

SECTION 16000**ELECTRICAL****PART 1 GENERAL****1.1 DESCRIPTION**

- A. The work covered by this Section of these Specifications includes but is not necessarily limited to the following items of work:
 - 1. Electrical service, distribution equipment and control equipment for pump station.
 - 2. Coordination with utility for power and metering.

1.2 SCOPE OF WORK

- A. This section of the specifications covers the complete electrical systems as indicated on the drawings or as specified herein. Provide all materials, labor, equipment, and supervision to install electrical systems. The work shall consist of, but shall not be limited to, the installation of the following:
 - 1. Install electrical distribution automatic transfer switch and docking station for an existing pump station.
 - 2. Coordination with utilities for power service indicated.

1.3 CODES AND PERMITS

- A. All work shall be done in accordance with the 2020 Edition of the National Electrical Code, applicable local and state of Georgia ordinances and regulations of local utility company. All permits and inspections certificates shall be paid for by the Contractor.

1.4 DRAWINGS

- A. The drawings indicate the general arrangement of equipment. Install electrical work to suit field conditions.
- B. Do not scale drawings. Dimensions required for layout of equipment shall be obtained from dimensioned plans unless specifically indicated on electrical plans.

1.5 CUTTING, PATCHING, EXCAVATING & BACKFILLING

- A. All cutting and patching required to carry out the work shall be provided under other Specification Sections.
- B. All excavation and backfilling required to install conduit shall be provided under this Section. Backfill shall be compacted as required under other Specification Sections.

1.6 RECORD DRAWINGS

- A. At the time of final inspection, provide three (3) sets of data on electrical equipment used in the project. This data shall be in bound form and shall include the following items:
 - 1. Shop drawings on equipment listed.

2. Data sheets indicating electrical characteristics of all devices.
3. Data sheets on all lighting fixtures indicating voltage, lamp, and ballast used in each fixture.
4. Test results required by "Electrical Systems Operation Test."

1.7 ELECTRICAL SYSTEMS OPERATIONAL TEST

- A. Prior to final inspection, the following systems or equipment shall be tested and reported as herein specified.
 1. Each ground rod installation shall be tested after all connection to ground rods are made. Ground rod installations shall be tested by "fall of potential" measuring method using ground resistance test meter and two auxiliary electrodes driven into the earth, interconnected through the meter with the ground rod installation being tested. Placement of auxiliary electrodes shall be in accordance with operating instructions of test meter, but in no case shall auxiliary current electrodes be placed within seventy feet of the grounding system being tested. Test data shall indicate placement of auxiliary electrodes with respect to system being tested, data readings were taken and lowest resistance recorded.
 2. Three (3) typewritten copies of the test shall be submitted to the Engineer for approval.

1.8 SITE INVESTIGATION

- A. Prior to submitting bids of the project, visit the site of the work to become aware of existing conditions which may affect the cost of the project. Where work under this project requires extension, relocation, reconnections, or modifications to existing equipment or systems, the existing equipment or systems shall be restored to their original condition, with the exception of the work under this contract, before the completion of this project.

1.9 SCHEDULING OF OUTAGES

- A. Electrical work requiring interruption of electrical power which would adversely affect the normal operation of other portions of the owner's property, shall be coordinate with the owner. When work requires interruption of power, the contractor shall provide a portable diesel bypass pump capable of 200% of station electric pumps capacity. The bypass pump shall be available throughout the outage. Schedule the interruption of electrical power three working days prior to actual shutdown.

1.10 SHOP DRAWINGS

- A. The Contractor shall submit for review by the Engineer a complete schedule and data of materials and equipment to be incorporated in the work. Submittals shall be supported by descriptive material, such as catalogs, cuts, diagrams, performance curves, and charts published by the manufacturer, to show conformance to specification and drawing requirements; model numbers alone will not be acceptable. Complete electrical characteristics shall be provided for all equipment.
- B. Submittals shall be made for each of the following items:

Disconnect Switches	Circuit Breakers
Automatic Transfer Switch	Enclosed Circuit Breakers

Generator Docking
Surge Protection Station

Fuses

- C. Each individual submittal item for materials and equipment shall be marked to show specification section and paragraph number which pertains to the item.
- D. Prior to submitting shop drawings, review the submittal for compliance with the Contract Documents and place a stamp or other confirmation thereon which states that the submittal complies with Contract requirements. Submittals without such verification will be returned disapproved without review.

