PART 1 GENERAL

1.01 WORK INCLUDED

A. This section covers work for furnishing and installing automatic transfer switches (ATS) rated 600 Volts and less, as shown on the Drawings for this project, complete.

1.02 GENERAL REQUIREMENTS

A. Also see the GENERAL CONDITIONS, Division 01 00 00, GENERAL REQUIREMENTS, and Section 26 00 10, GENERAL ELECTRICAL REQUIREMENTS which contain information and requirements that apply to the work specified herein and are mandatory for this project.

B. Like items of equipment or materials provided hereunder shall be the end products of one manufacturer to achieve standardization for appearance, maintenance, and replacement, and shall include all necessary appurtenances for a complete and working system. The equipment or materials shall be the product of a manufacturer regularly engaged in the production of equipment or materials for the specified use. The manufacturer shall have the sole responsibility for the proper functioning and coordination of the equipment or materials as furnished.

C. The Contractor or their sub-contractors shall provide all required miscellaneous equipment and materials, as shown on the Drawings and in accordance with these Specifications. The Contractor or their sub-contractors shall furnish all equipment and material items, whether specified or not, as necessary to provide a complete, operable electrical system.

D. There are two automatic transfer switches bid separately for the project. The first for the main terminal is a 1200A, 480/277V, 4-pole, Open Transition ATS with a switched neutral, SE rated (output circuit breaker) and a bypass switch. The second for the GA terminal is a 400A, 208/120V, 3-pole, Open Transition ATS. Both shall be NEMA 3R with a dead front cover.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, National Electrical Code by a qualified NRTL, and marked for intended location and application.

B. Comply with NFPA 70 and NEMA ICS 10, Industrial Control and Systems: AC Transfer Switch Equipment.

C. Comply with NFPA 110, Standard for Emergency and Standby Power Systems.

D. Comply with UL 1008, Transfer Switch Equipment, unless the requirements of these specifications are stricter.

1.04 FIELD CONDITIONS

A. Product Selection for Restricted Spaces: The Drawings indicate the maximum dimensions for transfer switches, including clearances adjacent surfaces and other items. Comply with the indicated maximum dimensions.

B. Environmental Limitations:

1. Do not deliver or install transfer switches until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above switches is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

a. Ambient Temperature: Between 32 degrees F to plus 104 degrees F.
b. Altitude: Not exceeding 3300 feet.

1.05 COORDINATION

A. Coordinate layout and installation of transfer switches and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, ductwork, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access in accordance with NEC 110.26.

1.06 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components that fail in materials or workmanship within the specified warranty period.

1. Warranty Period: 24 Months from the date of Substantial Completion.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect components, assembled switches, and associated equipment according to UL 1008. Ensure proper operation. Check transfer time and voltage, frequency, and time delay settings for compliance with the specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

B. Prepare test and inspection reports:

1. For each of the tests required by UL 1008, performed on representative devices, for emergency and standby systems. Include results of tests for the following conditions:

a. Overvoltage.
b. Undervoltage.
c. Loss of supply voltage.
d. Reduction of supply voltage.
e. Alternative supply voltage or frequency is at minimum acceptable values.
f. Temperature rise.
g. Dielectric voltage withstand; before and after short circuit test.
h. Overload.
i. Contact opening.
j. Endurance.
k. Short circuit.
l. Short-time current capability.
m. Receptacle withstand capability.
n. Insulating base and supports damage.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Store indoors in clean dry space with uniform temperature to prevent condensation. Protect from exposure to dirt, fumes, water, corrosive substances, and physical damage.

B. If stored in areas subjected to weather, cover transfer switches to provide protection from weather, dirt, dust, corrosive substances, and physical damage.

C. Handle MCCs according to Section 26 24 19, MOTOR CONTROL CENTERS.

3.03 EXAMINATION

A. Receive, inspect, handle, and store transfer switches according to NEMA ICS 1.

B. Examine switches before installation. Reject switches that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive transfer switches for compliance with installation tolerances and other conditions affecting performance of the work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.04 INSTALLATION

A. Comply with NECA 1, IEEE C2, and NFPA 70.

B. Design each fastener and support to carry the load indicated by seismic requirements and according to seismic restraint details. See Section 26 05 29, HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS.

