

SECTION 16400  
MARINA SUBSTATIONS – LOW VOLTAGE

PART 1 GENERAL

1.01 SCOPE

- A. The Contractor shall furnish and install, where indicated, an AMP free-standing, dead-front type low voltage distribution marina substation, utilizing an integrated transformer and group mounted circuit protective devices, as shown on the contract drawings.

1.02 REFERENCES

- A. The low voltage distribution marina substation and all components shall be designed, manufactured and tested in accordance with the latest applicable following standards:
  - 1. UL Standard 891

1.03 SUBMITTALS – FOR REVIEW/APPROVAL

- A. The following information shall be submitted to the Engineer:
  - 1. Front view elevation
  - 2. Floor plan
  - 3. Top view
  - 4. Single line
  - 5. Schematic diagram
  - 6. Component list
  - 7. Conduit entry/exit locations
  - 8. Assembly ratings including:
    - a. Short-circuit rating
    - b. Voltage
    - c. Continuous current
  - 9. Major component ratings including:
    - a. Voltage
    - b. Continuous current
    - c. Interrupting ratings
  - 10. Cable terminal sizes
  - 11. Product data sheets
- B. Where applicable, the following additional information shall be submitted to the Engineer:
  - 1. Bus connection
  - 2. Connection details between transformer and distribution

1.04 SUBMITTALS – FOR CONSTRUCTION

- A. The following information shall be submitted for record purposes:

1. Final as-built drawings and information for items listed in Paragraph 1.04, and shall incorporate all changes made during the manufacturing process
2. Wiring diagrams
3. Installation information

#### 1.05 QUALIFICATIONS

- A. The manufacturer of this equipment shall be a US based manufacturer that has produced similar electrical equipment for a minimum period of ten (10) years. When requested by the engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

#### 1.06 REGULATORY REQUIREMENTS

- A. The low-voltage marina substation shall be UL 891 labeled.

#### 1.07 DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

#### 1.08 OPERATION AND MAINTENANCE MANUALS

- A. Equipment operation and maintenance manuals shall be provided with each assembly shipped and shall include instruction leaflets, instruction bulletins and renewal parts lists where applicable, for the complete assembly and each major component.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. AMP – American Midwest Power : [www.ampmfg.com](http://www.ampmfg.com) (800) 328-8658,

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

#### 2.02 RATINGS

- A. The assembly shall be rated to withstand mechanical forces exerted during short-circuit conditions when connected directly to a power source having available fault current 22,000 amperes symmetrical at rated voltage.
- B. 480Y/277 Voltage rating as indicated on the drawings.
- C. Marina substation distribution to be rated \_\_\_\_A.

#### 2.03 CONSTRUCTION

- A. Marina Substation shall consist of a single rigid assembly suitable for pad mount or dock mount. The assembly's structure to be constructed from die formed vertical posts and base

- members that form a rigid self supporting structure to support the transformer, bussing and over current devices. All external structural members to be made from 5052 aluminum. All internal structural members to be made from galvanized 12 gauge steel. The sides and rear shall be covered with removable bolt-on 5052 grade aluminum covers and secured with stainless steel tamper resistant fasteners with gasketed washers. All edges of all covers or hinged front panels shall be pan formed. Provide adequate ventilation within the enclosure.
- B. The marina substation shall be provided with a 3” stainless steel base structure. Base to be of welded construction.
  - C. Distribution section to be dead front type with over current protective devices group mounted to vertical bussed panel assembly. All over current devices shall be front removable with load connections front accessible.
  - D. The assembly shall be provided with removable lifting means on the marina substations base.
  - E. The marina substation shall be equal to American Midwest Power type “Marina-Sub” utilizing the components herein specified and as shown on the drawings.

#### 2.04 BUS

- A. All distribution panel bus bars shall be tin-plated aluminum or silver plated copper. Bus bars shall be mounted with all three phases arranged in the same vertical or horizontal plane. Bus sizing shall be based on NEMA standard temperature rise criteria of 65 degrees C over a 40 degrees C ambient (outside the enclosure).
- B. Provide a full capacity neutral bus where a neutral bus is indicated on the drawings.
- C. All busses to be supported by high strength glass reinforced polyester insulating supports.
- D. A ground bus shall be furnished firmly secured in the distribution section structure.
- E. All hardware used on conductors shall be high-tensile strength and zinc-plated.

