

SECTION 26 41 13

LIGHTNING PROTECTION SYSTEM FOR STRUCTURES

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
1. CONTRACTOR shall provide all labor, materials, equipment, services, and incidentals shown, specified, and required to furnish and install lightning protection systems buildings and structures as shown on the drawings and described in this specification.
 2. The installer shall design, install and certify the system.
- B. Coordination:
1. Review installation procedures included under other Sections and coordinate installation of items to be installed with or before lightning protection systems.
- C. Related Sections:
1. Section 26 05 26, Grounding and Bonding for Electrical Systems.

1.2 REFERENCES

- A. Standards referenced in this Section are:
1. Lightning Protection Institute (LPI), LPI 175, Standard of Practice.
 2. LPI 176, Standard of Materials.
 3. NFPA 70, National Electrical Code.
 4. NFPA 780, Standard for the Installation of Lightning Protection Systems.
 5. UL 96A, Installation Requirements for Lightning Protection Systems.
 6. UL 651, Schedule 40 and 80 PVC Conduit.

1.3 QUALITY ASSURANCE

- A. Qualifications:
1. Delegated Design - Lightning Protection System Subcontractor:
 - a. Retain services of lightning protection Subcontractor regularly engaged in providing Master Labeled lightning protection systems.
 2. Subcontractor shall be LPI-certified Master Installer or Inspector.
 3. Subcontractor shall be listed with UL.
- B. Component Supply and Compatibility:
1. Obtain all materials equipment included in this Section regardless of component manufacturer from a single lightning protection system manufacturer.
 2. Lightning protection system manufacturer shall review and approve or prepare

all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for specified service conditions and shall be integrated into the overall system by lightning protection system manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Complete scaled drawings showing proposed routing and layout of lightning protection system with installation details. Drawings shall include equipment connection details and downlead details.
 - b. Provide signed and sealed Shop Drawings and calculations, which are prepared by delegated design Registered Professional Engineer licensed in the State in which the lightning protection system will be installed and who may be an employee of the Lightning Protection System Subcontractor.
 - c. Certification by delegated design professional engineer that design of lightning protection system was performed in accordance with performance and design criteria stated in the Contract Documents, and that design complies with Laws and Regulations and prevailing standards of practice.
2. Product Data:
 - a. Manufacturer's catalog cuts and technical information.
 - b. Technical specifications.

B. Informational Submittals: Submit the following:

1. Certificates:
 - a. Certificates of LPI code compliance provided by manufacturer, together with UL Master Label certificate or letter of finding.
2. Field Quality Control Submittals:
 - a. Master Installer or Inspector's final inspection report following installation.
3. Qualifications Statements:
 - a. Lightning protection system Subcontractor.
 - b. Delegated design professional engineer, if requested.

1.5 GUARANTEE

A. Guarantee:

1. Lightning protection system shall be guaranteed by lightning protection system manufacturer against defective parts and installation for one year from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 SYSTEM PERFORMANCE

A. System Description:

1. Each lightning protection system shall consist of a complete cable network on the roof or top of structure involving all air terminals, splices, and bonds with cable downloads routed concealed either directly in the building construction or in conduit to ground, and ground rods all connected together in an appropriate manner and certified by LPI to provide a zone of protection to entire building against lightning strikes, in accordance with NFPA 780.
2. Provide complete, certified lightning protection system. Provide bonding connections and miscellaneous items for complete system.

2.2 MANUFACTURERS

A. Manufacturers: Provide products of one of the following:

1. Heary Brothers Lightning Protection Company.
2. Thompson Lightning Protection, Inc.
3. Approved equivalent.

2.3 MATERIALS

A. General:

1. Size materials in accordance with NFPA 780, UL 96A, and LPI 176.
2. Materials and equipment shall be labeled or listed by UL for use in Master Labeled lightning protection systems. Completed system shall conform to NFPA 70, NFPA 780, LPI 175, LPI 176, and UL96A.
3. Materials shall comply in weight, size, and composition for class of structure to be protected in accordance with the following:
 - a. Use Class I materials for systems on structures not exceeding 75 feet in height.
 - b. Use Class II materials for systems on structures exceeding 75 feet above grade.
4. Materials shall be corrosion-resistant, heavy-duty type. Unless otherwise specified, materials shall be Type 316 stainless steel, copper, or high copper-content bronze castings. Bolts, screws, and hardware shall be Type 316 stainless steel.
5. Use aluminum materials in locations where system components are mounted on aluminum surfaces to avoid electrolytic corrosion of dissimilar metals. Also use where in contact with concrete to avoid staining.
6. Provide fittings, mounting bases, couplings, connectors, fasteners, and other system devices required for complete system.

