>

	(b) ☐**Some or all of the text or other material proposed in this Public Input was not authored by me. Its source is as follows:** (please identify which material and provide complete information on its source)

Public Input No. 138-NFPA 780-2026 [Section No. 4.19.2.3]

4.19.2.3.1 *

SPDs shall be permitted to be installed anywhere on the load side of a service disconnect overcurrent device or at the point of utilization on the load side of a branch circuit overcurrent protection device up to the equipment served; this protection is in addition to that required by 4.19.2.1 ~~and~~ , 4.19.2.2, and 4 .19.2.3.

Statement of Problem and Substantiation for Public Input

Essential facilities have electrical systems that are expected to tolerate and withstand transient energy above and beyond the systems installed for ordinary structures. This public input adds this extra layer of surge protection for electrical systems installed at essential facilities by requiring cascading, multi-level, or hierarchal surge protection on the electrical distribution system. A definition of “essential facility” is being proposed in an alternate public input, and the term is defined by the International Building Code (IBC).

Submitter Information Verification

Submitter Full Name: Bryan Holland
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Submittal Date: Tue Jun 02 15:46:49 EDT 2026
Committee: LIG-AAA

Public Input No. 54-NFPA 780-2026 [New Section after 4.19.3.1]

TITLE OF NEW CONTENT

4.19.2.1.1 All alternative energy power supply entering a building shall have a disconnect or switch capable of cutting off that power supply to the srtructure.

Statement of Problem and Substantiation for Public Input

Alternative energy power supplies often have no means of shutting off the power they supply, thereby endangering fire fighters spraying water on component parts that are burning. In such scenarios the SPD's are likely to be another device destroyed in the conflagration.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
Organization: Warren Lightning Rod Company
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Street Address:
City:
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Submittal Date: Tue May 19 16:54:24 EDT 2026
Committee: LIG-AAA

Public Input No. 118-NFPA 780-2026 [New Section after 5.10.2]

5.13 Fuel Canopies

5.13.1. Fuel canopies shall be protected in accordance with Chapter 4.

Statement of Problem and Substantiation for Public Input

Specific Direction is not provided on how to protect this type of structure. This section is added to bring clarity to this common structure. It has been misconstrued to be a structure that contains flammable vapors.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
Organization: Warren Lightning Rod Company
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Street Address:
City:
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Submittal Date: Mon Jun 01 16:01:46 EDT 2026
Committee: LIG-AAA

Public Input No. 119-NFPA 780-2026 [New Section after 5.10.2]

5.14 Car Charging Stations

5.14.1 Car Charging Staions shall be protected in accordance with chapter 4.

5.14.2. Light poles in close proximity to Charging Stations shall be used as a mast type system .

5.14.2.1 Light pole shall be located to place the charging equipment within a Zone of Protection.

5.14.2.2 The Zone of Protection shall be determined by one or more of the methods enumerated in section 4.7.1.

5.14.3 Surge Protection Devices

5.14.3.1 Surge Protection Devices shall be selected and installed in accordqance with section 4.19.

5.14.3.2 Surge Protecion Device shall be installed on each Car Charging module.

Statement of Problem and Substantiation for Public Input

This technology is in use. Direction needs to be provided on how to protect against the effects of lightning.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
Organization: Warren Lightning Rod Company
Affiliation: United Lightning Protection Association
Street Address:
City:
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Submittal Date: Mon Jun 01 16:15:01 EDT 2026
Committee: LIG-AAA

Public Input No. 56-NFPA 780-2026 [New Section after 5.10.2]

5.11 Fences

5.11.1

Fences shall be protected when deemed necessary by the Authority Having Jurisdiction.

5.11.2.Non-Metallic Fences

5.11.2.1

Non-metallic fences shall be protected in accordance with Chapter 4.

5.11.3 Metallic Fences

5.11.3.1

Metallic fences shall be bonded to the Lightning Protection System where located within 6 ft (1.8 m) of any Lightning Proyttection System component.

5.11.3.2

All metallic components of the fence shall be bonded together to ensure electrical continuity, if not inherently done through construction.

5.11.4. Metallic Fences with Non-Conductive Posts

5.11.4.1

Metal single-strand fences with non-conductive posts shall be grounded in accordance with 4.12.

5.11.4.2

A main-size conductor shall be bonded to each single strand to form a continuous path to ground.

5.11.5. Metallic Fences with Metal Posts

5.11.5.1

Fences with bare metal fence posts shall be considered grounded through the buried portion of the fence posts.

5.11.5.2

Fences shall be permitted to have supplemental grounding where required by the Authority Having Jurdisdiction.

5.11.5.3

Fences with a bare tension wire greater than 41,100 circular mils run between the fence posts shall be considered as inherently bonded.

5.11.5.4

Air terminals shall be permitted to be installed on fence posts but are not required.

5.11.5.5

Fencing mesh and barbed /razor wire shall be bonded to the post at an average interval of 100 ft.

5.11.6. Metallic Fences covered with non-conductive material

5.11.6.1

Fencing mesh covered with non-conductive material shall be bonded to the posts in accordance with 5.11.5.5.

5.11.6.2

Fence posts covered with non-conductive material shall be bonded in accordance with 4.18.3.

5.11.6.3

Fence posts covered with non-conductive material shall be grounded in accordance with 4.12.

5.11.7 Gates and Gate Posts

5.11.7.1

All gate posts through which vehicles or personnel will pass shall be provided with a grounding electrode meeting the requirements of Section 4.12 using a main-size conductor.

5.11.7.2

Class I main-size conductors buried not less than 18 in. (450 mm) in depth shall interconnect posts on opposite sides of a gate.

5.11.7.3

Gates shall be bonded to their grounded support posts using a flexible secondary-size jumper.

5.11.7.4

Fences around areas containing volatile materials shall be protected in accordance with Chapter 8.8.

***5.11.8 Automatic Gate Openers**

5.11.8.1 Place all apurtenances associated with gate openers such as actuators, motors, cameras, card readers, key pads, motion detectors, infrared sensors, WIFI antennas and telephones in a zone of protection in accordance with Section 4.7 .

5.11.8.2 Bonding

5.11.8.2.1 Bond all mounting platforms for appurtences ot the fence posts and gate posts in accordance with Section 4.13 .

5.11.8.2.2 Gates shall be bonded in accordance with section 5 .11.7.3.

5.11.8.2.3 Gate posts shall be interconnected in accordance with Section 5.11.7.2.

5.11.8.3 Grounding

5.11.8.3.1 Ground the gate posts on each side of the gate in accordance with Section 4.12 .

5.11.8.3.2 Additional grounding shall be considered for remote electric service box at the gate.

5.11.8.4 Surge Protection Devices (SPD's)

5.11.8.4.1 SPD's shall be installed on the conductive wires to the appurtenences at the gate.

5.11.8.4.2 SPD's shall be installed on the conductive wires at the structure providing the service to the gate.

5.11.8.4.3 SPD's shall be appropriate for the equipment it is protecting

5.11.8.4.4 Fibre optic shall be used for data lines where practicable.

Statement of Problem and Substantiation for Public Input

Changes correct the misconception that protecting fences is required as part of a Lightning Protection System for a structure that has a fence. It also provides additional clarification for addressing fencing with non-metallic components and gate openers.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
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Street Address:
City:

State:
Zip:
Submittal Date: Tue May 19 17:12:42 EDT 2026
Committee: LIG-AAA

Public Input No. 85-NFPA 780-2026 [New Section after 5.10.2]

5.11 Critical Facilities.

5.11.1 The following critical facilities shall have a lightning protection system installed in compliance with this standard or have a detailed risk assessment conducted in accordance with Section L.6.

(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, transportation facilities)

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

(6)Hazardous material storage, operating, and processing facilities

(7)Government buildings (e.g., courthouses, city halls)

(8)Educational institutions (e.g., schools, universities)

(9)Energy facilities (e.g., power plants, fuel refineries, natural gas facilities)

(10)Financial institutions (e.g., banks, stock exchanges)

(11)Transportation facilities (e.g., airports, seaports, bus stations, train stations)

Statement of Problem and Substantiation for Public Input

Remove L.5.3 replace with

5.11 Critical Facilities.

This should be linked to PI86

5.11.1 The following critical facilities shall have a lightning protection system installed in compliance with this standard or have a detailed risk assessment conducted in accordance with Section L.6.
(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, transportation facilities)
(5)Telecommunications facilities (e.g., telephone and internet service providers)
(6)Hazardous material storage, operating, and processing facilities
(7)Government buildings (e.g., courthouses, city halls)

(8)Educational institutions (e.g., schools, universities)
(9)Energy facilities (e.g., power plants, fuel refineries, natural gas facilities)
(10)Financial institutions (e.g., banks, stock exchanges)
(11)Transportation facilities (e.g., airports, seaports, bus stations, train stations)

Reason Statement
Lightning can interrupt, damage, or disable facilities that the public depends on during emergencies. NFPA 780 Annex L pinpoints these “critical facilities” and already recommends “should” have a formal lightning-risk assessment or a fully compliant lightning-protection system.
Assessment requirement. Annex L.5.3.2 already states that each critical facility should be protected by an NFPA 780 system or undergo a detailed risk assessment per Annex L.6.
Why the proposed change. Converting this advisory “should” into a mandatory “shall” guarantees:
- Life-safety continuity: emergency responders and medical staff stay operational.
- Service resilience: essential utilities and communications avoid costly downtime.

During catastrophic weather events critical facilities are heavily relied upon to be fully operational to ensure first responders can properly respond to the event.
Lightning is a subcomponent of severe/convective storms, which is the #1 weather peril according to NOAAs May 2026 report. Lightning is the only weather peril that is not directly addressed by building codes and standards, yet it is the direct cause of billions of dollars of damage to due fires and to electrical infrastructures.
Lightning protection is a proactive fire safety system as it will send the excessive electrical energy to ground safely mitigating the chance of fire or internal damage to electrical systems.

Supporting Data
1. Vaisala GLD360 lightning flash-density maps showing many critical-facility corridors >8 flashes km^{-2}-yr^{-1}.
2. Case studies:
   - 2023 emergency-dispatch outage, Harris County TX, traced to lightning-induced surge (12-hour disruption).
   - 2022 hospital CT-scanner loss, Orlando FL; repair + patient diversion cost US $840k.
3. Aon. Weather, Climate & Catastrophe Insight: 2024 Annual Report – convective-storm loss ranking and trend charts.
4. NOAA May 2026 Catastrophic U.S. Weather Peril Rankings: 1980–2024

Remove L.5.3 replace with

5.11 Critical Facilities.

5.11.1 The following critical facilities shall have a lightning protection system installed in compliance with this standard or have a detailed risk assessment conducted in accordance with Section L.6.
(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, transportation facilities)
(5)Telecommunications facilities (e.g., telephone and internet service providers)
(6)Hazardous material storage, operating, and processing facilities
(7)Government buildings (e.g., courthouses, city halls)
(8)Educational institutions (e.g., schools, universities)
(9)Energy facilities (e.g., power plants, fuel refineries, natural gas facilities)
(10)Financial institutions (e.g., banks, stock exchanges)
(11)Transportation facilities (e.g., airports, seaports, bus stations, train stations)

Reason Statement
Lightning can interrupt, damage, or disable facilities that the public depends on during emergencies. NFPA 780 Annex L pinpoints these “critical facilities” and already recommends “should” have a formal lightning-risk assessment or a fully compliant lightning-protection system.
Assessment requirement. Annex L.5.3.2 already states that each critical facility should be protected by an NFPA 780 system or undergo a detailed risk assessment per Annex L.6.

Why the proposed change. Converting this advisory “should” into a mandatory “shall” guarantees:

- Life-safety continuity: emergency responders and medical staff stay operational.
- Service resilience: essential utilities and communications avoid costly downtime.

During catastrophic weather events critical facilities are heavily relied upon to be fully operational to ensure first responders can properly respond to the event.
Lightning is a subcomponent of severe/convective storms, which is the #1 weather peril according to NOAAs May 2026 report. Lightning is the only weather peril that is not directly addressed by building codes and standards, yet it is the direct cause of billions of dollars of damage to due fires and to electrical infrastructures.

Lightning protection is a proactive fire safety system as it will send the excessive electrical energy to ground safely mitigating the chance of fire or internal damage to electrical systems.

