



*For Your Safety*

The following are the Code requirements and explanatory material for buried electrical wiring that are applicable to most residential applications.

**12-012 Underground Installations**

- **Subrule (1)** Direct buried conductors, cables, or raceways shall be installed to meet the minimum cover requirements of Table 53.

Wiring Method	Minimum Cover — Millimetres			
	Non-vehicular Areas		Vehicular Areas	
	750 V or Less	Over 750 V	750 V or Less	Over 750 V
Conductors or cable not having a metal sheath or armour e.g.- NMWU, USEI90	600	750	900	1000
Conductor or cables having a metal sheath or armour e.g. – TECK90, ACWU	450	750	600	1000
Raceway e.g. – PVC, DB2	450	750	600	1000

*Note: Minimum cover means the distance between the top surface of the conductor, cable, or raceway and the finished grade.*

**Table 53**

**Minimum Cover Requirements for Direct Buried Conductors, Cables, or Raceways**

**Notes for Subrule (1)** (see Figure 12-012 on page 3). The aim is that buried electrical wiring be adequately protected from potential damage by being buried to a minimum depth in the ground. "Direct burial" means conductors or cables that are directly buried underground (ie, the outer surface of the conductor or cable is in direct contact with the earth). "Cover" refers to the minimum distance between the top surface of the cable or raceway and finished grade.

- **Subrule (2)** The minimum cover requirements shall be permitted to be reduced by 150 mm where mechanical protection is placed in the trench over the underground installation.

**Notes for Subrule (2)** (see Figure 12-012 on page 3). The purpose is to permit a reduction in the protective depth of the wiring when adequate mechanical protection is installed above the wiring.

- **Subrule (3)** Mechanical protection shall consist of one of the following and, when in flat form, shall be wide enough to extend at least 50 mm beyond the conductor, cables, or raceways on each side:
  - (a) Treated planking at least 38 mm thick; or
  - (b) Poured concrete at least 50 mm thick; or
  - (c) Concrete slabs at least 50 mm thick; or
  - (d) Concrete encasement at least 50 mm thick; or
  - (e) Other suitable material.

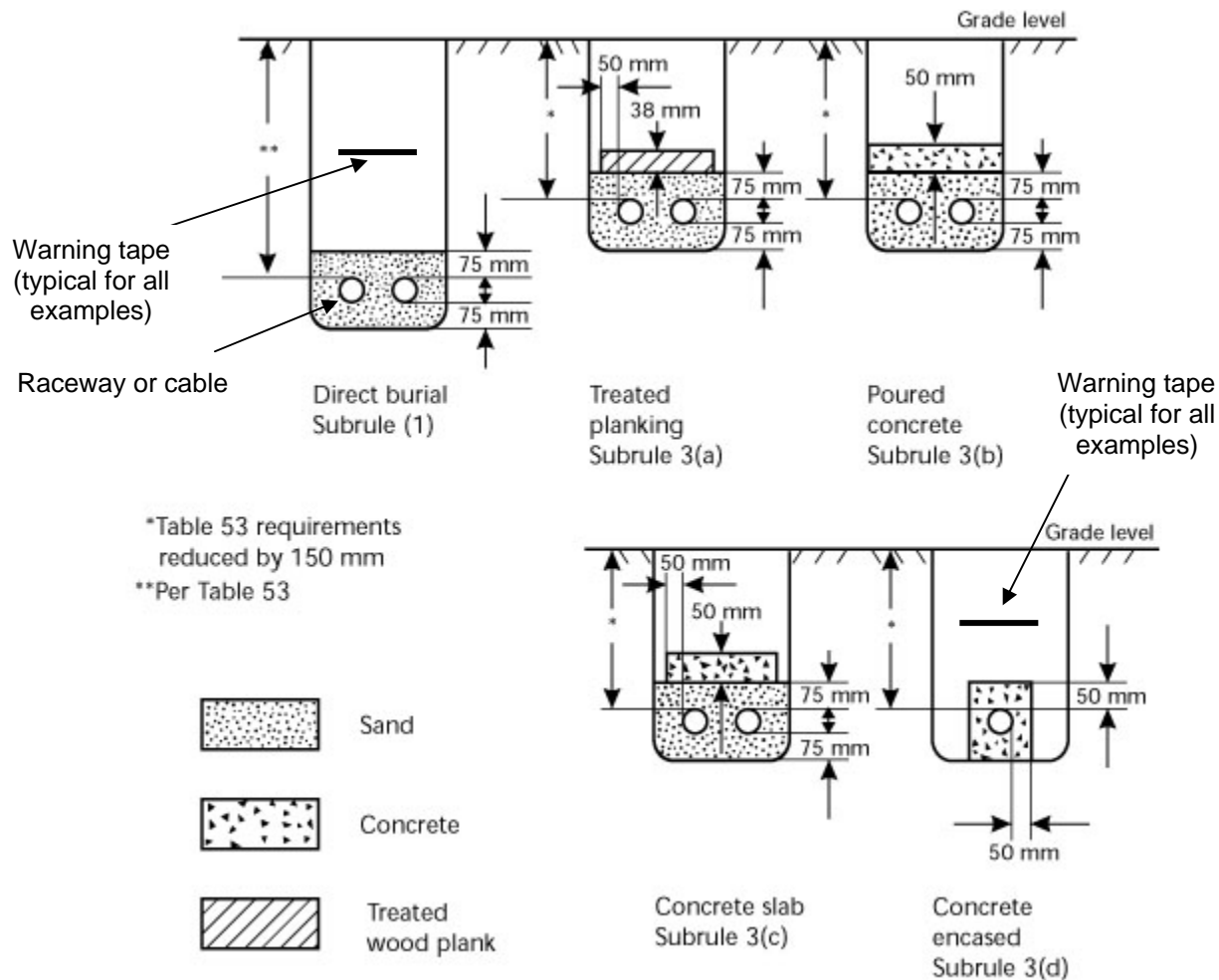
**Notes for Subrule (3)** (see Figure 12-012 on page 3). This subrule specifies the types of mechanical protection that are considered as being adequate and that will not injure the conductors or the insulating covering on the conductors.

