METROLINX

Splitter Boxes, Junction Boxes, Pullboxes and Cabinets Specification

Specification 26 05 31

Revision 01
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, 1.3.3, 2.4	March 2023	Added: 'the latest version of' Updated numbering on Electrical Identification and Nomenclature Specification and Updated identification requirements

LIST OF CONTENT

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. Labour, products, equipment and services necessary for splitters, junction boxes, pullboxes and cabinets 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 equipment and systems to all applicable standards of CSA, ULC, IEEE, ESA.

1.2.3. Design equipment and systems to the latest t version of GO DRM.

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

1.2.5. All splitter boxes, junction boxes, pull boxes and cabinets to be as follows except as permitted by other items in this section:

a) Outdoor or wet indoor location: Stainless steel construction

b) Dry indoor location: Powder coated galvanized steel construction

1.2.6. All splitter boxes, junction boxes, pull boxes and cabinets shall be grounded and bonded in accordance with the OESC and Metrolinx standards including MX-ELEC TRAC EW-SPEC, MX-ELEC TRAC EW-DW, MX-ELEC STR-SPEC, and MX-ELEC EM. In case of any conflicts, the more stringent requirement shall apply.

1.2.7. All designs shall minimize EMF effects and do everything needed to reduce EMI on the site. The design shall include the selection and specification of equipment that will reduce or eliminate the EMI effects. Power and communication wiring shall be separated in all cased or by using metal enclosures and separate raceways throughout the system. The only exception being Power-over-Ethernet wiring. Refer to Metrolinx standard MX-ELEC EMI-SPEC.

1.2.8. Minimum thickness of boxes and cabinets steel shall be 1.9 mm.

1.2.9. Size all boxes to accommodate the required number of conduits, conductors and terminal blocks. Provide junction boxes with 20% spare terminal blocks.

1.2.10. Design all boxes mounted flush with in roadways to accommodate heavy vehicle traffic.

1.2.11. Any fabricated box which houses equipment or controls in it must have OESC or CSA approvals on the assembly.

1.3. RELATED WORKS

1.3.1. Section 26 05 00 Electrical General Requirements.

1.3.2. Section 26 05 21 - Electrical Conductors and Cables.

1.3.3. Section 26 05 23 – Electrical Identification and Nomenclature

1.3.4. Section 26 05 34 - Raceway for Electrical Systems.

1.3.5. Section 26 50 00 – Lighting and Controls

1.4. REFERENCE STANDARDS

1.4.1. ANSI/ASA 61, Gray Powder Coating.

1.4.2. CAN/CSA C22.2 No. 0, General Requirements – Canadian Electrical Code, Part II.

1.4.3. CAN/CSA C22.2 No. 0.4, Bonding of Electrical Equipment.

1.4.4. CAN/CSA C22.2 No. 26, Wireways, Auxiliary, Gutters and Associated Fittings.

1.4.5. CAN/CSA C22.2 No. 40, Cutout, Junction and Pullboxes.

1.4.6. CAN/CSA C22.2 No. 85-M, Rigid PVC Boxes and Fittings.

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

1.4.8. OESC, The Ontario Electrical Safety Code.

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 two years after acceptance by Metrolinx.

1.8. DELIVERY, STORAGE AND HANDLING

1.8.1. Refer to Section 26 05 00

1.8.2. As per manufacturer's recommendations

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;

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

4) Product identification in accordance with GO DRM.

1.9.2. Shop Drawings Package

a) Submit Shop Drawings in accordance with Division 01 indicating:

1) Mounting details, methods and dimensions;

2) Enclosure type and size;

3) Internal layout of identified components;

4) Front panel layout of identified components;

5) Electrical wiring diagram with internal and external connections;

6) Bill of material listing all components;

7) Electrical schematic with description of operations, complete with terminal numbers and field connections; and

8) Identification.