Supporting Data
1. Vaisala GLD360 lightning flash-density maps showing many critical-facility corridors >8 flashes km^{-2}-yr^{-1}.
2. Case studies:
   - 2023 emergency-dispatch outage, Harris County TX, traced to lightning-induced surge (12-hour disruption).
   - 2022 hospital CT-scanner loss, Orlando FL; repair + patient diversion cost US $840k.
3. Aon. Weather, Climate & Catastrophe Insight: 2024 Annual Report – convective-storm loss ranking and trend charts.
4. NOAA May 2026 Catastrophic U.S. Weather Peril Rankings: 1980–2024

Submitter Information Verification

Submitter Full Name: Timothy Harger
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Submittal Date: Wed May 27 14:16:58 EDT 2026
Committee: LIG-AAA

Public Input No. 89-NFPA 780-2026 [New Section after 5.10.2]

5.12 Structures over water

5.12.1

Structures over water shall be protected in accordnce with chapter 4 with the exception of grounding electrodes.

5.12.2 The Authority Having Jurisdiction shall be permitted to protect only operating sections of bridges such as the moveable span of a draw bridge.

5.12.2.1 Where entire causeways are to be protected, street lights shall be used to protect against direct strikes if present.

5.12.3 Structures over salt and brackish water

5.12.3.1 Metallic structural elements such as piles, caissons, pile caps, and sheet piles submerged in water shall be permitted to be used as ground electrodes.

5.12.3.2 If not inherently electrically continuous with parts of the structure needing Lighting Protection, the metallic structure elements shall be made continous using a main sized conductor.

***5.12.3.3** Where metallic elements are not present, solid copper or stainlees steel components shall be used as the ground electrodes.

5.12.3.3.1 Such ground electrodes shall be installed according to the following:

(1) Submerged below the median low tide level.

(2) Ridgedly attached to the structure so as not be easily displaced by current, tide, or ice.

***(3)** Accessibly located for frequent routine inspection.

5.12.4 Structures over fresh water

5.12.4.1 Metallic structural elements such as piles, caissons, pile caps, and sheet piles submerged in water shall be bonded using a main size conductor.

***5.12.4.2** Solid copper or stainless steel components shall be used as the grounding electrodes.

5.12.2.4.1 Such grounding electrodes shall be installed according to the following:

(1) Driven into the bottom where practicable.

(2) Submerged below the median water line.

(3) Ridgedly attached to the structure so as not be easily displaced by current, tide, or ice.

***(4)** Accessibly located for frequent routine inspection.

Statement of Problem and Substantiation for Public Input

Structure over water like bridges, structures, docks, piers, and navigational aids such as range lights, light houses, and channel markers are at extreme risk from lightning strikes. Guidance is needed for protecting them.

Submitter Information Verification

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Street Address:
City:
State:
Zip:
Submittal Date: Fri May 29 10:49:19 EDT 2026
Committee: LIG-AAA

Public Input No. 24-NFPA 780-2026 [Section No. 6.2.2 [Excluding any Sub-Sections]]

Copper, 40% CCS, 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.

Additional Proposed Changes

File Name	Description	Approved
780_PC13.pdf	780_PC13	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 13 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

40% CCS is added to the section to ensure the material is effectively protected the same as copper and bronze materials.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
Street Address:
City:
State:
Zip:
Submittal Date: Mon Feb 09 14:49:12 EST 2026
Committee: LIG-AAA

Public Comment No. 13-NFPA 780-2024 [Section No. 6.2.2 [Excluding any Sub-Sections]]

Copper, 40% CCS, 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 Comment

40% CCS is added to the section to ensure the material is effectively protected the same as copper and bronze materials.

Related Item

• Public Input No. 20-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld Bimetallics, LLC.
Affiliation: American Bimetallic Association
Street Address:
City:
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Submittal Date: Sun May 12 09:28:36 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

Copyright Assignment

I, Peter Graser, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Comment (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Comment in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Comment and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Peter Graser, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 25-NFPA 780-2026 [Section No. 6.4.1.1]

6.4.1.1

Conductors shall be copper or 40% CCS , weighing not less than 375 lb per 1000 ft (558 g per m) without the lead coating, or approved corrosion-resistant material or coating.

Additional Proposed Changes

File Name	Description	Approved
780_PC14.pdf	780_PC14	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 14 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds a requirement that 40% CCS conductors used for this application also meet the weight per 1,000 ft. criteria established for copper.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
Street Address:
City:
State:
Zip:

Submittal Date: Mon Feb 09 15:09:07 EST 2026
Committee: LIG-AAA

Public Comment No. 14-NFPA 780-2024 [Section No. 6.4.1.1]

6.4.1.1

Conductors shall be copper or 40% CCS , 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 Comment

This adds a requirement that 40% CCS conductors used for this application also meet the weight per 1,000 ft. criteria established for copper.

Related Item

• Public Input No. 21-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld Bimetallics, LLC.
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Submittal Date: Sun May 12 11:32:44 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 112-NFPA 780-2026 [Chapter 8 [Title Only]]

Protection of Structures Housing Explosive Materials and Volatile substances

Statement of Problem and Substantiation for Public Input

Adding volatile substances to the title makes the chapter more inclusive to things that usually do not explode but can explode such ae lithium-ion batteries and fuel cells.

Submitter Information Verification

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Submittal Date: Fri May 29 16:08:14 EDT 2026
Committee: LIG-AAA

Public Input No. 27-NFPA 780-2026 [Section No. 8.4.2.4]

8.4.2.4*

Ground ring electrodes shall be bare copper ~~conductors~~ or 40% CCS conductors meeting or exceeding ~~105~~ 115 ,000 circular mils.

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 15 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS to the rule and increases the circular mil to 115,000 to revert back to sizing of Class II materials as defined in 2020 edition.

Submitter Information Verification

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Submittal Date: Mon Feb 09 15:28:03 EST 2026
Committee: LIG-AAA

Public Input No. 88-NFPA 780-2026 [Section No. 8.6.1]

8.6.1

Power and metallic communications lines (including intrusion detection lines) shall enter the facility ~~in shielded cables or metallic conduit run~~ underground for at least 50 ft (15 m) from the structure.

8.6.1.1

Metallic conduit shall be installed where power and communication lines are not provided with surge protection located immediately adjacent to entering the conduit run.

8.6.1.2

Non-metallic conduit shall be permitted when the power and communication lines are provided surge suppression located immediately adjacent to entering the conduit run and at the service panel after entering the building.

Statement of Problem and Substantiation for Public Input

The use metallic conduit created an EES that includes multiple parallel paths (Ground Loops) which promote a situation where Objectionable Current that is specifically prohibited in the NEC (NFPA 70, Article 250.6) as it creates a personnel shock hazard. Historically, the implementation of metal conduit was to provide for reactance chocking of the lightning energy transition into the facility through the electric service. Surge protection technological advancement and implementation requirements (cascaded protective devices) in modern electric service installations has resulted in minimized impact from the reactance choke effects of this requirement.

Submitter Information Verification

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Submittal Date: Fri May 29 10:48:01 EDT 2026
Committee: LIG-AAA

Public Input No. 111-NFPA 780-2026 [New Section after 8.8]

8.8* Metallic Fences around strucutres conatining volatile substances

8.8.1 Grounding.

8.8.1.1

Fences shall be grounded where located within 6 ft (1.8 m) of a structure by interconnection with the grounding system of the structure.

8.8.1.2

Fences meeting the criteria of 4.15.5.1.1 shall also be grounded within 100 ft (30 m) on both sides of where overhead power lines cross the fence.

8.8.1.3

Gate posts through which vehicles or personnel will pass shall be grounded in accordance with 4.15.5.3 .

8.8.1.4

Metal single-strand fences with nonconductive posts requiring grounding in accordance with 4.15.5.1 shall use a main-size conductor extending the full height of the post.

8.8.1.5

The main-size conductor discussed in 4.15.5.1.4 shall be bonded to each single strand to form a continuous path to ground.

8.8.2 Bonding.

8.8.2.1

Fences shall be bonded across gates and other discontinuities in accordance with the requirements of 4.15.5.3 .

8.8.2.2

Fencing mesh covered with nonconductive material shall be bonded to posts requiring grounding by 4.15.5.1 .

8.8.3 Gates and Gate Posts.

8.8.3.1

All gate posts through which vehicles or personnel will pass shall be provided with a grounding electrode meeting the requirements of Section 4.12 using a main-size conductor.

8.8.3.2

Class I main-size conductors buried not less than 18 in. (450 mm) in depth shall interconnect posts on opposite sides of a gate.

8.8.3.3

Gates shall be bonded to their grounded support posts using a flexible secondary-size jumper.

NOTE TO THE COMMITTEE:

RENUMBER THE REMIANDER OF CHAPTER 8 ACCORDINGLY

Statement of Problem and Substantiation for Public Input

Relocate 4.15.5. metallic fences to section 5.11 where it would be a consideration and back to section 8.8 where it was previously located and where lightning protection on fences would be considered a life safety issue.

Submitter Information Verification

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Submittal Date: Fri May 29 15:45:02 EDT 2026

Committee: LIG-AAA

Public Input No. 66-NFPA 780-2026 [Section No. 8.8]

8.8* Maintenance and Inspection Plan.

A maintenance and inspection plan shall be developed for all protection systems used to protect structures housing explosives. The plan shall include procedures for review, reporting, record retention, and response to known, suspected, or recorded lightning events affecting the structure, protected area, or lightning protection system. Where lightning event monitoring systems are installed, the plan shall include procedures for inspection of the lightning protection system in response to recorded lightning events.

Statement of Problem and Substantiation for Public Input

Section 8.8 requires a maintenance and inspection plan for all protection systems used to protect structures housing explosives. Chapter 8 also requires immediate documentation and reporting of any indication of damage produced by a lightning strike to a structure or its lightning protection system, inspection of surge protection after any suspected lightning strike, visual inspection of lightning protection systems at intervals not exceeding 7 months, and electrical testing at intervals not exceeding 14 months.

The existing text requires a maintenance and inspection plan but does not expressly state that the plan must address how the facility responds to known, suspected, or recorded lightning events. This is an important gap for structures housing explosives, where lightning-related damage, degradation, or surge-protective device operation could affect safety and operational readiness.

The proposed revision requires the maintenance and inspection plan to include procedures for review, reporting, record retention, and response to known, suspected, or recorded lightning events affecting the structure, protected area, or lightning protection system. This improves consistency with the existing Chapter 8 requirements for documentation, reporting, SPD inspection, periodic visual inspection, and electrical testing.

The proposed language is technology-neutral. It does not require a specific product or monitoring architecture in Section 8.8. However, where lightning event monitoring systems are installed or required elsewhere in Chapter 8, the maintenance and inspection plan should specify how event records are reviewed and acted upon. This ensures that recorded event data is integrated into the required inspection and maintenance process rather than being collected without defined responsibility, review criteria, or response actions.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 65-NFPA 780-2026 [Section No. A.8.8]	A.8.8 is the explanatory material to this modified article.
Public Input No. 69-NFPA 780-2026 [Section No. 8.9.6]	
Public Input No. 71-NFPA 780-2026 [Section No. 8.9.7]	

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Submittal Date: Tue May 26 14:52:39 EDT 2026
Committee: LIG-AAA

Public Input No. 67-NFPA 780-2026 [Section No. 8.9.3]

8.9.3

Any indication of damage produced by a lightning strike to a structure or its lightning protection system shall be immediately documented and reported to the appropriate authority.

8.9.3.1 Lightning Event Monitoring Systems.*

Structures housing explosive materials protected by a lightning protection system shall be provided with one or more lightning event monitoring systems capable of detecting and creating retrievable records of lightning events involving the structure, protected area, or lightning protection system.

8.9.3.2 Recorded lightning events involving the structure, protected area, or lightning protection system shall be documented and reported to the appropriate authority in accordance with 8.9.3.

8.9.3.3 Lightning event monitoring systems shall be installed in accordance with the manufacturer's instructions and shall not compromise the lightning protection system, including electrical continuity, current-carrying capacity, bonding, corrosion protection, surge protection, required separation, or zone of protection.

