

## **PART 1 - General**

### **1.1 RELATED SECTIONS**

- .1 Section 26 05 01 Common Work Results - Electrical.

### **1.2 REFERENCES**

- .1 Canadian Standards Association (CSA)
  - .1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
  - .2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.
  - .3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
  - .4 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.
  - .5 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.
  - .6 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

### **1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 See Section 01 74 21 Construction Demolition Waste Management.
- .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
- .3 Fold up metal banding, flatten and place in designated area for recycling.

## **PART 2 - Products**

### **2.1 CONDUITS**

- .1 Rigid steel threaded conduit shall conform to C.S.A. C22.2 No. 45 galvanized, sized as indicated.
- .2 Thinwall Type "EMT" conduit shall conform to C.S.A. C22.2 No. 83, galvanized, sized as indicated.
- .3 Flexible galvanized steel liquid tight conduit shall conform to C.S.A. C22.2 No. 56, sized as indicated.
- .4 Rigid PVC conduit shall conform to C.S.A. C22.2 No. 211.2, sized as indicated.
- .5 Flexible PVC conduit: to CAN/CSA-C22.2 No. 227.3, sized as indicated.

## **2.2 CONDUIT FASTENINGS**

- .1 One hole steel straps to secure surface conduits 53mm and smaller. Two hole steel straps for conduits larger than 53mm.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits at 1500mm on centers.
- .4 Threaded rods, 12mm diameter, 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 degree bends are required for 27mm and larger conduits.
- .3 Couplings for thinwall Type "EMT" shall be set screw type, zinc with matching locknuts.
- .4 Connectors for thinwall Type "EMT" shall be set screw type, zinc with matching locknuts.
  - .1 Connectors 32mm and larger shall be complete with threaded plastic bushings.  
Connectors less than 32mm shall be complete with insulated throats.
- .5 Couplings and connectors for P.V.C. rigid conduit shall be C.S.A. Approved for their respective use. All P.V.C. fittings shall be solvent weld type. Push-fit type fittings are not acceptable.
- .6 Connectors for flexible conduit, armoured cable shall be set screw galvanized steel and be complete with case hardened locknuts.
- .7 Connectors for liquid tight flexible conduit shall be watertight, compression type galvanized steel or aluminum. Locknuts shall be case hardened. Dry type connectors may be used in dry indoor areas not exposed to liquids or moisture, if approved for use.
- .8 Utilize watertight connectors and couplings for exposed vertical runs of EMT.

## **2.4 FISH CORD**

- .1 Polypropylene.

## **PART 3 - Execution**

### **3.1 INSTALLATION**

- .1 All conduit installed in outdoor shall be PVC.
- .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.
- .4 Rigid PVC or Galvanized rigid steel threaded conduit shall be used in all poured concrete construction. Thinwall Type "EMT" shall be used for all branch circuit wiring and all systems installed exposed on ceilings and walls unless noted otherwise. Bends, offsets, or elbows made on the job for steel conduits shall be made so that the conduit is not injured or flattened.
- .5 All branch circuit wiring run in thinwall Type EMT conduit shall be complete with a No. 12 AWG minimum green insulated bonding conductor, increasing as required by Table 16A of the C.E.C..
- .6 P.V.C. conduits sized 27 mm in diameter and larger shall be installed in trenches not less than 300mm in depth from underside of concrete floor slab to bottom of trench. Conduits shall be placed on a 152 mm bed of sand and have a second 152 mm of sand placed on top (completely around) of conduits prior to backfilling.
- .7 All concealed and exposed conduit shall be kept parallel to building lines and run "on the square". All conduits shall be installed to avoid proximity to steam and hot water pipes by 150 mm. Conduits shall run through ceiling spaces and down in walls. No conduit shall run in or under floor slabs unless specifically indicated.
- .8 All conduits shall be securely held in place by means of approved supports and in accordance with C.E.C. Sections 12-1010, 12-1114 and 12-1404. All EMT conduit straps shall be steel. Cast straps are not acceptable. EMT conduit shall be installed as a complete system and shall be securely fastened in place within 3'-0" of each outlet box, junction box, cabinet, couplings or fittings and the spacing between supports as follows:
  - .1 Less than 1500mm for 16mm and 21 EMT;
  - .2 Less than 2286mm for 27mm and 35mm EMT;
  - .3 Less than 3048mm for 41mm EMT or larger.
- .9 Code approved P.V.C. rigid conduit shall be used for underground circuits and where otherwise specifically noted. Conduit shall be joined with approved connectors and P.V.C. solvent cement. The proper size bonding conductor, as per the C.E.C., shall be installed in all P.V.C. conduits.
- .10 No branch circuit wiring shall run in concrete slabs. Conduit stubs in concrete shall be protected from damage during construction. Conduit openings shall be sealed with plugs or caps to prevent entrance of foreign materials. Where conduits pass through a waterproof membrane an oversize sleeve shall be installed and caulking applied to maintain the waterproof properties of the membrane. A cold cure mastic shall then be applied between sleeve and conduit.
- .11 Flexible conduit, not smaller than 10mm I.D., or flexible armoured cable with separate grounding conductor, and complete with insulating anti shorts, shall be used between lighting fixtures and their respective junction boxes, and where rigid or "EMT" conduit cannot be used, such as in cabinet work.