#### 2.05 WIRING/TERMINATIONS

- A. Small wiring, necessary fuse blocks and terminal blocks within the switchboard shall be furnished as required. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer’s wiring diagrams.
- B. All factory wiring terminations to be urethane coated.
- C. Mechanical-type terminals shall be provided for all line and load terminations suitable for copper or aluminum cable rated for 75 degrees C of the size as indicated on the drawings.
- D. Lugs shall be provided in the incoming line section for connection of the main grounding conductor. Additional lugs for connection of other grounding conductors shall be provided as indicated on the drawings.
- E. All control wire shall be bundled and secured with nylon ties. Insulated locking spade terminals shall be provided for all control connections, except where saddle type terminals are provided integral to a device. All current transformers secondary leads shall first be connected to conveniently accessible short-circuit terminal blocks before connecting to any other device. All groups of control wires leaving the switchboard shall be provided with terminal blocks with suitable numbering strips.

2.06 TRANSFORMERS – INTEGRATED IN MARINA SUBSTATION

- A. Marina substation will have transformers of size and ratings as indicated on drawings integrated into the assembly by substation manufacturer to form a single integrated assembly.
- A. Rated KVA as listed on drawings
- B. Transformer shall be cooled by natural air convection (AA).
- C. The electrical insulation system shall utilize Class H material in a fully rated 220 degrees C system. Transformer design temperature rise shall be based on a 30 degrees C average ambient over a 24-hour period with a maximum of 40 degrees C.
- D. The transformer shall be designed for a temperature rise of 150 degrees.
- E. The transformer shall be designed to meet the sound level standards for dry-type transformers as defined in NEMA TR1. The measurement procedure shall be as specified in ANSI C57.12.90.
- F. The transformer shall be UL labeled.
- G. High-voltage and low-voltage windings shall be copper.
- H. Transformers to be TP-1 rated.
- I. Transformer to be cable or hard bus connected to substation distribution panel. Connections to be clearly marked identifying the phases.
- J. Transformer to have vibration isolation mountings internal to the marina substation.

2.07 PANELBOARDS

- A. Amperage, voltage and interrupting ratings as listed on the drawings. Panels 240V or less shall be rated 10K or 22K AIC as indicated on drawings
- B. All bus bars shall be tin-plated aluminum or silver plated copper. Panels shall be mounted with all phase buses arranged in the same vertical plane.
- C. All branch feeder protective devices to be molded case circuit breakers.
- D. Circuit breakers must be series rated with main to maintain specified AIC rating of overall assembly.
- E. Provide a full capacity neutral bus where a neutral bus is indicated on the drawings.
- F. All busses to be supported by high strength glass reinforced polyester insulating supports.
- G. A ground bus shall be furnished and firmly secured for each integrated panel.

2.08 CUSTOMER METERING

- A. Where indicated on the drawings, provide a separate customer metering compartment with a front facing hinged door and include the following:

2.09 ENCLOSURES

- A. NEMA 3R Enclosure – Outdoor
- B. External enclosure material to be 5052 grade aluminum power painted white.

- C. All external hardware (fasteners, hinges, handles, etc.) to be stainless steel. All door hinges to be stainless steel continuous piano hinges.
- D. All exterior doors to have neoprene gaskets.

#### 2.10 NAMEPLATES

- A. Furnish master nameplate giving switchboard designation, voltage ampere rating, short-circuit rating, manufacturer's name, shop order number, and item number.
- B. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's wiring diagrams.

#### 2.11 FINISH

- A. All exterior and non galvanized interior steel surfaces of the substation shall be properly cleaned and provided with an oven baked polyester powder coating paint applied electrostatically. Color and finish of the marina substation shall be ANSI white.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. The Contractors shall install all equipment per the manufacturer's instructions, contract drawings and National Electrical Code.
- B. The assembly shall be provided with adequate lifting means and shall be capable of being moved into installation position and bolted directly to the pad or dock without the use of floor sills provided the floor is level to 1/8 inch per 3-foot distance in any direction. All necessary hardware to secure the assembly in place shall be provided by the Contractor.

#### 3.02 FIELD ADJUSTMENTS

- A. The Contractor shall perform field adjustments of the protective devices as required to place the equipment in final operating condition.
- B. Necessary field settings of devices, adjustments and minor modifications to equipment to accomplish conformance with an approved short circuit and protective device coordination study shall be carried out by the Contractor at no additional cost to the owner.