

SECTION 13100- LIGHTNING PROTECTION SYSTEM

PART 1 – GENERAL

A. Summary:

1. This Section includes lightning protection system for buildings and building elements.
2. The Lightning Protection System (LPS) will be designed to all requirements in the specified regulations.
3. The LPS will be installed by an experience company holding a UL Listed Installation Certificate.
4. Final Inspection will be conducted and certified by UL LLC (third party). A Master Label Certificate, compliant with UL 96A and NFPA 780, will be issued upon when installation passes inspection.

B. Related Work:

1. Division 7, Section “Sheet Metal Flashing and Trim”.
2. Division 26, Section “General Conditions”.
3. Division 26, Section “Surge Protection Devices”.
4. Division 26, Section “Grounding and Bonding”.

A. Description:

1. Provide safety for the building and occupants by preventing damage to building structure and systems described herein, caused by lightning.
2. This Section specifies the furnishing and installation of a complete UL Master Labeled Lightning Protection System (LPS).

C. Standards:

1. The following specifications and standards of the latest issue form a part of the specification:
 - a. National Fire Protection Association Lightning Protection Standard, NFPA 780.
 - b. Underwriters Laboratory, UL 96A
 - c. UFC 3-575-01
2. The application of specific requirements of the PLS design shall be on a case by case basis as determined by the hazard level and critical level per criteria in NFPA 780 and UFC 3-575-01.
3. The LPS Final Inspection will be conducted and certified by UL LLC.

D. System Design:

1. The Work covered by this Section of the specifications consists of furnishing all labor, materials, and items of service required for the completion of a functional and unobtrusive LPS as approved by the PM, and in strict accordance with this Section of the specifications and the applicable contract documents.
2. The LPS plans will be designed and sealed by a licensed and experienced Lightning Protection engineer.

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E. Quality Assurance:

1. The lightning protection system will conform to the requirements and standards for lightning protection systems of the NFPA 780 as specified in UFC 3-575-01, "Lightning and Static Electricity Protection Systems" for use on Class I and Class II structures.
2. The LPS and all components, electrical and otherwise, will be installed by a licensed Master Electrician.
3. Electrical Work, including the Surge Protector Device(s) (SPD), will be installed by a licensed Master Electrician. The SPD is an associated part of this Specification and will NOT be installed under a separate contract to the Prime Contractor.
4. The lightning protection installation contractor is required to be UL Listed Installer. The level of certification (Journeyman or Master Installer) will project specific and be determined by the PM and in accordance requirements in NFPA 780.
5. The LPS will be inspected by UL LLC at the Contractor's expense. Certification that the LPS has been inspected by a UL LLC (third party) representative, stating the system has been inspected and approved by UL LLC without variation will be submitted to the PM.
6. The request for the UL LLC inspection must be made by the actual LPS installer.
7. Bonding: Type I and Type II Surge Protection with common bonding per NFPA 780.

F. Submittals:

1. Submittals: Submit in accordance with Division 1 requirements.
2. A complete LPS design, produced and sealed by a licensed LPS engineer. The LPS design drawings will be sealed by the LPS Engineer of Record.
3. Product Data: Provide product data showing the type, and size of all conductors, through roof/through wall assemblies, conduit encasement of all exposed conductors, roof conductors, and terminals and mounting accessories.
4. Certifications:
 - a. Certification by the LPS Engineer of Record that the lightning protection system conforms to the applicable UL requirements and DPW specifications.
 - b. Certification that the LPS Engineer of Record is in fact licensed to produce and seal the LPS design/drawings.
 - c. Contractor will provide a copy of the Master Label Certificate for Inspection for Lightning Protection Systems provided by UL LLC upon completion and conformance to UL 96A and NFPA 780 standards. (See Attachment 13100-MLC- Example UL Master Label Certificate).
5. Materials Certification: Signed by LPS Engineer, that mechanical fasteners or roof adhesive, depending on roofing type, for air terminals is approved by manufacturer of both the terminal assembly and the roofing material manufacturer.

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6. A Master Label Certificate, issued to the UL Certified Installer, will be submitted after final inspection by UL LLC (third party) representative before Final Payment will be approved.
7. Maintenance Guidelines will be submitted at completion of the Work by the LPS Contractor indicating maintenance required of the LPS.

G. Coordination:

1. Coordinate installation of lightning protection with other building systems and components, including electrical wiring, supporting structures and building materials, metal bodies requiring bonding to lightning protection components, and building finishes.
2. Coordinate installation of air terminals attached to roofing materials systems with roofing manufacturer and installer.

PART 2 – PRODUCTS

A. Standard:

1. The system to be furnished under this specification will be the standard product of manufacturers regularly engaged in the production of lightning protection equipment and will be the manufacturer's latest approved design.
2. All equipment will be UL listed and properly UL labeled.

B. Manufacturers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Advanced Lightning Technology
 - b. East Coast Lightning Equipment
 - c. Erico Lightning Protection Co.
 - d. Approved Equal

C. Lightning Protection System Components:

1. All materials will be copper and bronze and of the size, weight, and construction to suit the application and used in accordance with LPI, UL, and NFPA code requirements.
2. LPS components will be Class I when installed less than 75 feet and Class II when installation exceeds 75 feet above adjacent grade.
3. Aluminum Components: Aluminum materials may not be used except on roofs that utilize aluminum, galvalume or galvanized metal roofing components. On aluminum, galvalume or galvanized metal roofs or where aluminum, galvalume or galvanized metal parapet caps exist, the entire lightning protection equipment will be utilize aluminum components to ensure compatibility. However, the down leads and grounding are to utilize copper.

