METROLINX

Disconnect Switches Specification

Specification 26 28 23

Revision 01
Date: March 2023

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Publication Date: August 2018
Revision Date: March 2023

Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes
Cover page	March 2023	Removed 'Capital Projects Group'
1.2.3, 1.33, 1.9.1, 3.1.2	March 2023	Added 'the latest version of' and updated numbering on Electrical Nomenclature and Identification specification

LIST OF CONTENT

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. Labour, products, equipment, and services necessary for disconnect switches Work.

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 to the latest version of the 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).

1.3. RELATED WORKS

1.3.1. Section 26 05 00 Electrical General Requirement.

1.3.2. Section 26 05 31 - Splitter Boxes, Junction Boxes and Pullboxes.

1.3.3. Section 26 05 53 – Electrical Identification and Nomenclature

1.3.4. Section 26 13 26 - Metal-Clad Switchgears.

1.3.5. Section 26 23 00 - Low Voltage Switchgears.

1.3.6. Section 26 24 13 - Switchboards and Panelboards.

1.3.7. Section 26 24 19 - Motor Control Centres

1.3.8. Section 26 28 00 - Circuit Breakers and Fuses

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

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. ASTM A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvanealed) by Hot-Dip Process.

1.4.8. CAN/CSA C22.2 No. 94-M, Special Purpose Enclosures.

1.4.9. CAN/CSA C22.2 No. 4, Enclosed and Dead-front Switches.

1.4.10. NEMA FU l−07 Low Voltage Cartridge Fuses.

1.4.11. NEMA KS l−06 Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

1.4.12. NFPA 130, National Fire Protection Association Standard for Fixed Guideway Transit and Passenger Rail System.

1.4.13. UL98−07 Enclosed and Dead−Front Switches.

1.4.14. UL248−00 Low Voltage Fuses.

1.4.15. UL489−09 Molded Case Circuit Breakers and Circuit.

1.5. SPARE PARTS

1.5.1. Provide manufacturer's recommended spare parts list and price for Metrolinx for review.

1.5.2. Minimum one set of fuses need to be provided and stored on site.

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 two years after acceptance by Metrolinx.

1.8. DELIVERY, STORAGE AND HANDLING

1.8.1. Store switch and fuses on Site in a protected, dry location. Cover with plastic to keep dust off.

1.8.2. Contractor to protect equipment from weather and moisture by covering with heavy plastic or canvas and by maintaining heat within enclosure in accordance with manufacturer's instructions.

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. Include time–current curves of fuses;

3) Include dimensional outline drawings; conduit entrance locations and requirements; voltage rating, continuous and short-circuit current ratings; horsepower rating; fuse type and rating; cable terminal sizes and temperature ratings;

4) Maintenance Data: recommended maintenance procedures and intervals. Include spare parts data listing; source and current prices of replacement parts and supplies;

5) Product transportation, storage, handling, and installation requirements; and

6) Product identification in accordance with Metrolinx Electrical Identification and Nomenclature Specification 26 05 53.

1.9.2. Shop Drawings Package

a) Submit manufacturer’s Shop Drawings indicating:

i) Complete, dimensioned general arrangement; and

ii) Identification.

1.10. QUALITY ASSURANCE

1.10.1. Manufacturers Qualifications: Company specializing in disconnect switch and fuses with at least ten years documented experience.

1.10.2. All electrical work shall be carried by licensed electricians with experience and training in the equipment and systems (certified or manufacture approve) being installed in Ontario.

1.10.3. Regulatory Requirements: Furnish Products listed and classified by CSA and ULc, as suitable for application, and shall be stamped accordingly

2. PRODUCTS

2.1. GENERAL

2.1.1. Disconnect switches to be CSA approved and bear CSA label.

2.1.2. Disconnect switches shall comply with CSA C22.2 No. 4.

2.1.3. Fuseholder assembles shall comply with CSA C22.2 No. 39.

2.1.4. Disconnect switches to be 3- or 4-pole with solid neutral as applicable, rated 60 Hz, 240/600 Vac or up to 1000 Vdc as applicable, single throw, continuous heavy duty, load break, quick-make, quick-break, rated for name plate ampere value and motor loads.

2.1.5. Shunt trip safety switch with shunt trip technology are to be operated electrically and remotely with a handle operation mechanism and visible blade indication. These switches can be used with emergency stop pushbuttons or other remote signaling means to quickly disconnect power from equipment. The switch can be in two-, three- and four-pole configurations for system voltages up to 600 Vac and 1000 Vdc with fusible and non-fusible protection options.

