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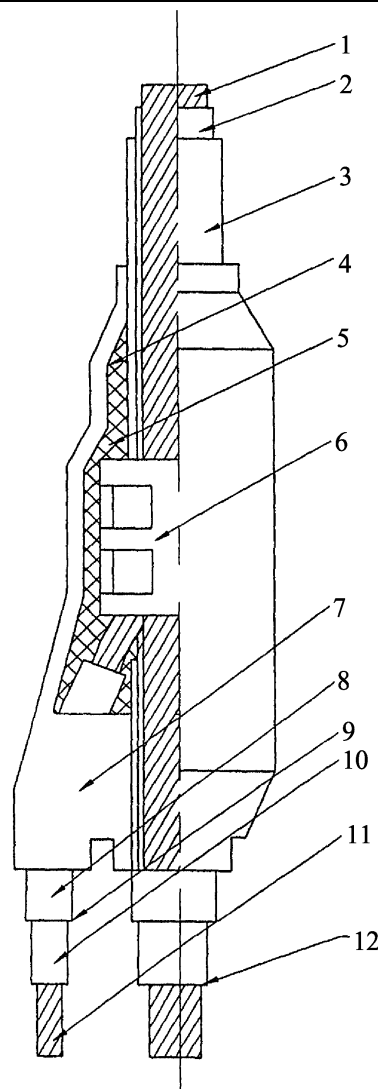
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(54) Title of invention

METHOD FOR MANUFACTURING
PREFABRICATED FLEXIBLE BRANCH CABLE

(57) Abstract

A method for manufacturing a prefabricated flexible branch cable. A main insulation layer and a main outer sheath are sequentially provided outside a main cable conductor, a branch insulation layer and a branch outer sheath are sequentially provided outside a branch cable conductor, between the main insulation layer and the main outer sheath, talcum powder containing an isolating agent is applied and a main non-woven fabric is wrapped, between the branch insulation layer and the branch outer sheath, talcum powder containing an isolating agent is applied and a branch non-woven fabric is wrapped, the main insulation layer, the main outer sheath, the branch insulation layer and the branch outer sheath are each peeled off at a joint between the main cable conductor and the branch cable conductor, the main cable conductor and the branch cable conductor are crimped by means of a C-shaped clamp with a ridge by an automatic hydraulic machine, after the crimping is completed, injection molding of a connector insulation layer is performed by using a suitable mold, a non-woven fabric is then wrapped around the formed connector insulation layer to form a non-woven wrapping layer, injection molding of a connector outer protective layer is performed again outside the non-woven wrapping layer, and the connector insulation layer and the connector outer protective layer jointly constitute a branch cable connector.



Claims

1. A method for manufacturing a prefabricated flexible branch cable, the prefabricated flexible branch cable comprising a main cable conductor (1) and a branch cable conductor (11), wherein a main insulation layer (2) and a main outer sheath (3) are sequentially provided outside the main cable conductor (1), a branch insulation layer (10) and a branch outer sheath (8) are sequentially provided outside the branch cable conductor (1), between the main insulation layer (2) and the main outer sheath (3), talcum powder containing an isolating agent is applied and a main non-woven fabric (12) is wrapped, between the branch insulation layer (10) and the branch outer sheath (8), talcum powder containing an isolating agent is applied and a branch non-woven fabric (9) is wrapped, the main insulation layer (2), the main outer sheath (3), the branch insulation layer (10) and the branch outer sheath (8) are each peeled off at a joint between the main cable conductor (1) and the branch cable conductor (11); the main cable conductor (1) and the branch cable conductor (11) are crimped by means of a C-shaped clamp (6) with a ridge by an automatic hydraulic machine, after the crimping is completed, injection molding of a connector insulation layer (5) is performed by using a suitable mold, a non-woven fabric is then wrapped around the formed connector insulation layer (5) to form a non-woven wrapping layer (4), injection molding of a connector outer protective layer (7) is performed again outside the non-woven wrapping layer (4), and the connector insulation layer (5) and the connector outer protective layer (7) jointly constitute a branch cable connector; the main insulation layer (2), the main outer sheath (3), the branch insulation layer (10), the branch outer sheath (8), the connector insulation layer (5), and the connector outer protective layer (7) are all made of methyl diphenyl flame-retardant silicone rubber, which has an operating temperature of up to 250°C after vulcanization; and before the injection molding of the connector insulation layer (5), it is ensured that the connector insulation layer (5) and the main insulation layer (2) and the branch insulation layer (10) are not vulcanized to form an interface therebetween, a

temperature at a manufacturing site is also controlled to be lower than the vulcanization temperature of the methyl diphenyl flame-retardant silicone rubber, and moreover, on the premise of ensuring mechanical properties, the amount of a vulcanizing agent and an accelerator in the methyl diphenyl flame-retardant silicone rubber is strictly controlled to prolong a vulcanization time as much as possible.

