SECTION 264100

facility lightning protection

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**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 1 Specification with completely editable text; therefore, any portion of the text can be modified by the A/E preparing the Solicitation Package to suit the project.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

**A Lightning Protection System is not required on all Mail Processing Facilities. Utilize this specification for facilities where the lightning risk assessment calculation predicts expected lightning stroke frequency to exceed the tolerable lightning frequency. Refer to Handbook AS-503, Standard Design Criteria, Module 2A - Mail Processing Facilities, 5-6 Lightning Protection.**

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1. GENERAL
	1. SUMMARY
		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, UL 96A master labeled, lightning protection and grounding system as approved by the Engineer and in strict accordance with this section of the specifications.
			1. If any departure from these specifications or submittal drawings covered below are deemed necessary by the contractor, details of such departures and reasons therefore shall be submitted as soon as practicable to the Engineer for approval. No such departures shall be made without the prior written approval of the Engineer.
		2. Section includes:
			1. Air Terminals and Bases.
			2. Grounding Electrodes.
			3. Lightning Protection Conductors.
			4. Grounding and Bonding for Lightning Protection.
		3. Substitutions:
			1. Section 016000 – Product Requirements: Product options and substitutions. Substitutions permitted.
		4. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
		5. Related Sections:
			1. Section 260500 - Common Work Results for Electrical: Basic electrical methods.
			2. Section 264101 - Underground Counterpoise.
			3. Section 264128 – Surge Protective Devices (SPDs).
	2. REFERENCES
		1. Lightning Protection Institute (LPI):
			1. LPI-175 - Lightning Protection Installation Standard.
			2. LPI-176 - Lightning Protection System Material and Components Standard.
			3. LPI-177 - Inspection Guide for LPI Certified Systems.
		2. National Fire Protection Association (NFPA):
			1. NFPA 780 – Lightning Protection Code.
		3. Underwriters Laboratories, Inc. (UL):
			1. UL 96 - Lightning Protection Components.
			2. UL 96A - Installation Requirements for Lightning Protection Systems.
	3. SUBMITTALS
		1. 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. Drawings shall include full layout of cabling and points, and connections.
		2. Submit product data showing dimensions and materials of each component and include indication of listing in accordance with ANSI/UL 96.
		3. Submit manufacturer’s installation instructions.
		4. Submittal shall include ground test wells.
	4. PROJECT AS-BUILT DOCUMENTS
		1. Submit project as-built documents.
		2. Accurately record actual locations of air terminals, grounding electrodes, bonding connections and routing of system conductors.
	5. QUALITY ASSURANCE
		1. Manufacturer: Company specializing in lightning protection equipment with minimum 5 years documented experience and member of the Lightning Protection Institute.
		2. Installer: Authorized installer of manufacturer with minimum 5 years documented experience and member of the Lightning Protection Institute.
2. PRODUCTS

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**NOTE TO SPECIFIER**

Verify manufacturer information, Product numbers, and availability at time of Project Manual preparation for Project.