1.11 EXISTING SERVICE

- A. Electrical service voltage is indicated for each site. It may be any one of the following:
 - 1. 240/120V, 1-phase, 3-wire
 - 2. 240/120V, 3-phase, 4-wire, Delta
 - 3. 480/277V, 3-phase, 4-wire, Wye
- B. Refer to the individual drawings for methods.
 - 1. Underground, originating in the secondary compartment of a utility furnished pad mounted transformer or utility pedestal.
 - 2. Aerial, originating in a weatherhead installed adjacent to the termination of a utility furnished secondary service drop.
- C. Complete metering systems are existing. Any modifications shall be in accordance with the utility standards. Coordinate with local utility.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Materials or equipment specified by manufacturer's name shall be used, unless approval of other manufacturer is listed in addendum to these specifications. Request for approval of substitute materials shall be submitted in writing to the Engineer at least ten (10) days prior to bid opening.
 - 1. Where substitution of materials alters space requirements indicated on the drawings, submit shop drawings indicating proposed layout of space, all equipment to be installed therein, and clearances between equipment. All clearances required by the National Electrical Code must be maintained.
 - 2. All material shall be new and shall conform to the applicable standard or standards where such have been established for the particular material in question. Publications and Standards of the organizations listed below are applicable to materials specified herein.
 - a. American Society for Testing and Materials (ASTM)
 - b. Underwriter's Lab (UL)
 - c. National Electrical Manufacturer Association (NEMA)
 - d. Insulated Power Cable Engineers Association (IPCEA)
 - e. Institute of Electrical and Electronic Engineers (IEEE)
 - f. Edison Electric Institute (EEI)
 - g. National Fire Protection Association (NFPA)
 - h. American National Standards Institute (ANSI)

3. Material of the same type shall be the product of one manufacturer.
4. U.L. listed material shall bear a U.L. label.

2.2 ENCLOSED CIRCUIT BREAKERS

- A. Circuit breakers shall be of the ampacity, class, and NEMA Rated as shown on the drawings, terminals shall be suited for 60 degrees C or 75 degrees C conductors. All separately mounted breakers shall be in NEMA 4X stainless steel enclosures. Breakers used for service disconnects shall be labeled as such. Factory installed ground terminals and insulated neutral bus shall be provided in all enclosures. Breakers shall be Eaton, Square D or GE/ABB.
- B. Circuit breakers shall be quick-make, quick-break, NEMA Rated thermal magnetic type. Two and three pole breakers shall be common internal trip. Tie handles are not acceptable. Breakers shall be ambient compensated type at 50 degrees C.
- C. Provide insulated neutral where required or indicated. Provide bonding jumper when used as service disconnect..
- D. Provide an equipment grounding lugs for termination of equipment ground conductors.
- E. Minimum interrupting rating shall be as shown on the drawings.
- F. When used as service disconnect, provide service label per NEC.

2.3 DISCONNECT SWITCHES

- A. The following specifications and standards are incorporated into and become a part of this specification:
 1. Underwriter's Laboratories, Inc. Publications 98, 198.2, 198.4.
 2. National Electrical Manufacturer's Association Publications KS-1.
- B. Products of GE/ABB, Eaton or Square D which comply with these specifications are acceptable.
- C. Disconnect switches shall be heavy duty fusible safety switch type, with the number of poles required to disconnect all ungrounded conductors serving the equipment.
 1. Furnish a solid neutral when the circuit includes a neutral conductor.
 2. Furnish an equipment grounding conductor lug bonded to the switch enclosure.
 3. Furnish NEMA type 4X stainless steel for all exterior locations.
- D. Switches shall have the following features:
 1. Quick-make, quick break switching mechanism.
 2. Line terminal shields.
 3. Provisions for padlocking in the "off" position.
 4. Door interlocks to prevent door from opening when switch is closed. Provide inconspicuous means to defeat this interlock.
 5. Permanent name plate indicating all ratings.
 6. Arc chute for each pole.
 7. 600 volt rating for 250 to 600 volt systems, 250 volt rating for systems below 250 volts.

