METROLINX

Circuit Breakers and Fuses Specification

Specification 26 28 00

Revision 01
Date: March 2023

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Publication Date: August 2018
Revision Date: March 2023
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Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes
Cover Page	March 2023	Removed 'Capital Projects Group' to reflect organizational changes
1.2.3, 1.3.7	March 2023	Updated numbering on Electrical Identification and Nomenclature Specification
2.1	March 2023	Updated general requirements and mould case circuit breaker requirements.

LIST OF CONTENT

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. Labour, products, equipment and services necessary for Moulded Case Circuit Breakers (MCCBs, Low Voltage), Air Circuit Breakers (ACBs, Low Voltage), Miniature Circuit Breakers (MCBs, Low Voltage), Medium Voltage Circuit Breakers (MVCBs), Medium Voltage Fuse Cut-outs, and Medium Voltage Load Break Switches (MVLBSs) work in accordance with the Contract Documents.

1.2. DESIGN REQUIREMENTS

1.2.1. The equipment furnished and the equipment installation, wiring methods and materials used shall conform to the latest edition of the Ontario Electrical Safety Code, Electrical Safety Authority (ESA) Bulletins and Supplements issued by the Electrical Safety Authority, and the applicable Metrolinx Standards. In case of any conflicts, the more stringent requirement shall apply.

1.2.2. Design Electrical equipment and systems to all applicable standards of CSA, ULC, IEEE, ESA.

1.2.3. Design electrical equipment and systems tothe latest version of GO DRM.

1.2.4. Design electrical equipment and systems to standards and codes to be latest editions adopted by and enforced by local authorities having jurisdiction (AHJ).

1.2.5. Devices selected in accordance with this Specification shall be in accordance with the voltage, frequency, phase, ampacity, interrupting capacity, options, and protection requirements shown on the Contract Documents.

1.2.6. Devices selected in accordance with this Specification shall be designed for use in switchboards, panelboards, and enclosures.

1.3. RELATED WORKS

1.3.1. Section 26 05 00 – Electrical General Requirements.

1.3.2. Section 26 23 00 – Low Voltage Switchgear.

1.3.3. Section 26 13 26 – Metal Clad Switchgear.

1.3.4. Section 26 24 19 – Motor Control Centres.

1.3.5. Section 26 28 23 – Disconnect Switches.

1.3.6. Section 26 29 10 - Motor Starters and Contactors.

1.3.7. Section 26 05 23 – Electrical Identification and Nomenclature

1.3.8. Section 25 05 10 – Building Automation System.

1.4. REFERENCE STANDARDS

1.4.1. Ontario Electrical Safety Code (OESC).

1.4.2. Ontario Building Code (OBC).

1.4.3. Metrolinx Standards, Drawings and Specifications.

1.4.4. GO Design Requirement Manual (DRM).

1.4.5. Metrolinx Electrical Safety Document.

1.4.6. CSA Z462, Workplace Electrical Safety.

1.4.7. CAN3 C235, Preferred Voltage Levels for AC Systems, 0 to 50,000V.

1.4.8. CAN3-Z299.4, Quality Assurance Program - Category 4.

1.4.9. ANSI, American National Standards Institute.

1.4.10. NEMA, National Electrical Manufacturer's Association.

1.4.11. EEMAC, Electrical Equipment Manufacturer's Association of Canada.

1.4.12. CSA Z460 Canadian Standard on Lockout/Tagout.

1.4.13. CSA Z463 Standard - Electrical Systems Maintenance.

1.4.14. CSA C22.2 No. 29 – Panelboards and Enclosed Panelboards, latest edition.

1.4.15. CSA C22.2 No. 5 – Molded-case circuit breakers, molded-case switches and circuit-breaker enclosures, latest edition.

1.4.16. CSA Z463 Standard - Electrical Systems Maintenance.

1.4.17. NEMA PB 1 Panelboards.

1.4.18. NEMA 250 Enclosures for Electrical Equipment (1,000V Maximum).

1.4.19. UL 50 Enclosures for Electrical Equipment.

1.4.20. UL 50 Enclosures for Electrical Equipment.

1.4.21. UL 489 Molded Case Circuit Breakers and Circuit Breaker Enclosures.

1.4.22. ANSI/IEEE C37.20.1 – Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear.

1.4.23. ANSI/IEEE C37.20.7 – Guide for Testing Metal-Enclosed Switchgear Rated up to 38kV for Internal Arcing Faults.

1.4.24. ANSI/IEEE C37.50 – Test Procedure for Low Voltage AC Power Circuit Breakers Used in Enclosures.

1.4.25. ANSI/IEEE C37.51 – Conformance Testing of Metal-Enclosed Low Voltage AC Power Circuit Breaker Switchgear Assemblies.

