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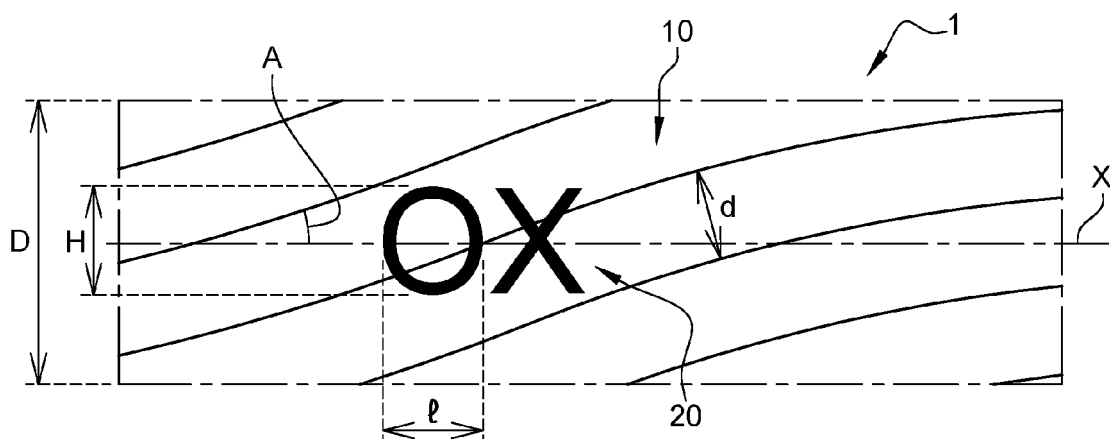
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(54) **A MARKED ELECTRIC CONDUCTOR**

(57) Electrical cable comprising: a central core and an outer layer of individual wires twisted around a longitudinal axis of the core, wherein a marking is provided along the longitudinal axis on at least two adjacent individual wires.

Fig. 2



Description

FIELD OF THE INVENTION

[0001] The present invention relates to electric cables comprising at least two conductors wound together to form a bundle. The invention aims to provide solution to guaranty exact length of cable provided to client, without the need to control mass of the delivered cables.

BACKGROUND OF THE INVENTION

[0002] It is known in the art, from EP-2706540, a cable including a marking device consisting of pairs (P1, P2, P3) of adjacent identical length values, the pairs respectively being spaced apart by a unit of length and being made up of increasing values, this marking device being designed to allow the cutting of a segment with length L of cable wound around a cable drum, characterized in that said marking device also includes two different marks on either side of each pair of values.

[0003] This solution is interesting for a cable user needing to cut cable to an exact length. The aim of that solution is to print a lot of marking onto a single cable, and to provide at the same time the cutting location for users willing to obtain a determined centimeters or meters of cables without the need of an extra device to measure it.

[0004] In the art when cables are provided to clients who intend to use those electric cable into huge buildings infrastructure, there is a need for those clients to be provided with an exact length of reeled cable that they may unreel on purpose.

[0005] Up to now, cable manufacturers used to weight the quantity of reeled cables delivered at their facilities. But this method is somewhat imprecise as the reeling support may introduce some variability. Moreover, the volume of reeled cable may not reflect the exact length of cable available on a reel as there might have been a problem during reeling and voids may be created in between the reeled layers of cable around the support.

[0006] The invention provides cables with an efficient information, especially for cables reeled on a support. Thanks to the invention, cable manufacturer may easily check the length of cables they received at their facilities, whatever the exact external shape of the reeled cable is, and without the need of a weighting check procedure. Weight checking is difficult as it is needed to weight the reeled cable and its support, and to weight the support when the cable has been fully unreeled. This weighting check procedure only provides information at a time the cable manufacturer already used the full length of cable in its manufacturing process. The invention aims to provide an efficient marking that provides early certainty at the client's facilities, to safe their building processes.

[0007] To that end, the invention provides an electrical cable comprising: a central core and an outer layer of individual wires twisted around a longitudinal axis of the core, wherein a marking is provided along the longitudinal

axis on at least two adjacent individual wires.

[0008] Each individual wires may be a bare metallic conductor, for example tinned, silver-plated or nickel-plated copper wires. A bare metallic conductor is a conductor free of any electrically insulating layer, especially free of any most external electrically insulating layer.

[0009] Individual wires are wound around the longitudinal axis of the cable with an angular wire inclination such that the marking is provided along a section of the cable such that the section forms a marking angle compared to the longitudinal, that marking angle being inferior to the angular wire inclination. For example, marking angle may also be a null angle compared to the longitudinal axis.