- 8. Rejection clips to accept only RK1 or RK5 fuses.
- E. Disconnect switches for three phase systems shall be three pole fusible type. Disconnect switches for single phase systems shall be two pole fusible type.
- F. Locate switches to provide full accessibility and working clearances required by the NEC. Locate adjacent to equipment served unless drawings indicate otherwise. Mount switch directly to structure or to metal channel depending upon field conditions. Mount switch handle between 36" and 60" above finished floor.

2.4 FUSES

- A. The following specifications and standards are incorporated into and become a part of this specification:
 - 1. Underwriter's Laboratories, Inc. Publications 198C, 198D, 198E, 198H, and 512.
 - 2. American National Standards Institute C97.1.
- B. Products of Bussman, GE/ABB, Shownut, Reliance, and Littlefuse complying with these specifications are acceptable.
- C. Provide fuses of types, sizes, ratings, and average time-current and peak let-through current characteristics indicated, of class L, RK1, RK5, J, or T as specified. For types and ratings required, furnish one spare set of three for each kind. Prior to energization of fusible devices, test devices for continuity of circuiting and for short circuits. Replace malfunctioning units.

2.5 GROUNDING

- A. The electrical system shall be grounded. All raceways shall contain an equipment grounding conductor to provide a low impedance path for grounded faults.
 - 1. The neutral shall be grounded at the service disconnect to a ground rod system.
 - 2. Ground rods shall be 3/4" copper weld rods 10" in length. Rods shall be located 20' apart and the top of rods shall be 12" below grade. Connections to rods shall be by chemical weld process. Provide a minimum of three rods. The resistance to ground shall be below 25 ohms, provide additional rods as required.

2.6 CONDUIT SYSTEM

- A. Provide complete conduit system including boxes, fittings, supports, etc. Conduits shall be rigid aluminum above grade and schedule 80 PVC below grade.
- B. Transition from below grade PVC to above grade shall be made with a rigid aluminum elbow and not a PVC elbow.

2.7 CONDUCTORS

- A. Provide all conductors specified or required for proper operation of systems. Conductors shall be copper and shall be No. 12 AWG unless otherwise indicated. Use solid Type THHN/THWN conductor for AWG sizes No. 10 and smaller and stranded Type THHN/THWN for all other conductors and where indicated.

- B. All conductors shall have size, grade of insulation, voltage and manufacturer's name permanently marked on the outer cover at regular intervals and shall be readable from all junction boxes and panels.
- C. Conductors No. 6 and smaller shall have either solid color installation or phase tape. Conductors No. 4 and larger shall have black insulation with colored phase tape.

2.8 SURGE PROTECTION

- A. Surge protection for the system shall be as indicated on the drawings, where indicated.
- B. The surge protection device shall be U.L. 1449, 4th ed listed. It shall have status indicating LED.
- C. Provide manufacturer's product data and connection diagrams.
- D. Enclosure shall be NEMA 4X.

