SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

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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.*

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1. GENERAL
	1. SUMMARY:
		1. Section Includes:
			1. Building wire and cable.
			2. Branch-circuit cable.
			3. Wiring connectors and connections.
			4. Drop cords.
			5. Busways.
		2. 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.
		3. Related Sections:
			1. As specified in Section 260500 - Common Work Results for Electrical: Basic electrical methods.
	2. REFERENCES
		1. As specified in Section 260500 – Common Work Results for Electrical.
	3. SUBMITTALS
		1. As specified in Section 260500 - Common Work Results for Electrical.
	4. QUALITY ASSURANCE
		1. As specified in Section 260500 – Common Work Results for Electrical.
	5. DELIVERY, STORAGE, AND HANDLING
		1. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
		2. Deliver in accordance with NEMA WC 26.

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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. PRODUCTS
	1. BUILDING WIRE AND CABLE
		1. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
			1. Alcan Cable, Atlanta, GA (770) 392-2376.
			2. Anixter, Inc., Skokie, IL (800) ANIXTER.
			3. General Cable, Highland Heights, KY (800) 526-4391.
			4. General Electric, Plainville, CT (860) 747-7111.
			5. Okonite, Ramsey, NJ (201) 825-0300.
			6. Southwire Company, Carrollton, GA (800) 444-1700.
			7. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
		2. Description: Single conductor insulated wire.
		3. Conductor: Copper, except conductors #1/0 AWG and larger may be compact stranded aluminum if equipped with compression lugs and installed per manufacturer’s recommendations and the National Electrical Code.
		4. Insulation Voltage Rating: 600 Volts.
		5. Insulation: NFPA 70, Type THHN/THWN or Type XHHW-2.
		6. Multiconductor cable: Metal clad cable, Type MC with ground wire.
			1. Type “MC” cable shall be permitted for use in exposed or accessible ceiling spaces only. Type “MC” cable shall not be utilized above inaccessible hard ceilings or in damp locations. Cable shall be supported and secured where such support does not exceed 3 ft. intervals and shall be properly color coded to identify phase, neutral, ground and switch legs.
	2. WIRING CONNECTORS
		1. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
			1. Buchanan Construction Products, Hackettstown, NJ (800) 610-5201.
			2. Thomas and Betts, Memphis, TN (800) 695-1901.
			3. 3M, St. Paul, MN (800) 364-3577.
			4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
		2. Compression Connectors; Conductor sizes #12 through #6 AWG:
			1. Buchanan: 2006S or 2011S.
			2. Thomas and Betts: [\_\_\_\_\_\_\_\_\_\_\_ ].
			3. 3M; [\_\_\_\_\_\_\_\_\_\_ ].
	3. DROP CORDS
		1. Description: Continuous length of cable with 20 Amp, 120 Volt locking blade type connector body at one end as indicated on Drawings. Secure cable at both ends with wire type stainless steel cable grips to prevent transmission of tension directly to conductors or terminal screws.
		2. Junction Box: Furnished and installed [flush with ceiling] anchored to building structure for fastening of upper cord grip.
		3. Cable: Type SO 600 Volt flexible cord with three #12 stranded wires.
		4. Connector Body: Single 20 Amp, 120 Volt, grounding receptacle of twist-lock type at one end and straight blade type at other end that grips on cable insulation and is manufactured for use with wire cable grips. Furnish and install drop cords in length required for a receptacle height of 6 feet 8 inches above finished floor.
	4. BUSWAYS
		1. Basis of Design: General Electric “Spectra” series.
		2. Manufacturers: Subject to compliance with project requirements, manufacturers offering products which may be incorporated in the Work include the following:
			1. Eaton Corporation, Cutler-Hammer Products, Pittsburg, PA (800) 525-2000.
			2. General Electric Company (800) 626-2000.
			3. Siemens Energy and Automation, Alpharetta, GA (800) 964-4114.
			4. Square D Company, Palatine, IL (800) 392-8781.
			5. No substitutions permitted.
		3. Provide factory shop drawing submittals for each type of busway.
			1. Show fabrication and installation details of busway, including plans, elevations and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths and fittings.
			2. Seismic-Restraint Details: Signed and sealed by a qualified Professional Engineer, licensed in the state where Project is located, who is responsible for their preparation.
				1. Design Calculations: Calculate requirements for selecting seismic restraints.
				2. Detail fabrication, including anchorages and attachments to structure and to supported busways.
		4. Furnish and install a totally enclosed, low-impedance 5 wire, copper, busway system of the indicated ratings with all necessary fittings, power takeoffs, hanging devices and accessories.
			1. Materials and installation shall comply with applicable codes, recommended practices and standards of ANSI, IEEE, NEMA and UL. All components of the busway shall be UL listed. Arrangements, details and locations shall be as shown on the drawings and specified herein. The housing shall be of extruded aluminum and all hardware shall be painted to prevent corrosion.
			2. Joints shall be of the one-bolt removable/isolatable type with through-bolts that can be checked for tightness without de-energizing the system. The means of visual indication shall be a color change in the head of the bolt. It shall be possible to make up a joint from one side in the event the busway is installed against a wall or ceiling. The joint shall be so designed as to allow removal of any length without disturbing adjacent lengths. Belleville springs shall be provided to give positive pressure over complete contact area.
