SECTION 261317

MEDIUM-VOLTAGE INTERRUPTER SWITCHGEAR

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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. This section includes medium voltage metal-enclosed switchgear assemblies consisting of fusible or non-fusible load interrupter switches and associated auxiliary equipment.
      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 Section include the following:
         1. Section 019113 - General Commissioning Requirements.
         2. Section 260500 - Common Work Results for Electrical.
         3. Section 260800 - Commissioning of Electrical Systems.
         4. Section 261116 - Secondary Unit Substations.
         5. Section 261216 - Dry-Type, Medium-Voltage Transformers.
         6. Section 261313 - Medium Voltage Circuit Breaker Switchgear.
         7. Section 261414 - Infrared Viewing Panes (IR Windows).
         8. Section 337173 - Electrical Utility Services.
   2. SUBMITTALS
      1. Submit shop drawings and product data for approval and final documentation in the quantities listed according to the Conditions of the Contract. All transmittals shall be identified by customer name, customer location and customer order number.
      2. Documents for Approval: One-line diagrams, dimensioned plans, sections, and elevations showing minimum clearances, installed devices, major features, nameplate legends and bills of material.
      3. Final Documents: Record documentation to include those in 1.3.B and wiring diagrams, single-line and three-line diagrams of switchgear bus and component connections, product data of accessories or parts not previously described in the drawings, list of recommended spare parts and instruction and installation manuals.
      4. Product Data: Include features, characteristics and ratings of switches, fuses and other components. Also, time-current characteristic curves for power fuses and any overcurrent devices.
      5. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components and location and size of each field connection. Include the following:
         1. Enclosure type and details.
         2. Nameplate legends.
         3. Bus configuration with size and number of conductors in each bus run, including phase, neutral and ground conductors of main and branch buses.
         4. Current ratings of buses.
         5. Short-time and short-circuit ratings of switchgear assembly.
         6. Mimic bus diagram.
         7. Wiring Diagrams: Detail wiring for power, signal and control systems and differentiate between manufacturer-installed and field-installed wiring.
   3. RELATED STANDARDS
      1. Comply with requirements of latest revisions of applicable industry standards, specifically including the following:
         1. ANSI/IEEE C37.20.3 – Standard for Metal-Enclosed Interrupter Switchgear.
         2. ANSI/IEEE C37.20.4 – Standard for Indoor AC Medium Voltage Switches Used in Metal-Enclosed Switchgear.
         3. NEMA
         4. UL
   4. QUALITY ASSURANCE
      1. Manufacturer Qualifications: Engage a firm with at least 5 years of experience in manufacturing switchgear.
   5. DELIVERY, STORAGE AND HANDLING
      1. Deliver products in factory labeled packages. Shipping groups shall not exceed 15 feet in length.
      2. Store and handle in strict compliance with manufacturer’s instructions and recommendations. Protect from potential damage from weather and construction operations. Store so condensation will not form on or in switchgear and if necessary, apply temporary heat where required to obtain suitable service conditions.
2. PRODUCTS
   1. MANUFACTURERS
      1. Subject to compliance with project requirements, manufacturer’s 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.
   2. RATINGS
      1. System Configuration: Switchgear suitable for application in three-phase, 60-Hz, grounded-neutral system.
      2. Electrical Ratings:
         1. Nominal System Voltage, kV: [4.16] [7.2] [13.8] [34.5]
         2. Maximum Design Voltage, kV: [5] [8.25] [15] [38]
         3. BIL Impulse Level: [60] [95] [150] [200]
         4. Main-Bus Continuous:[600] [1200] [2000] A.
         5. Switch Duty Cycle, Fault Closing, symmetrical A: [40] [61]
   3. GENERAL REQUIREMENTS
      1. The switchgear shall be factory assembled and tested and comply with applicable industry standards. If multiple sections, it shall be a coordinated design so that shipping groups are easily connected together at the site into a continuous line-up. Necessary connecting materials shall be furnished.