PART 3 EXECUTION

3.1 CONDUIT SYSTEMS

- A. Exposed conduits shall be installed parallel or at right angles to structures.
- B. Support exposed conduits at 5 foot intervals. Individual runs of conduits shall be supported by one hole conduit straps; groups of conduits shall be supported on Unistrut Channel with Uniclip Stainless Steel Conduit Supports.
- C. Conduit support devices, i.e., straps, channel, etc., shall be attached to structure with wood screws on wood, toggle bolts on hollow masonry, lead shields on masonry and machine bolts on steel. Nails are not acceptable.
- D. Rigid aluminum conduit shall be attached to sheet metal enclosures with threaded hubs. All rigid conduit stubs not attached to enclosures or attached to nonmetallic enclosures shall be terminated with insulated throat, grounding bushing.
- E. All conduits installed below grade shall be schedule 80 PVC and shall be installed 24 inches below finished grade. Where conduits turn up provide rigid aluminum elbow.
- F. Protect conduits against dirt, plaster, etc., with conduit plugs. Plug shall remain in place until all masonry is complete.
- G. All conduits entering or exiting concrete or installed below grade shall be protected from corrosion.
 - 1. Metallic conduits shall be protected from corrosion as follows:
 - a. Apply two coats of 3M Scotchrap pipe primer. Allow the primer to dry before application of the second coat or application of tape.
 - b. Apply two overlapping layers of 3M Scotchrap 51 tape.

- c. Pipe primer and tape shall extend from the end of the metallic conduit to 6" above grade or concrete.
- H. All conduits entering electrical equipment from below grade and wet well shall be sealed with electrical putty.

3.2 CONDUCTORS

- A. All conductors shall be color-coded as follows:

System	Phase A	Phase B	Phase C	Neutral
240/120V 1 Phase, 3 Wire	Black	Red		White
240/120V 3 Phase, 4 Wire Delta	Black	Orange (High Leg)	Red	White
480Y/277 3 Phase, 4 Wire	Brown	Orange	Yellow	Grey

Ground Conductor: Green

- B. Splices in branch circuit conductors shall be made with Skotchlok insulated connectors, Ideal Wing Nuts, or Buchanan Steel Crimping Sleeves, and nylon caps. Splices in motor junction boxes, wiring troughs and splices in conductors larger than No. 8 AWG shall be made with split bolt connectors, taped with Scotch No. 88 Tape.
- C. Only one conductor shall be installed under terminal of individual circuit breakers.

3.3 EQUIPMENT CONNECTIONS

- A. All equipment requiring electrical connections shall be connected under this section of these specifications. Where electrical connections to equipment requires specific locations, such location shall be obtained from shop drawings. Do not scale drawings for location of conduit stub-ups to serve specific equipment.
- B. Electrical circuits to equipment furnished under other sections of these specifications are based on design loads. If actual equipment furnished has loads other than design loads, electrical circuits and protective devices shall be revised to be compatible with equipment furnished and in compliance with the National Electrical Code at no additional cost to the Owner.
- C. Equipment furnished under other sections of these specifications to be connected under this section of the specifications shall consist of, but not be limited to, the following:
 - 1. Pumping Station Equipment
- D. The Contractors attention is directed to other sections of these specifications, where equipment requiring electrical service is specified, to become aware of the scope of work under this section of these specifications requiring electrical service and connections to equipment specified elsewhere.

3.4 GROUNDING

- A. The neutral conductor shall be grounded to a ground rod system at the service disconnect. The minimum system grounding conductor shall be No. 6 Bare Copper.
- B. All non-current carrying parts of electrical equipment shall be grounded. The continuity of the ground shall be maintained using a green insulated grounding conductor installed in all raceways.
- C. Ground rods shall be installed with the top of the rod 12 inches below finished grade. Connections to ground rods shall be made with chemical weld connections.
- D. Upon completion of the ground rod installation the Contractor shall record the ground reading. This ground reading shall not be taken within 48 hours of rainfall. Results of ground readings shall be forwarded immediately to the Engineer. Provide a minimum of three rods, the resistance to ground shall be below 25 OHMS. Provide additional ground rods as required to attain specified ground resistance.
- E. Grounding terminal of receptacles shall be grounded to grounding conductor and to outlet box with green insulated pigtail with 10/32 washer head machine screw.

