

Concrete Encased Duct Bank

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**PART 1 GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Section 03 30 00 - Cast-in-Place Concrete.
- .3 Section 31 23 10 - Excavating And Backfilling.
- .4 Section 26 05 00 - Common Work Results - for Electrical.
- .5 Section 26 05 43.01 - Installation of Cable in Trenches and in Ducts.

**1.2 REFERENCES**

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .2 American Society for Testing and Materials (ASTM)
  - .1 ASTM D 1056-07, Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
- .3 Canadian Standards Association (CSA).
  - .1 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
  - .2 CSA G30.3-M1983 (R1998), Cold-Drawn Steel Wire for Concrete Reinforcement.
  - .3 CSA G30.5-M1983 (R1998) Welded Steel Wire Fabric for Concrete Reinforcement.
  - .4 CAN/CSA-G30.18-09, Billet-Steel Bars for Concrete Reinforcement.

**1.3 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submissions/Shop Drawings.
  - .2 Product Data:
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- .1 Submit manufacturer's product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets.
- .3 Quality assurance submittals: submit following in accordance with Section 01 41 00 - Testing Laboratory Services.
  - .1 Test reports: submit certified test reports for specified materials from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
  - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .4 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

**PART 2 PRODUCTS**

**2.1 PVC DUCTS**

- .1 PVC conduit, type EBl, encased in concrete.

**2.2 PVC DUCT FITTINGS**

- .1 Rigid PVC opaque solvent welded type couplings, bell end fittings, plugs, caps, adaptors as required to make complete installation.
- .2 Expansion joints.
- .3 Rigid PVC 5 degree angle couplings.

**2.3 CONCRETE FOR DUCT BANK**

- .1 Refer to section 03 30 00- Cast-In-Place Concrete.
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**2.4 MARKER TAPES**

- .1 Polyethylene marker tape: 75mm wide suitable for burial below grade directly over buried ducts / cables.
- .2 Install a polyethylene ribbon in the trench indicating « Danger underground electrical line».

**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 GENERAL INSTALLATION**

- .1 Install underground duct banks including formwork.
  - .2 Before installing conduits, build duct bank on undisturbed soil or on well compacted granular fill not less than 150 mm thick, compacted to 95% of maximum proctor dry density.
  - .3 Open trench completely before ducts are laid and ensure that no obstructions will necessitate change in grade of ducts.
  - .4 Prior to laying ducts, construct "mud slab" not less than 75 mm thick.
  - .5 Install ducts at elevations and with slope as indicated and minimum slope of 1 to 400.
  - .6 Install rigid plastic base spacers at maximum intervals of 1.5 m levelled to grades indicated for bottom layer of ducts.
  - .7 Lay PVC ducts with configuration and reinforcing as indicated.
    - .1 Stagger joints in adjacent layers at least 150 mm and seal to make joints watertight.
    - .2 Encase duct bank with 75 mm thick concrete cover.
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- .3 Use only long sweep bends for sections extending above finished grade level and wharf level.
  - .8 Make transpositions, offsets and changes in direction using 5 degree bend sections, do not exceed a total of 20 degrees with duct offset.
  - .9 Use conduit to duct adapters when connecting to conduit. Use special adapters to connect non-metallic conduits to rigid galvanized steel conduits.
  - .10 Cut, ream and taper end of ducts in field in accordance with manufacturer's recommendations, so that duct ends are fully equal to factory-made ends.
  - .11 Allow concrete to attain 50% of its specified strength before backfilling.
  - .12 Use fasteners, clamps, anchors, ties and trench jacks as required to secure ducts and prevent moving during placing of concrete.
    - .1 Tie ducts to spacers with twine or other non-metallic material.
    - .2 Remove weights or wood braces before concrete has set and fill voids.
  - .13 Clean ducts before laying:
    - .1 Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.
  - .14 Duct cleaning:
    - .1 Pull 300 mm long x diameter 6 mm less than internal diameter of duct wooden mandrel through each duct, immediately after placing of concrete.
    - .2 Then pull stiff bristle brush through duct; avoid disturbing or damaging ducts where concrete has not set completely.
    - .3 Pull stiff bristle brush through each duct immediately before pulling-in cables in the presence of NSPI Representative.
  - .15 Install pull rope continuous throughout each duct run with 3 m spare rope at each end.
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**3.3 MARKER TAPE**

- .1 Install marker tape continuously over entire duct run.

**3.4 FIELD QUALITY CONTROL**

- .1 Site Tests/Inspections:
  - .1 Inspection of duct will be carried out by Departmental Representative prior to placing concrete.
  - .2 Placement of concrete and duct cleanout to be done when Departmental Representative present.

**3.5 CLEANING**

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

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