			3. Plug-in and feeder busway shall use identical parts and all multi-stacks shall be phase collected.
			4. The maximum hot-spot temperature rise at any point in the busway at continuous rated load shall not exceed 55 degrees C above a maximum ambient temperature of 40 degrees C in any position.
		5. Furnish and install busway plugs of the types and ratings indicated. Plugs shall be UL labeled. Housing shall completely enclose the switching device and shall be of sheet steel furnished in ASNI-61 grey enamel over a rust inhibitor. Provide stab shields that protect ground plug body to busway housing before stabs make power contact. Provide grounding terminal inside plug body and adequate shielding to prevent access to live parts when cover is open. A ground stab to engage grounding tab on busway and internal ground bus shall be provided. Provide means for padlocking cover and operating handle in “off” position. The operating handle shall be easily moved from end to side of vice versa so that it will be in the correct position to operate from the floor.
			1. Circuit breaker type plugs shall have an interrupting rating as indicated on the drawings. They shall have a releasable cover interlock that prevents opening of cover except with the breaker in “off” position. An interlock to prevent insertion or removal from busway when in “on” position shall be provided, as well as an interlock (releasable) to prevent closing circuit breaker with cover open.
			2. Plug assists shall be furnished on all plugs over 100 Amps that will mechanically engage or disengage the plug from the busway, but only when the plug is in the “off” position.
2. EXECUTION
	1. EXAMINATION
		1. As specified in Section 260500 – Common Work Results for Electrical.
	2. PREPARATION
		1. Completely and thoroughly swab raceway before installing wire.
	3. INSTALLATION - CONDUCTORS
		1. Wiring methods:
			1. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
			2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
			3. Above Accessible Ceilings: Use only building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
			4. Wet or Damp Interior Locations: Use only building wire, Type THW or THWN or Type XHHW-2 insulation in raceway.
		2. Install products in accordance with manufacturers published instructions and NECA SI.
		3. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
		4. Use stranded conductors for control circuits and final connections to all vibration equipment.
		5. Use conductor not smaller than 12 AWG for power and lighting circuits.
		6. Use conductor not smaller than 14 AWG for control circuits.
		7. Use 10 AWG conductors for 20 ampere, 120 Volt branch circuits longer than 75 feet.
		8. Use 10 AWG conductors for 20 ampere, 277 Volt branch circuits longer than 200 feet.
		9. Pull all conductors into raceway at same time.
		10. Use approved wire pulling lubricant for all building wire.
		11. Protect exposed cable from damage.
		12. Neatly train and lace wiring inside boxes, equipment, and panelboards in accordance with NECA Standards.
		13. Clean conductor surfaces before installing lugs and connectors.
		14. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
		15. For splices and taps, use only compression connectors for copper or aluminum conductors, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
			1. Splicing of copper feeder conductors #3 AWG and larger is prohibited.
			2. Splicing of aluminum feeder conductors #1 AWG and larger is prohibited.
			3. Splices within branch circuit or feeder conductors located underground or below grade shall not be provided. All splices shall be terminated above grade.
		16. Use solderless pressure compression connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
		17. Use conductors rated 90 degrees C, inside a ballast compartment or within 6 inches of any ballast.
		18. Conductor Sizes #8 and Larger: Class B stranding.
		19. Install Drop Cords to building structure at locations indicated on Drawings as indicated on Drawings.
		20. The sharing of neutral conductors for multiwire branch circuits is prohibited. All branch circuits shall contain individual neutral conductors.
	4. INSTALLATION – BUSWAYS
		1. Horizontal runs of busway shall be UL listed for hanging on 10-foot centers in any position. Vertical riser runs of busway shall be supported with rigid and/or spring hangers. (Max. 16 ft. centers).
		2. Final field measurements shall be made by the contractor prior to release for manufacture to assure coordination with other trades. Contractor shall coordinate routing of busways with field conditions.
		3. Contractor shall provide all necessary mounting hardware as recommended by the manufacturer. Utilize trapeze hangers, spring isolators, and ½ inch all-thread on 10-foot centers. Installation shall comply with local seismic zone requirements.
			1. Provide approved manufacturer’s standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, expansion joints and connectors. Obtain busway components from a single manufacturer.
		4. Engraved nameplates: ½ inch high black letters on yellow laminated plastic nameplate, engraved with the following wording: WARNING! DO NOT USE BUSWAY AS WALKWAY, LADDER OR SUPPORT.
	5. CONSTRUCTION
		1. Interface with Other Work:
			1. Identify wire and cable using Thomas and Betts type WM vinyl markers.
			2. Identify each conductor with its circuit number or other designation indicated on Drawings in all junction, pull, terminal boxes and cabinets. Identify neutrals with common circuit numbers in all junction, pull and terminal boxes, panels and cabinets.

