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15kV Metal-Clad Switchgear and Power Control Room Specification

General

1.0 General

1.1 The intent of this specification is for the manufacturer to furnish and install the equipment and material specified herein complete and operable.

1.2 All standard accessories to the equipment (15kV metal-clad switchgear with 36 breakers and a power control room with tie-breakers to use either utility feeder #1 or #2) specified shall be supplied even if not specifically mentioned in this specification.

1.3 Material used in the fabrication of the specified equipment shall be new, unused, not refurbished and of the highest quality.

Scope

2.0 Scope

2.1 Work Included

2.1.1 Furnish a metal-clad switchgear and power control room as detailed in Sections 3.0 through 11.0 of these specifications. Any drawings or data sheets attached to the inquiry shall be considered part of this specification. The equipment shall be complete, operable and tested with University of Texas Health Science Center at San Antonio, herein “the University”, staff prior to acceptance.

2.1.2 Provide production tests and inspections as detailed in Section 2.0 of this specification.

2.1.3 Prepare the equipment for transportation to the jobsite, advise, and monitor the loads shipped so as to prevent the possibility of shipping damage. The manufacturer shall allow for periodic site visits from University representative(s) at no additional cost to the University. Any associated airfare, ground transportation, hotel costs and meals shall be paid for by the manufacturer. Allow for a minimum of 2 manufacturing visits by the University representatives. Dates of visits shall coincide with critical milestones and testing events.

2.1.4 Install the switchgear and power control room, furnish all material, connections, splices, links, specialty tools, and information required to completely reassemble the switchgear and the power control room in the field or to facilitate the installation of the switchgear when performed by a licensed electrical contractor in the State of Texas. A schedule and assembly details/instruction shall be provided as part of this package 90 days prior to shipment for University review. Being that the University is a research and patient treatment facility, the schedule for delivery and assembly may be modified by the University.
2.1.5  Guarantee the performance of the switchgear and any specialty tools. This warranty shall, at a minimum, cover the equipment and specialty tools for eighteen (18) months from time of arrival on site or twelve (12) months from the date the University accepts the equipment, whichever occurs first. Supply all drawings, documentation, and information detailed in Section 20.0.

2.2  Work Not Included

2.2.1  Connection of incoming and outgoing cables.

2.2.2  Connection of external control cables or wiring.

2.2.3  Vault or manhole construction.

2.2.4  Ground grid engineering and construction.

2.2.5  Connection to any emergency power.

2.2.6  Connection to the University network.

Applicable Codes and Standards

3.0  Applicable Codes and Standards

3.1  The applicable codes and standards listed below should be considered as part of this specification. The latest revision in effect at time of inquiry shall apply for all standards referenced.

3.1.1  National Electrical Manufacturers Association (NEMA)

3.1.2  Institute of Electrical and Electronic Engineers (IEEE)

3.1.2.1  IEEE C37.20.7 (Type 2B).

3.1.2.2  IEEE 1584-2002 (Manufacturer to provide copy of arc analysis).

3.1.3  National Electric Code (NEC)

3.1.4  National Electric Safety Code (NESC)

3.1.5  2013 Uniform General Conditions for the University of Texas System Building Construction Contracts

https://www.utsystem.edu/ogc/docs/constlaw/UGC-SGC.pdf

3.1.6  The University of Texas Health Science Center at San Antonio Technical Specification


3.1.7  American National Standards Institute, Inc. (ANSI)

3.1.7.1  ANSI C37.04

3.1.7.2  ANSI C37.06

3.1.7.3  ANSI C37.09
3.1.7.4 ANSI C37.20.2
3.1.8 Underwriters Laboratories (UL)
3.1.9 IEC 62271-200 (Annex A)
3.1.10 EEMAC G14-1
3.1.11 IEC 61641

3.2 It shall be the manufacturer's responsibility to be knowledgeable of these standards and codes.

Construction
4.0 Construction

4.1 The equipment supplied shall be of metal-clad construction using welded, industrial-riveted, or bolted sheet steel. The construction shall be self-supporting and free standing. All metal work shall be free from burrs and sharp edges.