C. Motor Control Center Mounted Switch: The ATS will be factory mounted by the MCC supplier into the service section of the supplied structure. <Also see Section 26 24 19, MOTOR CONTROL CENTERS.

D. Set field adjustable intervals and delays, relays, and engine generator exerciser clock.

E. Identify components according to Section 26 05 53, IDENTIFICATION FOR ELECTRICAL SYSTEMS.

3.05 CONNECTIONS

A. Wiring to Remote Components: Match type and number of cables and conductors to generator sets, motor controls, control, and communication requirements of transfer switches as recommended by the manufacturer. Increase raceway sizes at no additional cost to the Owner if necessary to accommodate required wiring.

B. Wiring Method: Install cables in raceways and cable trays except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.

1. Comply with the requirements for raceways and boxes specified in Section 26 05 33, RACEWAYS AND BOXES.

C. Wiring Within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding the manufacturer's limitations on bending radii.

D. Ground equipment according to Section 26 05 26, GROUNDING AND BONDING.

E. Connect twisted pair cable according to Section 26 05 23, CONTROL VOLTAGE ELECTRICAL POWER CABLES.

F. Route and brace conductors according to the manufacturer's written instructions, and Section 26 05 29, HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS. Do not obscure the manufacturer's markings and labels.

G. Final connections to equipment shall be made with liquid tight, flexible metallic conduit no more than 18 inches in length.

3.06 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory authorized service representative:

1. Visual and mechanical inspection:

a. Compare equipment nameplate data with the Drawings and these Specifications.
b. Inspect physical and mechanical condition.
c. Inspect anchorage, alignment, grounding, and required clearances.
d. Verify that the unit is clean.
e. Verify appropriate lubrication on moving current carrying parts and on moving and sliding surfaces.
f. Verify that manual transfer warnings are attached and visible.
g. Verify tightness of all control connections.
h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:

1) Use of low-resistance ohmmeter.
2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.

i. Perform manual transfer operation.
j. Verify positive mechanical interlocking between normal and alternate sources.
k. Perform visual and mechanical inspection of surge arresters.
l. Inspect control power transformers.

1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
2) Verify that primary and secondary fuse or circuit breaker ratings match the Drawings.
3) Verify correct functioning of draw-out disconnecting contacts, grounding contacts, and interlocks.

2. Electrical Tests:

a. Perform insulation resistance tests on all control wiring with respect to ground.
b. Perform a contact/pole resistance test. Compare measured values with manufacturer's acceptable values.
c. Verify settings and operation of control devices.
d. Calibrate and set all relays and timers.
e. Verify phase rotation, phasing, and synchronized operation.
f. Perform automatic transfer tests.
g. Verify correct operation and timing of the following functions:

1) Normal source voltage sensing and frequency sensing relays.
2) Engine start sequence.
3) Time delay on transfer.
4) Alternative source voltage sensing and frequency sensing relays.
5) Automatic transfer operation.
6) Interlocks and limit switch function.
7) Time delay and retransfer on normal power restoration.
8) Engine cool-down and shutdown feature.

3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

a. Check for electrical continuity of circuits and for short circuits.
b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
c. Verify that manual transfer warnings are properly placed.
d. Perform manual transfer operation.

4. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking

sequence and operational function for each switch at least three times.

a. Simulate power failures of normal source to automatic transfer switches and retransfer from emergency source with normal source available.
b. Simulate loss of phase-to-ground voltage for each phase of normal source.
c. Verify time delay settings.
d. Verify pickup and dropout voltages by data readout or inspection of control settings.
e. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

B. Coordinate tests with tests of generator and run them concurrently.

C. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

D. Transfer switches will be considered defective if they do not pass tests and inspections.

E. Remove and replace malfunctioning units and retest as specified above.

F. Prepare test and inspection reports.

G. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.

1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

2. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.

3.07 DEMONSTRATION

A. Engage a factory authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment. Coordinate this training with that for the package engine generator equipment.

B. Training shall include testing ground fault protective devices and instructions to determine when the ground fault system shall be retested. Include instructions on where ground fault sensors are located and how to avoid negating the ground fault protection scheme during testing and circuit modifications.

END OF SECTION 26 36 00