

SECTION 16065 – LIGHTNING PROTECTION SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. All of the Contract Documents, as listed on the Table of Contents and including General and Supplementary Conditions and Division 1, General Requirements, shall be included in, and made part of, this Section.

1.2 DESCRIPTION OF WORK

- A. Provide a complete lightning protection system with all component parts as indicated and herein specified.
- B. Equipment furnished by one of the above manufacturers or an independent protection company shall be considered as equals.
- C. The system shall include air terminals on the roof; bonding of roof mounted mechanical equipment and stacks; bonding of structure and other metal parts, ground conductors and ground rods; with necessary connectors, bonding straps, fasteners, clamps and all other equipment and materials necessary for a complete system for the building.

1.3 RELATED WORK

- A. For work to be included as part of this Section, to be furnished and installed by the Electrical Subcontractor, refer to the Related Work section of Specification Section 16010.
- B. Carefully examine all of the Contract Documents, criteria sheets and all other Sections of the specifications for requirements which affect work under this Section, whether or not such work is specifically mentioned in this Section.
- C. For work related to, and to be coordinated with the electrical work, but not included in this Section and required to be performed under other designated Sections, see the following:
 - 1. Section 07530 – EPDM Roofing System

1.4 REFERENCES

- A. The lightning protection system and all components shall be designed, manufactured and installed in accordance with the latest applicable standards as follows:
 - 1. ANSI/NFPA 780 - Lightning Protection Code
 - 2. ANSI/UL 96 - Lightning Protection Components
 - 3. UL 96A - Installation Requirements for Lightning Protection
- B. The system shall be designed and installed in accordance with the requirements of NFPA 780 and UL 96A to obtain Master Label on the building.

1.5 WARRANTY

- A. Attention is directed to provisions of the General Requirements, Supplementary General Requirements, Section 01784 – Warranties and Section 16010 Electrical Special Conditions regarding guarantees and warranties for work under this Contract.

1.6 QUALIFICATIONS

- A. Manufacturer shall be a company specializing in lightning protection equipment, with minimum of (10) years documented experience and listed in UL's Electrical Construction Materials Directory or Supplement under Lightning Protection - Lightning Conductor, Air Terminals and Fittings.
- B. Installer shall be authorized installer of manufacturer with minimum of (10) years of documented experience and listed in UL's Electrical Construction Materials Directory or Supplement under Lightning Protection - Lightning Protection Installation.

1.7 SUBMITTALS

- A. Prepare and submit shop drawings and product data in accordance with the requirements hereinbefore specified and with the Shop Drawings, Product Data and Samples Section 01330 in the manner described therein, modified as noted hereinafter.
- B. Submit shop drawings showing layout of air terminals, grounding electrodes, and bonding connections to structure and other metal objects. Include terminal, electrode and conductor sizes, and connection and termination details.
- C. Submit product data showing dimensions and materials of each component, and include indication of listing in accordance with ANSI/UL 96.

- D. The manufacturer/installer shall submit for approval one reproducible drawing of installation drawings of each building, indicating all work required for this item including ground rod locations, air terminal locations and cable locations. Catalog cuts of all components shall also be submitted for approval to the Architect/Engineer. Three (3) prints of drawings shall be submitted for approval and (5) prints shall be submitted after approval.
- E. Submit manufacturer's installation instructions under provisions of Section 01300.

1.8 PROJECT RECORD DOCUMENTS

- A. Submit project Record Documents.
- B. Accurately record actual locations of air terminals, grounding electrodes, bonding connections, and routing of system conductors.

1.9 SEQUENCE AND SCHEDULING

- A. Coordinate work under provisions of Section 01040.
- B. Coordinate the work of this Section with roofing and exterior and interior finish installation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall be new and first quality commercial products. Standard fittings shall be used where practicable, in preference to special fittings.
- B. Materials shall comply in weight, size and composition with the requirements of ANSI/UL 96 and the NFPA Code relating to this type of structure.
- C. Lightning rod equipment and fittings shall bear the UL label.

2.2 AIR TERMINALS

- A. Air terminals shall be one-piece, lead coated, solid copper.
- B. Air terminals mounted on flat roofs shall be minimum 24" in height.

2.3 AIR TERMINAL BASES

- A. Air terminal bases shall provide a secure attachment to the structure, the air terminal and the conductor cable. The base shall be compatible with all (3) items in contact with it.

