

EARLY STREAMER EMISSION (ESE) AIR TERMINAL SYSTEM  
SECTION 26 41 19  
LIGHTNING PROTECTION SYSTEMS

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Provide all labor, components, equipment, and services to perform all operations required for the complete installation and related work as specified herein.
- B. Any such work in any other section of these specifications that is not specifically described therein shall comply with the requirements of this section.
- C. The following items of work are specifically included in, but not necessarily limited to, the work of this section without limiting the generality implied by these specifications:
  - 1. Early Streamer Emission (ESE) lightning protection air terminal
  - 2. Mast, complete with base and supports
  - 3. Down conductors
  - 4. Grounds
  - 5. Transient Voltage Surge Suppression

**1.02 SUBMITTALS**

- A. Provide shop drawings for review, showing location of ESE air terminal, mast, conductors, grounding system, installation procedures and details.
- B. Detailed manufacturer's data sheets on all components, accessories and miscellaneous equipment shall also be submitted.

**1.03 DESCRIPTION OF SYSTEM**

- A. Provide a complete installation of equipment to comprise a complete system in accordance with ESE Manufacturer's Installation Standard HBP-21.
- B. The installing contractor shall be responsible for all components and labor to accomplish this result.
- C. The system shall be installed so that completed work is unobtrusive and does not detract from the building appearance.

**1.04 CODES, REGULATIONS, PERMITS**

- A. The completed system shall comply with ESE Manufacturer's Installation Standard HBP-21, equipment supplier drawings and specification requirements for installation of ESE lightning protection systems.
- B. The installing contractor shall accomplish any corrections required by the inspection (at his own expense).
- C. Noncompliance shall be reported to the equipment supplier for consideration.

**1.05 STANDARDS OF QUALITY**

- A. The ESE system equipment supplier, contractor, and installer shall install the ESE system in compliance with the Manufacturer's Installation Standard HBP-21.
- B. Manufacturer's guarantee and warranty shall be submitted to the owner upon completion of the installation.

EARLY STREAMER EMISSION (ESE) AIR TERMINAL SYSTEM  
SECTION 26 41 19  
LIGHTNING PROTECTION SYSTEMS

**1.06 SERVICE AND INSPECTION**

- A. The installation of equipment shall be reviewed by the manufacturer, and shall be in accordance with the manufacturer's requirements.
- B. The installation shall be inspected by Applied Research Laboratories, Inc. (ARL) for compliance with Manufacturer's Installation Standard HBP-21.
- C. The lightning protection installing contractor shall provide a videotape of the installation, including but not limited to; mast mounting, bonding connections (waterline & structural steel), down conductors, ground rods/grids and all buried, concealed or inaccessible connections and components.
  - a. This information shall be forwarded to the ESE manufacturer for evaluation, certification, archiving and documentation.
  - b. The Manufacturer shall forward the videotape to Applied Research Laboratories, Inc. for inspection and certification.
  - c. The ground resistance of the completed system shall be measured using IEEE "Fall of Potential Method" in the presence of the Architect/Engineer and shall be forwarded to the ESE manufacturer.
    - i. Ground resistance shall be ten (10) ohms or less.
- D. Listing of components and certification of installation: Applied Research Laboratories; shall list the components, inspect and certify the installation for compliance with Manufacturer's Installation Standard HBP-21.

**PART 2 PRODUCTS**

**2.01 ESE AIR TERMINAL**

- A. ESE air terminal, 5/8" diameter, heavy chrome plated. Support structure and sphere shall be chrome plated copper.
- B. The base of the ESE air terminal shall be threaded for interconnection to top of mast.

**2.02 CONDUCTORS**

- A. Copper down conductors shall be 28 strands of 14-gauge wire rope lay, with a net weight of 375 pounds per 1,000 feet (60mm<sup>2</sup>), minimum.
- B. The structural steel may be utilized as the main conductor provided the steel is electrically continuous or is made so via other means.
  - 1. Every other column or an average of 60'-0" (18m) intervals shall be bonded and connected to the ground system.
- C. All conductors shall be secured every 3'-0" (900mm) maximum.
- D. Fasteners and clips utilized shall be of equal corrosion resistance as the components being secured.
- E. Bare copper components shall not be installed on dissimilar metals. Corrosion resistant copper equipment shall be utilized where these conditions exist.
- F. Corrosion resistant copper conductors and fittings shall be utilized where corrosive atmospheres are present.
- G. Conductors shall be installed so that a conductor shall always have a horizontal or downward path, free of "U" and "V" pockets, with the exception that an 8" (203mm) maximum rise, or a rise of 3" (80mm) maximum for every 12" (300mm) of conductor length shall be permitted in a main conductor run.
- H. Each ESE terminal shall have two (2) down conductors from the base of the mast to the grounding system.