METHOD FOR MANUFACTURING PREFABRICATED FLEXIBLE BRANCH CABLE

Technical Field

[0001] The present invention relates to a method for manufacturing a cable, and in particular to a method for manufacturing a prefabricated flexible branch cable.

Background Art

[0002] Prefabricated branch cables are entire continuous cable sets prefabricated in factories. According to the requirements of main cables, at specified parts of the main cables, conductors of the main cables and branch cables are compressively connected by means of copper or copper alloy tubes, and complete insulating treatment is then performed (JB/T10636-2006). Generally, the branch cables are structurally classified into two types of cables, namely, single-core prefabricated branch cables and multi-core prefabricated branch cables, which are widely applied to high-rise buildings, large standardized factories, comprehensive cultural, educational, sports and health facilities, highways, bridges and tunnels. At present, the main reference standards for branch cable manufacturing include JCS 376A-2002 "Cables with Branches", JCS427-2000 "600v Environmentally-Friendly Cables with Branches", JG/T 147-2002 "Copper-core Plastic Insulated Prefabricated Branch Power Cables with Rated Voltage of 0.6/1kV" and JB/T 10636-2006 "Copper-core Plastic Insulated Prefabricated Branch Cables with Rated Voltage of 0.6/1kV ($U_m = 1.2kV$)" of Japanese Electric Wire and Cable Makers' Association Standard. According to the above-mentioned standards, the main cables and the branch cables shall be insulated using polyvinyl chloride and cross-linked polyethylene, and sheaths are typically polyvinyl chloride sheaths and polyolefin sheaths; these standards basically stipulate water-immersion voltage tests or spark tests and insulation resistance tests of branch connectors of finished branch cables. The polyvinyl chloride is a thermoplastic material, which has an operating temperature of substantially 65°C or 70°C, and easily

absorbs water. Water absorption will cause the insulation resistance of the polyvinyl chloride to drop sharply. In addition, as a thermosetting material, the cross-linked polyethylene has an increased operating temperature, but it is only 90°C. An interface inevitably exists between insulations of the main cable and the branch cable in the connector, so these cables are not suitable for long-term water-immersion, underground or high-humidity environments. Obviously, in an operating environment exceeding 100°C or a long-term humid environment, current branch cables are hard to pass or fail to pass the water-immersion withstand voltage test or the insulation resistance test.

Summary of the Invention

[0003] The present invention aims to provide a method for manufacturing a prefabricated flexible branch cable. Products produced with the method are resistant to high humidity and high temperature, and are completely applied to an operating environment exceeding 100°C but lower than 250°C or a long-term humid environment.

[0004] In order to achieve the above object, a solution of the present invention is as follows: a method for manufacturing a prefabricated flexible branch cable, the prefabricated flexible branch cable comprising a main cable conductor and a branch cable conductor, where a main insulation layer and a main outer sheath are sequentially provided outside the main cable conductor, a branch insulation layer and a branch outer sheath are sequentially provided outside the branch cable conductor, between the main insulation layer and the main outer sheath, talcum powder containing an isolating agent is applied and a main non-woven fabric is wrapped, between the branch insulation layer and the branch outer sheath, talcum powder containing an isolating agent is applied and a branch non-woven fabric is wrapped, the main insulation layer, the main outer sheath, the branch insulation layer and the branch outer sheath are each peeled off at a joint between the main cable conductor and the branch cable conductor, the main cable conductor and the branch cable conductor are crimped by means of a C-shaped clamp with a ridge by an automatic hydraulic machine, after the crimping is