2.4 CONDUCTORS

- A. Ground and bonding conductors shall be soft drawn copper with a conductivity of at least 95% of pure copper.

2.5 CONNECTOR FITTINGS

- A. A connector fitting shall be constructed so that a minimum of 1 1/2" of each conductor can be secured within the connector. It shall be compatible with the material being secured.
- B. Water pipe connectors shall be constructed so as to provide at least 1 1/2" contact with the water pipe and conductor. It shall be compatible with the water pipe and conductor materials or be lead coated to form a bimetallic connection.

2.6 CLIPS

- A. Clips for securing copper conductors shall be not less than 0.032" thick and not less than 3/8" wide. Clips shall be placed not more than 3'-0" apart along a conductor.

2.7 GROUND ROD CLAMPS

- A. Ground rod clamps shall be not less than 3/32" thick, contact the ground rod and conductor not less than 1 1/2" and be secured with at least (2) bolts.

2.8 GROUND ELECTRODES

- A. Ground electrodes shall be as specified of proper size and material compatible with ground conditions and to obtain the desired minimum ground resistance.

2.9 FASTENERS

- A. Fasteners shall be compatible with the materials being secured and of a size and type specified.

2.10 CADWELD

- A. Bonding of lightning protection systems to building steel, ground rods, cable connections, all connections below grade, etc. shall utilize Cadweld exothermic grounding connections

PART 3 - EXECUTION

3.1 COOPERATION AND WORK PROGRESS

- A. The Electrical work shall be carried on under the usual construction conditions, in conjunction with all other work at the site. The Electrical Subcontractor shall cooperate with the Architect, General Contractor, all other Subcontractors and equipment suppliers working at the site. The Electrical Subcontractor shall coordinate the work and proceed in a manner so as not to delay the progress of the project.
- B. The Electrical Subcontractor shall coordinate his work with the progress of the building and other Trades so that he will complete his work as soon as conditions permit and such that interruptions of the building functions will be at a minimum. Any overtime hours worked or additional costs incurred due to lack of or improper coordination with other Trades or the Owner by the Electrical Subcontractor, shall be assumed by him without any additional cost to the Owner.
- C. The Electrical Subcontractor shall furnish information on all equipment that is furnished under this Section but installed under another Section to the installing Subcontractor as specified herein.
- D. The Electrical Subcontractor shall provide all materials, equipment and workmanship to provide for adequate protection of all electrical equipment during the course of construction of the project. This shall also include protection from moisture and all foreign matter. The Electrical Subcontractor shall also be responsible for damage which he causes to the work of other Trades, and he shall remedy such injury at his own expense.
- E. Waste materials shall be removed promptly from the premises. All material and equipment stored on the premises shall be kept in a neat and orderly fashion. Material or equipment shall not be stored where exposed to the weather. The Electrical Subcontractor shall be responsible for the security, safekeeping and damages, including acts of vandalism, of all material and equipment stored at the job site.
- F. The Electrical Subcontractor shall be responsible for unloading all electrical equipment and materials delivered to the site. This shall also include all large and heavy items or equipment which require hoisting. Consult with the General Contractor for hoisting/crane requirements. During construction of the building, the Electrical Subcontractor shall provide additional protection against moisture, dust accumulation and physical damage of the main service and distribution equipment. This shall include furnishing and installing temporary heaters within these units, as approved, to evaporate excessive moisture and ventilate it from the room, as may be required.
- G. It shall be the responsibility of the Electrical Subcontractor to coordinate the delivery of the electrical equipment to the project prior to the time installation of equipment will be required; but he shall also make sure such equipment is not delivered too far in advance of such required installation, to ensure that possible damage and deterioration of such equipment will not occur. Such equipment stored for an excessively long period of time (as determined in the opinion of

the Architect) on the project site prior to installation may be subject to rejection by the Architect.

- H. The Electrical Subcontractor shall erect and maintain, at all times, necessary safeguards for the protection of life and property of the Owner, Workmen, Staff and the Public.
- I. Prior to installation, the Electrical Subcontractor has the responsibility to coordinate the exact mounting arrangement and location of electrical equipment to allow proper space requirements as indicated in the NEC. Particular attention shall be given in the field to group installations. If it is questionable that sufficient space, conflict with the work of other Subcontractors, architectural or structural obstructions will result in an arrangement which will prevent proper access, operation or maintenance of the indicated equipment, the Electrical Subcontractor shall immediately notify the Contractor and not proceed with this part of the Contract work until definite instructions have been given to him by the Architect.