EARLY STREAMER EMISSION (ESE) AIR TERMINAL SYSTEM  
SECTION 26 41 19  
LIGHTNING PROTECTION SYSTEMS

- I. The electrical contractor shall furnish and install all necessary PVC conduit for concealed down conductors.
- J. No bend of a conductor shall be less than 90° and shall not have a radius of bend of less than 8" (203mm). Exceptions are through roof and wall assemblies and "T" connections.

**2.03 MAST**

- A. Aluminum or stainless steel mast with threaded connection for the ESE air terminal and bonding plate for cable connection.
- B. Mast support, depending upon application, may be roof mounting base, side mounting base or structural support.

**2.04 GROUNDING SYSTEM**

- A. Ground rods shall be copperbond 3/4" x 10'-0", minimum.
- B. One set of tripod grounds shall be installed for each down conductor. Refer to paragraph 2.02 B, for structural steel used as down conductors.
- C. Ground plates of high conductivity copper sheet, 20 gauge minimum, 24 in. sq., may be used in lieu of ground rods if soil conditions make it impossible to drive ground rods.
- D. The cable attachments to the ground rods must be accomplished via mechanical clamp. Cable attachments to ground plates shall be via copper bond plates of eight 8in<sup>2</sup> (5161mm<sup>2</sup>) of contact area.
- E. A ground loop may be substituted for the ground rods or ground plates. The ground loop must be of a main size conductor and shall comply with the ten (10) ohm resistance requirement of the grounding system.
- F. Ground rods, ground plates, and ground loop conductors shall be installed a minimum of 1ft. (300mm) below grade and a minimum of 2ft. (600mm) away from the foundation.
- G. Bonding of grounded systems shall be via main size conductors. The bonding shall be accomplished to achieve equal potential of all grounds.

**2.05 CONNECTORS, FITTINGS, FASTENERS, AND HARDWARE**

- A. Provide all connectors, fittings, fasteners, hardware, clamps, guards, lugs, etc., as required to connect, and install all parts of the system.
- B. All equipment shall be fabricated from copper and/or bronze components

**2.06 SURGE SUPPRESSION**

- A. Provide surge protection on the electrical, telephone, and antenna and TV lead wires.
- B. The surge suppresser for the main electrical panel shall be industrial grade, with replaceable modules, fused, indicator lights.
- C. The electrical surge suppression equipment shall be installed at the main entrance of the electrical system with a disconnecting mechanism.
- D. The surge suppresser shall have the capability of being disconnected without shutting down the electrical system.
- E. Telephone surge suppression shall be to the standards of the telephone system carrier.
- F. The suppresser shall be industrial grade with replaceable modules, and a reaction time of less than one (1) nanosecond.

EARLY STREAMER EMISSION (ESE) AIR TERMINAL SYSTEM  
SECTION 26 41 19  
LIGHTNING PROTECTION SYSTEMS

- G. This surge equipment shall be installed at the main entrance of the telephone system.
  
- H. Antenna and TV lead wire suppressers shall be industrial grade suitable for the conductor, coax or hard wire. The suppresser shall have a reaction time of less than one (1) nanosecond and shall be installed as close to the antenna or TV camera as possible.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Installation shall be accomplished in a professional manner by a lightning protection installing contractor or a licensed electrical contractor.
- B. All work installed within the building shall be concealed.
- C. All work installed in accessible locations shall be properly guarded and protected.
- D. All components shall be installed in a manner to prevent electrolytic action under presence of moisture.
- E. All roof, wall or other building penetrations shall be made in a manner to prevent the ingress of water or moisture.
- F. Roof penetrations, flashings/pitch pans shall be furnished and installed by the roofing contractor.
- G. PVC conduit shall be provided by the electrical contractor.

**PART 4 ACCEPTABLE MANUFACTURERS AND SUPPLIERS**

**4.01 MANUFACTURERS**

- A. Heary Bros. Lightning Protection Co., Inc. T. 1-800-421-6141
- B. Lightning Preventor of America T. 716-941-6145
- C.

**PART 5 INSPECTION AND LISTING LABORATORY**

- A. Applied Research Laboratories, Inc. T. 305-624-4800 or approved equal.

**END OF SECTION**