

Table of Contents

1. GENERAL DESIGN REQUIREMENTS 2

2. TECHNICAL REQUIREMENTS..... 3

3. SITE CONDITIONS..... 8

4. SHIPPING REQUIREMENTS..... 8

5. FIELD ENGINEERING SERVICES 10

6. MANUFACTURER’S WARRANTY..... 10

1. GENERAL DESIGN REQUIREMENTS

- 1.1. The Switchgear Building shall be designed, manufactured, assembled, insulated, and tested in accordance with the latest applicable ANSI/IEEE, NEMA, NFPA, ASTM, AISC, AWS, NEC, NESC, OSHA, Steel Door Institute (SDI) and Florida Building Code (FBC) standards except where specific requirements of these specifications conflict with these standards. In the event of any conflict between Specifications and Codes the more stringent requirements shall apply.
- 1.2. The switchgear building shall be of the highest commercial quality as to material, workmanship, and design. All materials used in the construction shall be selected as the best available for the purpose for which used, considering strength, ductility, insulation, and best engineering practice. Liberal factors of safety shall be used throughout the design.
- 1.3. All materials and equipment shall be completely factory built, assembled, wired, and tested. All equipment and components shall be new and of first quality and shall conform to these specifications, as well as, any codes governing the use of the material.
- 1.4. The Switchgear Building Manufacturers and Manufacturer plant locations must be pre-approved by JEA.
- 1.5. The Manufacturer of this building shall have produced similar buildings for a minimum period of five years. When requested by the Project Engineer, an acceptable list of installations for utilities with similar equipment shall be provided demonstrating compliance with this item.
- 1.6. The Manufacturer shall be ISO-9001 Certified.
- 1.7. All equipment furnished under this contract shall be labeled and listed by a nationally recognized testing laboratory.
- 1.8. The switchgear Manufacturer shall serve as the single point of responsibility for field service, as well as, warranty for all component systems installed within the assembly. The Manufacturer shall provide all interconnecting wiring between systems mounted within the building and shall furnish functional testing of these systems.
- 1.9. The switchgear building will be a "Walk-in Enclosure" to house outdoor rated switchgear, communications equipment, and associated components. It shall be equipped with all components and accessories required to provide a complete structure, weather tight and suitable to provide shelter for the substation electrical equipment.
- 1.10. The manufacturer shall guarantee the building to be completely weather-tight under all weather conditions for the warranty period. If leaks occur during the warranty period, whether through the roofs, walls, doors or accessory equipment, the manufacturer shall repair them to the satisfaction of and at no cost to JEA. The switchgear building roof shall be warrantied against leakage for a period of not less than twenty (20) years.
- 1.11. The manufacturer shall furnish all labor, materials, and equipment to perform and coordinate the necessary operations for the design, engineering, manufacturing, fabrication, delivery, off-loading and securing of the switchgear building to the JEA supplied switchgear building foundation.
- 1.12. The manufacturer shall include electrical, lighting, equipment grounding, lightning protection, and HVAC equipment with the switchgear building which shall include, but not be limited to what is listed in this specification. The manufacturer should include any accessories deemed necessary and traditionally provided in switchgear buildings.

Appendix – Metal Clad Switchgear Building

- 1.13. The manufacturer shall furnish and install a UPS system and a Fiber Optic Patch Panel as described in the Switchgear Specification.
- 1.14. Any work, materials, or equipment that may be reasonably inferred to be provided to complete the switchgear building and its electrical components must be provided by the manufacturer whether specifically stated herein. All exceptions shall be submitted to JEA by the manufacturer and must be approved by JEA prior to commencement of the project. Fabrication of the building may begin once JEA has authorized commencement through written approval of the manufacturer submitted drawings and documents.

