

**PART 1**      **GENERAL**

**1.1**      **REFERENCES**

- .1 Canadian Standards Association (CSA)
  - .1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware, a National Standard of Canada.
  - .2 CSA C22.2 No. 45, Rigid Metal Conduit.
  - .3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
  - .4 CSA C22.2 No. 83, Electrical Metallic Tubing.
  - .5 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit.
  - .6 CAN/CSA C22.2 No. 227.3, Nonmetallic Mechanical Protection Tubing (NMPT), a National Standard of Canada.

**1.2**      **SUBMITTALS**

- .1 Product data: submit manufacturer's printed product literature, specifications and datasheets.
  - .1 Submit cable manufacturing data.
- .2 Quality assurance submittals:
  - .1 Test reports: submit certified test reports.
  - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .3 Instructions: submit manufacturer's installation instructions.

**PART 2**      **PRODUCTS**

**2.1**      **CONDUITS**

- .1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel threaded.
- .2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.
- .3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.
- .4 Rigid PVC conduit: to CSA C22.2 No. 211.2.
- .5 Flexible metal conduit: to CSA C22.2 No. 56, aluminum liquid-tight flexible metal.

.6 FRE conduit: to CSA C22.2.

.7 Flexible PVC conduit: to CAN/CSA-C22.2 No. 227.3,

## **2.2 CONDUIT FASTENINGS**

.1 One hole steel straps to secure surface conduits 50 mm and smaller. Two hole steel straps for conduits larger than 50 mm.

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

.3 Channel type supports for two or more conduits at 1.5 m o.c.

.4 Threaded rods, 6 mm dia., to support suspended channels.

## **2.3 CONDUIT FITTINGS**

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

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

.3 Ensure conduit bends other than factory "ells" are made with an approved bender. Making offsets and other bends by cutting and rejoining 90 degree bends are not permitted.

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

## **2.4 EXPANSION FITTINGS FOR RIGID CONDUIT**

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection in all directions.

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

## **2.5 FISH CORD**

.1 Polypropylene.

**PART 3**      **EXECUTION**

**3.1**            **MANUFACTURER'S INSTRUCTIONS**

- .1      Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

**3.2**            **INSTALLATION**

- .1      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.
- .2      Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .3      Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.
- .4      Surface mount conduits except in finished areas or as indicated.
- .5      Use rigid hot dipped galvanized steel threaded conduit for exposed work below 2.4 m above finished floor.
- .6      Use epoxy coated conduit underground in corrosive areas and where exposed to exterior elements. (ie: pole mounted service entrance conduits)
- .7      Use electrical metallic tubing (EMT) except in cast concrete and above 2.4 m not subject to mechanical injury, as well as concealed work in masonry construction.
- .8      Use rigid PVC conduit underground and buried in or under concrete slab on grade.
- .9      Use FRE conduit for encasement in concrete duct bank for service entrance feeders.
- .10     Use flexible metal conduit for connection to motors in dry areas connection to recessed incandescent fixtures without a prewired outlet box connection to surface or recessed fluorescent fixtures work in movable metal partitions.
- .11     Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
- .12     Use AC-90 for vertical power supply drops to light fixtures.
- .13     Use explosion proof flexible connection for connection to explosion proof motors.
- .14     Install conduit sealing fittings in hazardous areas. Fill with compound.

- .15 Minimum conduit size for lighting and power circuits: 19 mm. 12 mm conduit is acceptable for switch leg drops only where one two-wire circuit and ground is required.
- .16 Install EMT conduit from computer room branch circuit panel to outlet boxes located in sub floor.
- .17 Install EMT conduit from computer room branch circuit panel to junction box in sub-floor immediately below panel. Run flexible conduit from junction box to outlet boxes for each computer in sub-floor.
- .18 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .19 Mechanically bend steel conduit over 19 mm dia.
- .20 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .21 Install fish cord in empty conduits.
- .22 Run 2 - 25 mm spare conduits up to ceiling space and 2 - 25 mm spare conduits down to ceiling space from each flush panel. Terminate these conduits in 152 x 152 x 102 mm junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in flush concrete type box.
- .23 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- .24 Dry conduits out before installing wire.

### **3.3 SURFACE CONDUITS**

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
- .3 Run conduits in flanged portion of structural steel.
- .4 Group conduits wherever possible on suspended channels.
- .5 Do not pass conduits through structural members except as indicated.
- .6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

### **3.4 CONCEALED CONDUITS**

- .1 Run parallel or perpendicular to building lines.

- .2 Do not install horizontal runs in masonry walls.
- .3 Do not install conduits in terrazzo or concrete toppings.

### **3.5 CONDUITS IN CAST-IN-PLACE CONCRETE**

- .1 Locate to suit reinforcing steel. Install in centre one third of slab. Use rigid PVC conduit.
- .2 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.
- .3 Install sleeves where conduits pass through slab or wall.
- .4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed. Use cold mastic between sleeve and conduit.
- .5 Do not place conduits in slabs in which slab thickness is less than 4 times conduit diameter.
- .6 Encase conduits completely in concrete with minimum 25 mm concrete cover.
- .7 Organize conduits in slab to minimize cross-overs.

### **3.6 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE**

- .1 Run conduits 25 mm and larger below slab and encased in 75 mm concrete envelope. Provide 50 mm of sand over concrete envelope below floor slab.

### **3.7 CONDUITS UNDERGROUND**

- .1 Slope conduits to provide drainage.
- .2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

### **3.8 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 On Completion and verification of performance of installation, remove surplus materials, excess materials rubbish, tools and equipment.

**END OF SECTION**