2.2. MATERIALS

2.2.1. Steel sheet: ASTM A653, coating designation Z275; galvanized steel sheet.

2.2.2. Stainless steel sheet: ASTM A240 Type 304.

2.2.3. Switches shall be in accordance with NEMA, CSA, ULC/UL.

2.2.4. UL – Underwriters' Laboratories

a) UL 98 Enclosed and Dead-Front Switches

b) UL 198C High-Interrupting Capacity Fuses, Current Limiting Type

c) UL 198E Class R Fuses.

2.2.5. NEMA classified General Duty (GD) for 240 V switches, and NEMA classified Heavy Duty (HD) for 600 V switches.

2.2.6. Switch shall be horsepower (HP) rated.

2.3. FUSED AND UNFUSED DISCONNECT SWITCHES

2.3.1. Quick make, quick break mechanism, with power and voltage ratings as specified.

2.3.2. Copper blades, visible in the open position.

2.3.3. An arc chute for each pole.

2.3.4. External operating handle shall indicate open and closed positions and have lock open padlocking provisions.

2.3.5. The disconnect must have visual knife blade position provided by a window or LED indicator lights

2.3.6. Mechanical interlock shall permit opening of the door only when the switch is in the open position, defeatable to permit inspection.

2.3.7. Fuse holders for the sizes and types of fuses specified.

2.3.8. Solid neutral for each switch being installed in a circuit which includes a neutral conductor.

2.3.9. Ground lugs for each ground conductor.

2.3.10. All disconnect switches to be lockable, complete with locks and keys.

2.3.11. Switch operating handle: Interlocked with switch cover, to prevent opening of cover when switch in ON position and to prevent operation of switch mechanism when door open.

2.3.12. Enclosures: Shall be the NEMA types (Enclosures: NEMA 1 for indoor controlled environment, NEMA 12 for dusty indoor environment and NEMA 4X for outdoor environment, conforming to CAN/CSA C22.2 No. 94, or as shown on the project documentation and shall be finished with manufacturer's standard gray baked enamel paint over pre-treated steel. Where the types of switch enclosures are not shown, they shall be the NEMA 4X stainless steel.

2.3.13. Disconnect switch electrical interlock auxiliary contacts shall conform to CSA C22.1.

2.3.14. External roof top exhaust fan disconnect switch to have (1NO+1NC) electrical auxiliary contacts. Auxiliary contacts to be late make, early break type.

2.4. MOTOR RATED TOGGLE SWITCHES

2.4.1. Type 1, general purpose for single−phase motors rated up to 1 horsepower.

2.4.2. Quick−make, quick−break toggle switch with external reset button and thermal overload protection matched to nameplate full−load current of actual protected motor.

2.5. FUSES

2.5.1. Refer to Contract Drawings for disconnect switch type, rating and accessories.

2.5.2. Only HRC fuses with interrupting rating of 200,000 A symmetrical and voltage rating of 600 V shall be used, unless otherwise indicated

2.5.3. Time delay fuses to carry 500% of their rated current for minimum of 10 s and marked "Time Delay",

2.5.4. CSA designation HRCI J fuses for lighting and general loads without inrush,

2.5.5. CSA designation HRCI J Time Delay fuses for motors, transformers and other loads with inrush, 600 A and lower

2.5.6. CSA designation HRC L Time Delay fuses for motors, transformers and other loads above 600 A with inrush.

2.5.7. CSA designation HRC L fuses for lighting and general loads without inrush above 600 A

2.5.8. Shall be in accordance with NEMA FU 1.

2.5.9. Fuses that are in controls circuits, requiring monitoring of fuse status must be selected and supplied with the spring-loaded indicator. When the fuse blows have the indicator pop out of the fuse to open or close the monitoring switch.

2.5.10. Service Entrance: Class L fast acting or time delay type.

2.5.11. Feeders: Class L, fast acting or time delay (over 600A) or Class J, fast acting or time delay for up to 600A.

2.5.12. Motor Branch Circuits: Class RK1 or Class RK5, time delay.

2.5.13. Other Branch Circuits: Class RK1 or Class RK5, time delay or Class J, fast acting, to suit application.

2.5.14. Control Circuits: Class CC time delay.

3. EXECUTION

3.1. INSTALLATION

3.1.1. Install fused and unfused disconnect switches and enclosures and as required by Code and in accordance with manufacturer's instructions.

3.1.2. Mount nameplates in accordance with Product identification in accordance with Metrolinx Electrical Identification and Nomenclature Specification 26 05 53.

3.1.3. Install dual element fuses in accordance with manufacturer's instructions.

3.1.4. Test disconnect switches in accordance with Section on, Commissioning.

END OF SECTION