

# Bentonite earth electrode backfill

An absorbent moisture retaining clay for lowering resistance to earth



Bentonite is a sodium activated montmorillonite, which when mixed with water swells to many times its dry volume. This enables moisture to be absorbed from the surrounding soil (e.g. rainfall), solving any soil to earth rod contact problems.

## Application

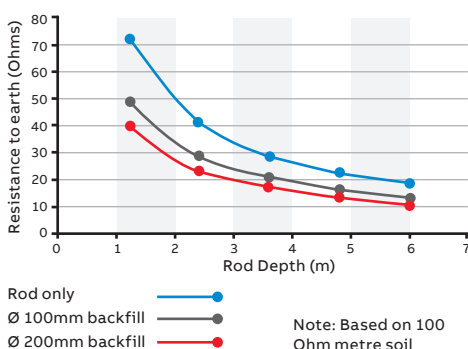
Bentonite moisture retaining clay is commonly used as a backfill for earth rods installed in drilled holes, or as a layer encapsulating horizontal earth conductors buried in a trench. Its main advantage as far as earthing is concerned is that it has the ability to retain moisture in the immediate vicinity of an earth rod, and hold it there for a considerable period of time. This reduces contact resistance and increases the effective size of earth electrodes.

When used as a backfill for an earth electrode, Bentonite will reduce its resistance to earth by greatly increasing the electrode's surface area and therefore improving its contact with the surrounding soil. For example, increasing the effective diameter of a rod from typically 15 mm to 200 mm (in Bentonite), could lower its resistance to earth by as much as 40% (see graph).

## Features & benefits:

- **Super absorbent**  
Absorbs up to five times its weight in water
- **Maximised surface**  
Swells up to thirteen times its dry volume which greatly improves contact resistance
- **Non-corrosive**  
Protects electrode and does not change characteristics as time elapses
- **Versatile installation**  
Suitable for use in trenches and particularly boreholes
- **Cost-effective**  
Requires less product when compared with cement based solutions
- **Low resistivity**  
The installed resistivity of Bentonite varies from about 3 Ohm metres upwards depending on its moisture content

Resistance versus diameter



## Product Information

Part no.	ABB order code	Description	Weight (kg)
CM015	7TCA083870R0030	Bentonite powder	25

### Versatile Installation

#### Suitable for use in boreholes and trenches

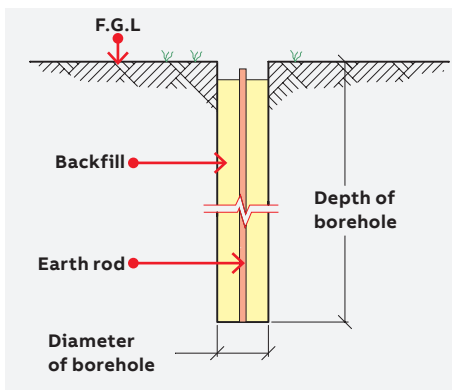
#### Mixing procedure

The expansion of Bentonite depends very much on the volume of water with which it is mixed. As a rule of thumb, we assume an expansion ratio of 2:1. So, 1 x 25 kg bag of Bentonite = 1 ft<sup>3</sup> (0.0283 m<sup>3</sup>) of dry or 2 ft<sup>3</sup> (0.0566 m<sup>3</sup>) of wet mixture. Therefore, in order to mix 1 m<sup>3</sup> of earth electrode backfill, mix 450 kg (18 bags) of Bentonite with water to suit the application.

#### Borehole procedure

- Bore a hole at the desired rod location of 75 - 100 mm (3-4 inches) diameter. The depth of the bore hole should be determined by the designer of the earthing system.
- Insert the earth rod into the borehole. Ensure that the top of the earth rod is at the correct level for its connection.
- Backfill the borehole with a Bentonite slurry. Regular agitation of the earth rod should ensure that no voids are formed within the backfill.

#### Borehole Procedure

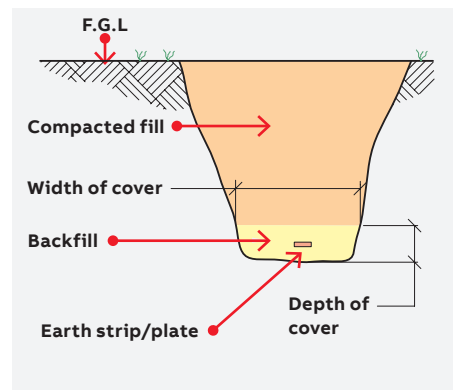


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#### Trench procedure

- Dig a trench at the desired electrode location of 200-300 mm (8-12 inches) wide. The depth of the trench (typically 600 mm) should be determined by the designer of the earthing system.
- Cover the bottom of the trench with a stiff mix of Bentonite 25-50 mm (1-2 inches) thick. Lay the earth strip into the trench. Ensure that the strip electrode is not depressed too far into the Bentonite.
- Apply another layer of Bentonite 25-50 mm (1-2 inches) thick. Ensure that the strip electrode is fully covered
- Carefully backfill and compact the remainder of the trench.

#### Trench Procedure



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