3.2 INSTALLATION

A. General

1. Unless specifically noted or indicated otherwise, all equipment and material specified in Part 2 of this specification or indicated on the drawings shall be installed under this Contract whether or not specifically itemized herein. This Section covers particular installation methods and requirements peculiar to certain items and classes or material and equipment.
2. The Electrical Subcontractor shall obtain detailed information from manufacturers of equipment provided under Part 2 of this specification as to proper methods of installation.
3. The Electrical Subcontractor shall obtain final roughing dimensions and other information as needed for complete installation of items furnished under other Sections or furnished by the Owner.
4. The Electrical Subcontractor shall keep fully informed of size, shape and position of openings required for material and equipment provided under this and other Sections. Ensure that openings required for work of this Section are coordinated with work of other Sections. Provide cutting and patching as necessary.
5. All miscellaneous hardware and support accessories, including support rods, nuts, bolts, screws and other such items, shall be of a galvanized or cadmium plated finish or of another approved rust-inhibiting coating.
6. The lightning protection system shall be installed in accordance with the current edition of UL 96A "Installation Requirements for Master Labeled Lightning Protection Systems".
 - a. No ferrous fasteners (except stainless steel), nor ferrous holding devices of any kind shall be employed as permanent fasteners.
 - b. Individual anchor bolts, employed in this installation, shall each have a pull-out resistance of not less than 100 pounds as determined by actual test.
 - c. The installation shall be made in a most conspicuous manner. Conductors shall be coursed on the back side of architectural construction to conceal equipment as much as possible.

B. Air Terminal Installation

1. Air terminals shall be installed as required by UL.
2. Air terminals shall have their points aligned vertically, and their bases shall be bolted or welded to the building.

C. Conductor Installation

1. Down conductors shall be installed on buildings at intervals of 100'-0" on center, maximum. When structural building steel is used instead of down conductors, the ground conductor interval shall not average over 60'-0" on center.
2. Conductors shall be connected to the ground rods with ground clamps allowing a reasonable amount of slack conductor to allow for expansion and contraction. Steel surfaces shall be clean and bright before applying connector plates or Cadwelding. Bends in these conductors shall have no angle more than 90°. Bends shall have a radius of not less than 8". Connectors shall, when fixed to conductors, be capable of withstanding a pull of 200 pounds.
3. Bonding conductors shall be connected to the bonding clamps allowing a reasonable amount of slack for expansion and contraction, and the conductor bonds shall be limited as stated above.
4. All metal fascia, television masts, ventilators, vents, roof drains, stacks, etc. shall be grounded.

D. Ground Installation

1. Ground terminal installation shall be made at all locations indicated on the drawings and at such other points as may be found necessary to properly ground the system.
2. All grounds shall be made by means of rods driven into the soil which shall penetrate vertically not less than 10'-0" below the finished surface of the ground and passing approximately 2'-0" away from the building foundations.
3. The Electrical Subcontractor shall add to the ground system in case the measured resistance exceeds 50 ohms per electrode, at the direction of the Architect/Engineer and at no additional cost to the Owner.
4. A stamped tag of non-corrosive metal shall be attached to the metal support for each building adjacent to each ground connection, to indicate the location and arrangement of the rods and final value of the resistance at time of installation. An as-built drawing and record of resistance values shall be submitted in addition to the stamped tag.

E. Grounding Cable Connections

1. All grounding cable connections to ground rods, structural steel and splices shall be of the exothermic welding process.

F. Where cables penetrate the roofing membrane, penetrations shall be permanently sealed per roof manufacturer's recommended methods by the Roofing Subcontractor.

3.3 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Verify that field measurements are as shown on the drawings.
- C. Beginning of installation shall mean installer accepts existing conditions.

3.4 PROTECTION OF SURROUNDING ELEMENTS

- A. Protect elements surrounding work of this Section from damage or disfiguration.

3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.
- B. Obtain the services of UL to provide inspection and certification of the lightning protection system under provisions of UL 96A.
- C. Obtain UL Master Label and attach to building at the location prescribed by UL 96A.

END OF SECTION