1.4.26. ANSI/IEEE C37.13 – Low Voltage AC Power Circuit Breakers Used in Enclosures.

1.4.27. ANSI C37.16 – Preferred Ratings, Related Requirements and Application for Low Voltage Power Circuit Breakers and AC Power Circuit Protectors.

1.4.28. ANSI/IEEE C37.17 - Trip Devices for AC and General-Purpose DC Low Voltage Power Circuit Breaker.

1.4.29. UL 1558 – Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear.

1.4.30. UL 1066 – Low Voltage AC and DC Power Circuit Breakers Used in Enclosures.

1.4.31. NEMA SG5 – Power Switchgear Assemblies.

1.4.32. NEMA SG3 – Low Voltage Power Circuit Breakers.

1.4.33. CAN/CSA C22.2 No. 0.22-11- Evaluation Methods for Arc Resistance Ratings of Enclosed Electrical Equipment.

1.4.34. ANSI C37.42, Switchgear - Distribution Cut-outs and Fuse Links - Specifications.

1.4.35. ANSI C37.46, Specifications for High Voltage Expulsion and Current-Limiting Type Power Class Fuses and Fuse Disconnecting Switches.

1.4.36. EEMAC G1 1, Indoor and Outdoor Switch and Bus Insulators.

1.4.37. NEMA SG2, High Voltage Fuses.

1.4.38. NEMA FU 1, Low Voltage Cartridge Fuses.

1.5. SPARE PARTS

1.5.1. Not applicable.

1.6. TRAINING

1.6.1. Not applicable.

1.7. WARRANTY

1.7.1. The contractor shall provide a manufacturer warranty for the work of this section with a minimum warranty period of five years after acceptance by Metrolinx.

1.8. DELIVERY, STORAGE AND HANDLING

1.8.1. Contractor to protect equipment from damage, weather, and moisture in accordance with Manufacturer's instructions. Contractor shall notify Metrolinx immediately upon the discovery of damaged equipment.

1.9. SUBMITTALS

1.9.1. Product Data Package

a) Submit manufacturer's Product data indicating:

1) Technical data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items, and parts lists;

2) Performance criteria, compliance with appropriate reference standards, characteristics, limitations, and troubleshooting protocol; and

3) Trip unit set-up and operational features.

1.9.2. Commissioning Package

a) Submit the following:

1) Commissioning Procedures;

2) Certificate of Readiness;

3) Attach Source Quality Control inspection and test results to the Certificate of Readiness;

4) Submit the following for each Product for incorporation into the Operation and Maintenance Manuals:

i) Functional description detailing operation and control of components;

ii) Performance criteria and maintenance data;

iii) Safety precautions;

iv) Operating instructions and precautions;

v) Component parts availability, including names and addresses of spare part suppliers; and

vi) Maintenance and troubleshooting guidelines/protocol.

1.10. QUALITY ASSURANCE

1.10.1. Regulatory requirements: All electrical items shall be approved by CSA and/or ULC.

2. PRODUCTS

2.1. GENERAL

2.1.1. The following general requirements apply to all circuit breakers covered by this Specification:

a) Circuit breakers shall be single throw;

b) Circuit breakers shall be "Trip-Free";

c) It shall be possible to open and close all breakers manually;

d) A trip on any one pole shall trip all poles;

e) Multi-pole applications shall be common-trip breakers with single handle;

f) The maximum interrupting time is 5 cycles;

g) Circuit breakers shall be 100% continuous duty unless otherwise indicated on the Contract Documents;

h) Circuit breakers shall be provided with a direct mechanical means for indicating its closed, open and/or tripped positions at the place of operation. Lamp indication in place of a mechanical indicator will not be accepted;

i) Service Entrance Circuit Breakers for main panelboards shall include a solid state, electronic trip unit which is capable of being coordinated with the other protective devices in the system to allow operation of protective devices closest to the fault location. The trip unit shall include communications capability as indicated on the Contract Documents;

j) Circuit Breakers shall have a minimum symmetrical rms interrupting capacity rating, as shown in the Short Circuit Protection and Coordination Studies or Contract Documents; and

k) Circuit breakers shall include all necessary interlocks to prevent inadvertent operations and to ensure safety of operating personnel and the equipment.