Statement of Problem and Substantiation for Public Input

Section 8.9.3 requires any indication of damage produced by a lightning strike to a structure or its lightning protection system to be immediately documented and reported to the appropriate authority. Section 8.9.6.3 requires surge protection to be inspected after any suspected lightning strike. These requirements depend on the ability to identify known, suspected, or recorded lightning events involving the structure, protected area, or lightning protection system.

The proposed requirement addresses this gap for structures housing explosive materials by requiring lightning event monitoring systems capable of detecting and creating retrievable records of lightning events. This provides objective event information to support documentation, reporting, inspection, maintenance planning, SPD review, and corrective action.

The proposed language is performance-based and technology-neutral. It does not prescribe a manufacturer, sensor type, or monitoring architecture. It can be satisfied by conductor-mounted lightning current recorders, optical lightning monitoring systems, electromagnetic-field monitoring systems, transient monitoring systems, or other instrumentation capable of creating retrievable lightning-event records.

This requirement is appropriate for Chapter 8 because structures housing explosive materials represent a high-consequence occupancy where post-lightning-event awareness and timely inspection are especially important. The proposed installation language also ensures that monitoring equipment does not compromise the lightning protection system.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 68-NFPA 780-2026 [New Section after A.8.1]	

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Committee: LIG-AAA

Public Input No. 69-NFPA 780-2026 [Section No. 8.9.6]

8.9.6

Lightning protection systems on explosives facilities shall be inspected visually at least at 7-month intervals for evidence of corrosion or broken wires or connections.

8.9.6.1

All necessary repairs shall be made immediately.

8.9.6.2

Any detected damage to the system shall be entered in the test records.

8.9.6.3*

Surge protection installed in accordance with Section 4.19 shall be inspected at intervals not exceeding 7 months, when visual inspection is performed, and after any suspected lightning strike.

8.9.6.4* Lightning Event Monitoring Systems

Where lightning event monitoring systems are installed or required, they shall be visually inspected at intervals not exceeding 7 months, at the same time as the visual inspection required by 8.9.6. The visual inspection shall verify, as applicable, that the equipment remains secured, serviceable, unobstructed, and positioned or connected as intended. Following a recorded or suspected lightning event, lightning event monitoring system records and device status shall be reviewed in accordance with the maintenance and inspection plan.

Statement of Problem and Substantiation for Public Input

Section 8.9.6 requires lightning protection systems on explosives facilities to be visually inspected at intervals not exceeding 7 months. Section 8.9.6.3 requires surge protection installed in accordance with Section 4.19 to be inspected at the same interval and after any suspected lightning strike.

Where lightning event monitoring systems are installed or required, they should be included in the same visual-inspection cycle to confirm that the equipment remains secured, serviceable, unobstructed, and positioned or connected as intended. This is necessary because the usefulness of recorded lightning-event information depends on the monitoring system remaining in proper condition and location.

The proposed language is technology-neutral and applies to conductor-mounted current recorders, optical monitoring systems, electromagnetic-field monitoring systems, transient monitoring systems, and other lightning event monitoring systems. The phrase “as applicable” is included because different monitoring technologies have different physical configurations and inspection considerations.

This addition aligns lightning event monitoring system visual inspection with the existing Chapter 8 inspection cadence without adding a separate inspection interval or prescribing a specific monitoring technology.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 66-NFPA 780-2026 [Section No. 8.8]	Related to the lightning event monitoring system
Public Input No. 70-NFPA 780-2026 [New Section after A.8.1]	

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Submittal Date: Tue May 26 15:13:52 EDT 2026
Committee: LIG-AAA

Public Input No. 71-NFPA 780-2026 [Section No. 8.9.7]

8.9.7*

The lightning protection system shall be tested electrically at least every 14 months.

8.9.7.1

The dc resistance of any single object bonded to the lightning protection system shall not exceed 200 milliohms.

8.9.7.2

The test shall be conducted in accordance with the appropriate test equipment manufacturer’s instructions.

8.9.7.3

The test shall be conducted by personnel familiar with lightning protection system testing.

8.9.7.4

Only those instruments designed specifically for earth resistance testing shall be permitted for use in this application.

8.9.7.5

Test instruments shall be properly maintained and calibrated in accordance with the manufacturer’s instructions.

8.9.7.6

Resistance to earth of grounding systems shall be measured in accordance with 8.9.7.6.1 or 8.9.7.6.2.

8.9.7.6.1

The three-point fall-of-potential test method shall be used when measuring the resistance to earth of grounding systems for explosives facilities.

8.9.7.6.2

Where space or geophysical issues prevent the ability to drive test stakes or rods to properly perform the three-point fall-of potential test, a clamp-on ground resistance meter shall be used in accordance with the manufacturer's instructions as permitted by the AHJ.

8.9.7.7

Records and test measurement data of resistance to earth and bonding tests shall be documented and shall be available for a time period acceptable to the AHJ.

8.9.7.8 * Lightning Event Monitoring System Records and Functional Verification

Where lightning event monitoring systems are installed or required, lightning event records shall be documented as part of the test records and shall be available for a time period acceptable to the AHJ. Each lightning event record shall include, at a minimum, the monitored structure, protected area, or system location; event date and time; identification of the device, instrument, system, or sensor that detected the event; the measured or observed lightning-event characteristics; and the date on which the record was retrieved or reviewed. Where lightning current is measured, the record shall include peak current magnitude at the monitored location.

At intervals not exceeding 14 months, lightning event monitoring systems shall be functionally verified in accordance with the manufacturer's instructions. Functional verification shall include, as applicable, verification of power source or status indication, time reference, sensor status, data storage, record retrieval, and communication or notification functions. Where calibration is required by the manufacturer or AHJ, calibration shall be performed in accordance with the manufacturer's instructions or AHJ requirements.

8.9.7.9 *

Only qualified personnel having the necessary training and expertise shall be permitted to maintain, inspect, and test explosives facilities.

Statement of Problem and Substantiation for Public Input

Where lightning event monitoring systems are installed or required, lightning event records shall be documented as part of the test records and shall be available for a time period acceptable to the AHJ. Each lightning event record shall include, at a minimum, the monitored structure, protected area, or system location; event date and time; identification of the device, instrument, system, or sensor that detected the event; the measured or observed lightning-event characteristics; and the date on which the record was retrieved or reviewed. Where lightning current is measured, the record shall include peak current magnitude at the monitored location.

At intervals not exceeding 14 months, lightning event monitoring systems shall be functionally verified in accordance with the manufacturer's instructions. Functional verification shall include, as applicable, verification of power source or status indication, time reference, sensor status, data storage, record retrieval, and communication or notification functions. Where calibration is required by the manufacturer or AHJ, calibration shall be performed in accordance with the manufacturer's instructions or AHJ requirements.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 66-NFPA 780-2026 [Section No. 8.8]	Supports the lightning event monitoring system
Public Input No. 72-NFPA 780-2026 [Section No. A.8.9.7.8]	
Public Input No. 73-NFPA 780-2026 [New Section after A.8.9.7.8]	

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Submittal Date: Tue May 26 15:23:49 EDT 2026
Committee: LIG-AAA

Public Input No. 28-NFPA 780-2026 [Section No. 10.2.2.1]

10.2.2.1

Copper and 40% CCS conductors shall be tinned.

Additional Proposed Changes

File Name	Description	Approved
780_PC16.pdf	780_PC16	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 16 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS to the rule as an equivalency for the needed protection of copper conductors.

Submitter Information Verification

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Submittal Date: Mon Feb 09 15:30:40 EST 2026
Committee: LIG-AAA

Public Comment No. 16-NFPA 780-2024 [Section No. 10.2.2.1]

10.2.2.1

Copper and 40% CCS conductors shall be tinned.

Statement of Problem and Substantiation for Public Comment

This adds 40% CCS to the rule as an equivalency for the needed protection of copper conductors.

Related Item

• Public Input No. 23-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
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Submittal Date: Sun May 12 11:39:17 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 29-NFPA 780-2026 [Section No. 10.2.2.3]

10.2.2.3

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

Additional Proposed Changes

File Name	Description	Approved
780_PC17.pdf	780_PC17	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 17 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

The allowance of 40% CCS should also be required to comply with the provisions of this chapter along with the other listed material types.

Submitter Information Verification

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Submittal Date: Mon Feb 09 15:34:54 EST 2026
Committee: LIG-AAA

Public Comment No. 17-NFPA 780-2024 [Section No. 10.2.2.3]

10.2.2.3

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

Statement of Problem and Substantiation for Public Comment

The allowance of 40% CCS should also be required to comply with the provisions of this chapter along with the other listed material types.

Related Item

• Public Input No. 25-NFPA 780-2023

Submitter Information Verification

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Submittal Date: Sun May 12 11:42:51 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 30-NFPA 780-2026 [Section No. 10.4.1.1]

10.4.1.1*

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

Additional Proposed Changes

File Name	Description	Approved
780_PC18.pdf	780_PC18	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 18 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

40% CCS is added to this section to ensure it is sized equivalent to copper when used as a main conductor.

Submitter Information Verification

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Submittal Date: Mon Feb 09 15:38:12 EST 2026
Committee: LIG-AAA

Public Comment No. 18-NFPA 780-2024 [Section No. 10.4.1.1]

10.4.1.1*

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

Statement of Problem and Substantiation for Public Comment

40% CCS is added to this section to ensure it is sized equivalent to copper when used as a main conductor.

Related Item

• Public Input No. 26-NFPA 780-2023

Submitter Information Verification

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Submittal Date: Sun May 12 11:45:05 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 31-NFPA 780-2026 [Section No. 10.4.2.1]

10.4.2.1

A bonding conductor made of copper or 40% CCS shall have a cross-sectional area of at least 0.013 $in.^2$ (8.3 mm^2).

Additional Proposed Changes

File Name	Description	Approved
780_PC19.pdf	780_PC19	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 19 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

40% CCS is added to this section to ensure it is sized equivalent to copper when used as a bonding conductor.

Submitter Information Verification

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Submittal Date: Mon Feb 09 15:40:29 EST 2026
Committee: LIG-AAA

Public Comment No. 19-NFPA 780-2024 [Section No. 10.4.2.1]

10.4.2.1

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

Statement of Problem and Substantiation for Public Comment

40% CCS is added to this section to ensure it is sized equivalent to copper when used as a bonding conductor.

Related Item

• Public Input No. 27-NFPA 780-2023

Submitter Information Verification

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Submittal Date: Sun May 12 11:47:02 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 32-NFPA 780-2026 [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% CCS), 10.4.1.2 (for aluminum), or 10.4.1.3 (for other metals).

Additional Proposed Changes

File Name	Description	Approved
780_PC20.pdf	780_PC20	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 20 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS to align with similar action taken in 10.4.1.1.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
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Submittal Date: Mon Feb 09 15:44:40 EST 2026
Committee: LIG-AAA

Public Comment No. 20-NFPA 780-2024 [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% CCS), 10.4.1.2 (for aluminum), or 10.4.1.3 (for other metals).

Statement of Problem and Substantiation for Public Comment

This adds 40% CCS to align with similar action taken in 10.4.1.1.

Related Item

• Public Input No. 28-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
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Affiliation: American Bimetallic Association
Street Address:
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Submittal Date: Sun May 12 11:49:04 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 33-NFPA 780-2026 [Section No. 11.4.1.1]

11.4.1.1*

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

Additional Proposed Changes

File Name	Description	Approved
780_PC21.pdf	780_PC21	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 21 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS as an alternative to copper for the counterpoise conductor.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
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Submittal Date: Mon Feb 09 15:47:29 EST 2026
Committee: LIG-AAA

Public Comment No. 21-NFPA 780-2024 [Section No. 11.4.1.1]

11.4.1.1*

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

Statement of Problem and Substantiation for Public Comment

This adds 40% CCS as an alternative to copper for the counterpoise conductor.

Related Item

• Public Input No. 29-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
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Affiliation: American Bimetallic Association
Street Address:
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Submittal Date: Sun May 12 11:51:33 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 34-NFPA 780-2026 [Section No. 11.4.1.2]

11.4.1.2*

In locations where bare copper or 40% CCS 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.

Additional Proposed Changes

File Name	Description	Approved
780_PC22.pdf	780_PC22	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 22 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS to the section and annex materials to ensure equivalent corrosion protection is provided.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
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City:
State:
Zip:
Submittal Date: Mon Feb 09 15:49:15 EST 2026
Committee: LIG-AAA

Public Comment No. 22-NFPA 780-2024 [Section No. 11.4.1.2]

11.4.1.2*

In locations where bare copper ~~counterpoise~~ or 40% CCS 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 Comment

This adds 40% CCS to the section and annex materials to ensure equivalent corrosion protection is provided.

