

USask Master Specification Directions: The master specifications are intended to be incorporated into the Consultant's final, project specific specification package. The project specific specifications are expected to include any and all sections or portions of sections (Part 1, Part 2, Part 3) that are required to create a fully executable project specification. USask Master Specs only provide information that USask **requires** be a part of the final specification package. Components or sections not included in the Master USask Specifications may still be required for a complete, well-designed project. **It is the consultant's responsibility to ensure all specifications match USask requirements. Any deviations or revisions to any section included in the master specifications requires written consent from the USask Engineering department. The consultant is liable for any omissions, errors, or incorrect equipment or components supplied to site.**

The Master Specifications shall be used in conjunction with USask's Design Guidelines. Any conflicts shall be brought to the attention of USask Engineering staff for clarification.

Part 1 General

Part 2 Products

.1 Busing and Cable Compartments

- .1 The complete Main Breaker Service Entrance Switchgear assembly, including all bus connections to and from the Main Breaker, shall meet the requirement for 65 kA fault current withstand and interrupting capability or as required by the power system study. The 65 KA fault withstand rating for the electrical bus shall be met by proper bus bracing and support. The fault current interruption and fault current withstand ratings shall not be met by the use of current limiting fuses or by the series rating of protective devices.
- .2 The switchgear assemblies shall be certified, and properly tagged as meeting the certification, for the intended use and for current loading and fault current interrupting/withstand requirements, by the Canadian Standards Association (CSA).
- .3 Front and rear access panels shall include bolt fastening and locking provisions.
- .4 Bus sections to be insulated tin plated copper, rated to meet the existing current and voltage requirements and include 4 grade 5 stainless steel bolts, washers and lock washers per connection point.
- .5 All permits, costs and actions associated with any testing and inspections required to achieve any and all required certifications are the responsibility of the Contractor.

.2 Breaker Compartments

- .1 The Main Service Entrance Switchgear shall be free standing and shall be mounted on the concrete housekeeping pad as defined on the drawings.
- .2 The Main Breaker compartment shall include:
 - .1 Shutters over the switchgear stabs providing insulation protection when breakers are in the disconnected and withdrawn positions. The shutter assemblies shall be pad-lockable in the closed position.
 - .2 Open door interlocks to prevent the opening/removal of the cell door when the breaker is in the connected or test positions.
 - .3 Racking interlocks to prevent the racking in of the breaker when the door is open or removed.
 - .4 Cradle rejection provisions to mechanically prevent the installation of

improperly matched breaker/cell combinations.

- .5 Cell pad-locking capabilities for breaker disconnected and withdrawn positions.
- .6 Door escutcheons and sealing.
- .7 Bolted and hinged door assemblies.
- .8 A hinged and lockable clear plastic protective cover over the front of the main breaker to provide sprinkler proof protection.

.3 Sprinkler Proof Rating

- .1 All electrical equipment shall be a minimum of Eemac 2 sprinkler proof rated and constructed so that exposure to water from sprinkler heads will not impair the effectiveness of the equipment.
- .2 A separate and complete non-combustible cover or roof shall be provided on all equipment. An overhang at the front, rear and sides shall effectively prevent the entrance of water either at the top or through projecting face plates, meters, etc.
- .3 Ventilation louvers shall be of the outdoor type and meeting the proper ingress protection standard such that falling water, water from the fire sprinklers or water running down the sides of the enclosure will not enter the enclosure. Where openings in the top are required for outgoing conduits, etc. a removable gasketed plate shall be provided and conduits or cables shall be installed using weatherproof fittings.
- .4 All conduit and cable entrances into the top of the sprinkler proof switchgear shall include weatherproof connectors and gasketing.
- .5 Surface mounted panel boards and equipment shall be complete with drip hoods (and shall have gasketed covers and doors. Flush mounted panel boards shall have gaskets between the trim and the wall and shall have gasketed doors.
- .6 All sprinkler proofing shall comply with the latest Code requirements and with the requirements of the local inspection authorities.

.4 Cabling

- .1 The low voltage cabling required for the metering shall be minimum 90 degrees C and shall meet Canadian Electrical Code requirements.

.5 Metering and Instrumentation

- .1 Customer metering for the Main Service Entrance Switchgear shall be provided which includes accurate energy, power measurement and power quality capabilities.
- .2 The metering shall provide the following metering values and functions:
 - .1 Current – all three phases and neutral
 - .2 Current Demand – maximum per phase and neutral
 - .3 Voltage – per phase, line to line and line to neutral
 - .4 Power – per phase, 3 phase total (kW, kVA, kVAr)
 - .5 Power Factor – 3 phase total
 - .6 Power Demands (kVAd, kWd, kVAr) – present and peak
 - .7 Real Energy (kWh)
 - .8 Energy In and Out (kVAh, kWh, kVArh)
 - .9 Minimum/maximum values (I, V, F, PF, THD)
 - .10 THD – per phase, voltage and current, up to 63rd harmonic
 - .11 Data and event logging

- .12 Trending and forecasting
 - .13 Disturbance and sag/swell detection
 - .14 Configurable waveform capture
 - .15 On board memory for advanced alarm and logging functions
 - .16 Self powered from voltage supply
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- .3 The metering shall incorporate a remote easy to read backlit display.
 - .4 Current transformers (1200:5A) shall be provided and installed on the main bus on the load side of the Utility metering apparatus.
 - .5 The metering hardware, fusing and surface mounted display unit shall be located in the panel area above the Main Breaker.
 - .6 The metering shall be Square D Power Logic Ion 9000 Series, complete with remote panel mounted display, revenue non sealed (for USask facility) or sealed (for external partners) advanced power quality meter.

.6 DC Power Supply

- .1 An auxiliary power supply, powered from the load side of the Utility metering location, shall be supplied and connected to the Main Breaker. The low voltage power supply shall provide complete visibility and operability of the monitoring and communication functions even when systems loads are nil.

Part 3 Execution

.1 Inspection

- .1 Examine the switchgear and site conditions to ensure that there is room to move the switchgear in to place and that there is adequate work space, safe work zones, equipment tolerances and mounting capabilities.
- .2 Start work only after unsatisfactory conditions are corrected.

.2 Installation

- .1 Install all electrical apparatus in accordance with manufacturer's written specifications and guidelines, the Canadian Electrical Code, local and Provincial codes and the Canadian Standards Association requirements.
- .2 All electrical apparatus is to be placed square with building and concrete support pad lines.
- .3 Housekeeping pad to be cast in place concrete and sized as per drawings. Cast in place concrete work to be in accordance with CAN/CSA-A23.1 and CSAA3001 and include floor anchoring, rebar strengthening (10 mm rebar around perimeter and at 300 mm spacing), minimum 25 MPa concrete and 10 mm top edge chamfer.

.3 Field Quality Control

- .1 Ensure work area is kept clean of debris and equipment
- .2 Document all testing and submit to consultant for approval

.4 Arc Flash Labeling

- .1 Provide label as indicated on drawings.

END OF SECTION