2.1.2. Circuit breaker Manufacturer shall furnish necessary bus connections, wire jumpers, bolts, nuts, washers, etc., suitably packaged and marked to facilitate assembly. Identify each shipping container with name of contents, contract number, and equipment number permanently marked and readily visible.

2.1.3. Circuit breaker mounting methods include: enclosed in standalone enclosures, wall mounted, or mounted inside panelboards/switchboards/switchgears/load-centers. Refer to Contract Documents for requirements.

2.2. MINIATURE CIRCUIT BREAKERS (MCB'S) (LOW VOLTAGE)

2.2.1. All MCB'S used shall be selected from the same commonly available product range; this shall account for MCB variants such as Arc Fault Circuit Interrupters (AFCIs) and Ground Fault Circuit Interrupters (GFCIs).

2.2.2. MCBs shall be quick make, quick break type, for manual and automatic operation with temperature compensation for 40 °C ambient.

2.2.3. Requirements for optional features where required on the Contract Documents:

a) Shunt trip shall directly trip the MCB;

b) MCB auxiliary switches shall be provided, dry contacts as shown on the Contract Documents;

c) The MCB shall be pad-lockable in the open position; and

d) MCB shall equipped with 30 mA ground fault module.

2.3. MOULDED CASE CIRCUIT BREAKERS (MCCBS) (LOW VOLTAGE)

2.3.1. MCCBs shall be in accordance with CSA C22.2 No. 5.

2.3.2. MCCBs shall be quick make, quick break type, for manual and automatic operation with temperature compensation for 40 °C ambient.

2.3.3. MCCBs shall be "stored energy operation" type.

2.3.4. MCCBs shall have the capability of being pad-locked in the open position.

2.3.5. MCCBs shall be either bolt on or draw-out type. MCCBs over 400 A must be of the draw out type and the panel/board bus must have a minimum 1000 A rating.

2.3.6. Draw-out requirements

a) Draw-out MCCBS shall include the following positions:

1) Service (Fully engaged);

2) Test; and

3) Withdrawn

b) An automatic, mechanical busbar shutter shall be provided to prevent access to the live busbars, this shutter shall be padlockable in the withdrawn position.

c) Draw-out MCCBs shall include interlocks to prevent circuit breaker withdrawal when in closed position and to prevent closing unless fully engaged or in test position.

d) An additional interlock shall automatically discharge the stored-energy operating mechanism springs upon removal of the MCCB out of the compartment.

e) Draw-out air circuit breakers (ACBs) shall include indication for the various positions.

f) Draw-out MCCBs shall be used in UL 67 Listed power panelboards and UL 891 Listed switchboards.

g) Secondary control circuits shall be connected automatically with a self-aligning, self-engaging plug and receptacle arrangement when the MCCB is racked into the Service position. Provision shall be made for secondary control plug to be manually connected in Test position.

h) The racking mechanism shall be operable with the breaker compartment front door closed and position indication shall be visible with door closed.

2.3.7. Protection requirements

a) MCCBs shall have both thermal and magnetic instantaneous trip functions as a minimum standard.

b) MCCBs with frame sizes 200 A and larger shall include adjustable LSIG (Long Short Instantaneous Ground) protection functions as follows:

1) Long-time pickup current;

2) Long-time delay;

3) Short time pickup;

4) Short time delay;

5) Instantaneous trip current;

6) Ground fault current;

7) Range of settings adjustment shall be as indicated on the Contract Documents; and

8) Provide capability to set and read settings.

c) MCCBs with frame sizes 200 A and larger shall have interchangeable trips.

d) Where required on the Contract Documents, a solid state, electronic trip unit with associated current monitors and self-powered shunt trip shall be provided as follows:

1) This unit shall provide multi-function protection including: Inverse definite minimum time (IDMT), long-time, short-time, instantaneous, and ground-fault;

2) All time and current setting values shall be adjustable with range of adjustment as indicated on the Contract Documents;

3) The trip unit shall include communications capability as indicated on the Contract Documents;

4) The trip unit shall include a display indicating the following: Trip indication, trip reason, trip current, and phase current; and

5) The trip unit shall include a minimum of two settings groups.

