

Amendment Notice: Wiring Selection and Methods for Power Communication

This bulletin applies to and amends the following documents:

- GO Design Requirements Manual (DRM), GO-DRM-STD-2017 Revision 3, dated February 2020
- GO Technical Master Specification, Section 26 05 21, Electrical Conductors and Cables Revision 0, dated August 2018

This Bulletin updates existing DRM (Feb. 2020) requirements for wiring installation and updates the Technical Master Specification, Section 26 05 21 Electrical Conductors and Cables. This revision improves the requirements for safe wire bundling practice and ensure alignment with applicable electrical codes.

Station Services and Business Technology (BT) experience heat generation from wires installed according to existing requirements as the current practice allows cables to be installed in bundles for easier wire management. This results in thermal events, heating problems and system stability issues with new powering devices (e.g. Power Over Ethernet 'PoE' devices). To mitigate these problems, this revision provides additional explicit requirements for wiring selection and methods.

The revision improves requirements for spare conduits in service duct banks, adds provisions for the fill capacity of raceways, and better details installation methods of wires in existing raceways. Correct installation/bundling of cables reduces operating cost, by mitigating overheating of cable bundle and preventing thermal events within the facility. The systems are easier to maintain and administer and powered devices are deployed more quickly. Using PoE devices allows for energy efficient savings, centralized control and improved business security.

Amendments to the DRM and updated Technical Master Specification are provided in the following attachments:

- Attachment 1: Revisions to GO DRM Feb. 2020 - Wiring Selection and Methods
- Attachment 2: Revisions to Technical Master Specification - Section 26 05 21, Electrical Conductors and Cables

On MyLinx the Bulletin is available for staff download on the [Go Manual](#) page and updates to the Technical Master Specification, Electrical Conductors and Cables are located on the [GO Standard Drawings and Specifications](#) page.

The Bulletin is also available for external users to download via the Metrolinx public download site (http://www.gosite.ca/engineering_public/).

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7.2.8 Service Duct Banks

Service duct banks shall conform to OESC (Ontario Electrical Safety Code) latest edition inside property line, or rail corridor per AREMA, CSA Standard C22.3 No. 7 Underground Systems, and OESC, coordinate with local Hydro and Bell for area having jurisdiction and for utility requirements.

Provide concrete encased duct banks in heavy vehicular areas and fire routes. Minimum 30% spare conduits with no cables or wires except for the ground wire and pull-cords shall be provided in duct banks for future use, coordinate with Metrolinx.

7.2.9 Wiring Methods

7.2.9.1 Raceways and conductors

Raceways and branch circuitry shall be implemented to minimize failure of a complete system due to failure or malfunctioning of any single electrical component. Distribution minimizing conductors of different circuits sharing common raceways and pull-boxes, etc., shall be implemented. Raceways shall not exceed a maximum of 40% capacity. Raceways selected shall suitably resist mechanical damage and environmental deterioration effects. In particular, special attention shall be applied to corrosion inhibitors and protective coatings or treatments on surface mounted conduit in underground areas (e.g., tunnels, below grade electrical rooms, Bridges and parking structures etc.).

A minimum 12 AWG stranded copper wire green insulated RWU90 below grade and RW90 above grade shall be placed inside each raceway. This wire is to be used as a tracer wire inside a buried raceway for the purpose of locates after installation.

In addition, slack wire shall be provided. In all runs, the amount of slack shall be no less than 1.0 m at each termination point and 600 mm in each pull point. Access wire is to be neatly coiled and be available for future use. When installing wires in an existing raceway, it will be the responsibility of the installer to ensure that new wires are neatly installed and tied together with all existing wiring. Drip loops shall be provided on all outside hanging raceways or conductors.

Refer to Metrolinx Standard Specifications: Rail Corridor Raceway Requirements 27 05 41, Raceway for Electrical Systems 26 05 34 and Electrical Conductors and Cables 26 05 21. Refer to Metrolinx electrification standards for electromagnetic interference (EMI) protection of devices and cables.

7.2.9.2 Conduits

Rigid galvanized steel conduit, or other Metrolinx approved cabling methods shall be used for all exposed work in normally dry areas not likely to present corrosion problems. Rigid steel or rigid PVC conduit may be used embedded in slabs where high impact protection is required. Rigid non-metallic conduit shall be used below ground, either direct buried or concrete encased.