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* 1. MANUFACTURERS
		1. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
			1. Harger Lightning Protection, Inc., Grayslake, IL (800) 842-7437.
			2. Heary Brothers Lightning Protection, Inc., Springville, NY (716) 941-6141.
			3. Independent Lightning Protection, Inc., Goshen, IN (800) 860-8388.
			4. Robbins Lightning, Inc., Maryville, MO (800) 426-3792.
			5. Thompson Lightning Protection, Inc., St. Paul, MN (800) 777-1230.
	2. STANDARDS
		1. All equipment used in this installation shall be UL approved and labeled in accordance with UL procedures, with each air terminal bearing an "A" label and all main conductors bearing a "B" label at 10 foot intervals.
		2. All equipment shall be new, the product of a single manufacturer as outlined above, and of a design and construction to suit the application where it is used in accordance with accepted industry standards and L.P.I. and UL code requirements.
	3. EQUIPMENT
		1. All materials shall be copper, aluminum or bronze as indicated on the drawings. All materials shall be UL approved and labeled and of the size, weight, and construction for use on building in accordance with L.P.I. and UL Code requirements for Class I and II structures and as per manufacturer's recommendations.
		2. Air terminal bases shall be of cast construction with bolted pressure cable connections and shall be securely mounted with stainless steel screws or bolts. Crimp type connectors are not acceptable. Bases shall have a minimum surface contact area of 8.5 square inches.
		3. Cable fasteners shall be of cast construction with pressure cable connectors, electrolytically compatible with the conductor and mounting surface and shall be spaced according to UL, L.P.I. and NFPA Code requirements.
		4. Bonding devices, cable splicers and miscellaneous connectors shall be of cast bronze with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable.
		5. Ground rods shall be 3/4 inch diameter, 10 feet long sectional copperweld steel. Obtain 5-OHMS maximum resistance as read with a clamp-on ground reading megger.
		6. All miscellaneous bolts, nuts and screws shall be brass, bronze or stainless steel. Crimp fittings are not acceptable. Stamped bronze materials are not acceptable.
		7. Equipment enclosures less than 3/16 inch thick shall be provided with individual air terminals bonded to the main coursing conductors.
		8. Equipment on ventilators, etc. shall be protected from corrosion in accordance with L.P.I. and UL requirements.
		9. All miscellaneous bolts, nuts and screws shall be stainless steel.
1. EXECUTION
	1. INSTALLATION
		1. Install in accordance with manufacturer’s instructions.
		2. Install in accordance with UL 96A, ANSI/NFPA 780 and LPI.
		3. Installation shall be made in an inconspicuous manner with conductors coursed to conceal equipment as much as possible. Down conductors shall be routed within the structure, wherever possible, and shall be run in 1-inch PVC conduit.
		4. Where fasteners are to be mounted in masonry or structural work, they shall be furnished to the Masonry or Structural Contractor so they may be installed during construction of the project.
		5. Down conductors shall be installed, bonded, etc. per NFPA 780 4.9.9. Specific attention is brought to the requirements of 4.9.13 requiring down conductors to be connected to reinforced steel at its upper and lower extremities.
		6. Provide proper connections of lightning protection system to all grounded media in and around the protected structure per NFPA 780 4.15 “Potential Equalization”.
		7. Provide proper grounding of all grounding media in, on and around structure to provide common ground potential per NFPA 780 4.14 including electric service, telephone, and antenna system grounds as well as underground metallic piping systems, underground metal conduits, etc.
		8. Underground counterpoise: Items required to be bonded/connected in “F” and “G” above shall be bonded/connected via ground ring counterpoise system where available and applicable.
		9. All exposed conductors located 6 feet or less above finished floor or finished grade are to be suitably protected/shielded as well as other exposed locations where conductor is subject to mechanical damage.
		10. Coordinate and receive approval of all penetrations of roofing system and mounting to roofing system with Designer and Roofing Contractor prior to submittal of shop drawings.
		11. Coordinate and receive approval of all connections to structural steel, rebar, etc. with Structural Engineer prior to submittal of shop drawings.
		12. Submittal of shop drawing by Contractor is evidence that the Contractor has received approval of penetrations, connections, etc., by all parties and that Contractor assumes responsibility for such penetrations, connections, etc.
		13. Locate air terminals as required. Take care to ensure that all points are within 2 feet of outside building edge, outside corners and ridge ends, and that maximum spacing does not exceed 20 feet, and that minimum projection above object protected is 10 inches.
		14. Maintain horizontal or downward coursing of main conductor and ensure that all bends have at least an 8" radius and do not exceed 90'.
		15. Support all roof coursing conductors, down leads and bonding cables at 3 feet on center maximum.
		16. Ground electrodes shall be installed within 12 inch dia. x 12 inch long PVC access wells equipped with cast iron covers; Harger #362PS12CILS80. Install access wells in unpaved, accessible areas, but in no instance less 2 ft. from foundation wall. Access wells shall be set within a 6 inch deep, gravel bed, 3 inches wide all round the PVC sleeve. Driven rods shall penetrate earth at least 10 ft. - 0 in. All down conductors and below grade connections shall be bonded utilizing exothermic welds.
		17. Bond to all metal bodies of conductance on roof with main size conductors as shown and as required by UL codes. These bonds include, but are not limited to, exhaust fans, vents, handrails, metal screens and panels, HVAC units, hatches, skylights, cooling towers, flag poles, antennas, etc., or any large metal body subject to direct stroke or exceeds the height of adjacent air terminals.
		18. Bond to metal bodies of conductance located within 6 feet of main conductor or other bonded object with approved secondary bonding conductor as shown and as required by UL codes. Such objects include, but are not limited to, flashings, metal coping caps, gravel guards, fascias, roof drains, down-spouts, interior ducts, machinery or piping, etc., or, in general, any isolated body at or below the roof subject to inductance and within 6 feet of system.
	2. FIELD QUALITY CONTROL
		1. The resistance of the lightning protection system shall not exceed 5 ohms. Where tests show resistance to ground is over 5 ohms, take appropriate action to reduce resistance to 5 ohms, or less, by driving additional ground rods, lengthening ground rods, or installing ground enhancement materials; then retest to demonstrate compliance. Furnish written report of all tests.
		2. Obtain the service of Underwriters Laboratories, Inc. to provide inspection and certification of the lightning protection system under provisions of UL 96A. Submit certification and submit in O&M Manual.
		3. Obtain UL Master Label per UL 96A. Submit copy of paperwork to the USPS Project Manager and submit in O&M Manual.
		4. Submit test results on each ground location including final length of each ground rod and final distance between each installed ground rod at each ground rod location.

END OF SECTION

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