2.3.8. Current Limiters

a) Current Limiters shall be used where indicated on the Contract Documents. The limiters shall be designed for application with MCCBs.

b) Coordinate limiter size with trip rating of circuit breaker to prevent nuisance tripping and to achieve interrupting current rating specified for circuit breaker.

c) Provide interlocks to trip circuit breaker and to prevent closing circuit breaker when limiter compartment cover is removed or when one or more limiter is not in place or has operated.

d) The limiter shall include automatically resetting current limiting elements in each pole.

e) The limiter let through current and energy shall be as indicated on the Contract Documents or where not indicated it shall be less than permitted for same size Class RK 5 fuse.

f) Current limiters with current limiting fuses shall not be used.

2.3.9. Accessories where required on the Contract Documents

a) Shunt Trip Device: 120 volts, AC.

b) Under Voltage Trip Device: 120 volts, AC.

c) Auxiliary Switch: 120 volts, AC. 1 normally open dry contact and 1 normally open dry contact.

d) Alarm Switch: 120 volts, AC. This shall indicate and alarm/trip condition.

e) Electrical Operator: 120 volts, AC. A mechanical spring charged/discharged indicator shall be included.

f) On/off indicator.

g) Local close via mechanical pushbutton.

h) Local open/trip via mechanical pushbutton.

i) Remote close via an external 2 pole dry contact.

j) Handle Lock: Include provisions for sealing and padlocking. A suitable mechanical interlock is required to ensure that the front access door of the breaker compartment may only be opened when the circuit breaker is in the "OFF" position. The operating handle must project through the front door of the compartment so that the breaker may be operated, and its status (i.e.: open, closed or tripped) determined, without having to open the door.

k) Operation counter to be a mechanical and direct mounted to the breaker.

l) Provide products suitable for use as service entrance equipment where so applied.

m) Electronic trip units shall include provision to interface to Building Automation System (BAS).

n) Circuit breaker lifting yoke.

o) Portable test set for testing all functions of circuit breaker without removal from enclosure.

p) Circuit breaker removal apparatus. This can be either an overhead-circuit-breaker lifting device, track mounted at top front of switchgear, complete with hoist and lifting yokes; or a portable, floor-supported, roller-base, elevating carriage arranged for moving circuit breakers in and out of compartments.

2.4. AIR CIRCUIT BREAKERS (ACBS) (LOW VOLTAGE)

2.4.1. ACBs shall be in accordance with CSA C22.2 No. 5 and IEEE C37.13.

2.4.2. ACBs shall be quick make, quick break type, for manual and automatic operation with temperature compensation for 40 °C ambient.

2.4.3. ACBs shall be "stored energy operation" type.

2.4.4. ACBs shall have the capability of being pad-locked in the open position.

2.4.5. ACBs shall be either bolt on or draw-out type. ACBs over 400 A must be of the draw out type and the panel/board bus must have a minimum 1000 A rating.

2.4.6. Draw-out requirements

a) Drawout ACBS shall include the following positions:

1) Service (Fully engaged);

2) Test; and

3) Withdrawn.

b) An automatic, mechanical busbar shutter shall be provided to prevent access to the live busbars, this shutter shall be padlockable in the withdrawn position.

c) Drawout ACBs shall include interlocks to prevent circuit breaker withdrawal when in closed position and to prevent closing unless fully engaged or in test position.

d) An additional interlock shall automatically discharge the stored-energy operating mechanism springs upon removal of the ACB out of the compartment.

e) Drawout ACBs shall include indication for the various positions.

f) Drawout ACBs shall be used in UL 67 Listed power panelboards and UL 891 Listed switchboards.

g) Secondary control circuits shall be connected automatically with a self-aligning, self-engaging plug and receptacle arrangement when the ACB is racked into the Service position. Provision shall be made for secondary control plug to be manually connected in Test position.

h) The racking mechanism shall be operable with the breaker compartment front door closed and position indication shall be visible with door closed.

