

## **PART 1 GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Section 26 05 00 - Common Work Results - Electrical.
- .3 Section 31 23 10 - Excavating, Trenching and Backfilling.

### **1.2 REFERENCES**

- .1 Canadian Standards Association, (CSA)
- .2 Insulated Cable Engineers Association, Inc. (ICEA)

## **PART 2 EXECUTION**

### **2.1 DIRECT BURIAL OF CABLES**

- .1 After sand bed specified in Section 31 23 10 - Excavating, Trenching and Backfilling, is in place, lay cables maintaining 75 mm clearance from each side of trench to nearest cable. Do not pull cable into trench.
- .2 Provide offsets for thermal action and minor earth movements. Offset cables 150 mm for each 60 m run, maintaining minimum cable separation and bending radius requirements.
- .3 Make termination and splice only as indicated leaving 0.6 m of surplus cable in each direction.
  - .1 Make splices and terminations in accordance with manufacturer's instructions using approved splicing kits.
- .4 Underground cable splices not acceptable.
- .5 Minimum permitted radius at cable bends for rubber, plastic or lead covered cables, 8 times diameter of cable; for metallic armoured cables, 12 times diameter of cables or in accordance with manufacturer's instructions.
- .6 Cable separation:
  - .1 Maintain 75 mm minimum separation between cables of different circuits.

- .2 Maintain 300 mm horizontal separation between low and high voltage cables.
- .3 When low voltage cables cross high voltage cables maintain 300 mm vertical separation with low voltage cables in upper position.
- .4 At crossover, maintain 75 mm minimum vertical separation between low voltage cables and 150 mm between high voltage cables.
- .5 Maintain 300 mm minimum lateral and vertical separation for fire alarm and control cables when crossing other cables, with fire alarm and control cables in upper position.
- .6 Install treated planks on lower cables 0.6 m in each direction at crossings.
- .7 After sand protective cover specified in Section 31 23 10 - Excavating, Trenching and Backfilling, is in place, install continuous row of 50mm wide yellow warning tape as indicated to cover length of run.

## **2.2 CABLE INSTALLATION IN DUCTS**

- .1 Install cables as indicated in ducts.
  - .1 Do not pull spliced cables inside ducts.
- .2 Install multiple cables in duct simultaneously.
- .3 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .4 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.
- .5 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.
- .6 After installation of cables, seal duct ends with duct sealing compound.

## **2.3 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical
- .2 Perform tests using qualified personnel. Provide necessary instruments and equipment.
- .3 Check phase rotation and identify each phase conductor of each feeder.

- .4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.
- .5 Pre-acceptance tests.
  - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.
  - .2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.
- .6 Acceptance Tests
  - .1 Ensure that terminations and accessory equipment are disconnected.
  - .2 Ground shields, ground wires, metallic armour and conductors not under test.
  - .3 High Potential (Hipot) Testing.
    - .1 Conduct hipot testing at 100 % of original factory test voltage in accordance with manufacturer's recommendations.
  - .4 Leakage Current Testing.
    - .1 Raise voltage in steps from zero to maximum values as specified by manufacturer for type of cable being tested.
    - .2 Hold maximum voltage for specified time period by manufacturer.
    - .3 Record leakage current at each step.
- .7 Provide Department's Representative with list of test results showing location at which each test was made, circuit tested and result of each test. Include results in Commissioning Manual.
- .8 Remove and replace entire length of cable if cable fails to meet any of test criteria.

**END OF SECTION**