3.5 EQUIPMENT IDENTIFICATION

- A. All electrical equipment shall be identified.
- B. Install engraved plastic – laminate sign on each major unit of electrical equipment. Provide a single line of text, ½" high letterin on 1 ½" high sign (or 2" high sign if 2 lines required). Provide signs for each unit of the following:
 - 1. Generator Docking Station
 - 2. Automatic Transfer Switch
 - 3. Service Disconnect/Main Breaker

3.6 GUARANTEE AND TEST

- A. Upon completion of the project all systems shall be tested for proper operation as directed by the Engineer or his representative. Equipment covers, i.e., panelboard, motor controls, etc., shall be removed where required for inspection of internal wiring. The Contractor shall furnish the personnel, tools and necessary equipment to inspect and test the system.
- B. Where ground readings are required, the Contractor shall provide a typewritten copy of certification of ground reading. Data shall indicate date readings were taken and lowest resistance recorded.
- C. All systems and component parts shall be guaranteed for one year from date of final acceptance of the completed project. Defects found during this guarantee period shall be promptly corrected at no additional cost to the Owner.

END OF SECTION

SECTION 16210

AUTOMATIC TRANSFER SWITCH

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The work required under this section of the specifications consists of the installation of the automatic transfer switch. All materials and devices which are an integral part of this system shall be provided under this section of the specifications.
- B. Definition:
 - 1. Automatic Transfer Switch (ATS): An automatic transfer switch is self-acting equipment for transferring one or more load conductor connections from one power source to another.

1.3 QUALITY ASSURANCE

- A. The following specifications and standards are incorporated into and become a part of this specification by reference.
 - 1. National Fire Protection Association (NFPA):
 - a. NFPA-70 National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701 and 702,
 - 2. Institute of Electrical and Electronics Engineers (IEEE) Standards:
 - a. IEEE 446 IEEE Recommended Practices for Emergency and Standby Power Systems for commercial and industrial applications.
 - b. IEEE 472 Voltage Surge Withstand Capabilities
 - 3. National Electric Manufacturers Association (NEMA) Standards:
 - a. ICS1-109 Test and Test Procedures for Automatic Transfer Switches
 - b. ICS 10-2005 Part 1 A.C. Automatic Transfer Switch
 - 4. Underwriters Laboratories Inc. (UL) Publications:
 - a. UL 1008 Automatic and Non-Automatic Transfer Switches
 - 5. American National Standards Institute (ANSI):
 - a. C37.90a Voltage Surge Withstand Capability
 - 6. The control system for the generator set shall comply with the following requirements.
 - a. CSA C22.2, No. 14 – M91 Industrial Control Equipment.
 - b. EN50082-2, Electromagnetic Compatibility – Generic Immunity Requirements Part 2: Industrial
 - c. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
 - d. FCC Part 15, Subpart B.
 - e. IEC8528 part 4. Control Systems for Generator Sets
 - f. IEC Std 801.2, 801.3 and 801.5 for susceptibility, conducted and radiated electromagnetic emissions.

7. The automatic transfer switch manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation and service, in accordance with ISO 9001.
- B. Acceptable Manufacturers: Products of the following manufacturers, which comply with these specifications, are acceptable:
 1. Transfer Switches:
 - a. GE/ABB True One
 - b. Other manufacturer by prior approval
- C. Coordination:
 1. The installing contractor shall review shop drawings submitted under this and other sections, as well as other divisions, to insure coordination between work required among different trades. Coordinate the installation sequence with other contractors to avoid conflicts and to provide the fastest overall installation schedule. Coordinate installation with architectural and structural features, equipment installed under other sections of the specifications, and electrical equipment to insure access and to insure clearance minimums are provided.

1.4 SUBMITTALS

- A. Refer to the SHOP DRAWINGS, PRODUCT DATA AND SAMPLES Section for required procedures.
- B. Manufacturer's Product Data:
 1. Submit material specifications and installations data for products specified under Part 2 - Products to include:
 - a. Transfer switches
- C. Shop Drawings: Submit shop drawings to indicate information not fully described by the product data to indicate compliance with the contract drawings. Submittals containing less than the information listed below will be rejected.
 1. Shop drawings for the transfer switch shall contain not less than the information listed as follows:
 - a. List of accessories contained in the control panel.
 - b. Withstand rating in RMS symmetrical amperes.
- D. Quality and Service:
 1. All materials and parts of the automatic transfer switch shall be new and unused. Each component shall be of current manufacture from a firm regularly engaged in the production of such equipment. Units and components offered under these specifications shall be covered by the manufacturer's parts and labor warranty for a minimum of five (5) years from date of Owner acceptance of the project on a new machine, a copy of which shall be included in the shop drawings submittal.
 2. Submittals will be accepted only on transfer switches which can be properly maintained and serviced without requiring the Owner to stock spare parts or wait longer than twenty-four hours for service. Submittals shall include the nearest location of permanent parts outlet from which parts may be obtained and written assurance that trained service personnel will be available on twenty-four hour's notice. Units with service centers more than 100 miles from project site will not be accepted.

