

Rule 12-012 Buried Wiring Info Sheet

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

12-012 Underground Installations

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

Table 53
Minimum cover requirements for direct buried cables
or insulated conductors in raceways
(See Rule 12-012.)

Wiring method	Minimum cover, mm			
	Non-vehicular areas		Vehicular areas	
	750 V or less	Over 750 V	750 V or less	Over 750 V
Cable not having a metal sheath or armour e.g. NMWU, USEI90	600	750	900	1000
Cable 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.

The aim is that buried electrical wiring be adequately protected from potential damage by being buried to a minimum depth in the ground as required in Table 53.

"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)** permits a reduction of the minimum cover requirements by 150 mm where mechanical protection is placed in the trench over the underground installation.

The purpose is to permit a reduction in the protective depth of the wiring when adequate mechanical protection is installed above the wiring. See Figure-1

- **Subrule 3)** 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 such as:
 - (a) Treated planking at least 38 mm thick; or

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- (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.

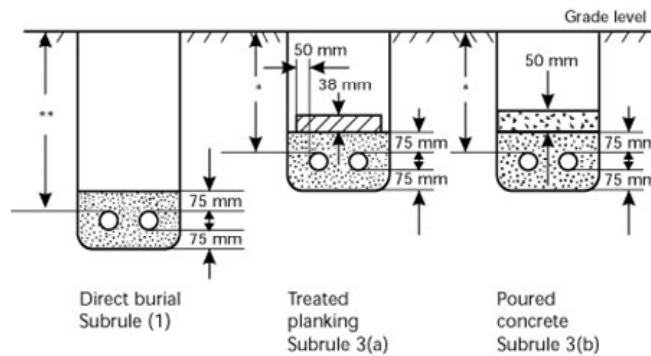
Note: when the above mechanical protection is in flat form, it shall be wide enough to extend at least 50 mm beyond the conductor, cables, or raceways on each side

In addition, Appendix B note indicates – *Wood planks when buried in the ground, should be pressure treated with a solution such as pentachlorophenol or other suitable material as recommended by a manufacturer of wood preservatives. The use of creosote as a wood preservative is not recommended because it is known to damage rubber and thermoplastic insulations of the conductor and act as a catalyst in the corrosion of lead.*

- **Subrule 4)** requires direct buried conductors or cables to be installed so that they run adjacent to each other and do not cross over each other and with a layer of 4.75 mm (nominal) screened sand or screened earth at least 75 mm deep both above and below the conductors.

Warning tape
(typical for all examples as per Subrule 11))

Raceway or cable



Warning tape

(typical for all examples as per Subrule 11))

*Table 53 requirements reduced by 150 mm
**Per Table 53

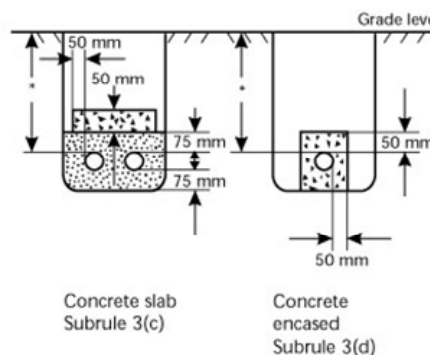
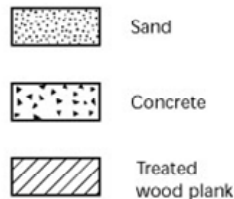


Figure 1

Typical Mechanical Protection for Conductors, Cables, or Raceways

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

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- Subrule 8)** This subrule permits electrical wiring installed in electrical raceways and armoured or metal-sheathed cables 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 in a conspicuous, legible and permanent manner after the installation. This option is useful where local conditions such as bedrock prevent burial at the depths required by Subrules 1), 2) & 3).