      2. The switchgear assembly shall consist of one or more metal-enclosed ventilated sections in indoor NEMA 1 enclosure(s). Units shall be of individual frames of bolted steel construction with full-side sheets separating adjacent units. Each frame shall be adequately braced to function properly under normal operating and short-circuit conditions. Assembly shall have the following:
         1. Window on door to permit viewing switch-blade positions when door is closed.
         2. Rear removable panels with handles
         3. Danger-warning sign
         4. Interlock air-interrupter switch with transformer secondary main circuit breaker, preventing switch from being opened or closed unless secondary main circuit breaker is open.
      3. The switchgear shall be UL listed with separate door to the switch. Door shall be mechanically interlocked with the switch to prevent closing the switch with the door open and to prevent opening the door with the switch closed. Door shall have provision for pad lock.
      4. Surge Arresters: Comply with IEEE C62.11, station class; metal-oxide-varistor type, with ratings as indicated, connected in each phase of incoming circuit and ahead of any disconnecting device.
      5. Main bus shall connect vertical sections and between compartments and shall be uniform capacity the entire length of assembly. The main horizontal bus shall be run in a vertical, edge-to-edge arrangement for high short circuit strength. Access to the rear cable termination area shall be possible without reaching over the main and vertical bus.
         1. Bus shall be 98% minimum conductivity copper with silver-plated joints.
         2. Ground Bus shall be copper of 98 percent minimum conductivity, with pressure connector for feeder and branch-circuit ground conductors, minimum size 1/4 by 2 inches.
         3. Bus bracing shall be equal to the short circuit interrupting rating of the lowest rated non-fused circuit breaker applied in the assembly.
         4. Neutral Bus shall be [50] [100] percent of phase-bus ampacity. Equip bus with pressure-connector terminations for outgoing circuit neutral conductors.
         5. [Neutral bus equipped with pressure-connector terminations for outgoing circuit neutral conductors. Neutral-bus extensions for busway feeders are braced.]
         6. [Neutral Disconnect Link: Bolted, uninsulated, 1/4-by-2-inch copper bus, arranged to connect neutral bus to ground bus.]
         7. MV clearances shall be maintained in all horizontal and vertical buses such that insulation is not required.
      6. Fungus Proofing: Permanent fungicidal treatment for switchgear interior, including instruments and instrument transformers.
   4. infrared viewing panes (ir windows)
      1. The design of interrupter switches is such that all important electrical components and connections can be effectively viewed for thermographic inspection. A single, transparent, rectangular infrared window (9 inch W x 5 inch H) shall be provided in the front top section; centered on the Phase “B” inter-phase barrier. A single, transparent window (3 inch round) shall be provided in the bottom front section of the switch to view the fuses and another rectangular, window (9 inch W x 5 inch H, transparent) shall be provided in the top rear section, centered on phase “B”, to view the cable connections at the top of the enclosure. Note that nonfusible, interrupter switches need not be equipped with a viewing pane in the bottom front section. Refer to specification section 261414 for specific details.
      2. Acceptable installers:
         1. IR viewing panes shall be factory installed by the switchgear manufacturer or field installed by a certified installer, as recommended by the IR viewing pane manufacturer.
         2. Installer shall be factory certified and trained by the IR viewing pane manufacturer.
   5. COMPONENTS
      1. Instrument Transformers: Comply with IEEE C57.13.
         1. Potential Transformers: Secondary voltage rating of 120V and NEMA accuracy class of 0.3 with burdens of W, X and Y.
         2. Current Transformers: [Bar type for utilities] [Donut type for shielded cable], ratios as indicated; burden and accuracy class suitable for connected relays, meters and instruments.
      2. Multifunction Digital-Metering Monitors shall be UL-listed or -recognized, microprocessor-based unit suitable for three- or four-wire systems. Units shall be mounted in the instrument compartment door.
