



Section 26 41 13 (Formerly 16670) – LIGHTNING PROTECTION SYSTEM SPECIFICATION

Part 1 – GENERAL

1.01 Summary:

- a. Provide a complete lightning protection system for the building(s) or structures shown on the contract drawings. The design of this system is to be in strict accordance with this section of the specifications and all contract drawings that apply.
- b. The lightning protection system shall be installed by a firm actively engaged in the installation of Underwriters Laboratories Inc. (UL) Master Labeled Lightning Protection Systems and shall be so listed by Underwriters Laboratories Inc. The completed system shall comply with the latest editions of Underwriters Laboratories Inc. "Installation Requirements for Lightning Protection Systems, UL96A" and of the National Fire Protection Association's "NFPA® 780, Standard for the Installation of Lightning Protection Systems". The system shall be physically inspected by UL and the Master Label® Certificate of Inspection shall be provided to the building owner and made available for viewing on the UL website, <https://lps.ul.com>.
- c. The work covered under this section of the specification consists of furnishing labor, materials and services required for the completion of a functional and unobtrusive lightning protection system approved by the architect, engineer and Underwriters Laboratories Inc.

1.02 Standards: The completed lightning protection system shall comply with the latest issue of the following standards which form a part of this specification. Where conflicts occur between the two standards, the requirements of NFPA®780 shall apply.

1. NFPA® 780, Standard for the Installation of Lightning Protection Systems.
2. UL 96A, Installation Requirements for Lightning Protection Systems

1.03 Submittals:

- a. Product Data: Submit manufacturer's descriptive and technical literature and catalog cuts.
- b. Shop drawings: Submit installation shop drawings shall be submitted to the architect and engineer for coordination with other trades and approval prior to start of the installation. Shop drawings are to show the extent of the system layout designed specifically for the building(s) or structures included in the contract drawings along with installation details of the products to be used in the installation.



1.04 Quality Assurance:

The installing contractor shall apply for inspection of the completed system by UL field representatives. The system is to be inspected by Underwriters Laboratories Inc, or other ANSI certified testing agency for compliance with NFPA® 780. The system shall be without deviation and the UL field representative will issue a UL Master Label® Certificate of Inspection for Lightning Protection Systems or Letter of Findings at completion of the installation, as indicated in section 3.04 below.

Part 2 – PRODUCTS

2.01 Materials:

All materials used in the installation shall be new and shall comply in weight, size and composition as required by UL 96A and NFPA® 780 and shall be labeled or listed by Underwriters Laboratories Inc. for use in lightning protection systems. The system furnished under this specification shall be the standard product of a manufacturer regularly engaged in the production of lightning protection equipment. The manufacturer shall be listed by UL as a manufacturer of lightning protection components.

2.02 Acceptable Manufacturers:

Harger Lightning & Grounding
301 Ziegler Drive, Grayslake, IL 60030
847-548-8700 • 800-842-7437 • Fax 847-548-8755
E-mail: hargersales@harger.com • Website: www.harger.com

2.03 Material Requirements:

- a. Class I materials shall be used on structures or portions of structures that do not exceed 75 feet in height above grade level. Class II materials shall be used on structures that exceed 75 feet in height above grade.
- b. Copper materials shall not be mounted on aluminum, Galvalume®, galvanized steel or zinc surfaces. This includes those materials that have been painted.
- a. Aluminum materials shall not come into contact with earth or where rapid deterioration is possible. Aluminum materials shall not come into contact with copper surfaces or where exposed to runoff from copper surfaces. Aluminum materials shall not be attached to surfaces covered with alkaline-based paint, embedded in concrete or masonry, or installed in a location subject to excessive moisture.