1.10. QUALITY ASSURANCE

1.10.1. All electrical items shall be approved by CSA and/or ULC;

2. PRODUCTS

2.1. JUNCTION BOXES AND PULLBOXES

2.1.1. Case 1: CSA certified for use with: rigid galvanized steel threaded conduits, liquid-tight flexible conduits, Teck cables

a) For outdoor and wet outdoor locations, the enclosure shall be:

1) Fabricated from minimum 1.9 mm thick stainless sheet steel and be suitable for surface or flush mounting;

2) Complete with screw on cover, a neoprene gasket for a water-tight seal and a 1.9 mm thick inner plate;

3) Minimum size of 150 mm x 150 mm x 100 mm; and

4) Type NEMA/EEMAC-4X.

b) For dry indoor locations, the enclosure shall be:

1) Fabricated from minimum 1.9 mm thick galvanized sheet steel, powder coated in accordance with ANSI/ASA 61, grey epoxy textured powder electrostatically applied inside and out and be suitable for surface or flush mounting;

2) Complete with screw on cover, a neoprene gasket for a water-tight seal and a 1.9 mm thick inner plate;

3) Minimum size of 150 mm x 150 mm x 100 mm; and

4) Type NEMA/EEMAC-4.

2.1.2. Case 2: CSA certified for use with rigid galvanized steel, epoxy or PVC coated inside and out rigid steel, rigid PVC, electrical metallic conduit (EMT), flexible metal conduit and armored cable but excluding Teck cable

a) For outdoor and wet outdoor locations, the enclosure shall be:

1) Fabricated from minimum 1.9 mm thick stainless sheet steel and be suitable for surface or flush mounting;

2) Provided with a screw on cover, conduit knockouts on all 4 sides, 4 internal mounting holes and bonding screw;

3) Minimum size of 150 mm x 150 mm x 100 mm; and

4) Type NEMA/EEMAC-4X.

b) For dry indoor locations, the enclosure shall be:

1) Fabricated from minimum 1.9 mm thick galvanized sheet steel, powder coated in accordance with ANSI/ASA 61, grey epoxy textured powder electrostatically applied inside and out and shall be suitable for surface or flush mounting;

2) Provided with a screw on cover, conduit knockouts on all 4 sides, 4 internal mounting holes and bonding screw;

3) Minimum size of 150 mm x 150 mm x 100 mm; and

4) Type NEMA/EEMAC-1.

2.1.3. Case 3: CSA certified for use with rigid PVC conduits

a) Enclosures shall be fabricated of the same PVC material as and provided by the same manufacturer as PVC conduit.

2.1.4. Where round junction boxes are used they shall be high strength and high impact resistant. Round junction boxes shall be suitable for surface or flush mounting. Enclosure shall be complete with cover, neoprene gasket, 4 tapped holes, 2 external mounting tabs, 4 tapped conduit entries and 2 close-up plugs.

2.1.5. Junction boxes, pull boxes and fittings are to be match the finish of the raceway used.

2.1.6. Embedded Junction Boxes and Pullboxes

a) Dry Indoor location

1) Fabricate embedded pullboxes from minimum 2.6 mm hot-dip galvanized steel.

2) NEMA/EEMAC 4.

b) Outdoor or wet location

1) Fabricate embedded pullboxes from minimum 2.6 mm stainless steel.

2) NEMA/EEMAC 4X.

c) Use extension collars for embedded junction boxes and pullboxes where reinforcing steel interferes with embedded conduits.

d) Fabricate pullbox covers of same materials as boxes, make covers of minimum 6 mm, non-slip checker plate construction, braced as required, suitable for application.

e) Fasten box covers by countersunk machine screws or minimum 10 mm nominal diameter bolts.

2.2. SPLITTER BOXES

2.2.1. Dry indoor location

a) Enclosures shall be fabricated from minimum 1.9 mm thick galvanized sheet steel, powder coated in accordance with ANSI/ASA 61, grey epoxy textured powder electrostatically applied inside and out and shall be suitable for surface mounting.

b) Type NEMA/EEMAC-1, sprinkler proof.

2.2.2. Outdoor and wet indoor location

a) Enclosures shall be fabricated from minimum 1.9 mm thick stainless steel and shall be suitable for surface mounting.

b) Type NEMA/EEMAC-4X.

