

PART 1 - GENERAL

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| <u>1.1 Related Sections</u> | .1 | Section 31 23 10 - Excavating, Trenching and Backfilling. |
| | .2 | Section 26 05 00 - Electrical General Requirements. |

PART 2 - PRODUCTS

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| <u>2.1 Cable Protection</u> | .1 | 38 x 140 mm planks pressure treated with copper napthenate or 5% pentachlorophenol solution, water repellent preservative. |
| <u>2.2 Markers</u> | .1 | Concrete type cable markers: 600 x 600 x 100 mm with words: cable, joint or conduit impressed in top surface, with arrows to indicate change in direction of cable and duct runs. |
| | .2 | Cedar post type markers: 89 x 89 mm, 1.5 m long, pressure treated with copper napthenate or 5% pentachlorophenol solution, water repellent preservative, with nameplate fastened near post top, on side facing cable or conduit to indicate depth and direction of duct and cable runs. .1 Nameplate: aluminum anodized 89 x 125 mm, 1.5 mm thick mounted on cedar post with mylar label 0.125 mm thick with words Cable, Joint or Conduit with arrows to indicate change in direction. |

PART 3 - EXECUTION

3.1 Direct Burial
of Cables

- .1 After sand bed specified in Section 31 23 10 - Excavating, Trenching and Backfilling, is in place, lay cables maintaining 150 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 Underground cable splices not acceptable.
- .4 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.
- .5 Cable separation:
 - .1 Maintain 150 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 150 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.

3.2 Cable
Installation in

- .1 Install cables as indicated in ducts.

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| <u>Ducts</u> | .2 | Do not pull spliced cables inside ducts. |
| | .3 | Install multiple cables in duct simultaneously. |
| | .4 | Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension. |
| | .5 | To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation. |
| | .6 | 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. |
| | .7 | After installation of cables, seal duct ends with duct sealing compound. |

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| <u>3.3 Markers</u> | .1 | Mark cable every 150 m along cable runs and changes in direction. |
| | .2 | Mark underground splices. |
| | .3 | Where markers are removed to permit installation of additional cables, reinstall existing markers. |
| | .4 | Install cedar post type markers. |
| | .5 | Lay concrete markers flat and centered over cable with top flush with finish grade. |

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| <u>3.4 Field Quality Control</u> | .1 | Perform tests in accordance with Section 26 05 00 - Electrical General Requirements. |
| | .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.
- .7 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.
- .8 Remove and replace entire length of cable if cable fails to meet any of test criteria.