4.2 The equipment shall be suitable for industrial or utility service and engineered to meet or exceed all code required wind and seismic forces for San Antonio, Texas.

4.3 The power control room shall be constructed for outdoor installation and use in San Antonio, Texas, with an elevation less than 3,300 feet. There is an oxygen tank within 100 feet owned by University Hospital System. Switchgear explosion shall be modeled and designed for proper containment.

4.4 The switchgear shall be constructed for use in outside temperatures that do not exceed a maximum of 124 degrees Fahrenheit or a minimum of -22 degrees Fahrenheit. The ambient temperature of the switchgear may vary based on the power control room design/construction. As a safeguard, the switchgear shall be able to function properly without any cooling or heating systems.

4.5 All equipment shall be ANSI 61 (light grey) color.

4.6 The power control room shall include an external welded ships ladder for access to the switchgear roof. Each ladder step shall include anti-slip material for safety and the ladder shall also include a locking mechanism for non-use situations.

4.7 The equipment shall have the proper labeling on the interior and exterior to notify personnel of the high voltage danger.

4.8 The manufacturer shall provide minimum clearance dimensions and other guidelines related to the performance of the arc resistant switchgear, noting that there are existing parking spaces and other high voltage gear in the area.

4.8.1 Where applicable, the manufacturer shall provide a method of venting the arc fault byproducts out of the switchgear.

4.8.2 Where the venting is intended to penetrate an external wall, the vent shall be covered, rain-tight, dust-tight and vermin proof.

4.9 Front Switchgear Compartment Doors
4.9.1 Each compartment housing a high voltage device shall be provided with steel hinged door(s).

4.9.2 The door(s) shall be provided with provisions for padlocking and a view window for observing circuit breaker positions.

4.9.3 The door(s) shall be capable of withstanding the effects of an internal arcing fault as proven by successful testing per IEEE C37.20.7.

4.9.4 No tie down bolts or other manual means shall be used to secure the door. A single handle must be provided to operate all required latching.

4.9.5 No special tools shall be required to latch the front compartment door or engage the arc resistant function.

4.9.6 The following interlocks shall be provided:

4.9.6.1 Interlock to prevent racking a circuit breaker into a compartment with the door in the open position. This interlock may be manually circumvented for maintenance purposes by a deliberate act on the part of the operator. This override shall require a minimum of two separate and distinct operations, neither of which is considered to be part of normal operations.

4.9.6.2 Interlock to prevent opening the compartment door unless the circuit breaker is in the disconnected position and safety shutters are closed. This interlock shall also include an indication of shutter position on the front of the compartment door. This interlock may be manually circumvented for maintenance purposes by a deliberate act on the part of the operator. This override shall require a minimum of two separate and distinct operations, neither of which is considered to be part of normal operations. This interlock shall reset should the compartment door be closed following maintenance after circumvention.

4.9.7 Provisions for racking of the circuit breaker between the connected and disconnected positions shall be provided with the door in the closed position.

4.10 Rear Switchgear Compartment Doors

4.10.1 Each rear compartment shall be provided with steel hinged door(s).

4.10.2 Each rear compartment door shall have an infrared (IR) window for thermal imaging by the end-user. The IR windows shall be a minimum of 4” in diameter and placed/located on the rear compartment door in order to maximize the field of view within the compartment.

4.10.3 Each rear compartment door shall be provided with provisions for padlocking, one padlock per line up.

4.10.4 The rear door(s) shall be capable of withstanding the effects of an internal arcing fault as proven by successful testing per IEEE C37.20.7 (latest edition).