- E. Record Drawings
 - 1. Include in each set three sets of operating, maintenance, and parts manuals covering all components for the automatic transfer switch. Each supplier shall provide instructions to the Owner in operation and maintenance of his equipment, both in written form and with on-site personnel for a minimum of four hours.

PART 2 - PRODUCTS

2.1 TRANSFER SWITCH(ES)

- A. Transfer switch (es) shall be rated at not less than as indicated on the drawings at rated voltage. Transfer switch (es) shall be rated and marked for total system load.
- B. Transfer switch (es) serving 480V or 240V three phase four wire loads shall be three poles with an unswitched neutral. 240V single phase three wire loads shall be two poles with unswitched neutral.
- C. Transfer switch (es) shall be the automatic type.
- D. Transfer switch (es) shall be wall mounted in a NEMA 4XSS enclosure. Enclosure shall have hinged door with three point latching and factory installed key locking enclosure door.
- E. Operation shall be inherently double-throw whereby all contacts move simultaneously. Electrical spacing shall be equal to or exceed those listed in Table 15.1 of UL-1008. Only those main contact structures specifically designed for transfer switch service shall be acceptable. An overload or short circuit shall not cause the switch to go to a neutral position. A manual operating handle shall be provided. All main contacts shall be silver alloy type protected by arc quenchers and, for switches rated 600 amps and larger, by arcing contacts. Operating transfer time shall be 1/15 second or less on switches rated below 600 amps, 1/10 seconds or less when rated above 600A.
- F. All switch and contacts, coils, springs and control elements shall be removable from the front of the transfer switch without removal of the switch panel from the enclosure and without disconnecting power conductors or drive linkages. Control and sensing relays shall be continuous duty industrial type with minimum contact rating of ten amps.
- G. Transfer switch shall be rated to withstand in RMS symmetrical amperes not less than the available symmetrical RMS amperes when protected by the circuit protective device on the line side of the transfer switch. Withstand rating of switch shall be based on switch contacts not welding under fault conditions. Provide switch with current limiting fuses to increase current withstand rating when switch is not rated for fault duty.
- H. The control panel for each automatic transfer switch shall contain the following accessories:
 - 1. Adjustable 0.5 to 6 second time delay on starting of EPS to override momentary power dips and interruptions of the normal services. Time delay shall be factory set at 1 second.
 - 2. Time delay on transfer to emergency adjustable from 0 to 60 seconds, factory set at 0 seconds.

3. Test switch on enclosure door to simulate failure of the normal power source. ATS shall transfer load to the EPS.
4. Push button to bypass time delay on re-transfer to normal.
5. Close differential voltage sensing shall be provided on all phases of the normal power supply. The pickup voltage shall be adjustable from 85% to 100% of nominal and the dropout voltage shall be adjustable from 75% to 98% of the pickup value. The transfer to emergency will be initiated upon reduction of normal source to 85% of nominal voltage and re-transfer to normal shall occur when normal source restores to 95% of nominal.
6. Independent single phase voltage and frequency sensing of the emergency source. The pickup voltage shall be adjustable from 85% to 100% of nominal. Pickup frequency shall be adjustable from 90% to 100% of nominal. Transfer to emergency upon normal source failure when emergency source voltage is 90% or more of nominal and frequency is 95% or more of nominal.
7. A time delay on re-transfer to normal source. The time delay shall be automatically bypassed if the emergency source fails and normal source is available. The time delay shall be field adjustable from 0 to 25 minutes and factory set at 15 minutes.
8. An unloaded running time delay for emergency generator cool-down, factory set at 5 minutes.
9. Pilot light for indicating switch in normal position (include fuses and auxiliary contact).
10. Pilot light for indicating switch in emergency position (include fuses and auxiliary contact).

