SECTION 26 41 19

LIGHTNING PROTECTION

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\*\* NOTE TO SPECIFIER \*\* National Lightning Protection Corporation; Lightning protection products.
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This section is based on the products of National Lightning Protection Corporation, which is located at:13550 Smith Rd., Suite 150Aurora, CO 80011Toll Free Tel: 800-628-2816Tel: 303-295-1695Fax: 303-295-1623Email: [request info (info@nlpcorp.com)](https://arcat.com/rfi?action=email&company=National%252BLightning%252BProtection%252BCorporation&message=RE%253A%2520Spec%2520Question%2520(13100nlp)%253A%2520&coid=39830&spec=13100nlp&rep=&fax=303-295-1623)
Web: <http://www.theprotectionsource.com>
 [ [Click Here](https://arcat.com/company/national-lightning-protection-corporation-39830) ] for additional information.
National Lightning Protection has been providing lightning protection, grounding, and surge protection equipment for commercial, industrial, government and military applications for the past 25 years. We have the experience, knowledge, and dedication to complete your project - and we care about doing the job right. At NLP we strive to provide the design professional, purchaser, and end user with the highest quality product and customer service. Every project is unique and our seasoned, professional staff of designers, estimators, and installers are prepared to help meet your particular needs. In addition to a standard line of products we provide cutting edge customized system designs, manufacturing, and installation. If we don't have it there is a good chance we can make it for you.

1. GENERAL
	1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. ESE Lightning protection air terminals.
		2. Mast, base, and supports.
		3. Down conductors.
		4. Grounding terminations.
	1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 05 10 00 - Structural Metal Framing [05 10 00] - Structural Steel
		2. Section 07 50 00 - Membrane Roofing [07 50 00] - Membrane Roofing.
		3. Section 07 60 00 - Flashing and Sheet Metal [07 60 00] - Sheet Metal Flashing and Trim.
		4. Section 07 90 00 - Joint Protection [07 90 00] - Joint Sealants.
		5. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems [26 05 26] - Grounding and Bonding
	1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. AASHTO code - Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. American Association of State Highway and Transportation Officials, Washington DC.
		2. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures
		3. Form ESE-1-90 - ESE Lightning Protection System, certification, verification, archiving, and system documentation.
		4. NRTL - OSHA's Nationally Recognized Testing Laboratory Program.
		5. Technical Standard US 17-102 - Installation Requirements for ESE Lightning Protection Systems, current edition.
		6. Technical Standard NF C 17-102 - Lightning Protection, current edition.
		7. Technical Standard UTE 17-108.
	1. DESIGN / PERFORMANCE REQUIREMENTS
		1. Lightning protection system shall conform to the Installation Requirements for ESE Lightning Protection Systems US 17-102.
		2. Lightning protection mast(s) shall conform to AASHTO code and ASCE 7.
	2. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements [01 30 00].
		2. Shop Drawings: Submit shop drawings showing location of ESE air terminal(s), conductors, bonding connections, and grounding equipment. Include sizes for conductors, ground electrodes, and connection/termination details.
		3. Product Data: Manufacturer's data sheets on each product to be used, including:
			1. Detailed data sheets showing application, dimensions, and material of each component.
			2. EPA data per AASHTO code and ASCE 7 for the lightning protection mast(s) to be used on this project.
			3. Risk Assessment Per NF C 17-102 annex A; UTE 17-108; or equivalent risk assessment yielding a protection level.
			4. Evidence of NRTL certification of the ESE Air Terminal's conformance with NF C 17-102 annex C testing.
			5. Installation methods.
		4. Shop Drawings: Indicate 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.
		5. Project Record Documents: Record actual locations of air terminals, grounding electrodes, bonding connections, and routing of system conductors.
		6. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
	3. QUALITY ASSURANCE
		1. Manufacturer Qualifications: Company specializing in lightning protection equipment with minimum ten years documented experience.
		2. Installer Qualifications: Authorized installer of manufacturer with minimum three years documented experience.
		3. Field Quality Control Inspection: Inspection of Completed System shall be performed by an approved OSHA NRTL Testing Laboratory in accordance with Section 01 40 00 - Quality Requirements [01 40 00].
