Therefore, the backfill material may introduce a considerable amount of non-degradable and not environmentally friendly constituents into the ground.

From the above it becomes clear that there is still a need for backfill materials, which comprise no or at least reduced amounts of environmentally questionable components while still having long-term service life.

Therefore, the object of the disclosure is to at least partially overcome the deficiencies of known backfill materials.

The object of the disclosure is solved, by means of a conductive and swellable backfill material for earthing applications comprising a conductive material selected from the group of graphite, coke powder and a combination thereof, a polyacrylamide powder, a binder comprising cement, and, optionally, a salt selected from the group of magnesium sulfate, sodium sulfate and a combination thereof.

In one aspect, the disclosure relates to a conductive and swellable backfill material for earthing applications comprising a (i) conductive material selected from the group of graphite, coke powder and a combination thereof, (ii) a polyacrylamide powder, (iii) a binder comprising cement, and, optionally, (iv) a salt selected from the group of magnesium sulfate, sodium sulfate and a combination thereof.

The backfill material according to the disclosure is specifically designed to swell upon contact with water, which can be present by means of soil water, rain or manual application upon installation of the backfill material.

The swelling process allows the backfill material to fill up any voids or air pockets which might be present in an earth hole in which the backfill material is filled. Also, this effect reduces the amount of backfill material necessary to fill up an earth hole of given volume and provides for an especially homogenous backfill material.

Furthermore, the swelling process provides an enhanced contact with a metallic rod or electrode used in an earth termination system in conjunction with the backfill material, e.g. a rod comprising or consisting of copper, aluminium

Claims

1. A conductive and swellable backfill material for earthing applications comprising a (i) conductive material selected from the group of graphite, coke powder and a combination thereof, (ii) a polyacrylamide powder, (iii) a binder comprising cement, and, optionally, (iv) a salt selected from the group of magnesium sulfate, sodium sulfate and a combination thereof.

2. The backfill material according to claim 1 wherein the polyacrylamide powder comprises an anionic polyacrylamide powder.

3. The backfill material according to claim 1 or 2 wherein the polyacrylamide powder has at least one of the following properties:

- a particle size in the range of from 20 to 80 mesh (US),

- a bulk density in the range of from 850 to 950 kg/m^3, and

- a gelling index of at least 1 kg in 1000 L water at a gelling duration of from 65 to 300 seconds.

4. The backfill material according to any of the preceding claims wherein the binder comprises a cement selected from the group consisting of Ordinary Portland Cement (OPC), Portland Pozzolana Cement (PPC), Sulfate Resisting Cement, Blast Furnace Slag Cement and combinations thereof.

5. The backfill material according to any of the preceding claims wherein the dry backfill material comprises

from 35 to 80 weight percent of the conductive material,

from 10 to 30 weight percent of the polyacrylamide powder,

from 5 to 6 weight percent of the binder, and

from 0 to 40 weight percent of the salt, each based on the total amount of solid components of the backfill material.

6. The backfill material according to any of the preceding claims wherein the backfill material further comprises Fly Ash.

7. The backfill material according to claim 6 wherein the dry backfill material comprises 10 weight percent or less of Fly Ash, based on the total amount of solid components of the backfill material.

8. The backfill material according to any of the preceding claims wherein the backfill material shows a water absorption of at least 110 % after 24 hours upon exposure to water based on the mass of the dry backfill material.

9. The backfill material according to any of the preceding claims wherein the backfill material has a resistivity of 0.12 Ωm or less.

10. The backfill material according to any of the preceding claims wherein the backfill material has a pH value in the range of from 6.50 to 7.50.