2.4.7. Protection requirements

a) ACBs shall have a solid state, electronic trip unit with associated current monitors and self powered shunt trip shall be provided as follows:

1) This unit shall provide multi-function protection including: Inverse definite minimum time (IDMT), long-time, short-time, instantaneous, and ground-fault;

2) All time and current setting values shall be adjustable with range of adjustment as indicated on the Contract Documents;

3) The trip unit shall include communications capability as indicated in the on the Contract Documents; and

4) The trip unit shall include a display indicating the following: Trip indication, trip reason, trip current, and phase current.

2.4.8. Accessories where required on the Contract Documents

a) Shunt Trip Device: 120 volts, AC.

b) Under Voltage Trip Device: 120 volts, AC.

c) Auxiliary Switch: 120 volts, AC. 2 normally open dry contact and 2 normally open dry contacts.

d) Alarm Switch: 120 volts, AC. This shall indicate and alarm/trip condition.

e) Electrical Operator: 120 volts, AC. A mechanical spring charged/discharged indicator shall be included.

f) On/Off indicator.

g) Local close via mechanical pushbutton.

h) Local open/trip via mechanical pushbutton.

i) Remote close via an external 2 pole dry contact.

j) Remote open via an external 2 pole dry contact.

k) Handle Lock: Include provisions for sealing and padlocking. A suitable mechanical interlock is required to ensure that the front access door of the breaker compartment may only be opened when the circuit breaker is in the "OFF" position. The operating handle must project through the front door of the compartment so that the breaker may be operated, and its status (i.e.: open, closed or tripped) determined, without having to open the door.

l) Operation counter to be mechanical and direct mounted to the breaker.

m) Provide products suitable for use as service entrance equipment where so applied.

n) Electronic trip units shall include provision to interface to Building Automation System (BAS) for monitoring of status, open /closed, metering of amperage, voltage, wattage, PF, VAR local and remotely on BAS.

o) Circuit breaker lifting yoke.

p) Portable test set for testing all functions of circuit breaker without removal from enclosure.

q) Circuit breaker removal apparatus. This can be either an overhead-circuit-breaker lifting device, track mounted at top front of switchgear, complete with hoist and lifting yokes; or a portable, floor-supported, roller-base, elevating carriage arranged for moving circuit breakers in and out of compartments.

2.5. MEDIUM VOLTAGE CIRCUIT BREAKERS (MVCBS)

2.5.1. MVCBs shall utilize vacuum or SF6 interrupters. MVCBs shall include one vacuum interrupter per phase.

2.5.2. MVCBs shall be quick make, quick break type, for manual and automatic operation with temperature compensation for 40 °C ambient.

2.5.3. MVCBs shall be “stored energy operation” type.

2.5.4. MVCBs shall have the capability of being pad-locked in the open position.

2.5.5. MVCBs shall be either bolt on or draw-out type.

2.5.6. Draw-out requirements

a) Draw-out MVCBS shall include the following positions:

1) Service (Fully engaged);

2) Test; and

3) Withdrawn.

b) An automatic, mechanical busbar shutter shall be provided to prevent access to the live busbars, this shutter shall be padlockable in the withdrawn position.

c) Drawout MVCBs shall include interlocks to prevent circuit breaker withdrawal when in closed position and to prevent closing unless fully engaged or in test position.

d) An additional interlock shall automatically discharge the stored-energy operating mechanism springs upon removal of the MVCB out of the compartment.

e) Drawout MVCBs shall include indication for the various positions.

f) Secondary control circuits shall be connected automatically with a self-aligning, self-engaging plug and receptacle arrangement when the MVCB is racked into the Service position. Provision shall be made for secondary control plug to be manually connected in Test position.

g) The racking mechanism shall be operable with the breaker compartment front door closed and position indication shall be visible with door closed.

2.5.7. Protection requirements

a) The MVCB protection shall be provided by a separate device, namely a multifunction, digital protection relay(s). Refer to related Sections or Contract Documents for specific protection functions and configuration.