PART 3 - EXECUTION

3.1 TRANSFER SWITCH INSTALLATION

- A. Wall mounted transfer switch (es) shall be installed with top of switch no more than seven feet above finished floor. Locate transfer switch (es) to provide working clearance and full accessibility as required by the National Electrical Code.
- B. Lace and group conductors installed in transfer switch with nylon tie straps. Only one conductor shall be installed under terminals. Form and train conductors in enclosure neatly parallel and at right angles to sides of box. Uninsulated conductor shall not extend beyond one-eighths inch from terminal lug. Conductors shall be installed such that no stresses are transferred to terminal lugs.
- C. Mounting and Support
 1. Mounting
 - a. Enclosure shall be secured to structure by a minimum of four (4) fastening devices. Transfer switches 400 amps and larger shall be secured by a minimum of eight (8) devices. A 1.5 inch minimum diameter round washer shall be used between head of screw or bolt and enclosure.
 - b. Enclosures shall be mounted where indicated on the drawings or specified herein. Support from the structure with fastening device specified.
 - c. Attach enclosure directly to masonry or concrete surfaces.
 - d. Mount enclosure on metal channel (strut), which is connected to structure with fastening device specified, for installations on steel structure, sheet metal equipment enclosure or masonry walls.

- e. Where enclosure is not indicated on a wall or structure, construct a metal channel (strut) free standing frame secured to floor, pad, or other appropriate building structure.
- f. Do not splice conductors in enclosure. Where required, install junction box or wireway adjacent to transfer switch and splice or tap conductors in box. Refer to number of conductors in a conduit limitation defined in the WIRES AND CABLES section of the specifications and do not exceed.
- g. Conductors not terminating in transfer switch shall not extend through or enter transfer switch enclosure.
- h. Install push-in knock-out closure plugs in any unused knock-out openings.
- i. Free standing transfer switch (es) shall be installed on a four inch high concrete pad, with horizontal base dimension exceeding base dimension of switch by three inches.
- j. Cleaning and Adjustment
 - 1) After completion, clean the interior and exterior of dirt, paint and construction debris.
 - 2) Touch up paint all scratched or marred surfaces with factory furnished touch up paint of the same color as the factory applied paint.

3.2 O&M MANUALS

- A. At least three sets of an instruction manual(s) for the automatic transfer switch shall be supplied by the Manufacturer(s) and shall contain:
 - 1. A detailed explanation of the operation of the system.
 - 2. Instruction for routine maintenance.
 - 3. Pictorial parts list and part numbers.
 - 4. Pictorial and schematic electrical drawings of wiring systems, including operation and safety devices, control panels, instrumentation and annunciators.

END OF SECTION

SECTION 16215

GENERATOR DOCKING STATIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes generator docking stations rated to 480Vac, including the following:
 - 1. Generator Docking Stations
- B. Related Sections include the following:
 - 1. 16210 – Automatic Transfer Switches

1.3 GUARANTEE/WARRANTY

- A. Manufacturer Warranty shall be provided for a minimum of 1 Year,
- B. The equipment installed under this contract shall be left in proper working order.
- C. New materials and equipment shall be guaranteed against defects in composition, design or workmanship. Guarantee certificates shall be furnished.

1.4 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's descriptive literature and product specifications. These shall include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
 - 2. Submit a schedule/matrix identifying each pump station and related docking station.
- B. Drawings:
 - 1. Single-line diagram or schematic of arrangement of docking station with ATS shall be submitted. Show connections between docking station, transfer switch, power sources, and load.
 - 2. Manufacturer's product drawings.
 - 3. As applicable: dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
- C. Operation and Maintenance Data:
 - 1. For each type of product include manuals for installation, operation, and maintenance.
 - 2. In addition, documentation shall define features and operating sequences for both automatic and manual operation.