4.10.5 A single handle is required to operate all required latching. Additional tie down bolts are acceptable. No special tools are required.
4.10.6 The following optional interlock may be provided if specified on drawings or data sheets:

4.10.6.1 Interlock to prevent opening the rear door(s) unless the removable element (circuit breaker) in the front compartment of the vertical section is in the disconnected position. This interlock may be manually circumvented for maintenance purposes by a deliberate act on the part of the operator. This override shall require a minimum of two separate and distinct operations, neither of which is considered to be part of normal operations. This interlock shall reset should the compartment door be closed following maintenance after circumvention.

4.11 Instrument compartments shall have doors that have been tested per IEEE C37.20.7.

4.12 Cooling vents may be provided in the switchgear for ventilation or cooling purposes.

4.12.1 Design must conform to the applicable IEEE standard construction and pass the requirements of IEEE C37.20.7 with respect to emission of ionized gas.

4.12.2 Design must be constructed so that accidental contact cannot compromise the ability of the design to withstand an arcing fault condition. Design must be constructed so that material cannot become trapped within the louver assembly and thereby prevent the arc resistant features from functioning.

4.13 When roof ventilation is required, provisions shall be included to prevent access by vermin.

4.14 The switchgear shall be capable of extension from either end at a future date without modification to existing structural members unless otherwise noted. Means shall be provided to meet all requirements of the exposed ends of the switchgear assembly. The described means shall not prevent future additions to the switchgear assembly and shall be tested according to IEEE C37.20.7.

4.15 It shall be the manufacturer’s responsibility to coordinate all necessary alignment and interconnection between component sections. The entire assembly must be electrically and mechanically assembled into one single line-up prior to final inspection and shipment.

4.16 The equipment must be shipped complete, without missing components or "ship shorts". The University may waive this requirement upon request prior to shipment.

4.17 To facilitate ease of handling, each shipping section shall be no more than two (2) vertical structures. Each shipping section shall be provided with lifting lugs adequately sized for the equipment.

4.18 Power circuit breakers shall be shipped and packaged separately from the switchgear structure.

4.19 The depth of the finished equipment shall be sufficient to allow for entrance, bending, and termination of 15kV power cables. Individual units shall be provided for top or bottom entrance as specified. A minimum of 26 inches of clearance between terminal pads and the cable entrance shall be provided.

4.20 Power circuit breakers and voltage transformer assemblies shall be draw-out construction to provide maximum operator safety.
4.21 Safety interlocks and barriers as required by ANSI standards shall be provided to prevent personnel from inadvertent exposure to the bus while the switchgear is energized.

4.22 A continuous silver-plated copper ground bus measuring ¼” x 2” shall be provided for the full length of the switchgear assembly. The ground bus shall be capable of carrying the rated short circuit current of the installed circuit breakers for a minimum of 2 seconds.

4.23 In order to minimize condensation, each cubicle designed for outdoor application shall have a space heater.

4.23.1 Space heaters may be wired with other space heaters in parallel and shall be provided with a single adjustable thermostat to maintain cubicle temperature at desired levels. Removal of a heater (for maintenance or replacement) shall not limit the other heaters and thermostat from operating properly.

Power Control Room Doors
5.0 Power Control Room Doors

5.1 A minimum of two doors shall be located at opposite ends of the power control room. Reference Drawing E1 for additional information.

5.1.1 One equipment door measuring at least 4 feet by 8 feet shall be provided.

5.1.2 One personnel door measuring at least 3 feet by 7 feet shall be provided.

5.1.3 All doors shall have a safety glass window with a minimum of 12 inches by 18 inches. All doors shall have an external locking mechanism where exiting the power control room is always possible.

5.1.4 All doors shall have proper weather seals for rain, extreme heat or ice.

5.1.5 All door hardware shall conform to University standards.

5.2 Equipment access doors shall be sized to match the installed switchgear or other equipment.

Power Circuit Breakers
6.0 Power Circuit Breakers

6.1 The power circuit breakers shall be electrically operated, three-pole, draw-out type. The interrupting medium shall be vacuum.

6.2 The circuit breakers shall have an ANSI rating structure based on a K factor of 1.0 and interrupting rating of 36kA, 50kA or 63kA at 15kV [Provide different pricing].