B. Ground Rods: Comply with Section 26 05 26, Grounding and Bonding for Electrical Systems.

C. Ground Cables:

1. Ground cables shall be copper, except in connections to aluminum surfaces as required to prevent dissimilar metals reaction.
 2. Ground cable stranding, number and size shall be suitable for classification of structure to be protected.
 3. Exposed ground cable shall be corrosion resistant.
- D. Air Terminals:
1. Air terminals shall be stainless steel 5/8-inch diameter and minimum of 18 inches long.
 2. Air terminals shall include a cast bronze point protector, stainless steel adapter, and copper base.
- E. Non-Metallic Conduit and Fittings:
1. Non-metallic conduit shall be Schedule 80 PVC plastic, rated for 90 degrees C, conforming to UL 651.
 2. Non-metallic fittings shall be of same material and manufacturer as base conduit. Provide cement for joining fittings to conduit. Fittings shall be by same manufacturer as base conduit.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine the conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install main conductors to provide two-way path from each air terminal horizontally or downward to connections with ground terminals.
- B. Install conductors free of excessive splices and sharp bends. Conductor bends shall form an included angle of not less than 90 degrees and shall not have bend radius less than eight inches. Secure conductors to structure at intervals not exceeding three feet.
- C. Conceal down conductors where possible in exterior wall construction. Space down conductors at intervals averaging not more than 100 feet around perimeter of structure. Provide at least two down conductors for each protected structure.
- D. For structural steel frame construction, down conductors at upper and lower extremities and at intervals not exceeding 200 feet shall be connected to structural steel. Make connections to steel frame with bonding plates having eight square inches of contact, or by exothermic weld connections.

- E. Provide air terminals at intervals not exceeding 20 feet along ridges and around perimeter of flat or gently-sloping roofs. Air terminals shall project a minimum of 10 inches above the area protected.
- F. Protect flat or gently-sloping roofs exceeding 50 feet in width, by providing additional air terminals at intervals not exceeding 50 feet on flat or gently-sloping area. Locate air terminals within two feet of roof edges and outside corners of protected areas. Air terminal spacing exceeding these dimensions will be allowed if the area protected is within a “zone of protection” from lightning strikes.
- G. Provide air terminals for stacks, flues, mechanical equipment, and other objects, having metal thickness less than 3/16-inch and not located within a “zone of protection”. Connect objects having metal thickness 3/16-inch or greater to lightning protection system.
- H. Do not connect copper equipment to aluminum surfaces, except using bimetal transition fitting. Lead coating is unacceptable for bimetal transition.
- I. Install roof penetrations using through-roof assemblies with solid bars and appropriate roof flashing. Conductors shall not pass directly through roof.
- J. Grounded metal bodies shall be bonded to the system using bonding connections and fittings. When ground conductors are installed in conduit, conduit shall be non-metallic.
- K. Bond building ground systems including electrical, communication, and telephone services and arresters.
- L. Bond metal pipes and roof mounted metal structure to the roof ground loop or to downlead cables.
- M. Provide ground electrodes for each down conductor dedicated for lightning protection system and bond electrodes to building or structure grounding system. Connect down conductor to ground rod using high-strength, removable ground clamp. Provide bronze ground rod clamp having at least 1.5 inches of contact between rod and conductor, measured parallel to the axis of the rod, at ground test wells.

3.3 FIELD QUALITY CONTROL

- A. Inspection:
 - 1. During installation, lightning protection system shall be inspected by Master Installer or Inspector at several stages during installation in accordance with LPI requirements.
 - 2. Do not conceal system components until inspection has been completed and successfully inspected, and observed by ENGINEER.

3. Upon completion of lightning protection system, arrange for final lightning system inspection and submit final inspection report to ENGINEER. Final lightning system inspection shall be performed by Master Installer or Inspector in accordance with LPI requirements.
4. Provide an LPI Master Installation Certificate inside the electrical room of each building after all required inspections and procedures have been completed.

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