Related Item

• Public Input No. 30-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
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Submittal Date: Sun May 12 11:53:50 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 35-NFPA 780-2026 [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 or 40% CCS conductor.

Additional Proposed Changes

File Name	Description	Approved
780_PC24.pdf	780_PC24	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 24 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS as an alternative for this application.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
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Submittal Date: Mon Feb 09 15:51:44 EST 2026
Committee: LIG-AAA

Public Comment No. 24-NFPA 780-2024 [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 or 40% CCS conductor.

Statement of Problem and Substantiation for Public Comment

This adds 40% CCS as an alternative for this application.

Related Item

• Public Input No. 31-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
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Affiliation: American Bimetallic Association
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Submittal Date: Sun May 12 11:58:28 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 36-NFPA 780-2026 [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% CCS 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 or 40% CCS conductor.

Additional Proposed Changes

File Name	Description	Approved
780_PC25.pdf	780_PC25	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 25 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS as an alternative for this application.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
Street Address:
City:
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Zip:
Submittal Date: Mon Feb 09 16:06:20 EST 2026
Committee: LIG-AAA

Public Comment No. 25-NFPA 780-2024 [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% CCS 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 or 40% CCS conductor.

Statement of Problem and Substantiation for Public Comment

This adds 40% CCS as an alternative for this application.

Related Item

• Public Input No. 32-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld Bimetallics, LLC.
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Submittal Date: Sun May 12 12:00:33 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 37-NFPA 780-2026 [Section No. 11.4.6 [Excluding any Sub-Sections]]

A minimum 6 AWG stranded copper or 40% CCS 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

Additional Proposed Changes

File Name	Description	Approved
780_PC26.pdf	780_PC26	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 26 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS as an alternative for this application.

Submitter Information Verification

Submitter Full Name: NFPA Holds
Organization: Holds
Street Address:
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Submittal Date: Mon Feb 09 16:11:12 EST 2026
Committee: LIG-AAA

Public Comment No. 26-NFPA 780-2024 [Section No. 11.4.6 [Excluding any Sub-Sections]]

A minimum 6 AWG stranded copper or 40% CCS 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 Comment

This adds 40% CCS as an alternative for this application.

Related Item

• Public Input No. 33-NFPA 780-2023

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld Bimetallics, LLC.
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Street Address:
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Submittal Date: Sun May 12 12:03:01 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 122-NFPA 780-2026 [New Section after 11.4.9]

***11.5 Protection for "Above Ground" Ramp Lighting**

11.5.1 Air terminals shall be placed on light poles to put the luminares within a zone of protection in accordance with section 4.7.

11.5.2 Two ground electrodes shall be attached to the base of each pole.

11.5.3 Light poles shall be interconnected by a ground ring electrode.

Statement of Problem and Substantiation for Public Input

Placing lightning protection on light pole protects the lights and also provides a zone of protection for areas under those light poles; making that area somewhat safer from the effects of lightning. Annex G.1.2 give similar guidance for parks and playgrounds.

Submitter Information Verification

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Submittal Date: Tue Jun 02 13:36:41 EDT 2026
Committee: LIG-AAA

Public Input No. 16-NFPA 780-2026 [New Section after 12.4.2]

TITLE OF NEW CONTENT

12.4.2.3.Add new Section 12.4.2.3:

"For large-scale ground-mounted solar farms, overhead ground wire (catenary) systems shall be permitted as a primary strike termination system. The design shall ensure that the zone of protection, determined in accordance with Section 4.8, covers all sensitive components including modules, trackers, and combiner boxes. Grounding system shall be integrated with the solar farm's equipotential grid.

Statement of Problem and Substantiation for Public Input

Currently, Chapter 12 focuses heavily on air terminals and masts. It has even pictures for both systems. Which are effective for small or roof-mounted arrays. Masts are being used for non conventional ESE or DAS rods. By explicitly recommending overhead ground wire (catenary) systems provides an alternative for large-scale developers.
a. A linear zone of protection aligns with long rows of solar trackers.
b. Fewer foundation points compared to hundreds of individual masts.
c. Overhead grounding uses the same physics as for high-voltage substations,

Submitter Information Verification

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Submittal Date: Thu Jan 15 13:00:54 EST 2026
Committee: LIG-AAA

Public Input No. 113-NFPA 780-2026 [New Section after 12.5.2.5]

Chapter 13 Battery Power Storage Facilities

13.1 Lead/Acid Batteries

13.1.1 Yards and Structures containing Lead/Acid Batteries shall be protected in accordance with chapter 4 with the following exceptions.

13.1.2 Protection against a direct strike

13.1.2.1 All structure housing batteries shall be placed within a Zone of Protection using the rollling sphere model.

13.1.2.2 The Zone of Protection shall be permitted to be calculated using a 150 ft. radius sphere.

13.1.2.3 Air terminals shall be permited to be placed on structures conatining Lead /Acid Batteries.

1 **3.1.3 Conductors**

13.1.3.1 Air terminals must be interconnected using a main size conductor.

13.1.3.2 Two paths to ground shall be provided from each air terminal.

13.1.3.3 Dead ends shall not be permitted.

13.1.4 Bonding

13.1.4.1 Bonding shall be done in accordance with section 4.6.12.3.2.

13.1.4.2 All battery storage units shall be bonded together.

13.1.4.3 C ommon bonding shall be accomplished by:

(1) Inherent bonding through construction if mounted on structural steel.

(2) A ring electrode outside of the separation distance if mounted on concrete.

(3) Attachment to a buried ground ring electrode.

(4) Use a main sized conductor.

13.1.5 Grounding

13.1.5.1 Grounding shall be done in accordance with section 4.12.

13.1.5.2 Grounding electrodes shall be placed at an average interval not greater than 100 feet.

13.1.5.3 All grounding electrodes shall be interconnected by a ground ring electrode.

13.1.5.3.1 The ground ring electrode shall be a main size conductor or larger.

13.1.6 Surge Protection Devices

13.1.6.1 Surge protection as described in Section 4.19 shall be required for all power, signal, data, and communications conductors and cables entering or exiting a Battery Power Strroage Facility.

13.2 Lithium-ion Batterries

13.2.1 Yards and Structures containing Lithium-ion Batteries shall be protected by Mast or Overhead Ground Wire (Catenary) type Lightning Protection Systems.

13.2.2 Protection against a direct strike

13.2.2.1 All structures housing batteries shall be placed in a Zone of Protection using the rolling sphere model.

13.2.2.2 The Zone of Protection shall be calculated using a 100 ft. radius sphere.

13.2.2.3 Air terminals shall not be permited to be placed on structures containing Lithium-ion Batteries.

13.2.3 Masts

13.2.3.1 Mast Systems shall be installed in accordance with Section 4.5.3.

13.2.3.2 To prevent sideflashes the minimum distance between a mast and structures containing Lithium-ion Batteries must be calculated in accordance with Section 4.5.5.

13.2.4 Overhead Ground Wire (Catenary) type Lightning Protection Systems

13.2.4.1 Overhead Ground Wire (Catenary) type Lightning Protection Systems shall be installed in accordance with Section 4.5.3.

13.2.4.2 To prevent sideflashes the minimum distance between an Overhead Ground Wire (Catenary) type Lightning Protection System and structures containing Lithium-ion Batteries must be calculated in accordance with Section 4.5.5.

13.1.4 Bonding

13.1.4.1 Bonding shall be done in accordance with section 4.6.12.3.2.

13.1.4.2 All battery storage units shall be bonded together.

13.1.4.3 Common bonding shall be accomplished by attachment to a buried ground ring electrode.

13.1.4.4 Bonding shall be done using main sized conductor.

13.1.5 Grounding

13.1.5.1 Grounding shall be done in accordance with section 4.12.

13.1.5.2 A Mast or Overhead Ground Wire support pole shall have two ground electrodes attached at the base.

13.1.5.3 All ground electrodes shall be interconnected by ground ring electrode.

13.1.5.3.1 The ground ring electrode shall be a main size conductor or larger.

13.1.6 Surge Protection Devices

13.1.6.1 Surge protection as described in Section 4.19 shall be required for all power, signal, data, and communications conductors and cables entering or exiting a Battery Power Storage Facility.

13.7 Fences

13.7.1 The Authority Having Jurisdiction shall consider protecting fences surrounding structures containing volatile substance in accordance with Section 8.8.

Statement of Problem and Substantiation for Public Input

Battery Power Storage facilities are already in use. Specific direction needs to be given on how to protect them.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
Organization: Warren Lightning Rod Company
Affiliation: United Lightning Protection Association
Street Address:
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Submittal Date: Fri May 29 16:12:50 EDT 2026
Committee: LIG-AAA

Public Input No. 116-NFPA 780-2026 [New Section after 12.5.2.5]

Chapter 14 Fuel Cells

14.1 Fuel Cells shall be protected by Mast or Overhead Ground Wire (Catenary) type Lightning Protection Systems.

14.2. Protection against a direct strike

14.2.1 All structures housing Fuel Cells shall be placed within a Zone of Protection using the rollling sphere model.

14.2.2 The Zone of Protection shall be calculated using a 100 ft. radius sphere.

14.2.3 Air terminals shall not be permited to be placed directly on fuel cells.

14.3.3 Masts

14.3.1 Mast Systems shall be installed in accordance with Section 4.5.3.

14.3.2 To prevent sideflashes the minimum distance between a mast and structures containing Fuel Cells must be calculated in accordance with Section 4.5.5.

14.4 Overhead Ground Wire (Catenary) type Lightning Protection Systems

14.4.1 Overhead Ground Wire (Catenary) type Lightning Protection Systems shall be installed in accordance with Section 4.5.3.

14.4.2 To prevent sideflashes the minimum distance between an Overhead Ground Wire (Catenary) type Lightning Protection Systems and structures containing Fuel Cells must be calculated in accordance with Section 4.5.5.

14.5 Bonding

14.5.1 Bonding shall be done in accordance with section 4.6.12.3.2.

14.5.2 All Fuel Cells shall be bonded together.

14.5.3 Common bonding shall be accomplished by:

(1) Inherent bonding through construction if mounted on structural steel.

(2) A ring electrode outside of the separation distance if mounted on concrete

(3) Attachment to a buried ground ring electrode

(4) Use a main sized conductor.

14.6 Grounding

14.6.1 Grounding shall be done in accordance with section 4.12.

14.6.2 A mast or Overhead ground wire support pole shall attach to two ground electrodes at the base.

14.6.3 All grounding electrodes shall be interconnected by ground ring electrode.

14.6.3.1 The ground ring electrode shall be a main size conductor or larger.

14.7 Surge Protection Devices

14.7.1 Surge protection as described in Section 4.19 shall be required for all power, signal, data, and communications conductors and cables entering or exiting a facility containing Fuel Cells.

14.8 The Authority Having Jurisdiction shall consider protecting fences surrounding structures containing volatile substances in accordance with Section 8.8.

Statement of Problem and Substantiation for Public Input

Fuel cells are now in use. Direction is needed on how to protect them from the effects of lightning.

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Submittal Date: Mon Jun 01 15:24:34 EDT 2026
Committee: LIG-AAA

Public Input No. 12-NFPA 780-2025 [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 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 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

Additional Proposed Changes

File Name	Description	Approved
780_PC4.pdf	780_PC4	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 4 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS to the table along with copper (CU) as an acceptable alternative material type. History of usage as a conductor material employed in lightning protection applications, and the laboratory work of the CCS 780 Task Group has provided sufficient evidence that 40% CCS meets the minimum requirements for performance.

Submitter Information Verification

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Submittal Date: Fri Dec 19 14:33:42 EST 2025
Committee: LIG-AAA

Public Comment No. 4-NFPA 780-2024 [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 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 Comment

This adds 40% CCS to the table along with copper (CU) as an acceptable alternative material type. History of usage as a conductor material employed in lightning protection applications, and the laboratory work of the CCS 780 Task Group has provided sufficient evidence that 40% CCS meets the minimum requirements for performance.

