TECHNICAL SPECIFICATION 88.15.06.006

LIGHTNING PROTECTION FOR STRUCTURES

1. The following is a listing of the publications referenced in this Section:

1.1 Lightning Protection Institute (LPI):

1. LPI 175 Lightning Protectors Installation Code
2. LPI 176 Lightning Protection System Material and Components Standard
3. LPI 177 Inspection Guide for LPI Certified Systems

1.2 National Fire Protection Association (NFPA):

1. NFPA 70 National Electrical Code
2. NFPA 780 Lightning Protection Code

1.3 Underwriters Laboratories:

1. UL 96 Lightning Protection Components
2. UL 96 A Installation Requirements for Lightning Protection Systems
3. UL 467 Grounding and Bonding Equipment

1.4 And per manufacturers’ recommendations

1. Summary:

2.1 This specification covers the design, fabrication, testing, delivery, installation, and commissioning of one (1) complete lightning protection system including, but not limited to, air terminals, conductors, ground terminals, interconnecting conductors, surge arrestors, connectors and fittings.

2.2 Lightning Protection Scope break is at the Ground Grid. Purchaser shall supply necessary grounding stingers for subcontractor connection at all major equipment. If additional grounding is deemed necessary, the subcontractor shall supply ground rods and connections to the lightning protection system. Engineering coordination with purchaser shall also be required for additions within or near the ground grid.

2.3 Subcontractor shall provide a system for each structure that requires lightning protection per the design drawings.

2.4 Lightning Protection shall consist of air terminals, interconnecting conductors, down conductors with connections to the grounding system, and bonding of metal objects on or within the buildings. Lightning Protection systems shall meet the requirements of the NFPA 780, or UL 96, UL96A, Lightning Protection Institute Standards 175, 176 and 177, and IEEE 142 and 980. Air terminal, conductors and other related accessories will be UL listed and labeled.

1. Design:

3.1 The lightning protection system shall include, but not be limited to the following:

3.2 Entire roof system, gutters, leaders, ventilators, and all other metal appurtenances, such as guard rails, shall be made electrically continuous and shall be grounded to the cable grid or directly to the building steel with approved fasteners.

3.3 All metallic objects inside the building within 6 feet of lightning protection system or metal connected to it shall be bonded to the system with approved fittings and conductors.

3.4 Grounded metal bodies located about the structure including but not limited to soil pipe vents, roof drains, exhaust fans, any miscellaneous equipment with electrical services, etc. shall be interconnected to the lightening conductor system, if within the “Bonding Distance” established by NFPA 780.

3.5 Bond all metallic pipes including water, sewer, storm, etc. which enter the building, within 12 feet of grade, to the nearest down lead, ground rod or ground loop.

3.6 Connections to Contractor installed #4/0 AWG ground loop conductor(s) (ground stinger) shall be made at each outside corner of the building

3.7 The system shall consist of the standard products of a manufacturer regularly engaged in the production of lightning protection system and be the manufacturer's latest UL approved design.

1. Material:

4.1 General: All lightning protection materials and components shall comply in weight, size and composition with UL 96A and NFPA 780 lightning protection material code requirements for this type of structure.

4.2 Materials: All materials shall be copper, bronze, or stainless steel. Aluminum components shall be used in locations where system components are mounted to aluminum surfaces to avoid galvanic corrosion of dissimilar metals. Class I materials shall be used on structures not more than 75 feet in height. Class II materials shall be used on structures over 75 feet in height.

4.3 Ground Rods: Grounds rods shall be copper, 3/4 inches in diameter, 10 feet in length. Ground rods shall conform to UL 467.

4.4 Conductors: Conductors shall be of the size and type required by UL 96A and NFPA 780.

1. EXECUTION:

5.1 Installation:

5.1.1 The installation shall be accomplished by an experienced installer who is a UL Certified Master Installer. The installer shall also be an LPI Certified Master Installer.

5.1.2 Terminals shall be installed and openings sealed in accordance with manufacturers recommendations.

5.2 Air Terminals:

5.2.1 Air terminals shall project a minimum of 10 inches above the object to be protected.

5.2.2 Air terminals shall be placed at an interval not exceeding 20 feet along ridges and around perimeters and not more than 24 inches from ridge ends, roof edges and the outside of corners of protected structures. On mid-roof sections, additional air terminals shall be located at intervals not exceeding 50 feet.

5.2.3 Prominent non-metallic objects or metal objects having a thickness of less than 3/16 inch require the installation of air terminals and conductors as required.

5.3 Conductors:

5.3.1 Conductors shall interconnect all air terminals and provide a two way path to ground.

5.3.2 Conductors shall maintain a horizontal and/or downward path to the ground and shall be free of excessive splices and sharp bends. No bend shall form an included angle of more than 90 degrees or have a radius of less than 8 inches.

5.3.3 Fasteners shall be placed on each run of exposed conductor at intervals not exceeding 3 feet.

5.3.4 Down conductors shall be spaced at intervals averaging not more than 100 feet around the perimeter of the structure.

5.3.5 Cable down conductors may be omitted where roof conductors are connected to the structure’s steel frame at intervals averaging not more than 100 feet around the perimeter. Connection to the steel frame will be made with bonding plates which provide a minimum of 8 square inches of contact.

5.4 Roof penetration: For down conductors or for connection to structural steel framework, penetrations shall be made using thru-roof assemblies with solid bars and appropriate roof flashings. Conductors shall not pass directly through the roof. Roof flashings compatible with the roofing system shall be furnished and installed by the roofing subcontractor per roofing manufacturer’s specifications.

5.5 The lightning protection system shall be installed in a neat and inconspicuous manner so that all components will blend with the appearance of the building.

5.6 All adhesive type fittings shall be set in place with an application of compatible adhesive compound.

5.7 Bare copper lightning protection materials shall not be installed on aluminum roof or siding or other aluminum surfaces and vice versa, aluminum lightning protection materials shall not be installed on copper roofing or copper siding or other copper surfaces.

6. Coordination:

6.1 The Subcontractor shall insure a correct, neat and unobtrusive installation.

6.2 The Subcontractor shall insure a solid mechanical and electrical connection to the building ground system. Contractor will supply ground loop/grid at base of buildings for Subcontractor’s connection.

7. Testing, Completion, And Approval:

7.1 The Subcontractor shall secure and deliver Underwriters' Laboratories Lightning Protection Inspection Certificate to the Engineer upon completion of the installation. This Certificate shall ensure that the installation complies with UL 96A requirements.

7.2 The Subcontractor shall secure and deliver the LPI System Certification to the Engineer upon completion of the installation.

7.3 The Subcontractor shall also submit copies of as-built shop drawings with LPI Forms 175A, B and C along with the LPI Certificate System Application.

8 Unit Pricing:

8.1 The following unit prices shall be provided by Seller as part of the Proposal in the attached Bid Proposal Package fill-in data sheets.  Each unit price shall include furnishing the specific unit designated, and includes all associated engineering and design costs, overhead, profit markup, and sales tax (if applicable).  Prices provided shall be used by the Contractor for scope changes up-to and including the time of vendor drawings being approved for fabrication. *[Note to Designer: Add the following items to the Request for Bid form.]*

* 1. Price per air terminals (10 inch and 24 inch)
  2. Price per conductor linear foot (for all sizes of conductors)
  3. Average price per linear foot of conductors for all other accessories/connectors/fittings

END OF SECTION