6.3 The basic insulation level (BIL) of the power circuit breakers shall be 95kV for 15kV applications.

6.4 The continuous current capacity of each power circuit breaker shall be 1200A.

6.5 Primary line and load connections shall be self-aligning.
6.6 The draw-out mechanism shall be configured to operate with the compartment door closed.

6.7 The draw-out mechanism shall hold the power circuit breaker rigidly in the fully connected positions.

6.8 The draw-out mechanism shall require less than 25 turns to move the circuit breaker from the connected to the disconnected positions.

6.9 Each circuit breaker shall have four (4) wheels to allow for easy maintenance and movement.

6.10 No lift truck, rails, ramps, channels, or transport device of any kind shall be required in order to move a circuit breaker from floor level to the fully connected position.

6.11 Interlocks shall be provided to prevent the circuit breaker from disconnecting from the main bus stabs unless the circuit breaker is open.

6.12 The power circuit breaker ground connection must be capable of carrying the short circuit rating of the circuit breaker for a minimum of 2 seconds and must also be capable of withstanding the peak current value (or 2.7 times the rated short circuit current) of the circuit breaker.

6.13 A grounded metal shutter system shall automatically cover the line and load stab connections when the circuit breaker unit is moved to the disconnected position. The shutter shall be pad-lockable in the closed position.

6.14 Auxiliary contacts to provide circuit breaker element position indication (Truck Operated Cell switch or TOC) and to provide circuit breaker contact position (Mechanism Operated Cell switch or MOC) shall be available when specified. Both switch operator and switch must be visible and accessible from the front of the low voltage compartment when the circuit breaker is in the fully connected position.

6.15 Circuit breaker operating mechanism shall be completely trip free both mechanically and electrically. Mechanical tripping of a closed circuit breaker shall be possible with the front cubicle door closed.

6.16 Control power and control circuit breaker shall be in the connected position. The circuit breaker cannot be inserted without the plug in place.

6.17 For operator safety the circuit breaker shall have a provision for padlocking it in the disconnected (racked out) position.

6.18 Each circuit breaker shall have a mechanical operations counter.

6.19 Each circuit breaker shall have an easily accessible means for contact wear indication.

6.20 A steel interference plate shall be mounted in the bottom of each circuit breaker cell assembly which only allows a higher rated circuit breaker (voltage, current, interrupting rating) to be inserted into a lower rated cell assembly.

Power Bus
7.0 Power Bus

7.1 The main power bus shall be made of copper (98% IACS conductivity).
7.2 Main power bus shall be silver-plated along the entire length to a thickness between 0.0002 inches and 0.0005 inches (5-12 nm).

7.3 The entire bus, except for terminations, shall be completely isolated with barriers and insulated as required by ANSI Metal-Clad construction standards. Ultrasound ports shall be provided in order to measure any tracking or arching events.

7.4 The main power bus shall be supported on molded cycloaliphatic epoxy insulators or electrical grade porcelain (glastic for 15kV applications) and mechanically braced to withstand stresses resulting from current values equivalent to the close and latch rating of the largest circuit breaker in the assembly and be UL Standard for Safety 891 compliant. Insulators shall be such that they ensure non-tracking properties and adequate leakage distance and withstand the stresses associated with the short circuit rating of the switchgear, including the proper allowance for transient conditions.

7.5 Bus joints shall be made with sufficient bolts and torqued to preserve initial contact pressure over the service life of the equipment. Bolts that are torqued to appropriate levels at the factory shall be identified with paint markings. Bolts shall be rated Grade 5 and plated for corrosion resistance.

7.6 Power bus orientation shall be A-B-C top to bottom, front to back, and left to right when viewed from the front of the switchgear.

Environment

8.0 Environmental

8.1 The switchgear shall be cooled and/or heated with air conditioning equipment sized to meet the conditions as recommended by the manufacturer. Air conditioning units may be wall or roof mounted on the power control room depending on size and physical limits.