2.04 Air Terminals

- a. Air terminals shall extend a minimum of ten inches above the object or area they are to protect. Air terminals shall be located at intervals not exceeding 20'-0" along ridges of pitched roofs and along the perimeter of flat or gently sloping roofs (flat or gently sloping roofs include roofs that have a pitch less than 3:12). Flat or gently sloping roofs exceeding 50'-0" in width shall be provided with additional air terminals located at intervals not exceeding 50'. Air terminals shall be located within two feet of the ends of ridges, roof edges and outside corners of protected areas.
- b. Air terminals shall be installed on stacks, flues, mechanical units and other objects not located within a zone of protection. Permanent metal objects on the structure having an exposed metal thickness 3/16" or greater may be substituted for air terminals and shall be connected to the lightning protection system as required by the specified standards using main size conductor and bonding plates having a minimum of 3 square inches of surface contact area.
- c. Air terminal bases shall be securely fastened to the structure in accordance with the specified standards. Fasteners may include stainless steel screws, bolts, nails, anchors or adhesive. Adhesive shall be compatible with the surface on which it is used. Any protective sheets or pads that may be required by the roofing manufacturer shall be furnished and installed by the roofing contractor.
- d. Main conductors shall be sized as Class I or Class II materials in accordance with the specified standards. Conductors shall provide a two way, horizontal or downward path from each strike or air terminal to connections to the lightning protection ground electrode system. Conductors shall be free of excessive splices and no bend of a conductor shall form an included angle of less than 90 degrees nor have a radius of bend less than 8 inches.
- e. Conductors shall be securely fastened to the structure on which they are placed at intervals not exceeding 3 feet. Fasteners shall be of the same material or of a material equally resistant to corrosion as that of the conductor. Any protective sheets or pads that may be required by the roofing manufacturer shall be furnished and installed by the roofing contractor.
- f. Connector fittings shall be listed for the purpose and of the same material as the conductor or of electrolytically compatible materials.
- g. Down conductors shall be sized as Class I or Class II materials in accordance with the specified standards. Class II conductors from a higher portion of a structure shall continue to connections to the lightning protection ground electrode system. Down conductors shall be spaced at intervals averaging not more than 100 feet around the perimeter of the structure. In no case shall a structure have fewer than two down conductors. Where down conductors are installed exposed on the exterior of a structure and are subject to physical damage or displacement, guards shall be used to protect the conductor a minimum of 6 feet above grade. Metallic guards shall be bonded at each end.



- h. In case of structural steel frame construction, down conductors may be omitted and roof conductors shall be connected to the structural steel frame at intervals not exceeding 100 feet along the perimeter of the structure.

2.05 Roof Penetrations

Roof penetrations required for down conductors or for connection to structural steel framework shall be made using thru-roof assemblies with solid riser bars or conduits and appropriate roof flashing. Conductors shall not pass directly through the roof. The roofing contractor shall furnish and install the materials required to properly seal all roof penetrations of the lightning protection components and any additional roofing materials or preparations required by the roofing manufacturer for lightning conductor runs to assure compatibility with the warranty for the roof including roof pads that may be required to protect the roof under each of the lightning protection components.

2.06 Ground Electrodes:

- a. Each down conductor shall terminate at a ground electrode dedicated to the lightning protection system, or to a building or facility ground electrode system that consists of multiple ground electrodes that are interconnected with a ground ring conductor.
- b. Ground rod electrodes shall be copper-clad steel, a minimum 5/8" diameter and 10 feet long. The down conductor shall be connected to the ground electrode using a bronze ground rod clamp having a minimum of 1½" contact between the ground rod electrode and the conductor measured parallel to the axis of the ground rod electrode, or by an Ultraweld exothermically welded connection. Ground rod electrodes shall be located a minimum of 2 feet below grade and shall be installed below the frost line where possible (excluding shallow topsoil conditions).
- c. Where it is not possible to drive ground rod electrodes because of bedrock or shallow topsoil conditions, ground plate electrodes, radial electrodes, ground ring electrodes, concrete-encased electrodes, or combinations of these may be used in accordance with NFPA® 780.
- d. Where the structural steel framework is utilized as down conductors for the system, ground electrodes shall be connected to columns around the perimeter of the structure at intervals averaging not more than 60 feet apart. Columns shall be grounded using either bonding plates having 8 square inches of surface contact area or by Ultraweld® exothermically welded connections.

