

EARTHING & LIGHTNING PROTECTION

FurseCEM™ Low Density earth electrode backfill

A reliable solution for lowering resistance to earth



Certain ground conditions make it difficult to obtain a very low earth resistance, which can be required for some particular installations.

For such cases, FurseCEM™ Low Density provides a convenient and permanent solution.

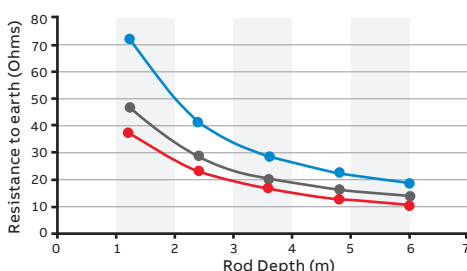


By adding FurseCEM™ Low Density in place of sand and aggregate to cement, a conductive concrete is formed. This enables this electrically conductive concrete to be used in many earthing applications, but it is primarily used within power generation and distribution, rail, underground and transport networks, telecommunication sites and defence facilities.

When used as a backfill for an earth electrode, FurseCEM™ Low Density 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, could lower its resistance to earth by as much as 50% (see graph).



Resistance versus diameter



Rod only
 Ø 100mm backfill
 Ø 200mm backfill

Note: Based on 100 Ohm metre soil

Features and benefits:

- **Tested to industry standard**
Fully compliant with IEC 62561-7 lightning protection systems components (LPSC) - Part 7: requirement for earth enhancing compounds
- **Permanent earth reading**
Resistivity that will remain constant over the life of the installation with no maintenance needed
- **Constant volume**
FurseCEM™ Low Density will not shrink or expand, thus maintaining constant contact between the earth electrode and the soil
- **Cost-effective**
Reduces drilling, saves on earthing materials, and requires no expensive maintenance
- **Environmentally friendly**
Chemically inert and completely non-corrosive in both aggressive and non-aggressive environments
- **Fast-drying properties**
Allows for quick and easy installation
- **Mechanical strength**
Provides high compressive strength where required and will not in any way damage earth electrodes, steelwork or concrete
- **Versatile installation**
Suitable for use in boreholes and trenches

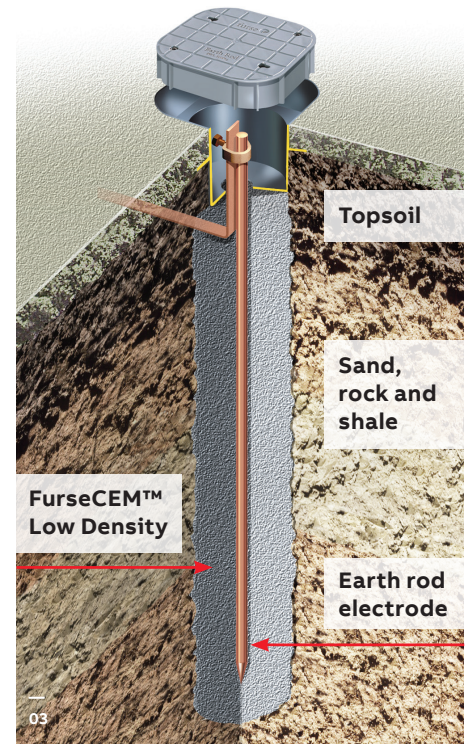
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01 FurseCEM™ Low Density concrete layer applied prior to installation of a lattice earth mat.



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02 Backfilling completed by layer of FurseCEM™ Low Density concrete applied above the lattice earth mat. Remaining ground made good with originally excavated material.



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03 FurseCEM™ Low Density concrete used as a backfill for a conventional earth rod to achieve a lower earth electrode resistance.



FurseCEM™ Low Density versus other methods of earth improvement

Chemical solutions such as copper sulphate, sodium carbonate, calcium sulphate and sodium chloride (table salt) mixed with charcoal are sometimes poured into the ground to improve earth readings, but these have the disadvantages of:

- being required in large quantities to make a difference
- requiring constant moisture to remain effective
- drying out if moisture is not present
- eventually leaching out of the soil, returning the earth resistivity to its former high value, unless regularly and expensively maintained
- causing corrosion of the earth electrode system and deterioration of concrete (particularly relevant to transmission towers)

Chemical earth rods perforated metal tubes packed with a chemical compound are also sometimes used, but these:

- are costly
- are subject to leaching or washing away of the chemicals unless maintained

FurseCEM™ Low Density is a non-corrosive permanent solution to earthing problems, providing a stable and maintenance free earth that will not vary significantly regardless of seasonal factors.

Mixing Procedure

The FurseCEM™ Low Density to cement/water ratio necessary for a particular application will depend on the workability and compressive strength required of the conductive concrete.

A typical specification would be 3:1 by weight e.g. in order to mix 1 m³ of conductive backfill, mix 975 kg of FurseCEM™ Low Density to 325 kg of cement and 250/300 litres of water. The mixing and placing of the concrete conforms to normal practices.

— FurseCEM™ Low Density earth electrode backfill

Description	ABB Product Code	Weight (kg)	Part No.
FurseCEM™ Low Density	7TCA083870R2019	25	CM045
FurseCEM™ Low Density Premix (conductive earthing mix supplied with cement)	7TCA083870R2020	25	CM050