

## SECTION 264113 LIGHTNING PROTECTION FOR STRUCTURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes:
  - 1. Provide all labor, materials, and equipment as necessary to complete all work as indicated on the drawings, and as specified herein.
  - 2. The Contractor shall furnish and install a complete lightning protection system with all necessary components for a complete and operational system.
- B. Related Sections include the following:
  - 1. Division 01 Section "Construction Waste Management"
  - 2. Division 01 Section "Sustainable Design Requirements - LEEDv4 BD+C" for additional LEED requirements

#### 1.3 SYSTEM DESCRIPTION

- A. The entire lightning protection system shall be manufactured and installed in accordance with Underwriters Laboratories, Inc. Pamphlet no. UL96A Master Labeled Lightning Protection Systems.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Isometric and plan views showing layout and connections to the required metal surfaces.
  - 2. Show the methods of mounting the system to the adjacent construction.
  - 3. Qualifications: Submit proof that the installer of the lightning protection system has had suitable and adequate experience installing other lightning protection systems and is capable of installing the system as recommended by the manufacturer of the equipment.
  - 4. Certification: Two weeks prior to final inspection, submit four copies of the following certifications to the Engineer:
    - a. Certification that the lightning protection system has been properly installed and tested.

- b. Certification that the lightning protection system has been inspected by a UL representative and has been approved by UL without variation.
- c. Include layouts of the lightning protection system, with details of the components to be used in the installation.
- d. Include raceway locations needed for the installation of conductors.
- e. Details of air terminals, ground rods, ground rings, conductor supports, splices, and terminations, including concealment requirements.
- f. Include roof attachment details, coordinated with roof installation.
- g. Calculations required by NFPA 780 for bonding of metal bodies.

#### **1.5 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Lightning Protection System Shop Drawings, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Lightning protection cabling attachments to roofing systems and accessories.
  - 2. Lightning protection strike termination device attachment to roofing systems, coordinated with the roofing system manufacturer.
  - 3. Lightning protection system components penetrating roofing and moisture protection systems and system components, coordinated with the roofing system manufacturer.
  - 4. Lightning protection system coordination with the building grounding system.
- B. Qualification Data: For Installer.
- C. Product Certificates: For each type of roof adhesive for attaching the roof-mounted air terminal assemblies, approved by the roofing-material manufacturer.
- D. Field quality-control reports.

#### **1.6 LEED Submittals:**

- A. Provide manufacturer's data and related documents for LEED requirements as shown in Division 1 Section "Sustainable Design Requirements".
- B. Provide submittals for the products named herein as delineated in Division 01 Section, "Sustainable Design Requirements - LEED V4 BD+C" Article 1.6, Action Submittals, subparagraph 1.6.C.9 for VOC content of sealants and adhesives.

#### **1.7 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For lightning protection system to include in maintenance manuals.
  - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

- a. Dimensioned site plan showing dimensioned route of the ground loop conductor and the ground rod locations. Comply with requirements of Section 017839 "Project Record Documents."
- b. A system testing and inspection record, listing the results of inspections and ground resistance tests, as recommended by NFPA 780, Annex D.

**B. Completion Certificate:**

1. UL Master Label Certificate.

**1.8 QUALITY ASSURANCE**

- A. Installer Qualifications: LPI Master Installer.
- B. The design of the systems shall be performed by fully qualified personnel having a minimum of five years experience designing these types of systems. They shall have been certified for design by a recognized lightning protection school such as the Lightning Protection Institute.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Warren Lightning Rod Company (design basis)
  2. Advanced Lightning Technology, LTD.
  3. East Coast Lightning Equipment Inc.
  4. Harger Lightning & Grounding.
  5. Preferred Lightning Protection.
  6. Thompson Lightning Protection, Inc.
  7. Or approved equal.

**2.2 PERFORMANCE REQUIREMENTS**

- A. NFPA Lightning Protection Standard: Comply with NFPA 780 requirements for Class I buildings.
- B. Lightning Protection Components, Devices, and Accessories: Listed and labeled by a qualified testing agency as complying with UL 96 and marked for intended location and application.

**2.3 MATERIALS**

- A. Air Terminals:
  1. Copper unless otherwise indicated.

2. 5/8-inch diameter with 10" minimum but not more than 24" length.
  3. Pointed tip.
  4. Integral base support.
  5. Wherever materials come in direct contact with aluminum surfaces, the air terminals shall be solid aluminum, 1/2 inch in diameter.
- B. Air Terminal Bracing:
1. Copper.
  2. 1/4-inch diameter rod.
- C. Class 1 Main Conductors:
1. Stranded Copper: 57,400 circular mils in diameter. Coordinate with final lightning protection system installer shop drawings.
- D. Secondary Conductors:
1. Stranded Copper: 26,240 circular mils in diameter. Coordinate with final lightning protection system installer shop drawings.
- E. Ground Loop Conductor: Stranded copper.
- F. Attachments: Fasteners shall be of suitable configuration for the intended application and of the same material as the conductor. Nails, screws, or bolts employed to secure the fasteners shall be of the same material as the fasteners or of material which is as resistant to corrosion as that of the fasteners. (Galvanized or plated steel nails, screws, or bolts are not acceptable).
- G. Connections and Splices: Connectors and splices shall be of suitable configuration and type for the intended application and of the same material as the conductor.
- H. Ground Rods:
1. Material: Copper-clad steel.
  2. Diameter: 3/4 inch.
  3. Rods shall be not less than 120 inches long.
- I. Conductor Splices and Connectors: Compression fittings that are installed with hydraulically operated tools, or exothermic welds, approved for use with the class type.
- J. Surge Arresters: Provide surge protection/suppression for all incoming utility services including electrical service, telecommunications service, and cable service in accordance with NFPA 780 requirements.

### **PART 3 - EXECUTION**

#### **3.1 CONSTRUCTION WASTE MANAGEMENT (LEED)**

- A. The contractor, subcontractors, and their personnel shall follow the procedures and practices for waste separation, collection and transport as defined in the contractor's "Waste Management Plan" as required by Division 01 Section "Construction Waste Management."

### 3.2 INSTALLATION

- A. Install lightning protection components and systems according to NFPA 780.
- B. Install conductors with direct paths from air terminals to ground connections. Avoid bends less than 90 degrees and 8 inches in radius and narrow loops.
- C. Conceal conductors within normal view from exterior locations at grade within 200 feet of building. Comply with requirements for concealed systems in NFPA 780.
  - 1. Roof penetrations required for down conductors and connections to structural-steel framework shall be made using listed through-roof fitting and connector assemblies with solid rods and appropriate roof flashings. Use materials approved by the roofing manufacturer for the purpose. Conform to the methods and materials required at roofing penetrations of the lightning protection components to ensure compatibility with the roofing specifications and warranty.
  - 2. Install conduit where necessary to comply with conductor concealment requirements.
  - 3. Air Terminals on Single-Ply Membrane Roofing: Comply with adhesive manufacturer's written instructions.
- D. Ground Ring Electrode: The conductor shall be not less than the main-size lightning conductor.

### 3.3 CONNECTIONS

- A. Aboveground concealed connections, and connections in earth or concrete, shall be done by exothermic welds or by high-compression fittings listed for the purpose.
- B. Aboveground exposed connections shall be done using the following types of connectors, listed and labeled for the purpose: exothermic weld.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
  - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

### 3.4 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 would cause deterioration or corrosion of conductors.

**3.5 FIELD QUALITY CONTROL**

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
  - 1. Perform inspections as required to obtain a UL Master Label for system.
- B. Prepare test and inspection reports and certificates.

**END OF SECTION 264113**