- .12 Liquid tight flexible conduit, not smaller than 10mm I.D., shall be used for connections to all transformers, motors and equipments, in both wet and dry areas.
- .13 Upon installation of all conduits, terminate in boxes, cabinets, and fittings, or install suitable plugs or caps, to prevent the entrance of foreign materials. Conduits shall be swabbed out using a drag, consisting of tight fitting rubber washers and shall be dry before conductors are pulled in.
- .14 All conduit subject to corrosive elements shall be treated with corrosion resistant compounds.
- .15 Conduit shall not pass through structural members without the permission of the Departmental Representative.
- .16 A sufficient number of fittings shall be used to permit easy pulling of wires. Conduits shall be continuous, and shall be made electrically and mechanically secure throughout.
- .17 Conduits shall not run directly between outlets on the opposite sides of a common partition, in order to prevent sound transmission.
- .18 It is strictly prohibited to install or otherwise "conceal" any types of rigid or flexible conduits, cables, etc. "within" the uppermost, or top portions of metal type Q-Deck "flutes", regardless of their intended use(s).
  - .1 All or any types of wiring associated with metal type decking is to be "surface" installed on underside, or room side of same.
- .19 Install conduit sealing fittings in hazardous areas. Fill with compound.
- .20 Minimum conduit size for lighting and power circuits: 21mm.
- .21 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .22 Mechanically bend steel conduit over 21mm diameter.
- .23 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .24 Install fish cord in empty conduits.
- .25 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- .26 Dry conduits out before installing wire.

### **3.2 SURFACE CONDUITS**

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1500mm clearance.

- .3 Run conduits in flanged portion of structural steel.
- .4 Group conduits wherever possible on suspended or surface channels.
- .5 Do not pass conduits through structural members except as indicated.
- .6 Do not locate conduits less than 75mm parallel to steam or hot water lines with minimum of 25mm at crossovers.

### **3.3 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.

### **3.4 CONDUITS - UNDERGROUND**

- .1 Slope conduits to provide drainage.
- .2 Use long radius rigid PVC elbow.

### **3.5 COUPLINGS AND CONNECTORS**

- .1 Threaded couplings shall be used for all rigid steel threaded conduit joints. All joints in or below concrete slabs shall be thoroughly red leaded and screwed tight. No exposed threads shall be left, i.e., running thread couplings are not approved.
- .2 Rigid steel threaded conduit shall connect to boxes and cabinets with the use of two case hardened steel locknuts and insulated bushing. Painted area at locknut connections shall be scraped clean, and locknuts screwed tight to ensure ground continuity.
- .3 Thinwall Type "EMT" couplings shall be securely tightened.
- .4 Connectors for thinwall Type "EMT", liquid tight and flexible conduit or cable shall terminate at boxes and cabinets with one case hardened locknut. Painted area shall be scraped clean, and locknut screwed tight to ensure ground continuity.
- .5 Couplings and connectors for rigid P.V.C. shall be cleaned with solvent and joined with cement C.S.A. approved for the purpose.

### **3.6 CONDUIT FITTINGS**

- .1 Install conduit fittings where required. Secure conduit in fittings and secure conduit to structure within 300mm of fitting.

- .2      Colour code coverplates, ceiling splines and access covers in accordance with Section 26 05 01.

**END OF SECTION**