Related Item

• Public Input 34 NFPA 780

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Submittal Date: Sun May 12 08:25:33 EDT 2024

Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 18-NFPA 780-2026 [Section No. A.4.2.5]

A.4.2.5

Aluminum, copper and ~~copper~~ 40% CCS on any structure must be designed and installed to ensure compatibility such that the expected lifecycle for any given component can be realized. The AHJ or building owner must have a thorough understanding of these compatibility issues.

Additional Proposed Changes

File Name	Description	Approved
780_PC7.pdf	780_PC7	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 7 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

This adds 40% CCS to the table along with copper (CU) as an acceptable alternative material type. History of usage as a conductor material employed in lightning protection applications, and the laboratory work of the CCS 780 Task Group has provided sufficient evidence that 40% CCS meets the minimum requirements for performance.

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Submittal Date: Mon Feb 09 12:02:31 EST 2026
Committee: LIG-AAA

Public Comment No. 7-NFPA 780-2024 [Section No. A.4.2.5]

A.4.2.5

Aluminum, copper and ~~copper on~~ 40% CCS on any structure must be designed and installed to ensure compatibility such that the expected lifecycle for any given component can be realized. The AHJ or building owner must have a thorough understanding of these compatibility issues.

Statement of Problem and Substantiation for Public Comment

This adds 40% CCS to the table along with copper (CU) as an acceptable alternative material type. History of usage as a conductor material employed in lightning protection applications, and the laboratory work of the CCS 780 Task Group has provided sufficient evidence that 40% CCS meets the minimum requirements for performance.

Related Item

• Public Input 14 NFPA 780 2023

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Submittal Date: Sun May 12 08:40:44 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 23-NFPA 780-2026 [Section No. A.4.12.3.2]

A.4.12.3.2

Field experience has demonstrated that a copper or 40% CCS conductor could experience accelerated corrosion at the point where the copper or 40% CCS conductor exits the concrete. Concrete and soil composition could have a direct impact on the amount of corrosion, if any. Investigation of existing installations at the proposed site or chemical analysis of the concrete and soil composition would provide a basis to determine if additional corrosion protection is warranted. Each installation should be evaluated to determine the need for any additional corrosion protection. Tinned copper ~~conductors~~ or 40% CCS conductors or installation of a nonmetallic sleeve over the conductor where the conductor exits the concrete are two methods that could mitigate corrosion. The nonmetallic sleeve should extend 6 in. (150 mm) on each side of the transition from concrete to soil. See Sections 4.2 and 4.3 for additional requirements.

Additional Proposed Changes

File Name	Description	Approved
780_PC12.pdf	780_PC12	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 12 of the (A2025) Second Draft Report for NFPA 780 and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

40% CCS is added to the section as the criteria for a copper concrete-encased electrode is the same for 40% CCS.

Submitter Information Verification

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Submittal Date: Mon Feb 09 14:47:01 EST 2026
Committee: LIG-AAA

Public Comment No. 12-NFPA 780-2024 [Section No. A.4.12.3.2]

A.4.12.3.2

Field experience has demonstrated that a copper or 40% CCS conductor could experience accelerated corrosion at the point where the copper or 40% CCS conductor exits the concrete. Concrete and soil composition could have a direct impact on the amount of corrosion, if any. Investigation of existing installations at the proposed site or chemical analysis of the concrete and soil composition would provide a basis to determine if additional corrosion protection is warranted. Each installation should be evaluated to determine the need for any additional corrosion protection. Tinned copper or 40% CCS conductors or installation of a nonmetallic sleeve over the conductor where the conductor exits the concrete are two methods that could mitigate corrosion. The nonmetallic sleeve should extend 6 in. (150 mm) on each side of the transition from concrete to soil. See Sections 4.2 and 4.3 for additional requirements.

Statement of Problem and Substantiation for Public Comment

40% CCS is added to the section as the criteria for a copper concrete-encased electrode is the same for 40% CCS.

Related Item

• Public Input No. 18-NFPA 780-2023

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Submittal Date: Sun May 12 09:20:59 EDT 2024
Committee: LIG-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: A full report of results of the IEC 62561-1 stress test performed on the conductor using connectors commonly used for lightning protection was not available for review for sufficient time prior to the Second Draft meeting for proper review. Given that the material properties copper and steel are so different with respect to lightning parameters, the concept of including copper clad steel in NFPA 780 is based on it being equivalent to copper. The concept has not been proven at this time. There is no physical reason to expect that copper clad steel can be considered the same as copper. For example, conductivity of copper is significantly larger than that of steel and the tensile strength of steel is significantly larger than that of copper. Which means larger heating effects can be expected for steel conductors and different compressive effects can be expected which is important for compressive fittings. The submitter should research and evaluate appropriate copper clad steel conductor and component rating and sizes to show equivalency with the current NFPA 780 requirements.

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Public Input No. 149-NFPA 780-2026 [Section No. A.4.15.5]

~~A.4.15.5~~ — A8.8 __

Bonding for metallic fences is meant to protect personnel who could come in contact with two parts of a metallic fence system that might become electrically charged, even unintentionally, at different potentials through faults or charge buildup through inductance or direct/indirect strikes, and who might complete the path for the charge to go to ground. The grounding for any part of a metallic fence and objects within either sideflash distance of a person who could possibly touch two parts of a metallic fence/gate at the same time is to prevent the person from becoming the path to ground (i.e., close an open circuit) for any charge buildup before or during a direct lightning strike; this includes a worst case scenario of a person with outstretched arms with or without objects they might be holding or using to close the gate, such as a tool. It is always best practice to not transit through gates when atmospheric conditions are conducive for a lightning event to occur.

If any part of a metallic fence and gatepost, whether at an ordinary or explosives facility, is within 6 ft (1.8 m) of any part of a lightning protection, (e.g., down conductor, ground rod of an LPS), two points of bonding to the LPS are necessary.

The sideflash analysis should include the following:

(1) Consideration of auxiliary equipment mounted on a fence (e.g., cameras, IDS, access control, mounting poles) for sideflash grounding and bonding control

(2) A figure created that is similar to Figure 4.15.4.1

(3) Developed sideflash/touch potential analysis processes and equations

If the gateposts are spaced such that a person can walk through and touch both gate posts [including the worst case scenario of a person with outstretched arms, a width of typically 6 ft to 8 ft (1.8 m to 2.4 m)], bonding (no mechanical connections) is necessary at the base, underground, able to be visually inspected or tested at the bond to the gate posts, and deeply enough that the bonding conductor will not be broken or disturbed by movement of the vehicle as it passes through.

If a gate is wide enough for a person to walk through and touch both gate posts with any kind of attachment or equipment they might be holding, bonding (no mechanical connections) is necessary at the base, underground, able to be visually inspected or tested at the bond to the gate posts, and deeply enough that the bonding conductor will not be broken or disturbed by movement of the vehicle as it passes through.

If a gate is wide enough that it allows a vehicle to be driven through it, grounding and bonding are necessary. Sideflash calculations can be used to evaluate the need to bond and ground.

If a gate is to be opened electronically — with codes or switches attached to an electrical source and the control interface within sideflash hazard — the gate post must be bonded to the electrical feeder to the electronics and the ground rod at the pedestal feeder must be bonded to the gate post. If the electronic switch pedestal is within sideflash distance of the gate post and any other part of the metallic fence (e.g., another post), it must be bonded to both the gate post and the next fence post that it is between or to the two fence posts it might be between. Remotely controlled gates where personnel are expected to remain within the vehicle and where the gate operator is not adjacent to the gate area (outside sideflash or touch potential hazard) can be exempted from sideflash or touch potential consideration.

Areas where fences and gates provide for personnel to gather and dwell for a given time should be considered as a source for step potential threat.

Statement of Problem and Substantiation for Public Input

Move annex material to reference section 8.8.

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Submittal Date: Wed Jun 03 13:59:27 EDT 2026
Committee: LIG-AAA

Public Input No. 64-NFPA 780-2026 [New Section after A.4.19.4.10]

A.4.20 Lightning Event Monitoring Systems

Lightning event monitoring systems can provide objective information to assist in determining whether lightning has affected a protected structure, protected area, or lightning protection system. These systems can include conductor-mounted lightning current recorders, optical lightning monitoring systems, electromagnetic-field monitoring systems, transient monitoring systems, or other instrumentation capable of creating retrievable records of lightning events.

Lightning event monitoring systems are not a substitute for required strike termination devices, conductors, grounding electrodes, bonding, surge-protective devices, separation distances, or other lightning protection system requirements. The number, type, and placement of such systems should consider the lightning protection system configuration, structure geometry, monitored area, expected current paths, accessibility, communication method, and the need to support inspection, testing, maintenance, reporting, and record retention.

Statement of Problem and Substantiation for Public Input

This companion Annex A material complements the newly suggested Chapter 4, 4.20 newly suggested section.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 63-NFPA 780-2026 [Chapter 4]	Explanatory material to newly proposed 4.20 related to lightning event monitoring system.

Submitter Information Verification

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Submittal Date: Tue May 26 14:42:47 EDT 2026
Committee: LIG-AAA

Public Input No. 106-NFPA 780-2026 [New Section after A.5.10]

New 5.11.8 Gate Openers

See annex **J.9.3**

Statement of Problem and Substantiation for Public Input

Adds direction to existing Annex material which is appropriately located in Annex J.9.3 under Smart Structures

Submitter Information Verification

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Submittal Date: Fri May 29 14:40:29 EDT 2026
Committee: LIG-AAA

Public Input No. 144-NFPA 780-2026 [New Section after A.5.10]

A.5.12.3.3

Copper clad steel ground electrodes will degrade rapidly in marine environments and should not be used.

Statement of Problem and Substantiation for Public Input

Explanation for why solid copper or stainless-steel grounding electrodes are needed.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
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Submittal Date: Wed Jun 03 12:13:26 EDT 2026
Committee: LIG-AAA

Public Input No. 145-NFPA 780-2026 [New Section after A.5.10]

A.5.12.4.2
See A.5.12.3.3.

Statement of Problem and Substantiation for Public Input

See A.5.12.3.3.

Submitter Information Verification

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Submittal Date: Wed Jun 03 12:19:15 EDT 2026
Committee: LIG-AAA

Public Input No. 146-NFPA 780-2026 [New Section after A.5.10]

A.5.12.2.4.1(4)

Due to the dynamic nature of water, wind, tide, ice, current, and electrolytic action, damage can rapidly occur to grounding electrodes. Periodic checks should be made to ensure the grounding system is intact and functional. Ease of accessibilty facilitates these inspections.

Statement of Problem and Substantiation for Public Input

Explanation for why grounding electrodes should be easily accessible.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
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Submittal Date: Wed Jun 03 12:23:34 EDT 2026
Committee: LIG-AAA

Public Input No. 68-NFPA 780-2026 [New Section after A.8.1]

A.8.9.3.1 Lightning Event Monitoring Systems

Lightning event monitoring systems can assist owners, inspectors, maintenance personnel, and authorities having jurisdiction in determining whether lightning has interacted with a structure, protected area, or lightning protection system. Such systems can include conductor-mounted lightning current recorders, optical lightning monitoring systems, electromagnetic-field monitoring systems, transient monitoring systems, or other instrumentation capable of creating retrievable records of lightning events.

For structures housing explosive materials, objective lightning-event information can support timely inspection, reporting, operational decision-making, review of surge-protective device status, maintenance records, and corrective actions. The number, type, and placement of lightning event monitoring systems should be based on the lightning protection system configuration, structure geometry, protected area, expected current paths, accessibility, and the need to identify lightning events involving the structure, protected area, or lightning protection system.

Statement of Problem and Substantiation for Public Input

The added explanatory material complements the suggested addition to Chapter 8, article 8.9.3.1.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 67-NFPA 780-2026 [Section No. 8.9.3]	This is the explanatory material to the newly added article 8.9.3.1

Submitter Information Verification

Submitter Full Name: Carlos Mata
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Submittal Date: Tue May 26 15:06:25 EDT 2026
Committee: LIG-AAA

Public Input No. 70-NFPA 780-2026 [New Section after A.8.1]

A.8.9.6.4 Lightning Event Monitoring Systems

Visual inspection is intended to confirm that lightning event monitoring system equipment remains capable of performing its intended monitoring function. Depending on the type of system, this can include confirming that sensors, recorders, enclosures, optical components, conductors, cables, power sources, or communication interfaces remain secured, serviceable, unobstructed, and positioned or connected as intended. Review of event records, device status, data retrieval, communication functions, and other functional checks can be addressed in the maintenance and inspection plan and in testing procedures.