8.2 Over-sizing, redundancy, or automatic cycling of air conditioning equipment can be provided if recommended by the manufacturer. Air filtration from dust, or chemical filtration of other contaminates shall be provided. Please note that the switchgear will be near two central cooling plants and a diesel generator farm.

8.3 Any air conditioning condensation shall be routed to a nearby bush or grassy area. The University shall provide exact location.

Coordination Study

9.0 Coordination Study

9.1 As part of the switchgear design, the manufacturer shall provide a coordination study and recommended settings for the new switchgear and its breakers and to any downstream breakers. As a basis, the University shall provide the manufacturer the latest (April 2015) coordination study in SKM Power Tools format. The manufacturer shall coordinate any utility information with CPS Energy.

9.2 The coordination study shall be delivered to the University in SKM Power Tools format and in hard copy format (2 copies) 90 days prior to the switchgear being shipped. The digital coordination files shall be accessible by SKM Power Tools Version 6.5.2.7 or University latest version.

9.3 During the coordination portion, the manufacturer shall allow for up to two visits to the plant for the University electrical engineer to review progress and provide any
recommended changes. These visits can be part coordinated with design review and manufacturing visits.

Grounding
10.0 Grounding

10.1 The switchgear and the power control room shall have external grounding pads to serve as an equipment ground to a grounding grid. The switchgear shall be grounded to the power control room. The power control room will be grounded to the University grounding grid.

Instrument Transformers
11.0 Instrument Transformers

11.1 Current Transformers (CT)

11.1.1 CTs shall be installed so that they can be easily maintained and replaced from the front of the switchgear without entering the power bus or cable termination compartments.

11.1.2 Each current transformer shall be rated to withstand the thermal and mechanical stresses imposed by the short circuit rating of the applied circuit breaker.

11.1.3 The secondary termination of current transformers shall be on a shorting terminal block.

11.1.4 Current transformers shall have a rated 5 ampere secondary current unless otherwise specified.

11.1.5 Metering and relaying accuracy classification shall be as specified in the data sheets and shall be suitable for the connected burden.

11.1.6 Current transformers, when installed, shall be fully rated for the appropriate voltage class. Current transformers with 600 volt insulation levels may be used if installed with fully rated insulation barriers such as around primary disconnect bushing assemblies.

11.2 Voltage Transformers (VT)

11.2.1 Voltage transformers and associated fuse assemblies shall be installed in draw-out assemblies so that they may be readily disengaged from the power bus.

11.2.2 Where physical size restrictions do not allow the voltage transformer to be mounted in a draw-out assembly, the voltage transformer may be stationary mounted with the fuses only mounted in the draw-out unit. The appropriate interlocks shall be provided to insure maximum operator safety.

11.2.3 When moved to the withdrawn position, the transformer draw-out unit shall automatically ground the transformer primary windings and the fuses. A visible indication of positive ground is required. The ground may be a momentary or sweeping action that occurs as the unit is moved out of the connected position.

11.2.4 Voltage transformers shall have 120 volt secondary voltage.
11.2.5 Voltage transformers shall have an accuracy rating comparable to the metering equipment and a burden capacity equal to twice the initial load.

11.2.6 Current limiting fuse protection shall be provided on the primary side of each voltage transformer.

11.2.7 Voltage transformers shall be designed to withstand the basic impulse level of the switchgear.

11.3 Control Power Transformers (CPT)

11.3.1 Control power transformers shall be mounted for sizes above 15kVA with the primary current limiting fuses mounted in a draw-out unit.

11.3.2 When moved to the withdrawn position, the fuse draw-out unit shall automatically ground the fuses.

11.3.3 Each control power transformer shall have a secondary molded case circuit breaker interlocked with the draw-out assembly so that the load is disconnected prior to draw-out.

11.3.4 All control power transformers shall be provided with either one (1) 7-1/2% tap or (2) 2-1/2% taps above and below rated voltage.