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**NOTE TO SPECIFIER**

Edit WIRING COLOR CODE below for voltage systems used for this Project.

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* 1. WIRING COLOR CODE
		1. Comply with the following color code for each voltage system.
		2. 208Y/120 Volt System:
			1. Phase A - Black.
			2. Phase A Switch Leg - Black with “S” tag.
			3. Phase B - Red.
			4. Phase B Switch Leg - Red with “S” tag.
			5. Phase C - Blue.
			6. Phase C - Switch Leg - Blue with “S” tag.
			7. Travelers - Yellow.
			8. Neutral - White.
			9. Equipment Ground - Green.
		3. 240/120 Volt System:
			1. Phase A - Black.
			2. Phase A Switch Leg - Black with “S” tag.
			3. Phase B - Orange (High-Leg).
			4. Phase C - Blue.
			5. Phase C Switch Leg - Blue with “S” tag.
			6. Travelers - Yellow.
			7. Neutral - White.
			8. Equipment Ground - Green.
		4. 480Y/277 Volt System:
			1. Phase A - Brown.
			2. Phase A Switch Leg - Brown with "S" Tag.
			3. Phase B - Orange.
			4. Phase B Switch Leg - Orange with "S" Tag.
			5. Phase C - Yellow.
			6. Phase C Switch -Leg- Yellow with "S" Tag.
			7. Travelers - Yellow with "T" Tag.
			8. Neutral - Grey.
			9. Equipment Ground - Green with Yellow stripe.
		5. Use same color for same phase throughout. Use same colors for switch legs. Travelers shall be yellow. Phase rotation shall be same in all panels. Identify large cables with colored tape.
		6. Provide identification tags on each conductor entering panel, switch, junction box and pull box to identify conductor.
	2. FIELD QUALITY CONTROL
		1. As specified in Section 260500 – Common Work Results for Electrical.
		2. Cables, 600 Volt or less and size no. 3 or larger, shall be meggered using an industry-approved “megger with a minimum of 500 Volt internal generating voltage. All inspection, cleaning and testing procedures shall be in compliance with the recommendations and standards outlined in the “maintenance testing specifications for electrical power distribution equipment and systems”, latest edition, published by International Electrical Testing Association (NETA). Insulation resistance test values shall be no less than 250 megaohms. A typewritten report of all readings shall be prepared and submitted.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022