completed, injection molding of a connector insulation layer is performed by using a suitable mold, a non-woven fabric is then wrapped around the formed connector insulation layer to form a non-woven wrapping layer, injection molding of a connector outer protective layer is performed again outside the non-woven wrapping layer, and the connector insulation layer and the connector outer protective layer jointly constitute a branch cable connector; the main insulation layer, the main outer sheath, the branch insulation layer, the branch outer sheath, the connector insulation layer, and the connector outer protective layer are all made of methyl diphenyl flame-retardant silicone rubber, which has an operating temperature of up to 250°C after vulcanization; and before the injection molding of the connector insulation layer, it is ensured that the connector insulation layer and the main insulation layer and the branch insulation layer are not vulcanized to form an interface therebetween, a temperature at a manufacturing site is also controlled to be lower than the vulcanization temperature of the methyl diphenyl flame-retardant silicone rubber, and moreover, on the premise of ensuring mechanical properties, the amount of a vulcanizing agent and an accelerator in the methyl diphenyl flame-retardant silicone rubber is strictly controlled to prolong a vulcanization time as much as possible.

[0005] The high-humidity and high-temperature resistant silicone rubber prefabricated flexible branch cable produced by the manufacturing method is completely applicable to an operating environment not exceeding 250°C or a long-term humid environment.

Brief Description of the Drawings

[0006] FIG. 1 is a schematic structural view of a single-core prefabricated branch cable.

[0007] In the figure: 1. Main cable conductor, 2. Main insulation layer, 3. Main outer sheath, 4. Non-woven wrapping layer, 5. Connector insulation layer, 6. C-shaped clamp, 7. Connector outer protective layer, 8. Branch outer sheath, 9. Branch non-woven fabric, 10. Branch insulation layer, 11. Branch cable conductor, 12. Main non-woven fabric.

Detailed Description of Embodiments

[0008] The present invention will be further described below with reference to an embodiment and an accompanying drawing thereof.

[0009] Referring to FIG. 1, a single-core prefabricated branch cable is taken as an example. A method for manufacturing a prefabricated flexible branch cable is provided. The prefabricated flexible branch cable comprises a main cable conductor 1 and a branch cable conductor 11. A main insulation layer 2 and a main outer sheath 3 are sequentially provided outside the main cable conductor 1, a branch insulation layer 10 and a branch outer sheath 8 are sequentially provided outside the branch cable conductor 1, between the main insulation layer 2 and the main outer sheath 3, talcum powder containing an isolating agent is applied and a main non-woven fabric 12 is wrapped, between the branch insulation layer 10 and the branch outer sheath 8, talcum powder containing an isolating agent is applied and a branch non-woven fabric 9 is wrapped, the main insulation layer 2, the main outer sheath 3, the branch insulation layer 10 and the branch outer sheath 8 are each peeled off at a joint between the main cable conductor 1 and the branch cable conductor 11, the main cable conductor 1 and the branch cable conductor 11 are crimped by means of a C-shaped clamp 6 with a ridge by an automatic hydraulic machine, after the crimping is completed, injection molding of a connector insulation layer 5 is performed by using a suitable mold, a non-woven fabric is then wrapped around the formed connector insulation layer 5 to form a non-woven wrapping layer 4, injection molding of a connector outer protective layer 7 is performed again outside the non-woven wrapping layer 4, and the connector insulation layer 5 and the connector outer protective layer 7 jointly constitute a branch cable connector; the main insulation layer 2, the main outer sheath 3, the branch insulation layer 10, the branch outer sheath 8, the connector insulation layer 5, and the connector outer protective layer 7 are all made of methyl diphenyl flame-retardant silicone rubber, which has an operating temperature of up to 250°C after

vulcanization; and before the injection molding of the connector insulation layer 5, it is ensured that the connector insulation layer 5 and the main insulation layer 2 and the branch insulation layer 10 are not vulcanized to form an interface therebetween, a temperature at a manufacturing site is also controlled to be lower than the vulcanization temperature of the methyl diphenyl flame-retardant silicone rubber, and moreover, on the premise of ensuring mechanical properties, the amount of a vulcanizing agent and an accelerator in the methyl diphenyl flame-retardant silicone rubber is strictly controlled to prolong a vulcanization time as much as possible.