2. TECHNICAL REQUIREMENTS

2.1. Manufacturing

- 2.1.1. All components and materials provided by the Manufacturer shall be new and free from defects.
- 2.1.2. All metal work shall be free from burrs and sharp edges. Elements may be connected by bolts, thread forming screws, or welds.
- 2.1.3. All steel structure members shall be cleaned prior to finishing.
- 2.1.4. All steel members shall be coated with an electrostatically applied polyester powder with a final baked on average thickness between 2.0 and 4.0 MILS.
- 2.1.5. Interior aisle space in front of the switchgear shall not be less than 5' 6" (sixty-six inches) and shall be adequate to permit withdrawal of the circuit breakers for inspection, testing, and maintenance.
- 2.1.6. Provide an aisle space extension, as required, to locate the required UPS system and a 19" Fiber Optic Termination Rack.
- 2.1.7. The 19" Fiber Optic rack, Battery Charger, Electrical Switches, Panelboards, Fire Alarm, and Building Controls shall be in a manufacturer recommended designated area of sufficient size with thought to ease of accessibility to all components between the building interior wall and switchgear side.
- 2.1.8. Wall penetrations should be minimal and only as necessary. Any exit point or structural penetration must be sealed with a removable barricade that will keep animals, insects, and any environmental elements from entering the building.
- 2.1.9. All building components and accessories must adhere to JEA's facility requirements or approved equivalent.

2.2. Structural

- 2.2.1. The structural requirements should be sized by design calculations to meet or exceed specified loads.
- 2.2.2. Structural members shall be located properly to allow ease of access to the switchgear, required equipment, floor access, and wall openings.
- 2.2.3. The structure base shall be designed with lifting lugs capable of lifting the complete structure and its components at the designed lifting points to not exceed allowable deflection.

Appendix – Metal Clad Switchgear Building

2.2.4. The building will be supported on a JEA provided slab with an open trench running the length of the switchgear under the power cable openings. If applicable, provide stairways with handrails from the slab to the building floor level.

2.3. Mechanical: (Refer to JEA's Facilities Standards at JEA.com for further details)

2.3.1. The switchgear building walls shall be insulated between the inner and outer walls. The interior wall shall be capable of self-supporting wall mounted loads, as required, located at the end of the switchgear building.

2.3.2. The enclosure shall be heated and cooled with HVAC equipment sized to meet the conditions as required. Air conditioning units are to be wall mounted and meet JEA's facilities requirements/standards or approved equivalent.

2.3.2.1. HVAC shall be controlled via wall-mounted programmable thermostat with auto-changeover capability. Default settings shall be 62°F for heating and 78°F for cooling with manual override available.

2.3.2.2. The heating and air conditioning equipment shall be capable of continuously maintaining an indoor temperature between 60°F and 80°F. Hot spots shall not exceed plus or minus 10°F from the set point temperatures.

2.3.2.3. All HVAC units shall be interlocked with the fire detection systems to automatically shut down the HVAC units in accordance with NFPA 90A requirements.

2.3.2.4. Provide a form "C" contact for HVAC trouble alarm.

2.3.2.5. Insulation Factors: Roof = R-30; Walls = R-19; Floor = R-13; Door = R-6.4

2.4. Doors: (Refer to JEA's Facilities Standards at JEA.com for further details)

2.4.1. A minimum of two doors, located at opposite ends of the enclosure are required. Doors measuring a minimum of four feet (4') wide by eight feet (8') tall shall be provided to allow for equipment entry and removal and personnel ingress and egress. Provide Aluminum rain canopies and/or drip shields over doorways.

2.4.2. Doors shall be hinged and have the ability to be locked for restricted entry. Coordinate doors, hinges, and locks with JEA's facility requirements as applicable.

2.4.3. All doors shall be steel honeycomb, flush, seamless entrance doors, fabricated of galvanized steel. Doors shall be phosphatized and shall receive one coat of baked primer and one finish coat of baked-on enamel. Doors shall be internally reinforced with steel for mounting of surface closers and shall be furnished with top caps for weather protection.