2.5.8. Accessories where required on the Contract Documents

a) Shunt Trip Device: 120 volts, AC.

b) Under Voltage Trip Device: 120 volts, AC.

c) Auxiliary Switch: 120 volts, AC. 2 normally open dry contact and 2 normally open dry contacts.

d) Alarm Switch: 120 volts, AC. This shall indicate and alarm/trip condition.

e) Electrical Operator: 120 volts, AC. A mechanical spring charged/discharged indicator shall be included.

f) On/Off indicator.

g) Local close via mechanical pushbutton.

h) Local open/trip via mechanical pushbutton.

i) Remote close via an external 2 pole dry contact. Provision for 3 remote trip signals shall be provided.

j) Remote open via an external 2 pole dry contact. Provision for 5 remote trip signals shall be provided.

k) Handle Lock: Include provisions for sealing and padlocking. A suitable mechanical interlock is required to ensure that the front access door of the breaker compartment may only be opened when the circuit breaker is in the "OFF" position. The operating handle must project through the front door of the compartment so that the breaker may be operated, and its status (i.e.: open, closed or tripped) determined, without having to open the door.

l) Operation counter to be mechanical and direct mounted to the breaker.

m) Provide products suitable for use as service entrance equipment where so applied.

n) MVCBs shall include provision to interface to Building Automation System (BAS) for monitoring of status, open /closed, metering of amperage, voltage, wattage, PF, VAR local and remotely on BAS.

o) Circuit breaker lifting yoke.

p) Portable test set for testing all functions of circuit breaker without removal from enclosure.

q) Circuit breaker removal apparatus. This can be either an overhead-circuit-breaker lifting device, track mounted at top front of switchgear, complete with hoist and lifting yokes; or a portable, floor-supported, roller-base, elevating carriage arranged for moving circuit breakers in and out of compartments.

2.6. MEDIUM VOLTAGE FUSE CUT-OUTS

2.6.1. Fuse cut-outs shall be rated in accordance with the Contract Documents.

2.6.2. Fuse cut-outs shall be suitable for the environmental conditions in which they are to be operated.

2.6.3. Fuse cut-outs shall be vertically mounted and hook stick operated.

2.6.4. Fuse cut-outs shall be heavy duty, automatic drop-out type

2.6.5. Fuse links shall be electrically and mechanically interchangeable between various makes, and button head design.

2.6.6. Fuse links shall be type K to type T sized as indicated on the Contract Documents.

2.7. POLE MOUNTED MEDIUM VOLTAGE LOAD BREAK SWITCHES (MVLBSS)

2.7.1. MVLBSs for pole mounting, outdoor application shall be horizontal mounted, vertical break, rotating insulator, gang operated, single throw, 3-pole.

2.7.2. MVLBSs switch base shall be 5 mm formed channel galvanized steel drilled for universal mounting on either wood, steel or pipe.

2.7.3. Light load MVLBSs shall permit switch opening and closing under light load, magnetizing or charging currents.

2.7.4. Full load MVLBSs shall permit switch opening and closing under full load, magnetizing or charging currents.

2.7.5. Arc horns shall be provided.

2.7.6. Contacts

a) Silver nickel alloy multi contact fixed contacts.

b) Silver nickel alloy spring loaded multi contact switch blade contacts.

2.7.7. MVLBS Assembly

a) Operated from center pole.

b) Outside poles connected to center pole through end yoke assemblies, pipe turnbuckles and universal ball and yoke assembly to permit switch operation with up to 15 degrees misalignment of pole bases.

c) Bearings and moving joints on each pole and interphase mechanism positively sealed by silicone cord rings (sealed for life).

d) Insulators: three per pole, standard station post type.

2.7.8. MVLBS Manual Operating Mechanism

a) Two offset bearings.

b) Pipe shaft, length as shown on the Contract Documents.

c) Pipe guides.

d) Pipe couplings.

e) Position indicator

f) Foot bearing.

g) Operating handle with padlock.

2.7.9. Fuses for MVLBSs shall be made of the following materials:

a) Fusible element: silver/nickel chrome; and

b) Arcing rods: main rod copper, silver clad, auxiliary rod stainless steel

3. EXECUTION

3.1. INSTALLATION AND COMMISSIONING

3.1.1. Manufacturer's installation and commissioning recommendations shall be followed by the installation and commissioning team.

3.1.2. Field Inspection and Testing

a) Inspect each circuit breaker visually.

b) Perform several mechanical ON and OFF operations on each circuit breaker.

c) Verify circuit continuity on each pole in closed position.

d) Determine that circuit breaker will trip on over current condition.

e) Include description of testing and results in test report.

3.1.3. Commissioning

a) Adjust trip settings so that circuit breakers coordinate with other overcurrent protective devices in circuit.

b) Adjust trip settings to provide adequate protection from overcurrent and fault currents.

END OF SECTION