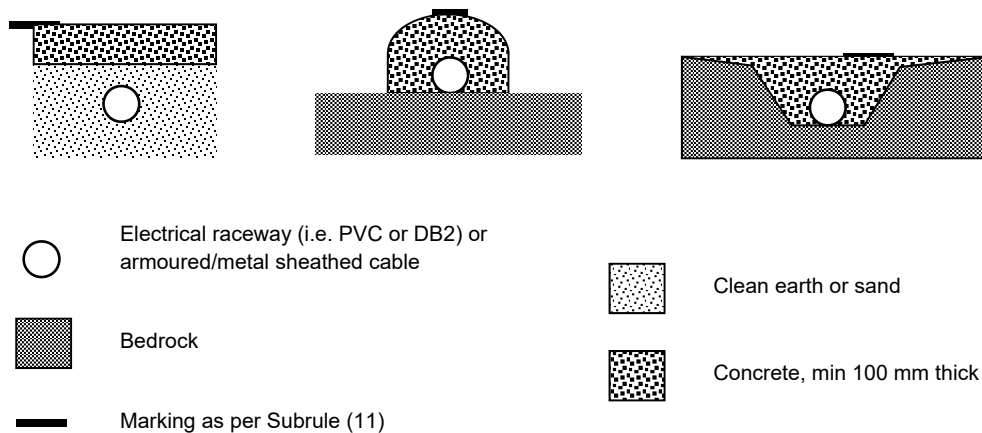


Figure 2

Raceways and armoured or metal-sheathed cables beneath grade level slab

- Subrule 10)** prevents backfill containing large rock, paving materials, cinders, large or sharply angular substances, or corrosive material not to 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.

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)** requires the initial installation to 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.

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

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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 than 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)** requires caution where underground raceways or cables are subject to movement by settlement or frost. Provision is to be made for the prevention of damage to the conductors or the electrical equipment due to movement of the ground from settling or frost action. Experience has shown damage 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.

Buried wiring separation from other services

Direct buried electrical wiring or conduit is permitted to be installed in the same trench as gas provided they are not installed in the same vertical plane and there is a horizontal separation of 300 mm within the trench.

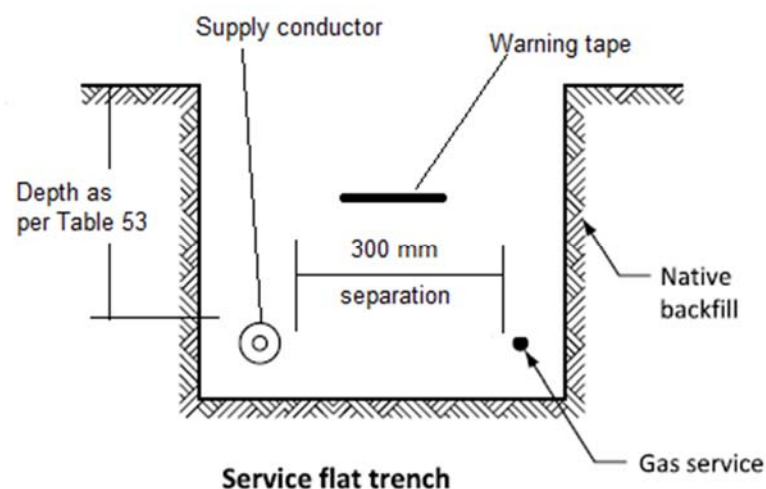


Figure 3

Horizontal separation from a gas service

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Where the electrical wiring and gas cross each other, they shall be separated vertically by a minimum of 300 mm at right angles or close to at the point of crossing. Where it is not possible to achieve this clearance, mechanical protection is required such as using a sand bag.

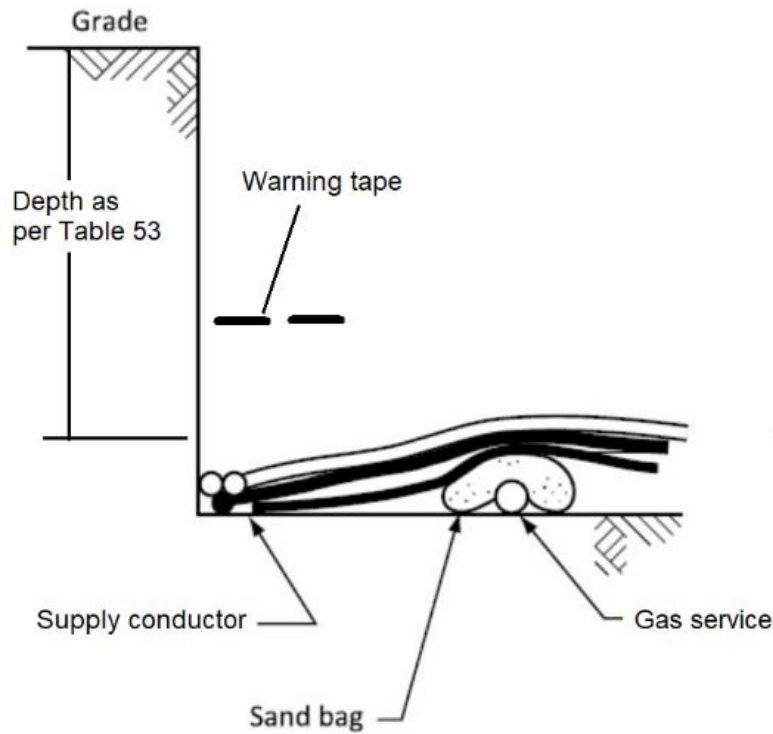


Figure 4

Electrical wiring and gas crossover