2.4.4. All latching doors shall be equipped with panic hardware that operate under simple pressure and open outward.

2.4.5. Door frames shall be fabricated of galvanized steel. Frames shall be bonderized and shall receive one coat of baked on primer and one finish coat of baked-on enamel. Frames shall be reinforced and provide heavy duty door closers.

2.4.6. Doors shall have a gasket to provide a weather seal.

Appendix – Metal Clad Switchgear Building

2.5. Grounding

- 2.5.1. Two external ground pads shall be bonded to the structural base to serve as an equipment ground connection point to a grounding grid.
- 2.5.2. The ground bus from each piece of installed equipment will be connected to the base assembly to provide a continuous ground patch. An accessible internal ground bus shall be provided for this and any future connections.
- 2.5.3. An additional continuous copper ground bus located above the communication equipment shall be provided.
- 2.5.4. A grounding electrode conductor shall be provided from the AC Panel, DC Panel, Breaker Test Station and other electrical equipment in the building to the internal ground bus.
- 2.5.5. All other grounding for the switchgear building equipment to be in accordance with the NEC and applicable IEEE standards.

2.6. Electrical

- 2.6.1. The switchgear building electrical installation shall comply with the NEC, NESC, NFPA 70, NFPA 70E, IEEE C2 and all other applicable electrical codes. In cases of differing requirements, the code with the more stringent requirements shall be followed.
- 2.6.2. The manufacturer shall furnish and install a separate, single cabinet 125VDC UPS System (SENS, Power Cab 120 Model # 4BG8110NTBAC00 or equivalent) to be located inside the switchgear building. The battery shall be sized in accordance with IEEE 485 and the battery size calculations shall be provided.
- 2.6.3. The manufacturer shall furnish and install a Fiber Optic Rack inside the Switchgear Building. Provisions shall include providing required conduit and cables for routing Fiber Optic cable interconnections between the switchgear auxiliary compartment RTAC units and the 125VDC source breaker at the UPS unit panel. The 125VDC power circuit shall be routed and terminated on a terminal block mounted on the equipment rack. The 19" communications rack shall be Chatsworth Products Part # 55053-103. The rack shall be grounded to the switchgear ground bus.
- 2.6.4. The switchgear building shall have an AC Power Panel (Square D type NQOD or approved equivalent) for building service loads which will be fed and powered from an external power source. The manufacturer shall also provide a factory installed Surge Protective Device (SPD) as recommended by the panelboard manufacturer. All AC supply branches shall be labeled and match the supplied drawings.

2.7. Raceways: Wiring inside the building shall be in metallic raceways.

- 2.7.1. The power, control and instrument cables shall be in separate raceways. The cable trays shall maintain a minimum 6 inches clearance from the top of tray to the lowest part of the ceiling or ceiling beam. All cable trays and accessories shall adhere to NEMA VE 1 or NEMA FG 1.
- 2.7.2. Power and control cable trays shall be aluminum ladder type with 9" rung spacing. Instrumentation trays shall be solid bottom hot dipped galvanized steel trays with steel covers.