PVC, epoxy coated rigid galvanized steel conduit or other Metrolinx approved raceway methods shall be used in areas that can have condensation on metal or corrosion problem areas. PVC conduit shall not be installed above ground, or in exposed locations. Conduit, having a minimum of 53mm shall be used in parking lots when deemed necessary. Concrete encasements shall be provided for bus loops, road crossings, and railway Right-of-Ways. In finished areas, all conduits shall be concealed.

Refer to GO Standard specifications for detailed requirements.

7.2.9.3 Cable Trays

Where required, hot dip galvanized cable trays shall be ladder type; steel or aluminum or non-metallic as required for the application, complete with vertical barriers to separate systems or cables as required. Class shall be selected based on conductor weight plus 50% spare capacity as a

**Attachment 2: Revisions to Technical Master Specification – Section 26 05 21,
Electrical Conductors and Cables**

**Metrolinx
Technical Master Specification
August 2018**

**Section 26 05 21
Electrical Conductors and Cables
Page 9 of 13**

- 2) 23AWG, Solid bare copper conductor;
- 3) polyolefin insulated and overall beldfoil shield
- 4) Jacket type: PVC
- 5) TIA / EIA 568
- 6) Shielded system - high noise immunity and EMI protection

2.4.4. Fibre Optic Cable:

- a) Single mode Fibre Optic Cable - up to 36 Strand. 36 strand cable shall be General Cable AP XX0361A1R.BK or approved equal, lower strand counts shall be selected from same product range.
- b) Single Mode Fibre Optic Patch Cord: Belden duplex SC/SC single mode fibre optic patch cord or approved equal

2.4.5. PA Speaker Cable:

- a) Belden 9312 or approved equivalent.

2.4.6. Ambient Noise Detection Microphone Cable:

- a) Belden 9312 or approved equivalent.

2.5. IDENTIFICATION

2.5.1. Furnish colour coding in accordance with Metrolinx Electrical Identification and Nomenclature Specification MX-ELEC ID-SPEC.

2.5.2. Provide identification for equipment and the sub-components in accordance with Metrolinx Electrical Identification and Nomenclature Specification MX-ELEC ID-SPEC.

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

3. EXECUTION

3.1. WIRING METHODS

3.1.1. Use wiring methods required by the AHJ, the OESC, the OBC and as indicated on the Contract Drawings, manufacturer's instructions, and as specified herein.

3.1.2. Neatly bundle and tie-wrap all cables using tie-wraps. [The tie-wrap shall meet UL 62275 or CSA C22.2 No. 62275 or NMX-J-623-ANCE used for electrical and communications installations.](#)

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**Metrolinx
Technical Master Specification
August 2018**

**Section 26 05 21
Electrical Conductors and Cables
Page 10 of 13**

3.1.3. When bundling cables, comply with manufacturer's recommended bundling practices for installation. Ensure that excess pressure is not placed on the cable at any point that may result in the compression or deformation of the cable jacket and internal pair/conductor geometry.

~~3.1.3.3.1.4.~~ Cabling bundles shall be designed in a manner that will prevent overheating and result in exceeding the ampacity within the bundle. Follow the manufacturer's specifications.

~~3.1.4.3.1.5.~~ Protect wire and cable from kinks.

~~3.1.5.3.1.6.~~ Provide grommets and strain relief where required.

3.2. INSTALLATION OF WIRES AND CABLES

3.2.1. Pull in all wires in any one conduit at same time directly from reels or coil carefully to avoid damage to conductors or insulation. In accordance with cable manufacturer's recommendations.

3.2.2. Conductors and cables shall be outdoor and sunlight resistant (SR) rated where installed outdoor and /or installed in locations where they will be exposed to weather elements ~~including solar radiation~~.

3.2.3. Conductors and cables shall be underground rated where installed below grade underground.

3.2.4. No joints in any conductors between any boxes or outlets. Neutral conductors unbroken throughout their length. Feeders continuous without splices throughout their entire length unless Metrolinx's approval given to allow splices.

3.2.5. Use proper crimping tool on pressure applied specific connectors at conductor joints.

3.2.6. Properly designate wire and cable circuits at distribution panelboards and switchboards by specified fibre tag.

3.2.7. Use terminal lugs on conductors No.10 AWG or larger where they are terminated for connection to switchboard or other equipment. Apply lugs with proper tools.

3.2.8. Carefully unroll cable from reels and coil and run cable as complete from one outlet or junction box to next.

3.2.9. Seal space between cables and sleeves or wall or floor opening, with UL listed firestop putty, sealant, compound or pillow, after wires and cables have been installed.