2.07 Common Bonding of Grounded Systems

- a. Common bonding of all grounded systems within the building shall be ensured by interconnecting them to the lightning protection system using main size conductor and fittings.
- b. For structures exceeding 60 feet in height, the interconnection of the lightning protection system ground electrodes and other grounded systems shall be in the form of a ground loop conductor.



- c. These grounded systems shall include but are not limited to the electrical service, communication, and antenna system grounds as well as all underground metallic piping systems including water, gas, sewer, underground metallic conduits, etc. Interconnection to a gas line shall be made on the customer's side of the meter.

2.08 Potential Equalization

- a. Grounded metal bodies located within the required bonding distance as determined by the bonding distance formula in NFPA® 780 shall be bonded to the lightning protection system using the required bonding conductors and connections.

2.09 Surge Protection Devices

- a. Surge protection devices (SPD) shall be provided at all power service entrances and at entrances of conductive signal, data and communication services.
- b. AC SPD's shall be listed and labeled as compliant with UL 1449, 3rd Edition and shall have a nominal discharge current (I_n) rating of at least 20 kA 8/20 μ s per phase.
- c. SPD's shall be listed for the protection of conductive signal, data, and communication services shall have a maximum discharge current (I_{max}) rating of at least 10 kA 8/20 μ s when installed at the entrance.

Part 3 – EXECUTION

3.01 Installation

- a. The installation of the lightning protection system shall be done in a neat and workmanlike manner.
- b. The lightning protection system shall be installed by or under the supervision of a UL listed lightning protection installer.
- c. The installers shall have completed factory training and be so certified by the manufacturer.
- d. Install the lightning protection system in accordance with the approved coordinated shop drawing and the referenced lightning protection system installation standards. Any deviations shall be brought to the immediate attention of the manufacturer so as not to delay certification.

3.02 Coordination

- a. Coordinate the installation of the lightning protection system with other trades.
- b. Coordinate all roof penetrations, fasteners and adhesive with the roofing contractor prior to installing any materials on the roof.



3.03 Project Documentation

- a. Photo document all concealed portions of the lightning protection system as they are being installed. This includes lightning protection system grounding electrodes, connections to structural metal, connections to underground metal piping entering the structure, connections to electrical and electronic service grounds, ground rings, etc. This documentation should be authenticated by the owner or his representative.
- b. Maintain accurate "as-built" drawings throughout the entire installation of the lightning protection system.

3.04 Inspection, Certification and Maintenance

- a. At completion of the installation of the lightning protection system, the contractor shall apply for inspection of the system by UL field representatives. The system is to be inspected for compliance with NFPA[®] 780.
- b. If the lightning protection system covers an entire independent structure and the system passes inspection, UL will issue a Master Label[®] Certificate of Inspection for Lightning Protection System. The contractor will submit the certificate for distribution to the premises' owner. For the certificate to be valid, the contractor must publish the certificate to the UL website, <https://lps.ul.com> where it may be viewed by consumers, building owners, insurance agencies and other interested parties. The Master Label[®] Certificate of Inspection is valid for a period of five years. If the building changes structurally or if modifications are made to the system during that period, the certificate is no longer valid.
- c. If the scope of the lightning protection system is limited by contractual or other reasons, the installer may limit the scope of the UL inspection. In those cases where the entire system is not inspected, a Master Label[®] Certificate of Inspection will not be issued by UL. They will issue a Letter of Findings of their inspection indicating compliance with the limited scope of the inspection.
- d. At project closeout, the contractor shall provide the owner with accurate as-built drawings as well as recommended guidelines for maintenance of the system.

END OF SECTION 26 41 13

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