# SECTION 26 41 13
# LIGHTNING PROTECTION FOR STRUCTURES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Lightning Protection System Components

B. Meet the following performance requirements:

1. A complete UL Master Labeled lightning protection system shall be provided for all buildings, structures, roof, equipment yard enclosures (walls or fences), and ground mounted equipment, mechanical equipment, generators, switchgear/switchboards, etc. associated with this project.
2. Provide dedicated lightning protection down conductors, building steel or enclosure structure alone is not acceptable.
3. Lightning Protection Installer to verify that the surge protection system meets the UL master label requirements at the beginning of the project. If not acceptable notify the Electrical Installer.

C. System Description:

1. Provide as required to provide a complete lightning protection system on building structure, equipment yard enclosures (walls or fences), as well as chiller plant, generator enclosures, and roof mounted equipment consisting of strike termination devices (lightning rod, air terminals), down and cross conductors, ground terminals, interconnection conductors, arresters, and other connectors or fittings required for a complete system.
2. All systems are to be designed and provided by a Lightning Protection Installer.
3. Entire system shall be provided with a U.L. Master Label when complete.

### 1.2 RELATED WORK

A. Section 26 00 10– Basic electrical requirements, is an integral part of this section. Requirements and work indicated in 26 00 10 are not repeated in this Section.

### 1.3 COORDINATION

A. Coordinate work under provisions indicated in Section 26 00 10:

B. Coordinate installation of lightning protection with installation of other building systems and components, including electrical wiring, supporting structures and building materials, metal bodies requiring bonding to lightning protection components, and building finishes.

C. Coordinate installation of air terminals attached to roof systems with roofing manufacturer and Installer.

D. Flashings of through-roof assemblies shall comply with roofing manufacturers' specifications.

## 1.4 QUALIFICATIONS / QUALITY ASSURANCE

A. Conform to requirements indicated in Section 26 00 10.

B. Provide systems designed and installed by a Lightning Protection Installer.

C. Provide a “Certificate of Compliance” for work performed after completion. The certificate should state that the following has been done:

1. The Installer has complied with all requirements of Underwriters’ Laboratories, Inc. Master Label Service as outlined in UL 96A including the completion and execution of the Master Label application form and the procurement and delivery of the UL “C” plate to the Owner or his representative.
2. The lightning protection system ground system has been tested and interconnected to the facility grounding system as required by NFPA-70 and NFPA 780.
3. As-built drawings have been turned over to the Owner or his representative.

D. Use NRTL listed components.

## 1.5 REGULATORY REQUIREMENTS AND STANDARDS

A. Conform to requirements indicated in Section 26 00 10 in addition to following:

1. Underwriters’ Laboratories, Inc. (UL):
   a. UL-96: Lightning Protection Components.
   b. UL-96A: Installation Requirements for Lightning Protection Systems.
   c. UL STANDARD 467: Grounding and Bonding Equipment

2. National Fire Protection Association (NFPA):
   a. NFPA-70: National Electrical Code.
   b. NFPA-780: Lightning Protection Code.

## 1.6 SUBMITTALS

A. Submit as required here in and under Section 26 00 10.

B. Shop Drawings:

1. Consisting of a complete list of equipment and materials, including manufacturer’s descriptive and technical literature, catalog cuts, installation instructions.
2. Shop drawings indicating type, placement, and location of protection devices, including cable attachments, grounding, mounting and any other details integral with the system.
3. Layout of the lightning protection system, along with details of the components to be used in the installation.
4. Include indications for use of raceway, data on how concealment requirements will be met, and calculations required by NFPA 780 for bonding of grounded and isolated metal bodies.

C. Qualification Data: For qualified Installer and manufacturer. Include data on listing or certification by UL.

D. Certification, signed by Contractor, that roof adhesive is approved by manufacturer of roofing material.

E. Field quality-control reports.

F. Comply with recommendations in NFPA 780, Annex D, "Inspection and Maintenance of Lightning Protection Systems," for maintenance of the lightning protection system.

G. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features, including the following:

1. Ground rods.
2. Ground loop conductor.
3. Test wells.

H. Inspection and Maintenance: Provide a written recommended inspection and maintenance procedure, including periodicity of inspections.

### 1.7 EXTRA MATERIALS

A. Furnish under provisions indicated in Section 26 00 10.

### 1.8 PROJECT RECORD DOCUMENTS

A. Submit under provisions indicated in Section 26 00 10.

B. As-Built Drawings: Provide a complete set of “As-Built” drawings showing the location of all grounds as well as a detailed layout of type, size, location and method of installation of all downleads, roof cables, bonding leads and connections, air terminals, etc., and in the case where structural steel is used for downleads, the method and location of all roof and ground connections to the steel must be clearly detailed.

### 1.9 OPERATION AND MAINTENANCE DATA

A. Submit under provisions indicated in Section 26 00 10.

### 1.10 WARRANTY

A. Provide under provisions indicated in Section 26 00 10.

## PART 2 - PRODUCTS

### 2.1 LIGHTNING PROTECTION SYSTEM COMPONENTS

A. Roof-Mounted strike termination devices (lightning rod, air terminals): NFPA 780, Class I, aluminum or unless otherwise indicated match existing.

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturer specified:

a. East Coast Lightning Equipment Inc.
b. ERICO International Corporation.
c. Harger.
d. Heary Bros. Lightning Protection Co. Inc.
e. Independent Protection Co.
f. Preferred Lightning Protection.
g. Robbins Lightning, Inc.

h. Thompson Lightning Protection, Inc.
i. East Boston Lightning rod, air terminal Co, Inc.
j. American Lightning rod, air terminal Co.
k. Substitutions: Under provisions of Section 26 00 10.