Statement of Problem and Substantiation for Public Input

This is supplementary explanatory material to the newly added Chapter 8, article 8.9.6.4

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 69-NFPA 780-2026 [Section No. 8.9.6]	This is explanatory material to this newly added article

Submitter Information Verification

Submitter Full Name: Carlos Mata
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Submittal Date: Tue May 26 15:18:24 EDT 2026
Committee: LIG-AAA

Public Input No. 65-NFPA 780-2026 [Section No. A.8.8]

A.8.8

~~The effectiveness of any lightning protection system depends on its installation, its maintenance, and the testing methods used. Therefore, all installed lightning protection systems should be properly maintained. Proper records of maintenance and inspections should be maintained on each facility to ensure adequate safety. These records are part of the lightning protection requirements and should be maintained~~ A maintenance and inspection plan shall be developed for all protection systems used to protect structures housing explosives. The plan shall include procedures for review, reporting, record retention, and response to known, suspected, or recorded lightning events affecting the structure, protected area, or lightning protection system. Where lightning event monitoring systems are installed, the plan shall include procedures for inspection of lightning protection systems in response to recorded lightning events .

Statement of Problem and Substantiation for Public Input

This explanation material supports the suggested modifications to Chapter 8, article 8.8.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 66-NFPA 780-2026 [Section No. 8.8]	

Submitter Information Verification

Submitter Full Name: Carlos Mata
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Submittal Date: Tue May 26 14:48:07 EDT 2026
Committee: LIG-AAA

Public Input No. 73-NFPA 780-2026 [New Section after A.8.9.7.8]

A.8.9.7.8 Lightning Event Monitoring System Records and Functional Verification

Lightning event monitoring system records can assist owners, inspectors, maintenance personnel, and authorities having jurisdiction in determining whether lightning has interacted with a structure, protected area, or lightning protection system. Useful event-record information can include device or sensor identification, monitored location, event date and time, time zone or time reference, detection method, peak current magnitude where current is measured, current polarity, stroke-level information, waveform data, optical data, electromagnetic-field data, transient data, device status, notification status, event review date, and corrective actions taken.

Time synchronization can be useful where lightning event records are correlated with facility alarms, surge-protective device status, process upsets, security systems, weather data, lightning location system data, or other facility records. Retention periods should consider facility hazard classification, AHJ requirements, inspection cycles, operational needs, and incident-investigation requirements. Functional verification is intended to confirm that the lightning event monitoring system remains capable of detecting, storing, retrieving, and communicating event records as intended. Calibration is typically performed only when recommended by the manufacturer or required by the AHJ.

Statement of Problem and Substantiation for Public Input

This is the explanatory material in support of the newly added Chapter 8, article 8.9.7.8.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 71-NFPA 780-2026 [Section No. 8.9.7]	This is the explanatory material to the newly added section.

Submitter Information Verification

Submitter Full Name: Carlos Mata
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Submittal Date: Tue May 26 15:36:02 EDT 2026
Committee: LIG-AAA

Public Input No. 72-NFPA 780-2026 [Section No. A.8.9.7.8]

A.8.9.7.~~8~~ 9

Assistance in determining a qualified person can be found in *NFPA 70E*.

Statement of Problem and Substantiation for Public Input

Renumbering this article to be consistent with the newly submitted article.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 71-NFPA 780-2026 [Section No. 8.9.7]	New numbering to maintain consistency with this newly added section.

Submitter Information Verification

Submitter Full Name: Carlos Mata
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Submittal Date: Tue May 26 15:28:53 EDT 2026
Committee: LIG-AAA

Public Input No. 124-NFPA 780-2026 [New Section after A.11.4.8.5]

A.11.5

The Authority Having Jurisdiction should consider locating light poles equipped with lightning Protection in such a way as to optimze the zone of protection those poles would provide thereby mitgating some of the effects of lightning to persons and property in that ramp area.

Statement of Problem and Substantiation for Public Input

Although workers should not be working outside during a thunderstorm, this will mitigate the effects of lightning. These steps should be considered.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
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Submittal Date: Tue Jun 02 14:04:07 EDT 2026
Committee: LIG-AAA

Public Input No. 74-NFPA 780-2026 [Section No. D.1.1]

D.1.1 Frequency of Inspections.

It is understood that all new lightning protection systems must be inspected following completion of their installation. Recommended guidelines for the maintenance of the lightning protection system should be provided to the owner at the completion of installation.

It is important to make periodic inspections of existing systems. The interval between inspections should be determined by factors such as the following:

(1) Classification of the structure or area protected

(2) Level of protection afforded by the system

(3) Immediate environment (corrosive atmospheres)

(4) Materials from which system components are made

(5) Type of surface to which the lightning protection components are attached

(6) Trouble reports or complaints

D.1.1.1

In addition to regular periodic inspections, a lightning protection system should be inspected whenever any alterations or repairs are made to a protected structure, as well as following any known lightning discharge to the system. Data from a lightning event monitoring systems can be used to identify a known lightning discharge to the system and to initiate post-event inspection.

D.1.1.2

It is recommended that lightning protection systems be visually inspected at least annually. In some areas where severe climatic changes occur, it might be advisable to visually inspect systems semiannually or following extreme changes in ambient temperatures. Complete, in-depth inspections of all systems should be completed every 3 to 5 years. It is recommended that critical systems be inspected every 1 to 3 years, depending on occupancy or the environment where the protected structure is located.

D.1.1.3

In most geographical areas, and especially in areas that experience extreme seasonal changes in temperature and rainfall, it is advisable to stagger inspections so that earth resistance measurements, for example, are made in the hot, dry months as well as the cool, wet months. Such staggering of inspections and testing is important in assessing the effectiveness of the lightning protection system during the various seasons throughout the year.

Statement of Problem and Substantiation for Public Input

Data from a lightning event monitoring system can be used to identify a known lightning strike to the system and to initiate post-event inspection.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 62-NFPA 780-2026 [Section No. 3.3]	Link inspection to the newly added definition of lightning event monitoring system.

Submitter Information Verification

Submitter Full Name: Carlos Mata
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Submittal Date: Tue May 26 16:12:10 EDT 2026
Committee: LIG-AAA

Public Input No. 121-NFPA 780-2026 [Section No. D.1.1 [Excluding any Sub-Sections]]

It is understood that all new lightning protection systems must be inspected following completion of ~~their installation. Recommended~~ the installation. Such inspection should be conducted by qualified persons. Recommended guidelines for the maintenance of the lightning protection system should be provided to the owner at the completion of installation.

It is important to make periodic inspections of existing systems. The interval between inspections should be determined by factors such as the following:

(1) Classification of the structure or area protected

(2) Level of protection afforded by the system

(3) Immediate environment (corrosive atmospheres)

(4) Materials from which system components are made

(5) Type of surface to which the lightning protection components are attached

(6) Trouble reports or complaints

Statement of Problem and Substantiation for Public Input

Qualification of inspectors assures quality, and functionality of Lightning Protection Systems and safeguards the integrity of the Lightning Protection industry.

Submitter Information Verification

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Submittal Date: Tue Jun 02 13:14:33 EDT 2026

Committee: LIG-AAA

Public Input No. 142-NFPA 780-2026 [New Section after D.1.4]

D.1.4.1

Visual Maintenance-Inpsection Checklist

Additional Proposed Changes

File Name	Description	Approved
doc05124620260602161623_-_Copy.pdf	Visual Maintenance-Inspection Checklist	

Statement of Problem and Substantiation for Public Input

Checklist provides clear direction on what to look for when doing a visual inspection

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
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Submittal Date: Wed Jun 03 10:20:21 EDT 2026
Committee: LIG-AAA

Public Input No. 75-NFPA 780-2026 [Section No. D.1.4]

D.1.4 Inspection Guides and Records.

Inspection guides or forms should be prepared and made available to the authority responsible for conducting inspections of lightning protection systems. These forms should contain sufficient information to guide the inspector through the inspection process so that he or she can document all areas of importance relating to the methods of installation, the type and condition of system components, test methods, and the proper recording of the test data obtained. Inspection guides and forms should include a location for lightning event monitoring system information where such devices are provided.

Statement of Problem and Substantiation for Public Input

Include information from lightning event monitoring systems in inspection guides and forms.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 62-NFPA 780-2026 [Section No. 3.3]	Add reference on how to use the data form the lightning event monitoring system.

Submitter Information Verification

Submitter Full Name: Carlos Mata
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Submittal Date: Tue May 26 16:15:10 EDT 2026
Committee: LIG-AAA

Public Input No. 76-NFPA 780-2026 [Section No. D.1.5]

D.1.5 Records and Test Data.

The inspector or inspection authority should compile and maintain records pertaining to the following:

(1) General condition of air terminals, conductors, and other components

(2) General condition of corrosion-protection measures

(3) Security of attachment of conductors and components

(4) Resistance measurements of various parts of the grounding electrode system

(5) Any variations from the requirements contained in this standard

(6) Lightning event monitoring system data, including the date and time of recorded events, peak current magnitude at the monitored location, monitored location, and actions taken in response to recorded events

Statement of Problem and Substantiation for Public Input

Add use of data from lightning event monitoring systems in the "Records and Test Data"

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 62-NFPA 780-2026 [Section No. 3.3]	Add use and how to record lightning event monitoring system data in the "Records and Test Data"

Submitter Information Verification

Submitter Full Name: Carlos Mata

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Submittal Date: Tue May 26 16:17:46 EDT 2026

Committee: LIG-AAA

Public Input No. 77-NFPA 780-2026 [Section No. D.2.2.2]

D.2.2.2

Lightning protection system maintenance procedures should be established for each system and should become a part of the overall maintenance program for the structure it protects.

A maintenance program should contain a list of more or less routine items that can serve as a checklist and establish a definite maintenance procedure that can be followed regularly. It is the repeatability of the procedures that enhances the effectiveness of a good maintenance program.

A good maintenance program should contain provisions for the following:

(1) Inspection of all conductors and system components

(2) Tightening of all clamps and splicers

(3) Measurement of lightning protection system resistance

(4) Measurement of resistance of grounding electrodes

(5) Inspection or testing, or both, of equipment providing surge protection to determine its effectiveness compared to similar new devices

(6) Refastening and tightening of components and conductors as required

(7) Inspection and testing as required to determine if the effectiveness of the lightning protection system has been altered by additions to or changes in the structure

(8) Inspection and functional verification of lightning event monitoring systems, where provided, including verification of status indication, power source, time reference, data retrieval, and communication or notification functions

Statement of Problem and Substantiation for Public Input

Add inspection and functional verification of lightning event monitoring systems.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 62-NFPA 780-2026 [Section No. 3.3]	Add inspection and functional verification of lightning event monitoring systems

Submitter Information Verification

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Submittal Date: Tue May 26 16:21:04 EDT 2026

Committee: LIG-AAA

Public Input No. 78-NFPA 780-2026 [Section No. D.2.3]

D.2.3 Maintenance Records.

Complete records should be kept of all maintenance procedures and routines and of corrective actions that have been or will be taken. Such records provide a means of evaluating system components and their installation. They also serve as a basis for reviewing maintenance procedures as well as updating preventive maintenance programs. Maintenance records should include recorded lightning events, review of event data, functional verification of lightning event monitoring systems, and corrective actions taken in response to recorded events.

Statement of Problem and Substantiation for Public Input

Add maintenance record requirements when lightning event monitoring systems are used.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 62-NFPA 780-2026 [Section No. 3.3]	Add maintenance record requirements to the lightning event monitoring systems.

Submitter Information Verification

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Submittal Date: Tue May 26 16:23:06 EDT 2026
Committee: LIG-AAA

Public Input No. 120-NFPA 780-2026 [New Section after E.1.4]

E.1.3.1 Permanent Test Electrodes

The permanent installation of test electrodes should be considered. This will make the test results more concise and relevent since the testing will be done to the same location in subsequent tests. These electrodes can be easily installed in small testwells i.e., a sprinkler valve box. It would be wise to make note of their exact location by taking measurements from the two corners of the structure nearest to the test electrode. Note the dimensions on a sketch. The next time a ground test is to be conducted the two test electrodes would be easily located at the intersection of the two dimensions.