11.3.5 Secondary winding shall be 120/240VAC, single phase, 60Hz, 3 wire.

Ferroresonance Study

12.0 Ferroresonance Study

12.1 In order to minimize failures and explosions, for the above mentioned instrument transformers, the manufacturer shall provide a ferroresonance study detailing the utility feeders and any risks associated with the installation. This study shall be performed prior to any switchgear or power control room design and manufacturing. This study shall be considered by the manufacturer during the final design process and any setting recommendations.

Control and Secondary Wiring

13.0 Control and Secondary Wiring

13.1 Control wiring shall be SIS type #14 AWG, 41 strand extra flexible, stranded copper or larger.

13.2 Current transformer secondary wiring shall be SIS type #12 AWG, 65 strand, extra flexible, stranded copper or larger.

13.3 Current transformer secondary wiring shall terminate on shorting type terminal blocks.

13.4 All control wiring shall be UL listed and have a VW-1 flame retardant rating or better.

13.5 Exposed wiring shall be suitably protected against contact with sharp edges and must be neatly bundled and secured with nylon wire ties throughout the assembly. Where control wiring passes from cubicle to door it shall be wrapped with suitable protection so as to
prevent damage. Holes cut to allow control wires to pass from cubicle to cubicle shall have a grommet for protection.

13.6 Splicing of control wire is not permitted. Control wiring must be a continuous length from terminal to terminal and each end shall be labelled accordingly.

13.7 Each control wire shall be marked at both terminations to agree with wiring diagrams. Plastic wire markers of either the slip on or heat shrink variety shall be provided.

13.8 Control wires leaving the cubicle of origin must first terminate on a terminal block. No control wire may leave a cubicle directly from any other device.

13.8.1 Space heater circuits are the only exception.

13.9 Where possible, a minimum of 10% spare terminals shall be provided in each cubicle.

Switchgear: Meters, Switches, and Relays

14.0 Switchgear: Meters, Switches, and Relays

14.1 Indicating meters shall be 1% accuracy, 4½” square switchboard type, with taut band suspension unless otherwise specified.

14.2 Control switches shall be rotary cam type with engraved face plates.

14.3 Ammeter and voltmeter transfer switches shall have an off position and shall be provided with knurled knob handles.

14.4 Selector type control switches (Auto-Manual or Hand-Off-Auto) shall have oval handles.

14.5 Circuit breaker control switches shall have pistol grip handles.

14.6 Protective relays shall be switchboard draw-out type with removable dust-tight viewing covers, front accessible connection plugs, built-in test capability, and mechanical targets that may be externally reset. Other electronic or multi-function relays may be specified for particular applications.

14.7 Current and voltage test plugs for field monitoring and maintenance shall be provided when specified.

14.8 Indicating lights shall be provided as shown on the control schemes. Lamps shall be replaceable from the front of the switchgear without opening the cubicle door.

Nameplates

15.0 Nameplates

15.1 Laminated plastic engraved nameplates shall be provided. The University shall provide a naming convention prior to any engraving.

15.2 Identification nameplates shall be black with white letters, caution nameplates shall be yellow with black letters, and warning nameplates shall be red with white letters.

15.3 Each externally visible device or component shall have an identification nameplate. Lettering shall be, at a minimum, 5/32 inches in height.
15.4 Each internal device or component shall have an identification marking.

Switchgear and Power Control Room Finish
16.0 Switchgear and Power Control Room Finish

16.1 All steel structure members shall be cleaned, rinsed, and phosphatized prior to painting.

16.2 Coating process shall be an electrostatically applied polyester powder with a final baked on average thickness between 1.5 and 4.0 mils.

16.3 Finish shall have a minimum pencil hardness of 2H as tested per ASTM D3363.

16.4 Finish shall pass the ASTM B117 salt spray test for a minimum of 1,000 hours.

16.5 All test reports for compliance shall be available to the University upon request.

Switchgear Inspection and Testing
17.0 Switchgear Inspection and Testing

17.1 Each circuit breaker shall be tested for proper adjustment and operation prior to shipment. The circuit breaker shall be given a minimum of 100 mechanical operations. Test reports shall be available upon request.