Appendix – Metal Clad Switchgear Building

- 2.7.3. Ethernet cables shall be run in instrumentation trays. Control cables and fiber optic cables shall be run in the control tray with a barrier between them.
- 2.7.4. Conduit shall be EMT for lighting and receptacle circuits. All others shall be rigid galvanized steel.
- 2.7.5. The manufacturer shall specify all required conduits, installation procedures and necessary details in a Conduit Plan in the Construction Drawing set. The conduit plan should identify which cables are routed within each conduit. Cable fill shall meet NEC requirements.
- 2.7.6. Conduit and wiring to the power panel shall be designed, supplied and pre-installed as much as possible for ease of field assembly.
- 2.8. Cable:
 - 2.8.1. Furnish for 600 volt maximum service, totally enclosed in conduit, NEC type XHHW or THWN (size per NEC).
 - 2.8.2. Fiber optic cable shall be 8 type OM3 fiber, multimode, indoor distribution cable Belden Catalog No. FL3D008R9 or approved equal.
 - 2.8.3. Cable shall be identified on the AC Panel schedule drawing and include the cable identification number, conductor size, number of conductors and a brief description of the conductor function.
 - 2.8.4. All installed cables shall have each end clearly labeled with the correct cable number identification as per the drawings. Cable identification tags shall be RhinoPRO ½" Flexible Nylon Labels – black on white, manufacturer part # 18488 or approved equal. Indoor labels shall be secured with no less than two plastic cable ties.
- 2.9. Lighting: (Refer to JEA's Facilities Standards at JEA.com for further details)
 - 2.9.1. Exterior Lighting shall be provided near the doors at a suitable height and be of the full cutoff design. The lights shall be photocell controlled with a dusk- dawn operation. The manufacturer shall provide two exterior lights – 120VAC, HPS, 70W, wall mount with full cutoff optics, Grainger 2RGW8 or LED equivalent.
 - 2.9.2. Interior Lighting shall be overhead T-8 fluorescent type with electronic ballasts and lamp guards or LED equivalent. Interior aisle space shall be illuminated to a minimum of 45 foot candles at a working height of 36" above the floor. Lighting shall be controlled by three way switches at each egress door.
 - 2.9.3. Emergency Egress Lighting shall be provided by powered emergency exit signs with integral lighting and 90 minute battery backup for each egress door.
- 2.10. Receptacles:
 - 2.10.1. The manufacturer shall supply a minimum of two exterior duplex receptacles with integral ground fault protection, one adjacent to each egress door.
 - 2.10.2. The manufacturer shall supply a minimum of four interior duplex receptacles equally spaced around the interior walls.

Appendix – Metal Clad Switchgear Building

2.11. Finishing

- 2.11.1. The exterior walls shall be light gray in color. The manufacturer should submit to JEA available color options upon project commencement.
- 2.11.2. The interior walls and ceilings shall be RAL 9010 Pure White.
- 2.11.3. The floor shall be painted light gray with a “non-skid” element added. The finish shall have a minimum pencil hardness of 2H as tested per ASTM D3363 and pass the ASTM B117 salt spray test for a minimum of 1000 hours. An undercoat shall be applied to the entire base using an industrial grade, high solid and high build epoxy. This undercoat shall be a minimum of 4 mils.
- 2.11.4. All structural elements including channels and angles shall be caulked to seal gaps and spaces.
- 2.11.5. An additional 4 mil undercoat shall be applied to the bottom of the base assembly.
- 2.11.6. The sides of the base assembly shall be finished using polyurethane paint to a minimum thickness of 2 mils.
- 2.11.7. Certified production test reports indicating satisfactory completion of all inspection and test procedures shall be provided.
- 2.11.8. The equipment shall be made available for customer inspection prior to shipment.

2.12. Other Building Accessories:

- 2.12.1. The manufacturer shall furnish and install door limit switch contact alarms for each egress door (2P2T, Honeywell S&C, DTE6-2RN2 or equivalent). Contacts shall be wired to the SEL-2523 annunciator device for remote alarming to SCADA.
- 2.12.2. The manufacturer shall provide a temperature monitor with high/low temperature alarm contacts wired to the SEL-2523 device for remote alarming to SCADA. The High temperature setpoint shall be 85 degrees F and the Low temperature setpoint shall be 50 degrees F.
- 2.12.3. The manufacturer shall provide two (2) photoelectric type smoke detectors with alarm contacts rated for 125VDC wired to the SEL-2523 device for remote alarming to SCADA. Activation of the fire detection systems shall inhibit the operation of the HVAC. The manufacturer shall design, furnish, and install the necessary controls to provide the fire detection interlock.
- 2.12.4. The manufacturer shall furnish and install one (1) fire extinguisher per switchgear building (Class D, Haldtrion 1, 11 pounds, 125 PSI operating pressure, 15 feet max range including heavy duty bracket, Grainger 4XP83)

