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(54) **Feldfreies Heizkabel**

(57) The present invention relates to electrical floor heating cable and in particular to cables generating acceptably small electromagnetic fields. The cable of the invention has a first, near end and a second, far end and comprises within an outer protective sheath (4) a cable core consisting of

- a central resistance conductor (1)
- a concentric sheath of insulation material (2) surrounding the resistance conductor, - as well as
- return conductor means (5) arranged to be interconnected with the resistance conductor in the far end of the cable.

The return conductor means consists of at least two separate conductors (5;5a-5c;10,11;15,16,17) which are distributed in the cable core. The return conductors are preferably embedded in a common insulation sheath (3) arranged over the resistance conductor sheath (2).

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Description

The present invention relates to electrical floor heating cables and in particular to cables generating acceptably small electromagnetic fields. In general the magnetic field is best reduced/eliminated by a concentric shield, as in coaxial cables, but this is not a practical solution with heating cables. The field generation problem can also be somewhat reduced by using two-conductor cables instead of single-conductor cables because the fields generated from the two conductors tend to eliminate each other. The fields from two-conductor cables having a resistance conductor and a return conductor should - however - be further reduced.

The object of the present invention is to reduce the field generating properties of electrical floor heating cable having a first, near end and a second, far end and comprising within an outer protective sheath a cable core consisting of

- a central resistance conductor,
- a concentric sheath of insulation material surrounding the resistance conductor, - as well as
- return conductor means arranged to be interconnected with the resistance conductor in the far end of the cable.

The main features of the invention appears from the accompanying claims. The problem of eliminating or greatly reducing generation of electromagnetic fields which could be harmful to human beings occupying rooms heated with electrical floor heating cables has been solved by letting the return conductor means consist of at least two separate conductors which are distributed in the cable core. The electromagnetic field is reduced to about 1% of the field experienced from single conductor heating cables, and to some 10% of the fields from normal two conductor cables.

Above mentioned and other features and objects of the present invention will clearly appear from the following detailed description of embodiments of the invention taken in conjunction with the drawings, where

Figures 1-4 show four embodiments of the invention.

In Figure 1 to 4 a resistance conductor 1 is provided with a concentric sheath 2 of insulation material such as crosslinked polyethylene. All embodiments have an outer protective sheath 4 of PVC or other suitable material and an earth screen 7 in contact with earth means 6 or 20. The earth screen could be a conventional Al/PE tape in contact with Cu wires 6 or 20. In the near end of the cable the resistance conductor can be substituted with a cold end copper conductor. Return conductors 5;10,11;15,16,17 are embedded in a common insulation sheath 3 arranged over the resistance conductor sheath 2. The sheath 3 could be a PVC sheath.

In Figure 1 the return conductor means is divided into three separate conductors 5a, 5b and 5c which are distributed in the cable core. In Figure 2 the return conductors means is constituted by two conductors 10 and 11 arranged 180° apart whereas in Figure 3 there are three conductors 15, 16 and 17 arranged 120° apart. In Figure 4 the return conductors 5 are arranged 90° apart.

In Figures 1-3 an earth wire 6 is arranged in a slot in the common insulation sheath 3, whereas in Figure 4 the earth conductor 20 is arranged as a group of conductors between the sheath 3 and the earth screen 7 and covering 10 - 25 % of the sheath surface.

All elements of the cable are preferably arranged in parallel with the cable axis, thereby avoiding stranding operations.

The above detailed description of embodiments of this invention must be taken as examples only and should not be considered as limitations on the scope of protection.

Claims

1. Electrical floor heating cable having a first, near end and a second, far end and comprising within an outer protective sheath (4) a cable core consisting of

- a central resistance conductor (1),
- a concentric sheath of insulation material (2) surrounding the resistance conductor, - as well as
- return conductor means (5) arranged to be interconnected with the resistance conductor in the far end of the cable, **characterized in that** the return conductor means consists of at least two separate conductors (5;5a-5c;10,11;15,16,17) which are distributed in the cable core.

2. Cable according to claim 1, **characterized in that** the return conductors (5;5a-5c;10,11;15,16,17) are embedded in a common insulation sheath (3) arranged over the resistance conductor sheath (2).

3. Cable according to claim 1 or 2, **characterized in that** the return conductors (5;5a-5c;10,11;15,16,17) are arranged in contact with the resistance conductor sheath (2).

4. Heating cable according to claim 1, 2 or 3 **characterized in that** the return conductors (5;10,11;15,16,17) are evenly distributed around the resistance conductor sheath, such as two conductors 180° apart or three conductors 120° apart or four conductors (5) 90° apart.

5. Cable according to claim 1, 2 or 3,
characterized in that the return conductors
include three conductors (5a,5b,5c) arranged 90
degrees apart from each other and from an earth
wire (6). 5
6. Cable according to claim 2,
characterized in that the common insulation
sheath (3) is provided with slot (8) for receiving an
earth wire (6) which is in contact with an earth
screen (7). 10
7. Cable according to claim 2,
characterized in that it includes a number of earth
wires (20) arranged around the common insulation
sheath (3) in contact with an earth screen (7). 15
8. Cable according to claim 7,
characterized in that the earth wires (29) are
arranged as a group around the sheath (3) covering
10 - 25 % of the sheath surface. 20
9. Cable according to claim 1,
characterized in that all the elements of the cable
are arranged in parallel with the cable axis. 25
10. Cable according to claim 1,
characterized in that in the near end of the cable
the resistance conductor is substituted with a cold
end copper conductor. 30

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