	4. PRE-INSTALLATION MEETINGS
		1. Section 01 30 00 - Administrative Requirements [01 30 00] - Administrative Requirements: Pre-installation meeting.
	5. DELIVERY, STORAGE, AND HANDLING
		1. Store products in manufacturer's unopened packaging until ready for installation.
		2. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
	6. SEQUENCING
		1. Coordinate Work with roofing and exterior and interior finish installations.
		2. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
		3. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.
	7. PROJECT CONDITIONS
		1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
	8. WARRANTY
		1. Air Terminals shall be provided with the manufacturers 5 year limited replacement warranty.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: National Lightning Protection Corporation, which is located at:13550 Smith Rd., Suite 150Aurora, CO 80011Toll Free Tel: 800-628-2816Tel: 303-295-1695Fax: 303-295-1623Email: [request info (info@nlpcorp.com)](https://arcat.com/rfi?action=email&company=National%252BLightning%252BProtection%252BCorporation&message=RE%253A%2520Spec%2520Question%2520(13100nlp)%253A%2520&coid=39830&spec=13100nlp&rep=&fax=303-295-1623);Web: <http://www.theprotectionsource.com>
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements [01 60 00].
	2. ESE AIR TERMINAL
		1. ESE air terminal assembly:
			1. Assembly shall have a continuous nickel plated copper central air terminal with a 316 grade stainless steel housing and a threaded base for connection to mast.
			2. Each assembly shall be provided with an identification plate indicating name, phone number, NRTL file number of the ESE air terminal manufacturer.
			3. Air terminal shall release stored energy based upon rapid variation of ambient field strength in phase with the approaching downward leader.
			4. Air terminal shall utilize independent synchronized modules including one module for neutralization of space charge at the tip of the air terminal prior to triggering the upward streamer. Modules shall be replaceable.
			5. Compliance:
				1. Air terminal shall be designed and certified to NF C 17-102
				2. Assembly shall be tested per appendix C of NFC 17-102 with testing be witnessed by an OSHA NRTL Laboratory.
				3. Air terminal shall have a standard deviation value 40% lower than the requirement in NF C 17-102 section C.3.5.2.5.
		2. Air terminals with any of the following characteristics are unacceptable.
			1. Air terminals that utilize an internal spark gap or pulsed release based upon hold voltage.
			2. Air terminals that utilize a central rod that is isolated from ground.
			3. Air terminals that utilized radioactive ionization sources.
			4. Air terminals listed under the UL category OVTZ.
	3. CONDUCTORS
		1. Copper conductors shall be 37 strand copper wire with a minimum net weight of 410 lbs. per 1,000 ft. (187.97kg per 304.8m). Aluminum conductors may be substituted, when necessary, to avoid dissimilar metals.
		2. Structural steel may be utilized as the main down conductor as follows:
			1. Structural steel shall be electrically continuous or made so.
			2. Perimeter columns shall be grounded or at intervals not exceeding an average of 60 feet (18.2 M) on center.
		3. All conductors shall be securely fastened to the structure at every 36 inches (914.4 mm) on center utilizing fasteners with corrosion resistance equal to that of the conductor.
		4. All metal objects of induction situated within 15 feet 0 inches (4.5 M) of a lightning protection conductor or bonded metal body shall be interconnected to the lightning protection system.
			1. Grounded metal bodies shall be interconnected to the lightning protection system using a main size conductor.
			2. Ungrounded metal bodies shall be interconnected to the lightning protection system using a secondary conductor no smaller than #6 AWG (13.3 mm2) copper.
		5. Copper materials shall not be installed directly upon a dissimilar metal. Aluminum or tin coated copper shall be installed where these conditions exist.
		6. Tin or lead coated copper and bronze equipment shall be utilized where corrosive atmospheres are present.
		7. Lightning protection conductors shall maintain a downward or horizontal path to ground avoiding U and V pockets with the following exception:
			1. A conductor may rise no more than 3 inches (76.2 mm) for every 12 inches (304.8 cm) of run.
		8. No bend of conductor shall form a final included angle of less than 90 degrees nor shall have a radius of less than 8 inches (203.2 mm). Exceptions are thru roof and thru wall connections.
		9. Provide each ESE air terminal with two paths to ground from the base plate of the mast, with the exception of an elevated mast that may have a single 16 feet (4.8 m) conductor run before 2 down conductors are implemented.