17.2 Each vacuum interrupter shall receive a vacuum integrity test by means of the system ac high potential test prior to shipment.

17.3 Each circuit breaker shall have a contact timing and contact motion velocity test.

17.4 Each circuit breaker shall be identified with an individual serial number permanently mounted on the breaker by means of a metal nameplate.

17.5 Manufacturer shall maintain permanent records of each circuit breaker produced and the production test results.

17.6 Component bill of material shall be checked for proper quantity, description, and part number.

17.7 Physical dimensions shall be checked against approved drawings.

17.8 Equipment shall be subjected to a primary current injection procedure to determine proper operation of all current sensitive components.

17.9 Equipment shall be subjected to a primary voltage injection procedure to determine proper operation of all voltage sensitive components.

17.10 Complete assembly shall have a low frequency withstand (an ac high potential) test performed to assure insulation system integrity.

17.11 Manufacturer shall have in place a system of recording, correcting, and verifying resolution of discrepancies discovered during the inspection and testing process. The manufacturer shall be ISO 9001 certified.
17.12 Certified production test reports indicating satisfactory completion of all inspection and test procedures shall be available upon request.

17.13 Upon request the equipment shall be made available for customer inspection prior to shipment.

17.14 Production tests shall be performed in accordance with the IEEE C37.20.2 and ANSI C37.09 standards.

17.15 The arc resistant design testing shall be performed per the IEEE C37.20.7 using the maximum short circuit current available for the system or device rating as the perspective current available at the incoming bus terminals of the test sample.

17.16 Test reports for design tests shall be available upon request and the University electrical engineer shall be the University approver of such reports.

Power Control Room: Electrical
18.0 Power Control Room: Electrical
18.1 The power control room shall have a dedicated electrical panel (120V/208V) and a UPS upstream in order to facilitate all 120V outlets and lighting in the power control room for up to 1 hour. Reference Drawing E1 for a layout and the University minimum requirements.

18.2 The UPS shall have Ethernet capability in order for University staff to monitor its state.

Finish of Structural Base Assembly (Power Control Room)
19.0 Finish of Structural Base Assembly (Power Control Room)
19.1 Base assembly shall be grit blasted prior to finishing.

19.2 Grit blast process shall comply with Commercial Blast Standard SSPC-6 as published by AISC.

19.3 Solvent cleaning is unacceptable.

19.4 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.

19.5 All structural elements including channels and angles shall be caulked to seal gaps and spaces.

19.6 An additional 4 mil undercoat shall be applied to the bottom of the base assembly.

19.7 The sides of the base assembly shall be finished using polyurethane paint to a minimum thickness of 2 mils.

Documentation
20.0 Documentation
20.1 Drawings

20.1.1 Prior to fabrication the following drawings shall be submitted by the manufacturer for approval.

20.1.1.1 Views from all elevations.
20.1.2 Internal equipment layout plan.
20.1.3 Base plan with mounting details, cable entry area and door swings.
20.1.4 Cross section view of each different section.
20.1.5 Three line diagram.
20.1.6 Component bill of material indicating quantity, description, and part number.
20.1.7 Control or schematic diagram for each different unit.
20.1.8 A drawing showing the total weight of the switchgear and power control room along with structure members of the control room.

20.1.2 Following the return of approval drawings the manufacturer shall prepare and submit wiring diagrams indicating physical location of secondary control components and the appropriate wiring connections. Each control wire shall be labeled. Copies of these drawings shall be submitted to the customer, upon completion, for record.

20.1.3 After the return of approval drawings or after any change made to previously approved drawings, the manufacturer shall submit a record copy of any and all drawings that contained revisions.

20.1.4 After completion of the inspection and testing procedures the manufacturer shall submit a complete set of "as built” drawings. These drawings shall function as a record of the final construction of the equipment at the time it left the factory.