Statement of Problem and Substantiation for Public Input

The recommendation for the permanent installation of test electrode would ass consistency to ground testing since future test would be testing to the exact same location.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
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Submittal Date: Tue Jun 02 12:50:19 EDT 2026
Committee: LIG-AAA

Public Input No. 136-NFPA 780-2026 [New Section after I.1.7]

I.1.8

Lightning Protection should be placed on light poles in ramp areas to provide a Zone of Protection for aircraft, equipment and personell that may be caught outside during a lightning event.

Statement of Problem and Substantiation for Public Input

Although workers should not be working outside during a thunderstorm, this is a way to mitigate the effects of lightning. These steps should be considered.

Submitter Information Verification

Submitter Full Name: Stephen Humeniuk
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Submittal Date: Tue Jun 02 15:37:17 EDT 2026
Committee: LIG-AAA

Public Input No. 79-NFPA 780-2026 [New Section after J.8]

J.8.1 Lightning Event Recording and Notification

Smart structures often include interconnected monitoring, control, security, communications, and building automation systems. A lightning event monitoring system can provide objective records of lightning current conducted by the lightning protection system and can support notification to facility personnel responsible for inspection, maintenance, and operational response. Useful features include time-tagged event records, peak current magnitude at the monitored location, device health or status indication, local or remote access to records, data retention, and export of event records for maintenance, investigation, and insurance documentation. The device should be installed so that it does not introduce unintended bonding paths or compromise lightning protection zone or equipotential grounding principles.

Statement of Problem and Substantiation for Public Input

Add lightning event monitoring system data feedback to smart structures.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 62-NFPA 780-2026 [Section No. 3.3]	Add lightning event monitoring system data feedback to smart structures.

Submitter Information Verification

Submitter Full Name: Carlos Mata
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Submittal Date: Tue May 26 16:26:09 EDT 2026
Committee: LIG-AAA

Public Input No. 117-NFPA 780-2026 [Section No. L.1 [Excluding any Sub-Sections]]

~~This lightning risk assessment methodology is provided to assist the building owner, safety professional, or architect/engineer in determining the risk of damage or injury due to lightning. This annex provides a simplified, quick-look assessment (Section~~ L.5 ~~) and a more detailed assessment for those requiring a more detailed analysis (Section~~ L.6 ~~). Once the level of risk has been determined, the development of appropriate lightning protection measures can begin. This annex does not supersede any federal, state, or local requirements of the AHJ.~~ Revise the entire section to align with the latest principles enumerated in IEC 62305-2

Statement of Problem and Substantiation for Public Input

The Risk Assessment Guide should be revised and simplified to make it more user friendly and to reflect the latest version of IEC TC 81 62305-2

Submitter Information Verification

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Submittal Date: Mon Jun 01 15:54:41 EDT 2026
Committee: LIG-AAA

Public Input No. 140-NFPA 780-2026 [Section No. L.1.1 [Excluding any Sub-Sections]]

There are some cases where the need for protection should be given serious consideration regardless of the outcome of the risk assessment. Examples are those applications where the following are factors:

(1) Large crowds
(2) Continuity of critical services
(3) High lightning flash frequency
(4) Tall isolated structure
(5) Building containing explosive or flammable materials
(6) Building containing irreplaceable cultural heritage
(7) Critcal/Essential Structures

Statement of Problem and Substantiation for Public Input

Lightning Protection on Critical /Essential Structures should always be considered.

Submitter Information Verification

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Submittal Date: Wed Jun 03 09:22:02 EDT 2026
Committee: LIG-AAA

Public Input No. 127-NFPA 780-2026 [Section No. L.5.3]

L.5.3

~~Critical~~ Essential Facilities.

L.5.3.1

The following are identified as ~~critical~~ **essential** facilities:

(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, transportation facilities)

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

(6) Hazardous material storage, operating, and processing facilities

(7) Government buildings (e.g., courthouses, city halls)

(8) Educational institutions (e.g., schools, universities)

(9) Energy facilities (e.g., power plants, fuel refineries, natural gas facilities)

(10) Financial institutions (e.g., banks, stock exchanges)

(11) Transportation facilities (e.g., airports, seaports, bus stations, train stations)

L.5.3.2

~~Critical~~ **Essential** facilities should have a lightning protection system installed in compliance with this standard or have a detailed risk assessment conducted in accordance with

~~Section~~

Section L.

~~6~~

6 .

Additional Proposed Changes

File Name	Description	Approved
NFPA_780-29_Section_L.5.3_PI.docx	NFPA 780 NEMA Public Input L.5.3	

Statement of Problem and Substantiation for Public Input

While the terms “critical facility” and “essential facility” are interchangeable and have the same meaning within the context of section L.5.3, the term “essential facility” is defined within the International Building Code (IBC) and used to identify the facilities listed in section L.5.3.1. For instance, Table 1604.5 identifies Risk Category IV structures as the “buildings and other structures

designated as essential facilities and buildings where loss of function represents a substantial hazard to occupants or users." This public input is an attempt to align the defined terms for structure classification within the building code and NFPA 780 to add clarity and improve enforcement.

Submitter Information Verification

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Submittal Date: Tue Jun 02 14:16:22 EDT 2026

Committee: LIG-AAA

NEMA NFPA Public Input Form

Please complete this form for all proposed NFPA Public Inputs, submitting a separate form for each input. Once approved by the NEMA Codes & Standards Committee, the information provided in this form will be submitted to NFPA.

<table>
<tr><td colspan="2">NEMA Section:</td><td colspan="2">ICS-BW, ICS-CC, ICS-VS</td><td>CMP Number:</td><td>780 TC</td></tr>
<tr><td rowspan="2">1.</td><td>(a) Title of NFPA Standard</td><td colspan="2">Standard for the Installation of Lightning Protection Systems</td><td>NFPA No. & Year</td><td>780-2029</td></tr>
<tr><td>(b) Section/Paragraph</td><td colspan="4">L.5.3</td></tr>
<tr><td>2.</td><td colspan="2">Public Input Recommends (Check one)</td><td colspan="3">☐New Text
☒Revised Text
☐Deleted Text</td></tr>
<tr><td>3.</td><td colspan="5">Proposed Text of Public Input (Include proposed new or revised wording, or identification of wording to be deleted): [Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike through to denote wording to be deleted (~~deleted wording~~).]</td></tr>
<tr><td></td><td colspan="5">L.5.3 ~~Critical~~ Essential Facilities.
L.5.3.1
The following are identified as ~~critical~~ essential facilities:
(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, transportation facilities)
(5) Telecommunications facilities (e.g., telephone and internet service providers)
(6) Hazardous material storage, operating, and processing facilities
(7) Government buildings (e.g., courthouses, city halls)
(8) Educational institutions (e.g., schools, universities)
(9) Energy facilities (e.g., power plants, fuel refineries, natural gas facilities)
(10) Financial institutions (e.g., banks, stock exchanges)
(11) Transportation facilities (e.g., airports, seaports, bus stations, train stations)
L.5.3.2
~~Critical~~ Essential facilities should have a lightning protection system installed in compliance with this standard or have a detailed risk assessment conducted in accordance with Section L.6.</td></tr>
<tr><td>4.</td><td colspan="5">Statement of Problem and Substantiation for Public Input: (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Public Input, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)</td></tr>
</table>

	While the terms “critical facility” and “essential facility” are interchangeable and have the same meaning within the context of section L.5.3, the term “essential facility” is defined within the International Building Code (IBC) and used to identify the facilities listed in section L.5.3.1. For instance, Table 1604.5 identifies Risk Category IV structures as the “buildings and other structures designated as essential facilities and buildings where loss of function represents a substantial hazard to occupants or users.” This public input is an attempt to align the defined terms for structure classification within the building code and NFPA 780 to add clarity and improve enforcement.
5.	**Copyright Assignment**
	(a) ☒ I am the author of the text or other material (such as illustrations, graphs) proposed in the Public Input.
	(b) ☐Some or all of the text or other material proposed in this Public Input was not authored by me. Its source is as follows: (please identify which material and provide complete information on its source)

Public Input No. 86-NFPA 780-2026 [Section No. L.5.3]

~~**L.5.3** – Critical Facilities.~~

~~**L.5.3.1** –~~

~~The following are identified as critical facilities:~~

(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, transportation facilities)~~

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

(6) ~~Hazardous material storage, operating, and processing facilities~~

(7) ~~Government buildings (e.g., courthouses, city halls)~~

(8) ~~Educational institutions (e.g., schools, universities)~~

(9) ~~Energy facilities (e.g., power plants, fuel refineries, natural gas facilities)~~

(10) ~~Financial institutions (e.g., banks, stock exchanges)~~

(11) ~~Transportation facilities (e.g., airports, seaports, bus stations, train stations)~~

~~**L.5.3.2** –~~

~~Critical facilities should have a lightning protection system installed in compliance with this standard or have a detailed risk assessment conducted in accordance with Section L.6 .~~

Statement of Problem and Substantiation for Public Input

The text of 1.5.3 will need to be deleted and will be replaced with proposed text outlined in PI- 85 for new paragraph 5.11

Submitter Information Verification

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Submittal Date: Wed May 27 14:40:06 EDT 2026

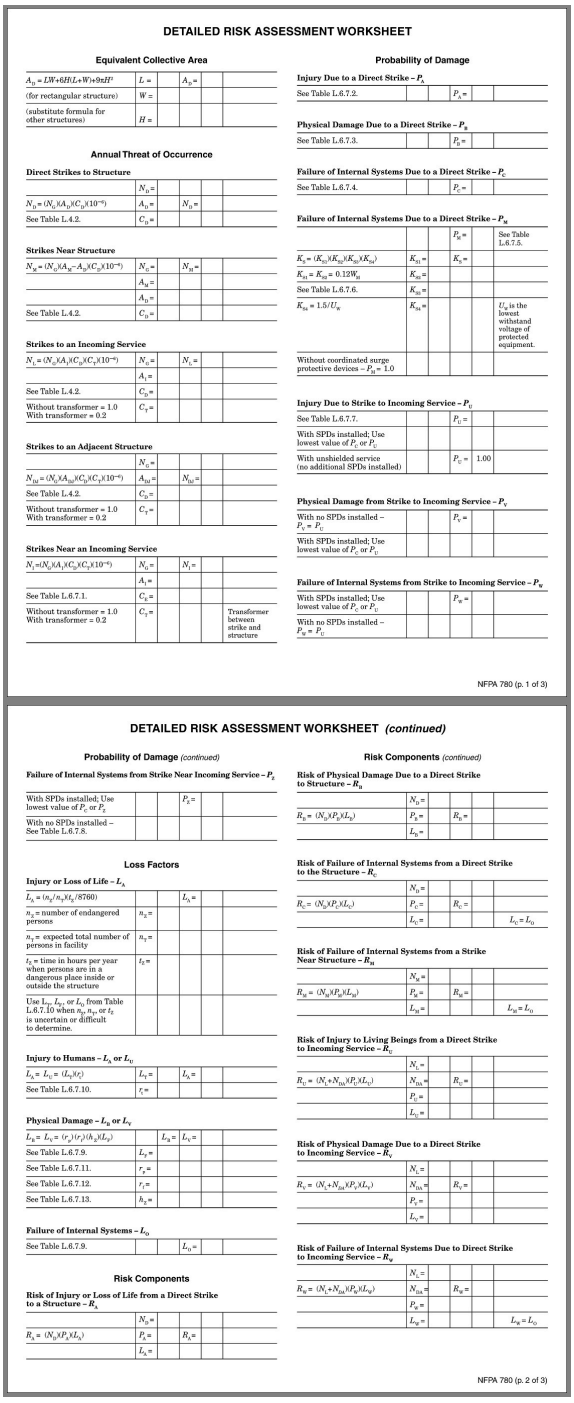
Committee: LIG-AAA

Public Input No. 26-NFPA 780-2026 [Section No. L.6.8]

L.6.8

Figure L.6.8 provides a worksheet for detailed risk assessment.

Figure L.6.8 Detailed Risk Assessment Worksheet.