		10. Install down conductors as widely separated as possible.
	4. LIGHTNING PROTECTION MAST
		1. Provide as indicated on the Drawings and as certified or accepted by the ESE Air Terminal system manufacturer,
		2. Masts may be aluminum, steel, or galvanized steel as follows:
			1. Height required by the application.
			2. Threaded connection for acceptance of ESE air terminal.
			3. Bonding plate for cable connection.
			4. Structured as required by wind and safety factors inherent to the geographic location of the installation.
		3. Anchor base, direct burial, and side mounted masts shall be designed and manufactured to the AASHTO code. Effective Projected Area (EPA) data based upon the AASHTO code and ASCE 7 for the fastest wind speed shall be included with the project submittals.
	5. GROUNDING SYSTEM
		1. Ground system shall have no more than 10 ohms of resistance
			1. Measure resistance using the IEEE fall of potential method.
			2. Resistance shall be measured at each down conductor.
			3. Make resistance measurements in dry weather, not earlier than 48 hours after precipitation.
			4. Resistance measurements and testing method shall be documented.
		2. Acceptable Ground terminations
			1. Ground rods: 3/4 inch by 10 feet (19.0 mm by 304.8 mm) copper-clad (3 per down lead).
			2. Electrolytic ground electrodes (1 per down lead) may be used in lieu of or in combination with ground rods, and plates to achieve the 10-ohm resistance requirement.
			3. Ground loop conductors shall be a minimum of 2/0 AWG (67.4 mm2) stranded bare copper. Each down conductor shall terminate at a ground rod. Grounds rod shall be connected to the ground loop.
		3. Ground connections shall be Bundy HYGROUND fittings or exothermic connections, or equivalent irreversible connections.
		4. Connections to ground rods, ground plates, electrolytic ground electrodes, or ground loop conductors shall be made at a point not less than 24 inches (609.6 mm) away from foundation walls and 18 inches (457.2 mm) below grade,
		5. Space ground terminations as evenly as possible around the entire building perimeter.
		6. All grounded systems shall be bonded together using main size conductor to achieve equal potential of all grounded systems. All such connections shall be accomplished via exothermic welding where possible.
	6. CONNECTORS, FASTENERS, AND HARDWARE
		1. Provide all connectors, fittings, fasteners, clamps, guards, lugs, exothermic connections, etc. as required to install all parts of the lightning protection system. All material should be NRTL listed where applicable. All equipment shall be fabricated from copper and/or bronze material for the use intended.
		2. All connections between dissimilar metals shall be executed with tinned or nickel plated fittings and treated with Penetrox A or approved equal.
2. EXECUTION
	1. EXAMINATION
		1. Do not begin installation until substrates have been properly prepared.
		2. Verify related systems, dimensions and measurements with field conditions
		3. If conditions or substrate preparation are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
	2. PREPARATION
		1. Clean surfaces thoroughly prior to installation.
		2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
	3. INSTALLATION
		1. Install ESE lightning protection system in accordance with manufacturer's instructions.
		2. Installation shall be accomplished in a neat and orderly manner.
		3. All work inside the building shall be concealed.
		4. All wall, roof, and other penetrations shall be sealed as required and performed by the appropriate trade.
		5. All structural applications shall be coordinated with the project structural engineer and all other applicable trades.
		6. Protect elements under other sections from damage or disfiguration during work under this section.
		7. All adhesive lightning protection components shall be installed with an adhesive approved by the roof or flashing manufacturer.
		8. All work installed in accessible areas shall be properly guarded and protected from damage.
		9. All material shall be installed in a manner to protect against electrolytic couple in the presence of moisture.
	4. PROTECTION
		1. Protect installed products until completion of project.
		2. Touch-up, repair or replace damaged products before Substantial Completion.
	5. FIELD QUALITY CONTROL
		1. Field Quality Control Inspection: Inspection of Completed System shall be performed by an approved OSHA NRTL Testing Laboratory in accordance with Section 01 40 00 - Quality Requirements [01 40 00].
			1. Field Inspections shall be performed and documented for the following.
				1. Inspection of down conductors prior to being covered by interior, exterior, or other installations.
				2. Inspection of lightning protection system grounds prior to burial.
				3. Provide NRTL inspection report for completed lightning protection system.
			2. Field Quality Control Inspection:
				1. Completed lightning protection system shall be inspected to the Installation Requirements for ESE Lightning Protection Systems US 17-102.
				2. Completed form ESE-1-90 shall be returned to the ESE manufacturer for certification, verification, archiving, and system documentation.

END OF SECTION