[0010] Referring to FIG. 1, to produce such a qualified prefabricated flexible branch cable, the following points should be strictly followed. (1) Since the vulcanization time of the room-temperature vulcanized silicone rubber is short, the time for producing a main cable and a branch cable and manufacturing the prefabricated branch cable should be strictly controlled. Before molding, it should be ensured that the injection-molded connector insulation layer 5, the main insulation layer 2 and the branch insulation layer 10 are not vulcanized to form an interface therebetween. (2) Since the temperature has a great influence on the room-temperature vulcanization speed of the silicone rubber, on the one hand, effective measures should be taken to ensure that a production temperature is controlled to be lower than the vulcanization temperature before molding of the connector; on the other hand, on the premise of ensuring mechanical properties, the amount of the vulcanizing agent and the accelerator in the room-temperature vulcanized silicone rubber is strictly controlled to prolong the vulcanization time as much as possible. (3) In order to avoid adhesion between the insulation layers and sheath layers, during the actual production of the main cable and the branch cable, the insulation layers are externally coated with talcum powder containing an isolating agent and wrapped with the branch non-woven fabric 9 and the main non-woven fabric 12 to avoid adhesion between the insulation layers and sheath layers after vulcanization, and the connector insulation layer 5 is also externally wrapped with the non-woven wrapping layer 4 to avoid adhesion between the

connector insulation layer 5 and the connector outer protective layer 7. (4) Since the silicone rubber itself is relatively soft, Category-5 and Category-6 conductors are respectively used as the main cable conductor 1 and the branch cable conductor 11. (5) Due to the effective mechanical properties of the branch cable outer sheath of the silicone rubber, effective protective measures should be taken during production and subsequent construction, and scientific mounting and construction should be strictly performed.

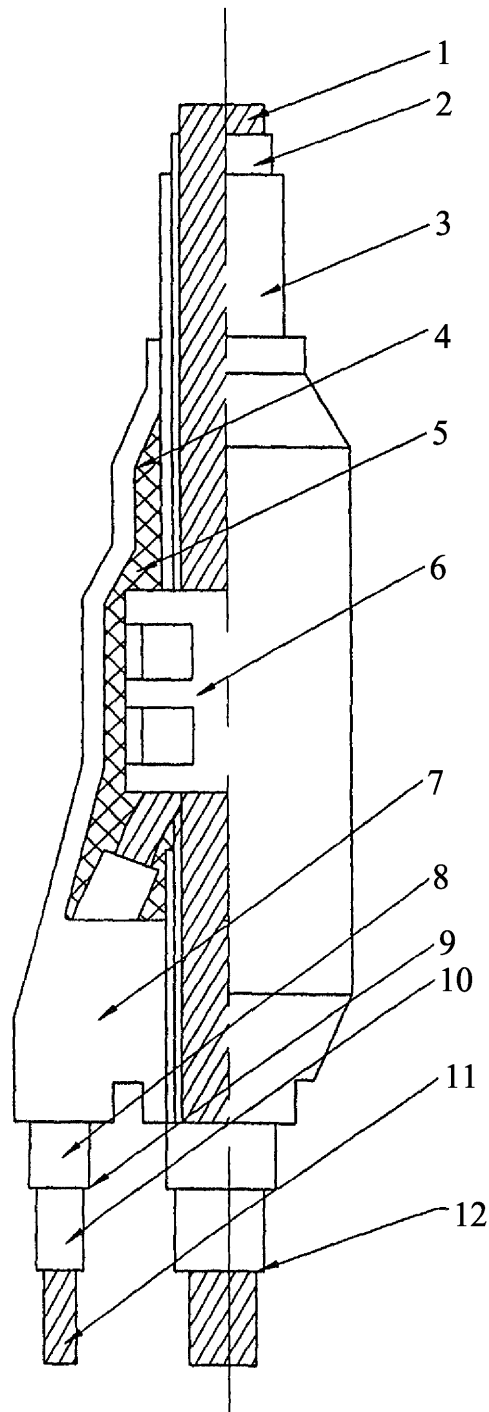


FIG. 1

I, Ella LI MA,

translator to RWS Group Ltd, of Europa House, Chiltern Park, Chiltern Hill, Chalfont St Peter, Buckinghamshire, United Kingdom, hereby declare that I am conversant with the English and Chinese languages and am a competent translator thereof. I declare further that to the best of my knowledge and belief the following is a true and correct translation of the accompanying document "CN102332345A Wenpin" in the Chinese language.

Signed this 28th day of September 2023

E. LI 李琴
E. LI

For and on behalf of RWS Group Ltd