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| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | February 19, 2010 | Modified ‘Related Sections’ |
| 3 | September 28, 2010 | Minor revisions and added section 1.3 – Measurement and Payment |
| 4 | June 3, 2013 | Final Draft – Consolidated Comments Spec Update Project |
| 5 | June 18, 2013 | Incorporation of new Commissioning Specification cross references. Incorporated several aspects of the NL building specifications. |
| 6 | July 29, 2014 | Changes to reflect renaming of commissioning specification and final review (AV) |
| **7** | **November 17, 2014** | **Updated, Finalized Specification – Reference eDOCS #5630489 v5 (AV)** |
| 8 | February 2, 2015 | Updated standards (CSA C22.2 No. 227.3-15) |
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NOTE:

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**The on-line copy is the current version of the document.**

# GEneral

## Related Sections

#### Section 01300 – Submittals

#### Section 01740 – Cleaning

#### Section 01810 – Equipment Testing and Facility Commissioning

#### Division 13 – SCADA and Instrumentation

#### Section 16010 – Electrical General Requirements

## References

### Comply with the latest edition of the following statutes, codes, standards, and all amendments thereto:

#### Canadian Standards Association (CSA):

##### CAN/CSA C22.2 No.18, Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware, a National Standard of Canada.

##### C22.2 NO. 18.2-06 (R2011), Nonmetallic Outlet Boxes.

##### C22.2 NO. 18.3-12, Conduit, tubing, and cable fittings (Tri-national standard, with ANCE NMX-J-017 and UL 514B).

##### CAN/CSA-C22.2 NO. 18.4-04 (R2013), Hardware for the Support of Conduit, Tubing, and Cable (Bi-National standard, with UL 2239).

##### CSA C22.2 No.45.1-07 (R2012), Electrical Rigid Metal Conduit – Steel (Tri-National standard with UL 6 and NMX-J-534-ANCE-2007).

##### C22.2 NO. 45.2-08 (R2013), Electrical rigid metal conduit - Aluminum, red brass, and stainless steel (Tri-national standard, with NMX-J-576-ANCE and UL 6A).

##### CSA C22.2 No.56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

##### CSA C22.2 No.83-M1985 (R2013), Electrical Metallic Tubing.

##### C22.2 NO. 83.1-07 (R2012), Electrical Metallic Tubing - Steel (Tri-National Standard, with UL 797 and NMX-J-536-ANCE-2007).

##### CSA C22.2 No.211.2-06 (R2011), Rigid PVC (Unplasticized) Conduit.

##### CAN/CSA-C22.2 NO. 227.3-15 - Nonmetallic Mechanical Protection Tubing (NMPT) (Bi-National standard, with UL 1696).

#### Ontario Electrical Safety Code (OESC), 28th Edition, 2021.

## Submittals

### Product data: Submit the manufacturer's printed product literature, specifications and datasheets.

#### Submit cable manufacturing data.

### Quality assurance submittals:

#### Test reports: submit certified test reports.

#### Certificates: submit certificates signed by the manufacturer certifying that materials comply with specified performance characteristics and physical properties.

#### Instructions: submit the manufacturer's installation instructions.

## Measurement and Payment

### All costs associated with the work of this Section shall be included in the price(s) for Item No(s). \_\_\_ in the Bid Form.

# PRODUCTS

## Conduits

### Electrical Metal Tubing (EMT): Shall be in accordance with CSA C22.2 No.83-M1985 (R2013), Electrical Metallic Tubing, with couplings / with expanded ends.

### Rigid metallic conduit shall be in accordance with C22.2 NO. 45.2-08 (R2013), Electrical rigid metal conduit - Aluminum, red brass, and stainless steel (Tri-national standard, with NMX-J-576-ANCE and UL 6A).

### Rigid PVC conduit: Shall be in accordance with CSA C22.2 No.211.2-06 (R2011), Rigid PVC (Un-plasticized) Conduit.

### Flexible metal conduit: Shall be in accordance with CSA C22.2 No.56, liquid-tight flexible metal.

## Conduit Fastenings

### One-hole steel straps to secure surface conduits Nominal Pipe Size 2 - 50 mm and smaller. Two-hole steel straps for conduits larger than Nominal Pipe Size 2 - 50 mm.

### Beam clamps to secure conduits to exposed steel work.

### Channel type supports for two or more conduits at 1.5 m oc.

### Use threaded rods, minimum 10mm in diameter, to support suspended channels.

## Conduit Fittings

### Fittings: manufactured for use with the conduit specified in the Contract Documents.

### Coating: same as conduit.

### Factory "ells" where 90 degree, 45 degree or 22.5 degree bends are required for 25 mm and larger conduits.

### Watertight connectors and couplings for EMT. Set-screws are acceptable in dry locations and not acceptable in humid (humidity >70%) or wet locations.

