EARTHABLE FLEXIBLE INTERMEDIATE BULK CONTAINER

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ABSTRACT

The application relates to an earthable flexible intermediate bulk container comprising a container 1 made of a flexible material, which has a dissipative or conductive grid of conductive threads 5, or alternatively is dissipative or conductive over the full surface area, and at least one carrying strap 2 connected to the container 1 by means of a carrying seam 3, characterized in that at least one carrying strap 2 is provided over the full surface area, at least from the carrying seam 3 to the suspension point 4, with a dissipative or conductive material in a surface resistance range, measured in accordance with TRBS 2153, of 0.1 to 10⁵ ohms.
EARTHABLE FLEXIBLE INTERMEDIATE BULK CONTAINER

[0001] The application relates to an earthable flexible intermediate bulk container.

[0002] Earthable flexible intermediate bulk containers, Type C FIBCs, are generally used for avoiding risks of electrostatic ignition in areas where there is a potentially explosive atmosphere or when handling combustible dusts with a high level of ignition sensitivity.

[0003] Commercially available Type C FIBCs are sewn-together containers with a carrying strap of a flexible material in which the carrying strap makes it possible for the container to be picked up from above and transported (as shown for example in FIG. 1). They are generally made of a polypropylene fabric that is provided with a dissipative or conductive grid of conductive threads. The connection of the conductive threads to another requires appropriate sewing of the fabric, so that the conductive threads of all the individual parts of the FIBC are in good, adequate contact with one another and with the earthable point, see also TRBS 2153 Annex B and DIN IEC 61340-04-04.

[0004] In practice, this connection is not always ensured in all places. In particular there are often problems in the region of the carrying straps, which nowadays are generally made of insulating PP fabric and are provided with 3 to 8 conductive threads arranged exclusively in parallel, for one reason because not all of the conductive threads are in adequate contact with the earthable point—for example, the threads may be destroyed by the sewing on of the carrying straps—or since they only rest loosely on the PP fabric of the body of the FIBC—they do not have a proper earth contact. For another reason because twisting of the carrying straps for example means that adequate contact of the threads with the picking-up equipment—for example a spider-strap—which often serves as an earthing point, is not always ensured.

[0005] From the aspect of avoiding risks of electrostatic ignition, earthing of Type C FIBCs is a safety measure that has to meet strict requirements and, as a result of manufacturing defects or operating errors, can lead to accidents (L. G. Britton, “Process Safety Progress”, Vol. 12. No. 4. October (1993), 240-250).

[0006] FIBCs are therefore additionally provided with one or more earthing jumpers, the location of which is not specific. Nevertheless, inadequately earthed conductive threads can under some circumstances lead to risks of electrostatic ignition. An FIBC that is not earthed leads to strong effectively igniting electrostatic spark discharges.

[0007] The object was therefore to invent an earthable flexible intermediate bulk container with significantly simplified and improved earthing, without any isolated conductive threads being able to occur any longer in the carrying straps.

[0008] The object was achieved according to the invention by at least one carrying strap 2 of the intermediate bulk container being provided over the full surface area, at least from the carrying strap 3 to the suspension point 4, with a dissipative or conductive material in a surface resistance range, measured in accordance with TRBS 2153, of 0.1 to 10⁷ ohms.

[0009] The subject matter of the application is therefore an earthable flexible intermediate bulk container comprising:

- container 1 made of a flexible material, which has a dissipative or conductive grid of conductive threads 5, or alternatively is dissipative or conductive over the full surface area, and

- at least one carrying strap 2 connected to the container 1 by means of a carrying seam 3, characterized in that at least one carrying strap 2 is provided over the full surface area, at least from the carrying seam 3 to the suspension point 4, with a dissipative or conductive material in a surface resistance range, measured in accordance with TRBS 2153, of 0.1 to 10⁷ ohms.

[0010] For the purposes of the invention, provision over the full surface area means that the carrying strap is continuously dissipative or conductive over its surface area instead of being provided with parallel conductive threads. For the purposes of the invention, therefore, carrying straps are not exclusively provided with conductive threads, a combination of conductive threads and a full surface area that is conductive being possible.

[0011] By providing at least one of the carrying straps with a conductive effect over the full surface area in the way according to the invention, these straps can be regarded as intrinsically safe earthable parts, and the earthing can then be simply ensured firstly by way of the picking-up equipment—for example the conductive and earthed metal spider clamp or else the metal prongs of a forklift truck (always earthed in areas with potentially explosive atmospheres). Secondly, an earthing clip may also be securely attached to the carrying straps, and there are no longer occasions when the FIBCs are already regarded as unsuitable in the inspection of incoming goods just because of inadequately earthed conductive threads.

[0012] The material, usually polypropylene, that is necessary for the load-bearing strength of the straps, usually remains present as before. The conductive effect described can be provided for example by enclosing them in conductive foil or by conductive coating of the carrying straps or the like.

[0013] For reasons of flexibility/extensibility of the carrying straps, it is sufficient to make 60% to 100% of the surface area of a carrying strap conductive, as long as the earthing between the container and the suspension point of the carrying strap is ensured, i.e. the provision of a conductive effect begins on one side of the carrying strap at the carrying seam.

[0014] Preferably, all of the carrying straps are provided with a conductive effect over the full surface area.

[0015] Should earthing jumpers be desired in the bottom region, an extension of at least one carrying strap in the bottom region can easily be made into an earthing lug. It is then possible to dispense with the additional sewing on of further earthing points, such as for example earthing jumpers.

[0016] The carrying straps can then be referred to in the earthing instructions as clearly identified earthable points; in addition, if desired, an earthing symbol could be printed onto the carrying straps provided with a conductive effect.

FIG. 1: Type C FIBC according to the prior art, where:

- 1—container
- 2—carrying strap
- 3—carrying seam
- 4—suspension point
- 5—dissipative or conductive grid of conductive threads
[0025] 6—earthing jumpers
[0026] 7—earthing lead

1. Earthable flexible intermediate bulk container comprising:
   a container made of a flexible material, which has a dissipative or conductive grid of conductive threads, or alternatively is dissipative or conductive over a full surface area thereof, and
   at least one carrying strap connected to the container by means of a carrying seam,
   wherein at least one carrying strap is provided over the full surface area, at least from the carrying seam to a suspension point, with a dissipative or conductive material in a surface resistance range, measured in accordance with TRBS 2153, of 0.1 to $10^9$ ohms.

2. Earthable flexible intermediate bulk container, all carrying straps thereof being provided with a conductive effect over a full surface area.

3. Earthable flexible intermediate bulk container, at least one carrying strap being made into an earthing lug in a bottom region thereof.

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