20.1.5 Drawings may be provided in any of the following forms as requested by the customer:

20.1.5.1 Full size plotted reproducible drawings size as required. "D size" measuring approximately 22” x 34”, "C size" measuring approximately 17” x 22”, "B size" measuring approximately 11” x 17”, or "A size" measuring approximately 8½” X 11”.

20.1.5.2 Three (3) reduced photocopies of original plotted drawings.

20.1.5.3 Digital files in Autodesk AutoCAD 2015 version.

20.1.5.4 Digital file format shall be .dwg format.

20.1.6 Each drawing prepared by the manufacturer shall show, at a minimum, the name of the project, jobsite location, purchase order or contract number, and equipment identification number in addition to the University’s work order number.

20.2 Operating and Maintenance Manuals

20.2.1 At time of shipment the manufacturer shall provide a copy of the operating and maintenance instructions for all major components contained in the switchgear assembly.

20.2.2 On-site training for a minimum of 8 hrs. shall be provided to University staff.
20.2.2.1 The training shall include operation of breakers, removal of switchgear doors, removal of power control room panels, air conditioner operation, UPS, and all metering with the power control room.

20.2.2.2 An additional day of on-site training shall be available, at no charge to the University, within a two year window from the date of acceptance. The University shall establish the date.

20.2.3 Manual shall contain a table of contents to allow for easy reference. Reference this specification as a sample. Provide 3 hard copies of all manuals.

20.2.4 Operating and maintenance manuals shall be provided as .pdf files on a CD for easy reference.

20.3 Spare Parts List

20.3.1 Upon completion of the engineering design phase, a quotation for one (1) year's recommended spare parts shall be submitted. Revisions to this list, as requested by the University, shall be free of charge.

Country of Origin
21.0 Country of Origin

21.1 As part of the bid package, the manufacturer shall provide a list with the country of origin of all equipment made outside of the United States and if any University witness testing will be outside of the United States.

Schedule
22.0 Schedule

22.1 As part of the bid package, the manufacturer shall provide a schedule for the Design Phase.

22.2 As part of the bid package, the manufacturer shall provide a schedule for the Manufacturing Phase.

22.3 As part of the bid package, the manufacturer shall provide a schedule for the Delivery and Installation Phase.

Litigation
23.0 Litigation

23.1 As part of the bid package, the manufacturer shall provide litigation and legal proceedings information on the firm's letterhead under each heading: (1) Litigation History, (2) Agreements, (3) Terminations and Incomplete Projects and (4) Suspension or Debarment. At the end of the document include the sentence “Signed Under the Pains and Penalty of Perjury” (28 U.S. Code § 1746). Please submit 3 copies in a separate sealed envelope entitled “Litigation/Legal Proceedings History”.

References
24.0 References
24.1 As part of the bid package, the manufacturer shall provide a list of at least five projects similar in scope as described in Sections 1.0 and 2.0. The list shall include project name, scope, location, client name and contact information.

Pre-Bid Meeting
25.0 Pre-Bid Meeting

25.1 A mandatory pre-bid meeting shall be held at the project site on the date specified in the Request for Quotation Letter. Bidders may discuss any questions pertaining to the scope of the services covered in this Agreement at the pre-bid meeting. It shall be mandatory for the Bidder to attend the entire pre-bid meeting for a bid to be considered. There shall be no exceptions.

Uniform General Conditions for University of Texas Systems Building Construction Contracts
26.0 Uniform General Conditions for University of Texas Systems Building Construction Contracts

26.1 The contractor shall follow the UT Systems Building Construction Contracts’ General Conditions (latest revision) [https://www.utsystem.edu/ogc/docs/constlaw/UGC-SGC.pdf](https://www.utsystem.edu/ogc/docs/constlaw/UGC-SGC.pdf)

Attachments
27.0 Attachments

27.1 Drawing E1 (Project 00347188) being a 24’X36” drawing attached herein.