

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 04 03 43 - Historic - Dismantling Stone Masonry.
- .2 Section 04 05 00 - Common Work Results for Masonry.
- .3 Section 07 61 00 - Sheet Metal Roofing.
- .4 Section 07 62 00 - Sheet Metal Flashing and Trim.

1.2 REFERENCES

- .1 Institute of Electrical and Electronics Engineers, Inc. (IEEE)
 - .1 IEEE 837, Standard for Qualifying Permanent Connections Used in Substation Grounding.
- .2 CSA International
 - .1 CAN/CSA-B72, Installation Code for Lightning Protection Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer member of the Ordre des ingénieurs du Quebec.
 - .2 Indicate materials and methods of attachment of conductors to air terminals, masonry, roofing and electrodes.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, in clean, dry, well-ventilated area, in accordance with manufacturer's recommendations.
 - .2 Store and protect lighting protection from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.5 WARRANTY

- .1 For Work in this Section 26 41 13 - Lightning Protection for Structures, the 1 year warranty period **is extended to 10 years.**

Part 2 Products

2.1 MATERIALS

- .1 Materials to be used shall be new, of first quality and of a conductivity of 98% minimum.
- .2 Lightning rods or air terminals for copings of chimney stalks: solid copper rods, diameter of 13 mm, 1220 mm long.
- .3 Lightning rods or air terminals for roof ridge: solid copper rods, diameter of 13 mm, 460 mm long.
- .4 Lightning rods or air terminals for roof fans: solid copper rods, diameter of 13 mm, 305 mm long.
- .5 Air terminal base (or point base) for 50 mm offset vertical mounting on copings of chimney stalks: solid copper, for 13 mm lightning rods, with two mounting holes for screws.
- .6 Air terminal base (or point base) for ridge and fans mounting: solid copper, for 13 mm lightning rods, with legs that can be easily formed to match slope, and with four mounting holes for screws.
- .7 Conductors: stranded and twisted, size: 40 strands of 17 gauge (approx. diameter of 13 mm), in soft copper.
- .8 Fastenings and attachment straps: pre-drilled in copper for 13 mm copper conductors, with 6 mm stainless steel screws.
- .9 Connections: inspectable wrought copper compression connectors, in compliance with standard IEEE 837.
- .10 Pinch type cable fasteners for anchoring into masonry: in copper, with 31 mm lead, for standard cable conductors.
- .11 Cable splicers located 2 m above ground level: solid brass, 203 mm long, diameter of 13 mm, with four stainless steel tightening bolts.
- .12 Ground rod clamps: U-bolt ground rod clamp with high conductivity bronze casting and high strength stainless steel u-bolt, offering a 75 mm long contact surface between clamp and cable.
- .13 Neoprene strips and round washers: 3mm thick, to isolate all copper components (ex.: air terminal base and conductive cable attachment straps) from stainless steel flashing on copings of chimney stalks.
- .14 Ground electrodes: 3 m x 19 mm diameter, solid copper.
- .15 Ground Enhancement Material (GEM).

- .16 Bronze receptacles and covers of adequate diameter for installation flush with finished concrete or ground surface, to protect the borings in which the ground rods will have been installed.

2.2 DESCRIPTION

- .1 System to consist of metallic air terminals, point bases, lightning conductors connecting air terminals between them and to ground, the required straps, connections and fasteners, and of ground electrodes.

2.3 REGULATORY REQUIREMENTS

- .1 System subject to: approval by authority having jurisdiction.
- .2 System shall comply with: Standard CAN/CSA-B72.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for lightning protection installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Install lightning protection to CAN/CSA-B72, as well as to instructions on drawings.
- .2 Bond discharge conductors to service mast or other non-current-carrying electrical parts.
- .3 Meet the following specific requirements:
 - .1 System must be installed by a specialized firm duly authorized to conduct this type of work, and having the required permits and licenses;
 - .2 Lightning rods or air terminals will be installed on top of each chimney, along the roof ridge and on each of the roof fans, as indicated on the drawings. Air terminals will be interconnected with a conductor cable;
 - .3 Conductor cables will be installed with as few turns as possible, and they shall circumvent obstacles horizontally along the network's path;
 - .4 A minimum of six (6) conductor cables to ground are required for the building as a whole, and each of the cables to grounds shall be equipped with a splicer located no higher than 2 m from the ground. All connections will be mechanical;
 - .5 All joints will have to be mechanically made.

- .6 All metallic elements shall be connected to the network.
 - .7 Fastenings and attachment straps shall be spaced at a maximum of 1 m o.c. on the chimneys, and at a maximum of 1.5 m o.c. elsewhere;
 - .8 On the roof, all fastenings and attachment straps shall placed along battens (never on the flat surface of the roof), and be screwed and soldered;
 - .9 Ground electrodes will have to be inserted in previously bored shafts in locations and in accordance with dimensions indicated on the architectural drawings. The remaining space around the rods will have to be filled with a ground enhancement material (GEM).
 - .10 It is forbidden to use other materials than those specified, or materials that are incompatible.
- .4 Inspect system with Departmental Representative during the installation and when completed.
 - .5 Upon completion of the installation, prepare and submit as built drawings to Departmental Representative.
 - .6 Submit certificate of installation to Departmental Representative.

3.3 INSPECTION

- .1 Obtain inspection certificate from Departmental Representative for discharge conductor passing through any fire supporting membrane.
- .2 Resistance tests in the presence of the Departmental Representative will be required for the entire system. Ohmic resistance will have to be below 25 ohms.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by lightning protection installation.

END OF SECTION