      3. The numerical protective relays shall have multi-phase inputs (current and voltage) and multifunction protection elements that are UL listed or recognized meeting ANSI Surge Withstand standards IEEE C37.90.1 and C37.90.2. Features include:
         1. Protection, breaker control and automation CFC (Continuous Function Logic)
         2. Four Function keys that can be user-programmed
         3. Four (4) Line Backlit front display for metering, relay settings and fault information
         4. Seven (7) user-programmable target LED’s and two (2) diagnostic alarm LED’s
         5. Front access to circuit boards packaged in a flush mounted case with removable front cover
         6. Microprocessor Based Protection that includes:
            1. Three-phase and Ground Instantaneous (2 element) Overcurrent with Timer (50, 50-1, 50-2, 50N-1, 50N-2)
            2. Time Overcurrent (Selectable Curves)(51, 51G, 51N)
            3. Negative sequence time and Instantaneous Overcurrent (46TOC, 46-1, 46-2)
            4. [Three-phase and Ground Directional (2 element) (67-1, 67-2, 67N-1, 67N-2)]
            5. [Frequency protection with 4 independent setpoints that can be used for either under-frequency or over-frequency (81O/U)]
            6. [Over-voltage protection (59)]
            7. [Under-voltage protection (27-1, 27-2)]
            8. Breaker failure (50BF)
            9. Wide range of taps (0.5 - 20 amps, in 0.5 amp steps)
            10. Trip coil monitoring, function 74TC, for dc control power applications
            11. PLC programming capability to perform custom protection and control functions
            12. Windows based software for easy configuration and programming of the relay
         7. User Programmable Binary Inputs and Outputs
         8. Metering of phase and ground currents and amperes demand, min/max
         9. Metering of phase and ground voltages and min/max
         10. Metering of watts, vars, kilowatt-hours and kilovars-hours, including min/max and demand
         11. Logging of system and protective events, last 50 events (accessible via front RS-232 communications port and rear system communications port)
         12. Log of last 8 trips - containing time, date, interrupted amps, time in pickup, etc.
         13. Logging of per-phase interrupted amperes for the last fault
         14. 110-125VDC/110-250VAC power supply model selection options:
             1. [7SJ6225-5EC02-3FG0 (no rear system port)]
             2. [7SJ6225-5EC92-3FG0 +LOA (Profibus rear RS485 port)]
             3. [7SJ6225-5EC92-3FG0 +LOB (Profibus rear Fiber port)]
             4. [7SJ6225-5EC92-3FG0 +LOD (Modbus rear RS485 port)]
             5. [7SJ6225-5EC92-3FG0 +LOE (Modbus rear Fiber port)]
             6. [7SJ6225-5EC92-3FG0 +LOG (DNP3 rear RS485 port)]
             7. [7SJ6225-5EC92-3FG0 +LOE (DNP3 rear Fiber port)]]
      4. Control power transformer, single phase, with primary disconnect fuse 120/240 VAC secondary, internally mounted dry-type transformer with disconnect primary fuses, [5] [10] [15] kVA.
         1. [Automatic transfer of load with main-tie-main controls.]
      5. Mimic Bus: Continuous mimic bus applied to front of switchgear, arranged in single-line diagram format, using symbols and lettered designations consistent with approved final mimic-bus diagram. Mimic-bus segments shall be coordinated with devices in switchgear sections to which applied, to produce a concise visual presentation of principal switchgear components and connections.
   6. INTERRUPTER SWITCH AND FUSE ASSEMBLY
      1. Load interrupter switches shall be three-pole, single throw, gang-operated stored energy type with quick-make, quick-break operation.
         1. Electrically operated
         2. Non removable switch handle
         3. Separate main and arcing contacts to provide maximum endurance for fault close and load interrupting duty
         4. Arcing contacts shall be spring loaded so that on opening they breaker after the main contacts, on closing they make after the main contacts. Arc interruption to take place in an interruption chute.
