

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 General

- .1 The complete Main Service Entrance Switchgear assembly, including the Main Breaker, busing, connections and components shall meet the requirement for 65 kA fault current withstand and interrupting capability, or capacity as required by power system study.
- .2 The 65 kA rating of the individual breaker in the Main Service Entrance Switchgear shall be met by breaker ratings and is not to be accomplished by the use of current limiting fuses, current limiting reactors or the use of series rating of components.
- .3 The continuous current rating of the individual bus connections to the breaker assembly shall meet, or exceed, the frame rating of the individual breaker as shown on the Drawings.
- .4 The switchgear assembly 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).
- .5 All permits, costs, testing and actions associated with any non-factory testing and inspections required to achieve any and all required certifications and approvals are the responsibility of the Contractor.
- .6 The required protective device settings for the Main breaker will be provided by the Arc Flash Study and shall be reviewed by the Consultant.

.2 Sprinkler Proof Rating

- .1 Sprinkler proof rating shall be as defined under Section 26 24 13 Low Voltage Switchgear and Section 26 03 09 General Electrical Provisions.

.3 Power Circuit Breakers

- .1 The circuit breakers shall be designed/listed to ANSI C37 and UL 1066 certifications and approved for use in Canada.

- .2 The breakers shall be draw-out, manual operation units with 4 distinct positions: connected, test, disconnected, and withdrawn.
- .3 The breakers shall be 100% current rated and rated as shown on the Drawings.
- .4 The circuit breakers shall meet the required 65 kA instantaneous fault withstand and interrupting rating, or as required by power system study.
- .5 The breakers shall also have the following features and capabilities:
 - .1 Two step stored energy mechanisms that can provide an open/close/open operation without a recharge.
 - .2 Dual insulated barriers between the main contacts and the secondary contacts.
 - .3 Segregated accessory and main contact compartments.
 - .4 Positive indication of actual contact status.
 - .5 Anti-pumping protection such that an open request always takes precedence over a close request.
 - .6 Push to reset requirements after a fault condition.
 - .7 Mechanical operation counter.
 - .8 Main contacts temperature sensing and wear indication.
 - .9 Manual front charging handle.
 - .10 Close/open capabilities from front push buttons or via remote.
 - .11 A positive ground contact check between the circuit breaker and cell when the accessory cover is removed while the circuit breaker is in the connected, test or disconnected position. Provisions for pad locking in all installed and removed conditions.
 - .12 Front mounted lockable push buttons, with lockable clear covers, to open and close the circuit breaker, complete with indicators to show the position of the circuit breaker contacts, status of the closing springs, and circuit breaker position.
 - .13 An indicator that shows "charged—not OK to close" if closing springs are charged but circuit breaker is not ready to close.
 - .14 Provision for padlocking in the breaker open position.
 - .15 Bottom or top feed power supply connection capabilities.
 - .16 All secondary connections made directly to the front of the circuit breaker cradle. The secondary circuits connected to the breaker in the connected, test and disconnected positions.
 - .17 Padlocking provisions to receive up to three padlocks when the circuit breaker is in the disconnected position, positively preventing unauthorized racking in and closing of the circuit breaker contacts.
 - .18 Equipped with an interlock to discharge the stored energy spring when the circuit breaker is withdrawn from its cell.
 - .19 Front manual racking handle and handle storage and remote racking option.
 - .20 Certified to perform a minimum of 10,000 operations without maintenance.
 - .21 Field interchangeable electrical accessories including shunt trip, spring release, electrical operator, auxiliary contacts, and trip unit.
 - .22 A shunt trip wired to terminal blocks in the metering compartment for future use by the Owner.
 - .23 Breaker lifting tabs.

.4 Metering, Protection and Communication

- .1 The breaker shall incorporate relaying components that provide the following relaying, metering and communications functions and capabilities:
 - .1 Field installable, upgradeable and configurable trip units, sensor plugs and accessories.
 - .2 True RMS sensing
 - .3 Overcurrent (LSIG), current imbalance, voltage imbalance, time delayed under voltage, over voltage, maximum power, reverse power, minimum frequency, maximum frequency and phase sequence protection.
 - .4 Memory retention (thermal imaging) protection for repetitive faults
 - .5 Fine adjustment (locally and remote) of pickup and delay settings.
 - .6 LED long time pickup indication
 - .7 Adjustable long-time pickup and delay, short-time pickup and delay, instantaneous, and ground-fault pickup and delay protection functions.
 - .8 Nine long-time pickup settings from 0.4 to 1 times the sensor plug (I_n) and inverse definite minimum time lag with optional additional rating plugs. Long- time delay settings in nine bands from 0.5–24 seconds at six times I_r .
 - .9 Nine short-time pickup settings from 1.5 to 10 times I_r . Short-time delay settings in nine bands from 0.1 – 0.4 I^2t On and 0 – 0.4 I^2t Off.
 - .10 Instantaneous settings from Off and including 2 to 15 times I_n .
 - .11 Field changeable ground fault protection for residual ground fault, source ground return and modified differential options. Settings (for circuit breaker sensor sizes 1200 A or below) in nine bands from 0.2 to 1.0 times I_n . Ground fault settings (for circuit breakers above 1200 A) in nine bands from 500 to 1200 A.
 - .12 Neutral overcurrent protection
 - .13 Maintenance mode switch and indication for the selection of faster trip settings to reduce arc flash hazard ratings when maintenance staff are working on the downstream switchgear.
 - .14 Local trip indications.
 - .15 Ground fault push to trip.
 - .16 LCD display that includes metering, bar graphs, trip settings, maximum readings monitoring and historical values.
 - .17 Real time metering that includes current, voltage, power, and frequency.
 - .18 Time stamped (sliding or fixed window) power demand (real/apparent/reactive).
 - .19 Time stamped trip and alarm histories.
 - .20 Harmonic analysis and waveform capture (4 currents and 3 voltages) indicating harmonic components, total harmonic distortion, analysis of power quality, and systematic time stamping.
 - .21 Programmable output contacts.
 - .22 Event logging including breaker trips, system faults, beginning/end of alarms, settings modifications, maintenance records, test kit connections, contact wear, counter resets and loss of time.

.5 Breaker Compartment

- .1 The breaker compartments 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.

.6 Auxiliaries

- .1 A remote racking device, that permits the remote racking in and out of the breaker from the connected to disconnected positions, is required for this project.
- .2 A portable floor supported breaker lifting unit, that permits the safe and efficient removal and installation of the breaker from the breaker cell, is required for this project.

.7 Manufacturers

- .1 The design, supply, manufacturing, installation and testing of the breakers and associated components shall be by Schneider Electric or an approved alternate.
- .2 The main breaker shall be Schneider Electric Masterpact NW Model L1 universal power circuit breaker or an approved alternate.
- .3 The main breaker trip unit shall be Micrologic type 6.0H, or an approved alternate.

Part 3 Execution

.1 Inspection

- .1 Examine the switchgear to determine adequate safe work space, equipment tolerances and mounting details. Start work only after unsatisfactory conditions are corrected.

.2 Installation

- .1 Provide all necessary test equipment, portable site power and lighting to complete the site work.
- .2 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.

- .3 Installation of breaker settings and breaker testing and commissioning to be completed by the manufacturer's service representatives. Settings provided by the Consultant

.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.
- .3 The modified electrical apparatus shall not be energized until all work is done and all testing is completed and only when test results indicate system is safe for energization.
- .4 Instruct Owner's electrical personnel in the safe operation and handling of the breakers.

END OF SECTION