3. SITE CONDITIONS

- 3.1. Location: Multiple Substation locations in Jacksonville, Florida
- 3.2. Applicable Codes: ASCE-7-10 Minimum design loads for Buildings and Other Structures; Florida Building Code
- 3.3. Structure Risk Classification: Category II
- 3.4. Wind: Basic Wind Speed: $V_{ult} = 135\text{mph}$; Wind Importance Factor = 1.15; Exposure Category C; Occupancy Category III
- 3.5. Seismic: Design Category B
- 3.6. Rainfall: 8.75 inches (25 year, 24 hour rainfall)
- 3.7. Temperature: Maximum average = 93 degrees F (July/August), Minimum average = 38 degrees F (January)

4. SHIPPING REQUIREMENTS

- 4.1. The switchgear manufacturer shall be responsible for the on-site delivery and mechanical installation of the sections of switchgear, installation and wiring of the SENS DC power cabinet (UPS system), installation of the 19" Communications panel and all other required equipment and accessories within the switchgear building.
- 4.2. All equipment shall be shipped F.O.B. jobsite, freight prepaid and allowed to the project address in Jacksonville, FL.
- 4.3. The Manufacturer shall coordinate and schedule delivery of all equipment to the job site for off-loading.
- 4.4. At least six weeks prior to shipping the Manufacturer shall create and transmit to JEA a shipping schedule showing, at a minimum, the following information:
 - 4.4.1. Item Description (Breaker #)
 - 4.4.2. Shipping form (Crate, carton, pallet, etc.)
 - 4.4.3. Shipping Dimensions
 - 4.4.4. Gross Weight
 - 4.4.5. Shipping Plan (route of delivery)
 - 4.4.6. Date of Arrival
- 4.5. The shipping schedule should be per shipping vessel (truck) to assure that JEA's on-site representative knows exactly what is arriving and when it is to arrive. Any updates to the shipping schedule should be provided at least three business days in advance of delivery.
- 4.6. Equipment and accessories shall be labeled for shipment with a large (minimum 8 x 10) sheet in an obvious location on the outside of each of the shipping containers as follows:
 - Owner name: JEA
 - Owner Order Number: (JEA Purchase Order #)
 - Owner Project Name: (To be determined)
 - Owner Contact: (To be determined)
 - Contents: (Vertical section, breaker, etc.)
- 4.7. Each container should be labeled and numbered so that they may be identified before being uncrated. Any items not fully assembled shall be packaged separately.