2.2.3. Enclosure shall have mounting holes, conduit knockouts, bracket hinges, padlocking provision, drip hood and interior panel.

2.2.4. Splitter boxes shall be rated for minimum 600 V, amperage as indicated on Contract Drawings.

2.2.5. Fire resistant backing: Fibre cement and galvanized sheet steel composite panel, 9.5 mm thick, 3DF2 by DuraSystem Barriers Inc or approved equivalent.

2.2.6. At least two spare terminals shall be provided on each set of lugs in splitters.

2.2.7. Main, branch lugs and connections bars shall match required size and number of incoming and outgoing conductors as indicated on Contract Drawings.

2.3. CABINETS

2.3.1. CSA certified for de-icing, lighting, heat tracing, PLC, and lighting control.

2.3.2. Dry indoor location

a) Fabricate cabinets from minimum 2.6 mm hot-dip galvanized steel unless indicated otherwise.

b) Type NEMA/EEMAC-4 unless indicated otherwise.

2.3.3. Outdoor and wet indoor location

a) Fabricate cabinets from minimum 2.6 mm stainless steel unless indicated otherwise.

b) Type NEMA/EEMAC-4X unless indicated otherwise.

2.3.4. Cabinets shall accommodate the required power and control devices to provide the functions as indicated in related Sections, Specifications and Contract Drawings.

2.3.5. Cabinets shall have lockable hinged doors complete with lock and key and padlock provision. Cabinets including doors shall be grounded in accordance with the latest OESC and GO Design Requirements Manual requirements.

2.3.6. Provide an approved wiring diagram attached to the inside of cabinet door.

2.3.7. Power and communications compartment shall be separated by a dividing wall. Both compartments shall be provided with separate access points independent of each other. Wireways shall be provided across the compartments for wiring.

2.3.8. Copper ground bus shall be provided in each compartment. Communication equipment shall be single point ground to main electrical system ground.

2.3.9. Adequate heating, ventilation and air conditioning shall be provided to prevent the development around electrical and communication equipment of ambient air temperature in excess of those normally permissible for such equipment.

2.3.10. Cabinet should be provided with LED lighting and light switch in accordance with specification 26 50 00 Lighting and Controls.

2.3.11. Cabinet shall be free standing structure and mounted on a house-keeping concrete pad.

2.3.12. A minimum 1-meter clear working space shall be provided in front of access points, which may occur behind equipment and patch panels, and in front of and behind racking.

2.3.13. Provide 25% spare space for future expansion in both power and communication compartments.

2.4. IDENTIFICATION

2.4.1. Furnish colour coding in accordance with Metrolinx Electrical Identification and Nomenclature Specification 26 05 23

2.4.2. Provide identification for equipment and the sub-components in accordance with specification 26 05 23 – Electrical Identification and Nomenclature. Splitters, junction boxes, pull boxes and cabinets shall have unique names.

2.4.3. Provide nameplates, warning signs and labels as required by the AHJ.

3. EXECUTION

3.1. INSTALLATION

3.1.1. Install splitters, junction boxes, pullboxes and cabinets in locations indicated on Contract Drawings to suit Site conditions.

3.1.2. Before proceeding with installation, ensure junction/pull/splitter boxes, conduits and other electrical equipment clear mechanical, architectural and other installations.

3.1.3. Install junction and pullboxes and splitter boxes in accordance with the OESC.

3.1.4. Set boxes and fittings square with adjacent ceiling, floor, wall or beam line and support independently of conduits entering same. Keep unused knockouts flush and tight. Unused nailing or other holes in boxes not permitted.

3.1.5. Locate boxes to be freely accessible. Locate boxes above suspended ceilings within reach of openings for fluorescent fixtures. Install access panels where boxes inaccessible.

3.1.6. Install pullboxes in every conduit run exceeding 45 m between termination points. Space pullboxes 45 m maximum apart. Use a maximum of 180° total bend angle, or 4 quarter bends, 2 right angle bends, or equivalen, in conduit run between pullboxes.

END OF SECTION