DETAILED RISK ASSESSMENT WORKSHEET

Equivalent Collective Area

$A_D = LW + 6H(L+W) + 9\pi H^2$	L =		A_D =		
(for rectangular structure)	W =				
(substitute formula for other structures)	H =				

Annual Threat of Occurrence

Direct Strikes to Structure

	N_D =				
$N_D = (N_g)(A_D)(C_D)(10^{-6})$	A_D =		N_D =		
See Table L.4.2.	C_D =				

Strikes Near Structure

$N_M = (N_g)(A_M - A_D)(C_D)(10^{-6})$	N_D =		N_M =		
	A_M =				
	A_D =				
See Table L.4.2.	C_D =				

Strikes to an Incoming Service

$N_L = (N_g)(A_L)(C_D)(C_T)(10^{-6})$	N_L =		N_L =		
	A_L =				
See Table L.4.2.	C_D =				
Without transformer = 1.0 With transformer = 0.2	C_T =				

Strikes to an Adjacent Structure

	N_D =				
$N_{DJ} = (N_g)(A_{DJ})(C_D)(C_T)(10^{-6})$	A_{DJ} =		N_{DJ} =		
See Table L.4.2.	C_D =				
Without transformer = 1.0 With transformer = 0.2	C_T =				

Strikes Near an Incoming Service

$N_I = (N_g)(A_I)(C_D)(C_T)(10^{-6})$	N_L =		N_I =		
	A_I =				
See Table L.6.7.1.	C_D =				
Without transformer = 1.0 With transformer = 0.2	C_T =				Transformer between strike and structure

Probability of Damage

Injury Due to a Direct Strike – P_A

See Table L.6.7.2.			P_A =		

Physical Damage Due to a Direct Strike – P_B

See Table L.6.7.3.			P_B =		

Failure of Internal Systems Due to a Direct Strike – P_C

See Table L.6.7.4.			P_C =		

Failure of Internal Systems Due to a Direct Strike – P_M

			P_M =		See Table L.6.7.5.
$K_S = (K_{S1})(K_{S2})(K_{S3})(K_{S4})$	K_{S1} =		K_S =		
$K_{S1} = K_{S2} = 0.12W_1$	K_{S2} =				
See Table L.6.7.6.	K_{S3} =				
$K_{S4} = 1.5/U_W$	K_{S4} =				U_W is the lowest withstand voltage of protected equipment.
Without coordinated surge protective devices – $P_M = 1.0$					

Injury Due to Strike to Incoming Service – P_U

See Table L.6.7.7.			P_U =		
With SPDs installed; Use lowest value of P_C or P_U					
With unshielded service (no additional SPDs installed)			P_U =	1.00	

Physical Damage from Strike to Incoming Service – P_V

With no SPDs installed – $P_V = P_U$			P_V =		
With SPDs installed; Use lowest value of P_C or P_U					

Failure of Internal Systems from Strike to Incoming Service – P_W

With SPDs installed; Use lowest value of P_C or P_U			P_W =		
With no SPDs installed – $P_W = P_U$					

NFPA 780 (p. 1 of 3)

DETAILED RISK ASSESSMENT WORKSHEET *(continued)*

Probability of Damage *(continued)*

Failure of Internal Systems from Strike Near Incoming Service – P_Z

With SPDs installed; Use lowest value of P_C or P_Z			P_Z =		
With no SPDs installed – See Table L.6.7.8.					

Loss Factors

Injury or Loss of Life – L_A

$L_A = (n_z/n_t)(t_z/8760)$			L_A =		
n_z = number of endangered persons	n_z =				
n_t = expected total number of persons in facility	n_t =				
t_z = time in hours per year when persons are in a dangerous place inside or outside the structure	t_z =				
Use L_1, L_2, or L_O from Table L.6.7.10 when n_z, n_t, or t_z is uncertain or difficult to determine.					

Injury to Humans – L_B or L_U

$L_A = L_U = (L_O)(r_f)$	L_U =		L_A =		
See Table L.6.7.10.	r_f =				

Physical Damage – L_B or L_V

$L_B = L_V = (r_p)(r_f)(h_z)(L_O)$			L_B = L_V =		
See Table L.6.7.9.	L_O =				
See Table L.6.7.11.	r_p =				
See Table L.6.7.12.	r_f =				
See Table L.6.7.13.	h_z =				

Failure of Internal Systems – L_O

See Table L.6.7.9.			L_O =		

Risk Components

Risk of Injury or Loss of Life from a Direct Strike to a Structure – R_A

	N_D =				
$R_A = (N_D)(P_A)(L_A)$	P_A =		R_A =		
	L_A =				

Risk Components *(continued)*

Risk of Physical Damage Due to a Direct Strike to Structure – R_B

	N_D =				
$R_B = (N_g)(P_B)(L_B)$	P_B =		R_B =		
	L_B =				

Risk of Failure of Internal Systems from a Direct Strike to the Structure – R_C

	N_D =				
$R_C = (N_g)(P_C)(L_O)$	P_C =		R_C =		
	L_O =				$L_O = L_O$

Risk of Failure of Internal Systems from a Strike Near Structure – R_M

	N_M =				
$R_M = (N_M)(P_M)(L_M)$	P_M =		R_M =		
	L_M =				$L_M = L_O$

Risk of Injury to Living Beings from a Direct Strike to Incoming Service – R_U

	N_L =				
$R_U = (N_I + N_{DJ})(P_U)(L_U)$	N_{DJ} =		R_U =		
	P_U =				
	L_U =				

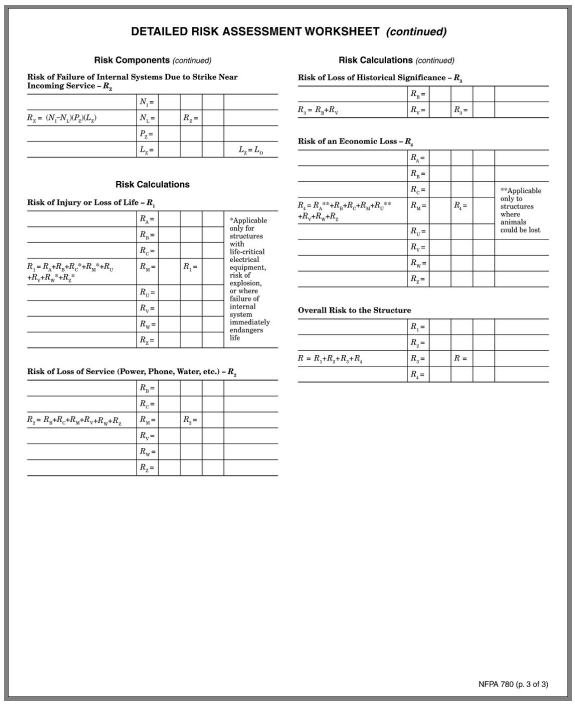
Risk of Physical Damage Due to a Direct Strike to Incoming Service – R_V

	N_L =				
$R_V = (N_I + N_{DJ})(P_V)(L_V)$	N_{DJ} =		R_V =		
	P_V =				
	L_V =				

Risk of Failure of Internal Systems Due to Direct Strike to Incoming Service – R_W

	N_L =				
$R_W = (N_I + N_{DJ})(P_W)(L_W)$	N_{DJ} =		R_W =		
	P_W =				
	L_W =				$L_W = L_O$

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DETAILED RISK ASSESSMENT WORKSHEET *(continued)*

Risk Components *(continued)*

Risk of Failure of Internal Systems Due to Strike Near Incoming Service – R_2

	N_1 =				
$R_2 = (N_T - N_1)(P_2)(L_2)$	N_1 =		R_2 =		
	P_2 =				
	L_2 =				$L_2 = L_U$

Risk Calculations

Risk of Injury or Loss of Life – R_1

	R_A =				*Applicable only for structures with life-critical electrical equipment, risk of explosion, or where failure of internal system immediately endangers life
	R_B =				
	R_C =				
$R_1 = R_A + R_B + R_C + R_M + R_V + R_L + R_H + R_Z$	R_M =		R_1 =		
	R_L =				
	R_V =				
	R_H =				
	R_Z =				

Risk of Loss of Service (Power, Phone, Water, etc.) – R_3

	R_D =				
	R_L =				
$R_3 = R_B + R_C + R_M + R_V + R_H + R_Z$	R_M =		R_3 =		
	R_V =				
	R_H =				
	R_Z =				

Risk Calculations *(continued)*

Risk of Loss of Historical Significance – R_4

	R_B =				
$R_4 = R_B + R_V$	R_V =		R_4 =		

Risk of an Economic Loss – R_5

	R_A =				
	R_B =				
	R_C =				**Applicable only to structures where animals could be lost
$R_5 = R_A{}^{**} + R_B + R_C + R_M + R_V{}^{**} + R_L + R_H + R_Z$	R_M =		R_5 =		
	R_V =				
	R_H =				
	R_Z =				

Overall Risk to the Structure

	R_1 =				
	R_2 =				
$R = R_1 + R_2 + R_3 + R_4$	R_3 =		R =		
	R_4 =				

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Statement of Problem and Substantiation for Public Input

The "Equivalent Collective Area" used in Page 1 of Figure L.6.8 refers to the same "Equivalent Collection Area" calculations as in Annex L.4.

Figure L.6.8 should be updated to use the terminology of "Equivalent Collection Area" for consistent naming of the same calculation.

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Public Input No. 150-NFPA 780-2026 [New Section after O.1.2.4]

O.2.3 Lightning Protection Institute *Standard of practice for the Design-Installation-Inspection of Lightning Protection Systems LPI-177* /2017 Edition; Visual Maintenance Checklist

renumber rest of the section accordingly

Statement of Problem and Substantiation for Public Input

Reference for the source of the Visual Maintenance-Inspection Checklist added to Annex D

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Public Input No. 130-NFPA 780-2026 [Section No. O.1.2.6]

O.1.2.6 ULSE Publications.

UL Standards & Engagement, 1603 Orrington Avenue, Suite 2000, Evanston, IL 60201.

UL 497, *Protectors for Paired-Conductor Communications Circuits*, 2001, revised 2022.

UL 497A, *Secondary Protectors for Communications Circuits*, ~~2001, revised 2019~~ 2024 .

UL 497B, *Protectors for Data Communications and Fire-Alarm Circuits*, 2004, revised 2022.

UL 497C, *Protectors for Coaxial Communications Circuits*, 2001, revised 2022.

UL 497D, *Outline of Investigation for Component Secondary Protectors for Communications Circuits Used with Specified Voltage Suppression*, ~~2007~~ 2016 .

UL 497E, *Outline of Investigation for Protectors for Antenna Lead-In Conductors*, ~~2011~~ 2016 .

UL 1449, *Surge Protective Devices*, ~~2021, revised 2022~~ 2025 .

Statement of Problem and Substantiation for Public Input

Update references

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Public Input No. 139-NFPA 780-2026 [Section No. O.1.2.7]

O.1.2.7 Other Publications.

ANSI C2, *National Electrical Safety Code® (NESC®)*, 2023.

Bengtsson, et al., 2001.

Hernández, et al., 2011.

ISO 1496, *Series 1 freight containers — Specification and testing — Part 1: General cargo containers for general purposes*, 2013.

"Lightning Direct Effects Handbook," Advanced General Aviation Transportation Experiments (AGATE), National Institute for Aviation Research (NIAR), Wichita State University, Kansas, 2002.

López, R. E., and L. R. Holle, "Lightning Casualties and Damages in the United States from 1959 to 1994," *Journal of Climate*, No. 13 (19): pp. 3448–3464, October 2000.

Moore, C. B., et al., "Lightning Rod Improvement Studies," *Journal of Applied Meteorology and Climatology*, No. 39 (5): pp. 593–609, May 2000.

NEMA 250, *Enclosures for Electrical Equipment (1,000 Volts Maximum)*, 2020.

NEMA 500093, Cascade, Multi-Level, or Hierarchical Surge Protection Systems, 2026

Scalvini, R., "Carbon and Lightning," *Professional Boatbuilder*, No. 128: pp. 41–61, December/January 2011.

Statement of Problem and Substantiation for Public Input

Essential facilities have electrical systems that are expected to tolerate and withstand transient energy above and beyond the systems installed for ordinary structures. This public input adds this extra layer of surge protection for electrical systems installed at essential facilities by requiring cascading, multi-level, or hierarchal surge protection on the electrical distribution system. A definition of "essential facility" is being proposed in an alternate public input, and the term is defined by the International Building Code (IBC).

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