Appendix – Metal Clad Switchgear Building

- 4.8. All equipment openings and entrances to internal wiring and control devices shall be protected against the entrance of dirt, dust, moisture or any other element. All surfaces that may be subject to corrosion or oxidation should be protected per Manufacturer's recommendations. All connections shall be protected by metal covers to prevent damage during shipment.
- 4.9. All equipment shall be packaged for outdoor storage.
- 4.10. The Manufacturer shall include storage instructions that will minimize damage to the equipment and material. Storage requirements shall be site specific and as stringent as the most sensitive component requires.
- 4.11. Switchgear shall be provided with adequate lifting means. Handle in accordance with the Manufacturer's written instructions to avoid damaging equipment, installed devices and finish. Lift only by installed lifting eyes.
- 4.12. Adequate means for moving the units on rollers shall also be provided.
- 4.13. The equipment shall be ruggedly designed and braced to withstand shipment by truck or rail.
- 4.14. The Manufacturer shall prepare and crate all equipment and materials to protect them against damage in transit. The Manufacturer has the option to ship on a designated truck and not crating cubicles. The factory protection or cover must be maintained with heavy canvas or plastic to protect from dirt, water, construction debris and traffic.
- 4.15. Where equipment sections must be separated for shipment, all materials and equipment required to facilitate reassembly and reconnection of interconnecting bus work in the field shall be furnished. Wiring between equipment sections separated for shipment shall be brought to terminal blocks appropriately identified so only short jumper connections are required. These shall be furnished and identified by the Manufacturer for field assembly.
- 4.16. The Manufacturer shall provide procedures for delivery, storage, handling and preventative maintenance after receipt of the equipment on site.
- 4.17. The Manufacturer shall provide complete written instructions prior to shipping describing the necessary procedures to receive the material and equipment in a safe manner preventing injury to the receiving personnel and minimizing any damage to equipment.
- 4.18. Each group shall be bolted to skids and enclosed in a protective covering and be equipped to be handled by crane or industrial "fork" truck. Each group shall be a maximum of 4000 pounds.
- 4.19. All apparatus or equipment, not bolted to the housing structure and not forming a part thereof in shipment, shall be packed and crated separately. Circuit Breakers, accessories and installation materials shall be packed and crated separately. Detailed packing lists shall be provided.
- 4.20. Circuit breakers may be integrally shipped in their switchgear enclosures. If shipped separately, they shall be appropriately marked, boxed and protected against shipping and handling damage and shall be delivered to a designated point by JEA. They shall be inserted in the appropriate cubicles after each cell has been inspected and/or tested for mechanical performance. They are not to be considered an integral part of the stationary structure, but together they shall perform as outlined in this specification and the appropriate standards.
- 4.21. Deliver the switchgear building and medium voltage metal clad switchgear as one completed assembled unit. Shipping splits, if required, will be enclosed with a protective covering to prevent the entrance of dust and water. Shipping splits are to be limited to two (2) coupled compartments during

transit. Temporary bracing to support the roof and wall structure to prevent damage during shipment shall be installed as required.

4.22. Provisions for anchoring on a level foundation will be provided.

5. FIELD ENGINEERING SERVICES

- 5.1. JEA requires that the Manufacturer's representative visit the site to review site conditions and delivery route prior to switchgear construction and installation. The site visit can be scheduled through the Project Engineer.
- 5.2. The switchgear manufacturer shall supply a field service technician for the complete installation, startup and final testing after equipment has been delivered. The total cost for the field service technician which shall include all travel and living expenses shall be provided in the bid.
- 5.3. The field service technician shall be a qualified technician having a minimum of five (5) years field experience in the installation of switchgear buildings and the installation, operation and maintenance of switchgear and associated equipment.
- 5.4. The field service technician shall be available to answer any installation questions that may arise.
- 5.5. The field service technician shall perform the following functions regarding the switchgear building while on-site:
 - 5.5.1. Examine the installation area to assure there is enough clearance to install the switchgear.
 - 5.5.2. Check concrete pads for flat and level surface.
 - 5.5.3. Check and verify field measurements and locations of required switchgear anchors and feeder conduits are located as per Manufacturer's specific requirements.
 - 5.5.4. Verify that medium voltage metal-clad switchgear is ready to install and oversee the assembly of the equipment.
 - 5.5.5. Verify that any required utilities are available and in the proper location and ready for connection to the equipment.
 - 5.5.6. Inspect installed switchgear for anchoring, alignment, grounding and physical damage.
 - 5.5.7. Check the tightness of all accessible electrical connections with a calibrated torque wrench. Refer to minimum acceptable values in the Manufacturer's instructions.
 - 5.5.8. Clean the interiors of the switchgear, switchboards and panels to remove construction debris, dirt and shipping materials.
 - 5.5.9. Repaint scratched or marred exterior surfaces to match the original finish.

6. MANUFACTURER'S WARRANTY

- 6.1. The Manufacturer shall act as a "single point" of responsibility for the switchgear building and all components installed in the switchgear assembly that are not furnished by JEA.
- 6.2. The building and equipment shall be warrantied for a minimum period of 5 years from startup date.