   7. TESTING
      1. Perform production tests in compliance with ANSI C37 and NEMA SG 5 requirements. Provide certified test results.
   8. UNITS REQUIRED
      1. Incoming Line: Qty [\_\_]:
         1. 3 – [\_\_] kV MCOV [station] [intermediate] class surge arrestors
         2. [Set of \_ voltage transformers, rated [\_\_\_\_\_\_\_\_] V]
         3. [Set of \_ current transformers, rated [\_\_\_\_\_\_\_\_] A]
         4. [1 Microprocessor-based 3-phase and ground overcurrent relay, ANSI Device 50/51, 50/51N.]
         5. [1 – Microprocessor-based meter]
         6. Connections shall be made via:
            1. [A set cable lugs [ ] per phase, [Clamp-type] [compression-type] [Cable terminators] [Potheads] for [\_\_\_\_] type cable [\_\_\_] size, [\_\_] kV for [top] [bottom] entry.]
            2. [Metal-enclosed bus rated [\_\_\_] A]
      2. Switches: Qty [\_\_]:
         1. Current rating: [600] [1200] A
         2. [Outgoing set of cable lugs] [Close-couple connection to transformer with insulated cable] [Close-couple connection to transformer with rigid bus]
   9. ACCESSORIES
      1. The following accessories shall be provided:
         1. Three spare control fuses for potential transformer and control power transformer.
         2. Spare Indicating Lights: One of each type installed.
         3. Touchup Paint: One-half pint of paint matching enclosure finish.
3. EXECUTION
   1. INSTALLATION
      1. General: Electrical contractor to install metal-clad switchgear in accordance with manufacturer’s written instructions and the following specifications.
      2. Install and anchor switchgear in accordance with manufacturer’s instructions.
      3. Tighten bus joints, electrical connectors and terminals according to manufacturer's published torque-tightening values. Install equipment grounding conductors for switchgear with ground continuity to main electrical ground bus.
   2. ADJUSTMENTS AND CLEANING
      1. Set field-adjustable, protective-relay trip characteristics.
      2. Clean exposed surfaces using manufacturer recommended materials and methods. Touch-up damaged coating and finishes using non-abrasive materials and methods recommended by manufacturer. Eliminate all visible evidence of repair.
   3. TESTING
      1. After installing switchgear and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
         1. Procedures: Perform inspections and tests specified below. Report values that do not meet manufacturer's written recommendations. Certify compliance with test parameters.
         2. Switchgear: Perform inspections and tests stated in NETA ATS, Section 7.1.
         3. Instrument Transformers: Perform inspections and tests stated in NETA ATS, Section 7.10.
         4. Metering and Instrumentation: Perform inspections and tests stated in NETA ATS, Section 7.11.
         5. Ground-Fault Systems: Perform inspections and tests stated in NETA ATS, Section 7.14.
         6. Battery Systems: Perform inspections and tests stated in NETA ATS, Section 7.18.
         7. Surge Arresters: Perform inspections and tests stated in NETA ATS, Section 7.19.
   4. WARRANTY
      1. Equipment manufacturer warrants that all goods supplied are free of non-conformities in workmanship and materials for [12 months] [18 months] from date of initial operation.
   5. FIELD QUALITY CONTROL
      1. Manufacturer's Field Services: Engage a factory-authorized service representative to inspect field-assembled components, installation and connection of switchgear; and to pretest and adjust switchgear components. Report results in writing.
      2. Remove and replace malfunctioning units with new units and retest.
   6. STARTUP SERVICES
      1. Engage a factory-authorized service representative to perform startup service.
      2. Train USPS's maintenance personnel on procedures and schedules for energizing and de-energizing, troubleshooting, servicing and maintaining equipment and schedules.
      3. Verify that switchgear is installed and connected according to the Contract Documents.
      4. Verify that electrical control wiring installation complies with manufacturer's submittal by means of point-to-point continuity testing.
      5. Complete installation and startup checks according to manufacturer's written instructions.

END OF SECTION

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