[0010] Preferably several markings are performed all along the cable at a substantially constant interval. Marking may include metering information such that the reeled cable is provided with the lowest metering value close to the support, and the marking with the highest metering value being the most external part of that reeled cable. For example, markings may be provided every meter all along the cable.

[0011] Preferably marking comprises at least two distinct characters, each character having at least height and width above individual wires diameter, and less than cable diameter.

[0012] Even more preferably character height and width is at least 110% of individual wires diameter, and less than 70% of the cable diameter.

[0013] The invention also provides a reeled cable comprising a support and an electrical cable according to the invention, the electrical cable being reeled in successive layers around the support.

[0014] Finally, the invention also provides a reeling process of a cable wherein an electrical cable according to the invention, such that the marking is provided by an inkjet printer after twisting the individual wires to form the electrical cable and before reeling the electrical cable on the support.

[0015] A further object of the present invention is to seek to solve one or more of the problems or drawbacks according to prior art.

[0016] Advantageous embodiments of the present invention are indicated in the dependent claims.

[0017] Other objects and advantages of the present invention will more fully appear from the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is an external view of a reeled cable along the invention;

Figure 2 is an enlarged view of a marking on a cable along the invention.

SUMMARY OF THE INVENTION

[0018] An electrical cable 1 of the invention is a strand-

ed cable comprising a plurality of metallic wires 10, for example of aluminum, copper, or other metals or alloys of combinations thereof, where the metallic wires are bundled or wrapped together to form the stranded cable.

[0019] The stranded cable 1 may be manufactured in a variety of configurations, where the plurality of metallic wires is bundled or wrapped together to form a bunch stranding configuration, a concentric stranding configuration, an unilay stranding configuration or a rope laying configuration.

[0020] Furthermore, the stranded cable 1 may have a generally circular cross-section. Preferably the external cross section of such electrical cable is provided by adjacent external surfaces of wires placed in contact one to another and stranded in an helical manner around a central core such that there is enough metallic wires to cover the central core all over with adjacent wires.

[0021] Metallic wires 10 being of a generally circular cross section, those metallic wires are tangentially contacting each other to define the external surface of the electrical cable.

[0022] The electrical cable 1 according to the invention is a multi-wire electrical conductor assembly. The central core may be either identical to metallic wires forming the external surface of the cable, or in an alternative be a carbon wire.

[0023] For example, the electrical cable according to the present invention includes nineteen individual metallic wires 10. A core wire is provided which has a straight longitudinal extent, and for example six wires are closely wound in helical fashion about the core wire to provide a centrally arranged cluster of seven wires having a circular cross-section, and the remaining twelve wires are closely wound in helical fashion around the periphery of the centrally arranged cluster of wires. In forming the electrical cable, it is preferable to first wind the wires about the core wire, and then wind the second layer of wires about the first wire with the same direction of helical twist. However, all wires could be wound simultaneously, and the outer wires can be wound with a helical twist opposite that of wires. Preferably all individual wires are identical metallic wires.

[0024] Cross section of each individual wire is between 0.15 mm² and 2 mm².

[0025] The electrical cable extends along a longitudinal axis X. It presents an outer diameter "D" between 2 and 40 mm.

[0026] Each individual wire has an external diameter "d" between 0.05 and 12 mm.

[0027] Wires are helically wound along the X axis, such that wires defining part of the external surface of the electrical cable present an angle A with such longitudinal axis.

[0028] Marking 20 provided on the cable may comprise at least one row of character. A row of character may comprise at least two characters. A character is, by definition, a graphic symbol used in writing or printing. Characters may be any kind of sign or symbol, including let-

ters, figures and/or Unicode set of characters. Size of the characters are in length "l" along the X-axis and Height "H" perpendicular to X-axis are set such that

$$H \geq 1.1 * d * \tan(A) / \sin(A)$$

$$H \leq 0.7 * D$$

Claims

1. Electrical cable comprising: a central core and an outer layer of individual wires twisted around a longitudinal axis of the core, wherein a marking is provided along the longitudinal axis on at least two adjacent individual wires.
2. Electrical cable according to claim 1 wherein individual wires are bare metallic conductors, for example tinned, silver-plated or nickel-plated copper wires.
3. Electrical cable according to one of the preceding claims wherein individual wires are wound around the longitudinal axis with an angular wire inclination such that the marking is provided along a section of the cable such that the section forms a marking angle compared to the longitudinal inferior to the angular wire inclination.
4. Electrical cable according to one of the preceding claims wherein several markings are performed all along the cable at a substantially constant interval.
5. Electrical cable according to claim 1 wherein marking comprises at least two distinct characters, each character having at least height and width above individual wires diameter, and less than cable diameter.
6. Electrical cable according to claim 5 wherein character height and width is at least 110% of individual wires diameter, and less than 70% of the cable diameter.
7. Reeled cable comprising a support and an electrical cable according to any previous claims, the electrical cable being reeled in successive layers around the support.
8. Reeling process of a cable wherein an electrical cable according to any claim 1 to 6 wherein the marking is provided by an inkjet printer after twisting the individual wires to form the electrical cable and before reeling the electrical cable.