Paragraph (a). Treated planking – Wood planking should be pressure treated with a solution such as pentachlorophenol. Creosote and some types of wood preservative may injure the insulation of the conductor and must not be used.

Paragraphs (b), (c), and (d). Concrete -- When 50 mm of poured concrete, or 50 mm thick concrete slabs are placed over the installation, or concrete encasement of 50 mm thick is used, the conductors or cable should be installed in a conduit to prevent injury to the conductors.

Paragraph (e). Other material -- Other material includes polyethylene pipe that is certified to CSA Standard B137.1. Because this pipe is not certified as an electrical raceway, conductors and cables approved for direct earth burial shall be used (This is usually indicated by the letter “U” in the conductor/cable type. Examples are types NMWU, or TWU).

- **Subrule (4)** Direct buried conductors or cables shall be installed so that they run adjacent to each other and do not cross over each other and with a layer of 6 mm (nominal) screened sand or screened earth at least 75 mm deep both above and below the conductors.



**Figure 12-012**

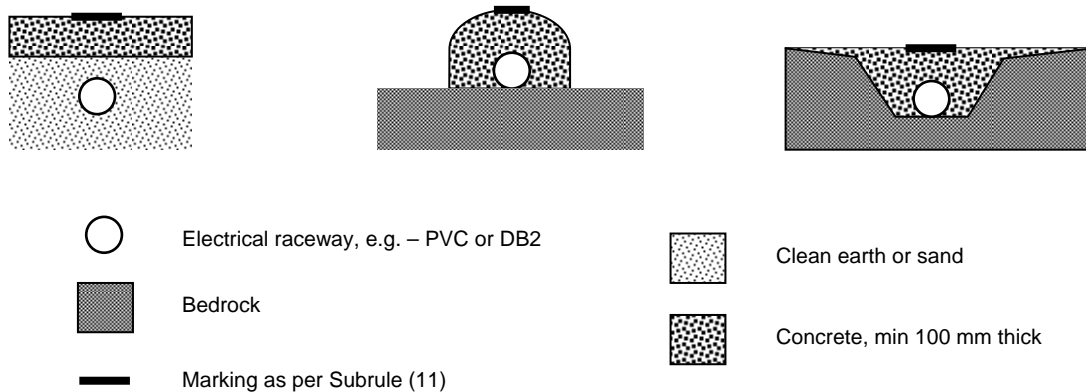
**Typical Mechanical Protection for Conductors, Cables, or Raceways**

**Note:** Figure 12-012 is copied from the CSA CE Code Handbook – An Explanation of the Rules of the Canadian Electrical Code, Part 1.

- **Subrule (8)** Raceways shall be permitted to be installed directly beneath a concrete slab at grade level provided the concrete slab is not less than a nominal 100 mm in thickness, the location is adequately marked, and the raceway will not be subject to damage during or after installations.

**Notes for Subrule (8).** This subrule permits electrical wiring installed in electrical raceways to be buried beneath a grade level concrete slab, provided that the concrete slab is at least 100 mm thick. Examples of permitted electrical raceways are Rigid PVC conduit, and Rigid Type DB2 conduit. The concrete slab will provide adequate protection from any digging operations, provided that the location is marked after the

installation. This option is useful where local conditions such as bedrock prevent burial at the depths required by Subrules (1), (2) & (3).



- **Subrule (10)** Backfill containing large rock, paving materials, cinders, large or sharply angular substances, or corrosive material shall not be placed in an excavation where such materials may damage cables, raceways, or other substructures, prevent adequate compaction of fill, or contribute to corrosion of cables, raceways, or other substructures.

**Notes for Subrule (10).** This subrule makes it clear that material that can damage the underground cables or raceways not be used in backfilling the trench. Backfill containing large rocks may affect backfill settlement, and the additional weight may contribute to sharp objects penetrating the sand or earth covering and damaging the conductor insulation.

- **Subrule (11)** The initial installation shall be provided with a suitable marking tape buried approximately halfway between the installation and grade level, or adequate marking in a conspicuous location to indicate the location and depth of the underground installation.

**Notes for Subrule (11).** The intention is to ensure a buried installation of electrical wiring is adequately marked for the safety of persons working on or near the wiring in the future. The requirement applies to all types of installation whether direct buried or installed in pipe or conduit and whether mechanically protected or not.

Common trade practice is to bury an electrical warning marker tape (similar to crime scene tape) halfway above the electrical wiring in the trench.

Other adequate marking includes permanent above ground markers such as printed signs on posts or printed “tombstone” markers installed flush to grade indicating the installation location at intervals of not more that 15 m or at any change in direction.

Another alternative is the installation of suitable markers above grade at each riser location and at any location the buried installation enters a building or similar structure to indicate the presence of buried cables; and the installation of a layout drawing at a conspicuous location such as the service box or distribution panel.

- **Subrule (12)** Where underground raceways or cables are subject to movement by settlement or frost, provision shall be made for the prevention of damage to the conductors or the electrical equipment.

**Notes for Subrule (12).** The intent is to prevent damage to raceways, cable, and electrical equipment due to movement of the ground due to settling or frost action. Experience has shown damage that includes raceways being pulled apart, conductors being pulled out of terminations, damage to electrical enclosures and to components within the enclosures.

Examples of provisions that can be made to prevent damage are the proper use of conduit expansion fittings and/or expansion loops in cables both below grade and at terminations within enclosures.