1.5 QUALITY ASSURANCE

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

- B. Comply with NFPA 70.

1.6 GUARANTEE

- A. The equipment installed under this contract shall be left in proper working order.
- B. New materials and equipment shall be guaranteed against defects in composition, design, or workmanship. Guarantee certificates shall be furnished.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Generator Docking Stations:
 - a. Trystar: The basis of design is TMTS series docking stations.
 - b. Or pre-approved alternate. Refer to material substitution section of Specification Section 16000.

2.2 GENERAL DOCKING STATION PRODUCT REQUIREMENTS

- A. Docking station shall include 16 Series Camlok Panel Mounts for use as connection to Portable Generator.
- B. Entire package must be listed to ETL or UL 1008 Standards. UL listing of individual components is not acceptable.
- C. Enclosures:
 1. NEMA 3R rain-tight, 304 stainless steel enclosure
 - a. Pad-lockable front door shall include a hinged access plate at the bottom for entry of cables from portable generator or portable load bank. NEMA 3R integrity shall be maintained with access plate open for cable entry.
 - b. Front and side through a front access panel shall be accessible for maintenance.
 - c. Top, side, and bottom through a front access panel shall be accessible for permanent cabling.
 2. Finishes:
 - a. Paint after fabrication. Powder coated Hammertone Gray.
- D. Phase, Neutral, and Ground Buses:
 1. Material: Silver-plated Copper
 2. Equipment Ground Bus: bonded to box.
 3. Isolated Ground Bus: insulated from box.
 4. Ground Bus: 50% of phase size.
 5. Neutral Bus: Neutral bus rated 100 percent of phase bus.
 6. Round edges on bus.
- E. Temporary generator connectors shall be Camlok style mounted on gland plate.
 1. Camlok shall be color coded according to system voltage. Refer to Specification Section 16000 for color code.
- F. Temporary connectors shall include protective flip lids to prevent accidental contact.

- G. Permanent connectors shall be broad range set-screw type, located behind an aluminum barrier.
- H. Short Circuit & Withstand Rating
 - 1. Shall be minimum 65KAIC unless otherwise indicated on drawings.
- I. Voltage & Amperage:
 - 1. Docking station shall be sufficient for use with 480V 3P at all locations.
 - 2. Docking station shall be rated in accordance with specified transfer switch sizing.
- J. Phase Rotation Monitor Device:
 - 1. Phase monitoring relay to be Siemens 3U4512-1AR20 or equal.
- K. Additional accessories shall be included in submittal drawings as follows:
 - 1. Two Wire Auto Start
 - 2. Battery Charger Receptacle 20A GFCI 125V
 - 3. SCADA Terminal Port
- L. Alternate Transfer Switch Configuration
 - 1. Docking Station shall have integrated Automatic Transfer Switch (ATS).
 - 2. The ATS shall have two source positions – Normal and Emergency Line
 - 3. The ATS shall be located behind pad lockable door to prevent any tampering by unauthorized personnel.
 - 4. Short Circuit & Withstand Rating shall be as follows unless otherwise indicated on the drawings.
 - a. 18KaIC 100-200Amp/30KaIC
 - b. 400Amp/42KaIC
 - c. 600Amp/65KaIC
 - d. 800Amp/65KaIC)
 - 5. Voltage & Amperage
- M. Refer to the drawings for the required service voltage configuration at each station.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive Generator Docking Station for compliance with installation tolerances and other conditions affecting performance of the Work.

3.2 INSTALLATION

- A. Surface, Flush or Base Mounted:
Determined by Location

- 1. Install anchor bolts to elevations required for proper attachment to Generator Docking Station.
- 2. Elevation of docking station should be at or above base flood elevation for each site.

3.3 FIELD QUALITY CONTROL

- A. Third Party Tests and Inspections to include the following:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

- B. Prepare test and inspection reports, including a certified report that identifies Generator Docking Station and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 16215