

1 General

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 00 - Common Work Results - Electrical.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
- .3 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.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2 Products

2.1 CONDUITS

- .1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel-threaded.
- .2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.
- .3 Rigid pvc conduit: to CSA C22.2 No. 211.2.
- .4 Flexible metal conduit: to CSA C22.2 No. 56, steel liquid-tight flexible metal.

2.2 CONDUIT FASTENINGS

- .1 One hole steel straps to secure surface conduits 50 mm and smaller.
 - .1 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 on centre.
- .4 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified.
Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.
- .3 Watertight connectors and couplings for EMT.
 - .1 Set-screws are not acceptable.

2.4 FISH CORD

- .1 Polypropylene.

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 The minimum acceptable conduit size used is 21 mm.
- .2 Unless noted otherwise, conduits are to be installed as high as possible to conserve headroom, to reduce interference with other trades 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 Use rigid galvanized steel threaded conduit where subject to injury.
- .5 Use electrical metallic tubing (EMT) for the following:
 - .1 Communication outlets between device box and accessible ceiling space in all walls and partitions.
 - .2 All Fire alarm system wiring.
 - .3 All security system wiring.
 - .4 All wiring within electrical rooms and mechanical rooms.
 - .5 All exposed wiring.
 - .6 Home runs to panelboards for all branch circuit wiring. A home run is defined as that portion of the branch circuit wiring that runs between the applicable panelboard, and the room or area in which it terminates, and/or makes its first splice, for drop off, to the applicable branch circuit device. AC90 will not be acceptable for this application. Where the branch circuit has multiple splices

and/or drop offs to multiple rooms, the use of AC90 for the drop off is permitted, however, the home run conduit shall be continued until the final room destination or drop off is reached.

.7 Where noted elsewhere in the contract documents.

.8 EMT shall be installed as a complete system and shall be securely fastened in place within 300 mm of each outlet box, junction box, cabinet, couplings, fittings and changes in direction and the spacing between supports as follows:

.1 Not greater than 1500 mm for 21 mm EMT

.2 Not greater than 1800 mm for 27 mm and 35 mm EMT

.3 Not greater than 3050 mm for 41 mm EMT or larger.

.9 All conduit runs shall be a maximum of 30 meters in length with a maximum of four (4) 90 degree bends between pull points. A pull box shall be placed in conduit runs where the sum of the bends exceeds 360 degrees, where the overall run exceeds 30 meters or there is a reverse bend in the run.

.10 Pull boxes shall be placed in straight sections of conduit run and shall not be used in lieu of a bend. Conduit fittings shall not be used in place of pull boxes or bends. The use of C, LB, LL, LR and T type fittings are prohibited on this project unless written permission is provided by the Departmental Representative.

.11 The use of corner pulling ELLs or corner pulling elbows is not permitted.

.12 Conduits shall be installed in a neat and ordered manner. When installed in a group, conduits shall be parallel and evenly spaced apart.

.13 Where PVC expansion joints are required, install as follows:

.1 Mount expansion joints so that the piston can travel in a straight line.

.2 Firmly attach the expansion joint so that it remains stationary. Ensure that the conduit is loosely mounted in supports to allow for lineal movement as it expands and contracts due to temperature changes.

.3 Spacing of conduit supports must be in accordance with Section 12-1114 of the CEC.

.4 Where more than one expansion joint is required in a run of conduit, consult manufacture's recommendations for proper installation procedures.

.14 Liquid tight metal flexible conduit is not to be used as a general purpose raceway. Use liquid tight flexible metal conduit (maximum length permitted to be 1.5 M) and liquid tight conduit fittings for:

.1 Connection to vibrating equipment.

.2 Connections to **all** sprinkler system equipment (flow switches, supervised valves, alarm pressure switches, etc).

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

.16 Mechanically bend steel conduit over 19-mm diameter.

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

.18 Install fish cord in empty conduits.

.19 Where conduits become blocked, remove and replace blocked section.

.20 Dry conduits out before installing wire.

.21 The installation of conduits above the structure, directly below roof insulation is strictly prohibited.

.22 All conduits to be complete with minimum #12 green insulated bond conductor.

.23 Ensure all metal raceways are bonded to ground, including those used for communication systems, fire alarm systems. Where a separate bonding conductor is run to a bonding bushing on an open end of a metal raceway, a #6 green RW90 shall be used.

3.3 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Run conduits in flanged portion of structural steel.
- .3 Group conduits wherever possible on suspended channels.
- .4 Do not pass conduits through structural members except as indicated.
- .5 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 Protect conduits from damage where they stub out of concrete.
- .4 Install sleeves where conduits pass through slab or wall.
- .5 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed.
 - .1 Use cold mastic between sleeve and conduit.
- .6 Organize conduits in slab to minimize cross-overs.

3.5 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.