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4. Surge Protection Devices: Surge protection device(s) will be installed at the main electrical service(s) and bonded to the electrical system and will follow all requirements in NFPA 780, Paragraph 4.14 and all NFPA standards.
5. The surge protection device must comply with UL Standard 1449 as a Type 1 or Type 2 lightning rated unit of 20kA or more. It will be the responsibility of the LPS Contractor to size and install the surge protection device on the main electrical service as specified.
6. The UL compliant Surge Protection Device(s) will be installed by a licensed Master Electrician who is in the employ of the LPS Installation Company.
7. Roof-Mounted Air Terminals: NFPA Class I and Class II, Copper, unless otherwise indicated.
 - a. Roof-Mounting Air Terminals: Designed for single-ply membrane, metal standing seam roofing panels, asphalt composition roofing shingles.
 - b. Class I Air Terminals: Solid copper, 18” long, not less than 3/8 inch diameter, with sharp bare copper nickel plated points.
 - c. Class II Air Terminals: Solid copper, 18” long, not less than 1/2 inch diameter, with sharp bare copper, nickel plated points.
8. Ground Rods, Ground Loop Conductors, and Concrete-Encased electrodes:
 - a. Comply with Division 26, Section “Grounding and Bonding” and standards referenced in the Section.
 - b. Copper clad steel, stainless steel, 19 inch diameter by 10 feet long.
9. All grounding conductors will be protected against physical damage by the use of a protective cover that will be securely fastened to the building. The protective cover will be installed as to protect the grounding conductor from finished grade to a height of 6’-0” above grade.
10. Grounding Plates: Solid copper, not less than 20 gauge.
11. Bonding Plates: Bronze, 8 square inches.
12. Down Conductor Guards: Stiff copper or brass.
13. Anchors and Fasteners: Bronze bolt and clamp type will be used for all applications except at roofing membrane materials, using adhesive that is compatible with the membrane material.
14. Connectors: Bronze clamp-type connectors will be used for roof conductor splices, and the connection of the roof conductor to air terminals and bonding plates. Crimp-type connectors are not allowed.
15. Exothermic Welds: Exothermic welds will be used for splicing the roof conductor to the down conductor, splices of the down conductors, and for connection of the down conductors to the ground rods, ground plates, and the ground ring.
16. Overhead Grounding Wires: Aluminum Conductor Steel Reinforced (ACSR) type will be used.

PART 3 – EXECUTION

A. Installation:

1. The installation will be accomplished by an experienced installation company that is directly UL listed as a UL Listed Installer.

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2. The level of certification (Journeyman or Master Installer) will project specific and be determined by the requirements in NFPA 780 and UFC 3-575-01.
3. The installation will be in accordance with the NEC and per manufacturer's instructions.
4. The lightning protection contractor will be required to remove the existing lightning protection system, if one exists, and will reinstall the new lightning protection components.
5. Install the conductors as inconspicuously as practical.
6. All equipment will be installed in a neat, workmanlike manner.
7. The system will consist of a conductor network at the roof and include air terminals, connectors, splicers, bonds, copper down leads, and proper ground terminals. Copper down lead conductors will be utilized even when aluminum is required on the roof. Down lead conductors in PVC conduit will be allowed to be run down the side of the building in an exposed fashion.
8. Install conductors with direct paths from air terminals to ground connections. Avoid sharp bends and narrow loops.
9. Cable Connections: Use approved exothermic-welded connections for all conductor splices and connections between conductors and other components, except those above single-ply membrane roofing.
10. Bond extremities of vertical metal bodies exceeding 60 feet in length to lightning protection components.
11. Install ground rods and ground plates not less than 2 feet deep and a distance not less than 3 feet nor more than 8 feet from the nearest point of the structure.
12. Bond down conductors to metal main water piping where applicable.
13. Conductors will be rigidly fastened every 3 feet along the roof and down the building to ground.

A. Coordination:

1. The lightning protection installer will work with other trades to insure a correct, neat and, as much as possible, an unobtrusive installation.
2. The lightning protection contractor will use a compatible adhesive to adhere lightning protection components to the roof when required.
3. The lightning protection contractor will furnish and install the adhesive and obtain an approval of the compatible adhesive from the roofing manufacturer/contractor prior to the installation.

B. Corrosion Protection

1. 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.
2. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.

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C. Field Quality Control and Completion:

1. Upon completion of the installation, the lightning protection installer will conform to the requirements and standards for lightning protection systems of UL, and NFPA.
2. A 3-4 Point Grounding Test, which bonds the electrical system to the LPS will be conducted by the LPS Installer. The test will show as result of less than 25 OHMS.
3. Field Inspection: At the Contractor's expense, a Final Inspection will be conducted by UL LLC (third party). A Master Label Certificate will be submitted to the Government stating all LPS components, including surge protection and grounding is installed in accordance with all UL 96A and NFPA 780 requirements.
4. A copy of the Final Inspection/Report will be delivered to the Government in a digital format.

End of Section- 13100