2. Strike termination devices (lightning rod, air terminals) more than 24 Inches (600 mm) long: With brace attached to the device at not less than half the height of the device.
3. Single-Membrane, Roof-Mounted strike termination devices (lightning rod, air terminals): Designed specifically for single-membrane roof system materials. Comply with requirements in Division 07 roofing Sections.

B. Main and Bonding Conductors: Copper – Use aluminum conductor where in contact with aluminum roofing components.

C. Ground Loop Conductor: The same size and type as the main conductor except tinned.

D. Ground Rods: Copper-clad steel sectional type; 3/4 inch (19 mm) in diameter by 10 feet (3 m).

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Install lightning protection components and systems according to UL 96A and NFPA 780.

B. Install conductors with direct paths from strike termination devices (lightning rod, air terminals) to ground connections. Avoid sharp bends.

C. No bend of conductor is to form an included angle of less than 90 degrees nor have a radius of bend less than 8 inches (203 mm).

D. Interconnect all conductors, strike termination devices (lightning rod, air terminals) to form a two-way path from each strike termination devices (lightning rod, air terminals) horizontally or downward to connections with ground terminals.

E. Conductors may be coursed through air without support for a distance of 3 feet (900 mm) or less. With a 5/8 inch (15.9 mm) rod or its equivalent as a support, securely fastened at each end, a conductor may be coursed through air for a distance not to exceed 6 feet (1800 mm).

F. Install roof conductors to interconnect all strike termination devices (lightning rod, air terminals) and provide a two-way path to ground horizontally or downward from the base of each terminal.

G. Install at least two down conductors on any kind of structure. Location depends on placement of strike termination devices (lightning rod, air terminals), size of structure, most direct coursing, security against displacement and location of metallic bodies, water pipes, and ground conditions. Separate down conductors as widely as practicable. For structures over 200 feet (71 m) in perimeter, install one additional down conductor for each additional 100 feet of perimeter or fraction thereof. Provide down conductors in addition to any building steel connection.

H. Terminate each down conductor at a ground terminal.

I. Bond, cellular phone, microwave, radio and television masts of metal, located on a protected building, to the lightning protection system with a main-size conductor and fittings.

J. Use connector fittings on all lightning conductors at “end-to-end” “tee” or “Y” splices. Attach them so as to withstand a pull test of 200 pounds (890 N). Make fittings for connection to metal tracts, gutters, downspouts, ventilators, chimney extensions, or other metal parts about the structure tight to the object by compression under bolt heads. Both crimp type and exothermic weld splicers of stamped or cast metal are acceptable under Class I requirements. Do not use crimp type clamps and splicers in Class II installations.

K. Securely attach conductors to the building or other object upon which they are placed. Use fasteners not subject to breakage. Furnish nails, screws and bolts, with which fasteners are secured, of the same material as the conductor or of such nature that there will be no electrolytic corrosion in the presence of moisture because of contact between the different parts. Space conductor fasteners not more than 3 feet (900 mm) apart on all conductors.

L. All requirements covering exposed systems apply to concealed installations. Conductors are coursed the same way except that they may be coursed behind they may be coursed behind the exterior wall facing, in concealed or embedded conduit, or embedded directly in concrete.

M. In a concealed installation where conductors are embedded in concrete, bond the reinforcing steel to the cable with a main size conductor. Bond reinforcing steel at the top and bottom of each embedded downlead.

N. Provide lightning protection for roof mounted equipment.

O. Materials, installation methods and procedures are to be in accordance with UL-96 and 96A, NFPA 780, NEC and local electrical codes. Provide for and obtain a “Certificate of Compliance” for the work performed.

P. Bond to metallic components in the area of lightning protection conductors in accordance with NFPA 780.

Q. Conceal the following conductors:

1. System conductors.
2. Down conductors.
3. Interior conductors.
4. Conductors within normal view of exterior locations at grade within 200 feet (60 m) of building.

R. Where any part of a protection system is exposed to mechanical injury, provide protection by covering it with molding or tubing. If ferrous metal pipe or tubing at both ends.

S. Cable Connections: Use exothermic-welded connections for all conductor splices and connections between conductors and other components.

1. Exception: In single-ply membrane roofing, exothermic-welded connections may be used only below the roof level.

T. Strike termination devices (lightning rod, air terminals) on Single-Ply Membrane Roofing: Comply with roofing membrane and adhesive manufacturer's written instructions.

U. Bond extremities of vertical metal bodies exceeding 60 feet (18 m) in length to lightning protection components.

V. Ground Loop: Connect to ground-level, potential equalization conductor and extend around the perimeter of structure or area or item indicated.

1. Bury ground ring not less than 24 inches (600 mm) from building foundation.
2. Bond ground terminals to the ground loop.
3. Bond grounded building systems to the ground loop conductor within 12 feet (3.6 m) of grade level.

W. Bond lightning protection components with intermediate-level interconnection loop conductors to grounded metal bodies of building at 60-foot (18-m) intervals.

X. Provide lightning protection for generator enclosures. Provide at least two down conductors at opposite corners to the ground ring. Bond to the enclosure structure at each down conductor.

## 3.2 CORROSION PROTECTION

A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.

B. Use conductors with protective coatings where conditions cause deterioration or corrosion of conductors.

## 3.3 FIELD QUALITY CONTROL

A. Notify Architect at least 48 hours in advance of inspection before concealing lightning protection components.

B. UL Inspection: Meet requirements to obtain a UL Master Label for system.

**END OF SECTION**