

**UNDERGROUND INSTALLATIONS****Date of Issue:** Aug 5, 2022**No:** IB-EL 2020-01  
**REVISION 01**

This bulletin provides guidance on the application of rules pertaining to the 2021 BC Electrical Code Regulation. The requirements of local municipal authorities having jurisdiction may vary. Installers should consult with local authorities having jurisdiction, prior to undertaking work, to determine their requirements.

**Scope:** This Bulletin provides guidance on acceptable material and methods used to backfill and cover underground installations.

**Background:** Many factors such as climate, terrain, elevation change, soil conditions, etc. can affect an underground installation. The code rules pertaining to the installation of underground cables and raceways may not provide adequate direction under these varying conditions. CAN/CSA C22.3 No. 7 Underground installations or other applicable standards should also be consulted.

BC Electrical code rule 12-012 provides requirements for underground installations. Where an option other than compliance with rule 12-012 has been selected, the Field Safety Representative must indicate their selected alternative when obtaining a permit for the installation of the raceways. Alternatively, this indication can be declared in the remark's section/field when a request for inspection is submitted for the concealment — however, the description of work on the permit should be revised to describe the option selected.

This bulletin provides guidance for acceptable installation of underground raceways and cables. A variance is required when methods other than those described in this bulletin are utilized.

**Acceptable options for backfill of direct buried cables or raceways:**

1. **Installations comply with rule 12-012:** Cables and conductors are permitted to be encircled with 75mm of material installed using sand or screened earth in accordance with rule 12-012 4).

The application of this subrule for the installation of raceways is also acceptable when other considerations as described in the rule are met.

2. **Utility specifications:** Where it is permitted by the utility to install cables or raceways in the same trench as a utility plant, backfill specified by the utility is acceptable (*for ducting or raceways, however, where cables are installed, requirements of rule 12-012 must be met*). Please contact the appropriate utility regarding their backfill requirements.
3. **Engineered specifications:** Specifications submitted by a qualified professional in good standing in BC are acceptable. The specifications are required to be submitted before an

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inspection is requested for concealment of underground raceways and cables, in accordance with rule 2-014.

An inspection request is required prior to concealment of any underground equipment.

It is the Field Safety Representative's responsibility to demonstrate that the installation is compliant.

### **BC Electrical Code requirements for backfill**

1. Underground cables and raceways shall be installed in accordance with rule 12-012 underground installations.
2. Subject to provisions for mechanical protection, depth of burial for cables and raceways must comply with Table 53.
3. Backfill material for direct buried cables must be screened sand or soil with maximum particle size of 4.75 mm.
4. Raceways installed in accordance with rule 12-012 4, are acceptable.
5. Where backfill includes particles larger than 4.75 mm, the installer must be able to demonstrate that the particle size will not cause damage to raceways or cables. Demonstration of compliance with C22.3 No. 7 or other applicable utility standards will be acceptable.
6. It is common for underground systems to be installed on slopes where the elevation change is significant. In these types of installations, the installer must be able to demonstrate the installation is secure and the underground components such as raceways, pull boxes, grounding systems, etc. will not be compromised through erosion or periodic flooding. The use of bracing, anchoring, etc. is recommended to prevent the underground system from damage.

### **Considerations under CSA C22.3 No. 7-15 underground systems**

The following provides general guidance regarding CSA C22.3 No. 7-15 Underground systems. Installers of underground raceways, cables, and conductors should be familiar with the requirements of CSA C22.3 No. 7-15 and are advised to obtain a copy of this standard prior to undertaking work that is intended to comply with the standard. Copies of the standard may be purchased through CSA.

**Backfill** — materials of suitable thermal properties that are placed around and tamped over the underground facilities to restore the excavation to the desired elevation and final finish; also, the act of placing and tamping these materials. [CSA. C22.3 No. 7-15, *Underground systems*; p. 13]

Backfilling of trenches is intended to restore the ground to its original state, while ensuring that cables, raceways, and other underground works are protected from damage. Factors such as compaction method, settling, particle size, and elevation changes are general considerations when selecting the appropriate material. Care must be taken to ensure cables and raceways are not damaged or distorted by backfill activities or materials.

Installers should consult the local road authority for backfill requirements of cables or raceways installed under roadways, highways, airports, and similar rights-of-way where vehicular traffic is

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expected. The Transportation Association of Canada may be able to provide guidance where installers are not able to locate their local road authority requirements.

Suitable backfill material must be selected to ensure that cables and raceways are not damaged during and after installation. Considerations include:

- preventing mechanical damage to underground plant.
- promoting compaction.
- achieving drainage.
- providing adequate heat dissipation; and
- minimizing corrosion of metal parts.

Where it is intended to use native material to backfill an excavation, installers must take care to protect cables and raceways from damage by:

- using mechanical protection; or
- using initial material that is suitable for the area over and around the underground cables or raceways to prevent damage by subsequent fill.

In unstable soil conditions, an assessment for differential soil settlement that can impose damaging stresses on cables or raceways must be undertaken. Considerations include:

- soil type, structure, and bearing strength.
- seasonal soil water content variations and freeze/thaw cycles.
- shear zones caused by pre-loaded sites.
- shear zones caused by buildings on piles.
- proximity of civil works to slopes and ditches; and
- sinking, floating, or tilting of civil structures.

All underground cables and raceways shall be marked in accordance with rule 12-012(11) to identify location and prevent damage during future excavations.

Provincial Safety Manager

**References:**

CAN/CSA C22.3 No. 7 Underground Installations

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