### Ensure conduit bends other than factory “ells” are made with a bender approved by the Consultant. Making offsets and other bends by cutting and rejoining 90 degree bends shall not be permitted.

### Connectors and couplings for EMT: Steel set-screw type, size as required.

## Expansion Fittings for Rigid Conduit

### Weatherproof expansion fittings with internal bonding assembly suitable for 200 mm linear expansion.

### Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 21 mm deflection in all directions.

### Weatherproof expansion fittings for linear expansion at entry to panel.

## Fish Cord

### Polypropylene 6 mm in all empty conduits.

# EXECUTION

## Installation

### Comply with the manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### Install all conduit, conduit fittings and accessories in accordance with the latest edition of the Canadian Electrical Code in a manner that does not alter, change or violate any part of the installed system components or the CSA/UL certification of these components.

### Install conduits in order to conserve headroom in exposed locations and to minimize interference in spaces through which they pass.

### Install fire stops where required by fire rating of penetrated structure, code and drawings.

### Conceal conduits in the office, washrooms and stairwells.

### Surface mount conduits unless noted otherwise in the Contract Documents.

### Use EMT for wiring of life safe system and concealed wiring.

### Use rigid PVC conduit in corrosive areas.

### Use liquid tight flexible metal conduit for connection to motors or vibrating equipment.

### Use explosion proof flexible connection for connection to explosion proof motors.

### Install conduit sealing fittings in hazardous areas. Fill with compound.

### Minimum conduit size for lighting and power circuits: 19 mm.

### Bend the conduit cold. Replace the conduit if kinked or flattened more than 1/10th of its original diameter.

### Mechanically bend steel conduit over 19 mm diameter.

### Field threads on rigid conduit must be of sufficient length in order to draw conduits up tight.

### Install fish cord in empty conduits.

### Run two 27 mm spare conduits up to ceiling space and two 25 mm spare conduits down to ceiling space from each flush panel. Terminate these conduits in 152 mm x 152 mm x 102 mm junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in surface type box.

### Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.

### Dry-out the conduits before installing wire.

## Surface Conduits

### Run parallel or perpendicular to building lines.

### Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

### Run conduits in flanged portion of structural steel.

### Group conduits wherever possible on suspended or surface channels.

### Do not pass conduits through structural members except as indicated on the Drawings.

### Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

## Concealed Conduits

### Run parallel or perpendicular to building lines.

### Do not install horizontal runs in masonry walls.

### Do not install conduits in terrazzo or concrete toppings.

## Conduits in Cast-in-Place Concrete

### Locate to suit reinforcing steel. Install in centre one third of slab. Use rigid PVC conduit

### Protect conduits from damage where they stub out of concrete. Use rigid steel conduit for stub-up and adapt to in-floor rigid PVC conduit.

### Install sleeves where conduits pass through slab or wall.

### Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed. Use cold mastic between sleeve and conduit.

### Do not place conduits is slabs in which slab thickness is less than four times the conduit diameter.

### Encase conduits completely in concrete with minimum 25 mm concrete cover.

### Organize conduits in slab to minimize cross-overs.

## Conduits in Cast-in-place Slabs On Grade

### Embedded conduits: Ensure that the maximum outside diameter of concrete embedded conduit is 1/3 the structural slab thickness measured at thinnest point. Ensure that the minimum space between each conduit running parallel is 3 times the outside diameter of largest conduit. Do not run conduits running parallel to beam axes, directly above beams. Offset conduits running parallel to beams by a minimum of 300 mm from the face of the beam to the outside wall of the conduit. Cross conduits at right angles, wherever possible. Run conduits in the space between layers of reinforcing steel without deforming reinforcing steel pattern.

## Conduits Underground

### Slope conduits to provide drainage.

### Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

## Cleaning

### Proceed in accordance with Section 01740 – Cleaning.

### On completion and verification of performance of installation and commissioning, remove surplus materials, excess materials rubbish, tools and equipment from the Site.

## Commissioning

### For all commissioning activities on systems where components of this Section are integral to functionality, refer to Section 01810 – Equipment Testing and Facility Commissioning. All inspection and testing activities shall be completed in accordance with the documentation required as part of the commissioning plan that shall be provided to the Consultant and get approved prior to the commencement of commissioning activities.

**END OF SECTION**