Fig. 1

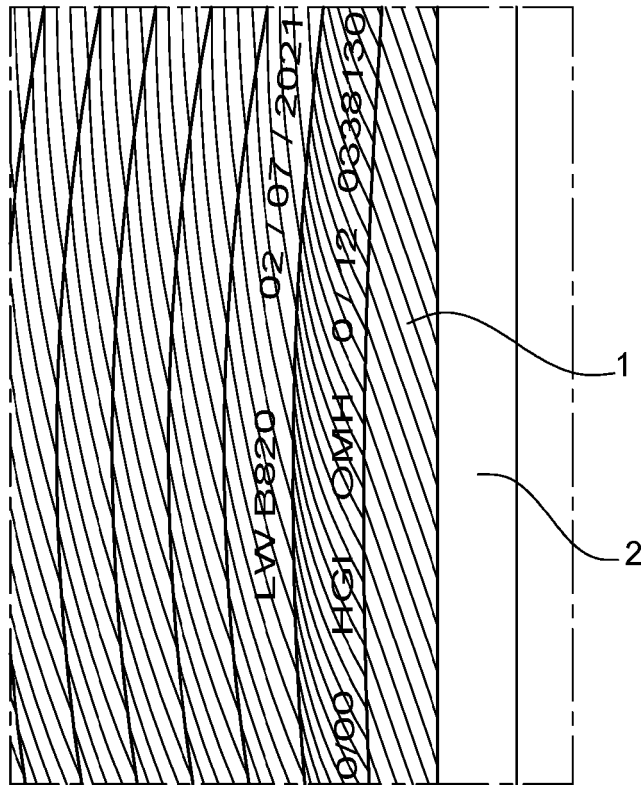
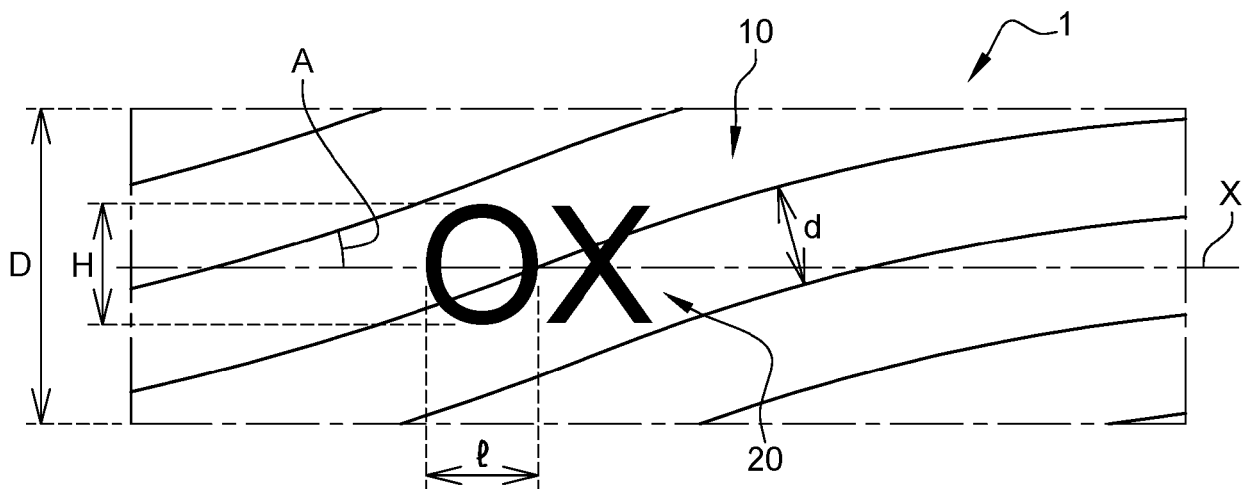


Fig. 2





EUROPEAN SEARCH REPORT

Application Number

EP 22 30 5283

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EPO FORM 1503 03.82 (P04C01)

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 July 2022	Examiner Alberti, Michele
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 30 5283

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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