A Submarine Cable Heterogeneous Conductor and a Processing Method therefor, and a Submarine Cable and a Preparation Method therefor

Cross-Reference to Related Application

[1] The present disclosure is based upon and claims priority to Chinese patent application No. 202111453428.8, filed on November 30, 2021, the disclosure of which is hereby incorporated by reference in its entirety.

Technical Field

[2] The present disclosure relates to the technical field of submarine cables, and in particular to a submarine cable heterogeneous conductor and a processing method therefor, and a submarine cable and a preparation method therefor.

Background

[3] A landing section of a submarine cable has harsh laying conditions, which is the bottleneck section for the carrying capacity of the submarine cable. Therefore, the design of the cross-section of most existing submarine cable conductors is based on the landing carrying capacity, which inevitably causes the problems of large carrying capacity margin and high cost of the submarine cable at a submarine section. The common solution is to increase the cross-section of the submarine cable conductor after landing, and connect the submarine cables with different diameters through engineering joints or maintenance joints. However, whether the engineering joints or maintenance joints are used, the technology is only limited to a copper conductor, and cannot be implemented on an aluminum conductor submarine cable. Moreover, a copper core submarine cable is more expensive than an aluminum core submarine cable.

[4] At this stage, the submarine cable homogenous metal engineering joint technology is relatively mature, but there is a certain bottleneck in the heterogeneous conductor engineering joint technology, due to different activities of different metals, the welding quality is difficult to control, for example, the aluminum is more active than copper. Since the common wire welding is seam welding, moisture in the air may infiltrate a flux core through a gap, which causes a welding seam to have an indentation due to a damp flux, and at the same time, the presence of water leads to a chemical reaction between the two, causing the oxidation of the aluminum over time, thereby making it difficult to guarantee the welding quality. The tensile strength and bending performance after ordinary welding are difficult to guarantee, and cannot meet the use performance of the submarine cable.

Summary

[5] The present disclosure mainly aims to provide a submarine cable heterogeneous conductor and a processing method therefor, and a submarine cable and a preparation method therefor, so as to solve the problem of poor welding quality of the submarine cable

circular annular welding layer 231 is preferably arranged outside the second conductor core 21 and the third conductor core 31, and the first circular annular welding layer 231 is divided into the plurality of welding sections, so that the rigidity of the second conductor 2 and the third conductor 3 is relieved by using a welding surface between the welding sections, thereby improving the bending performance of the submarine cable heterogeneous conductor.

[40] In one embodiment of the present disclosure, one end, connected to the second conductor 2, of the first conductor 1 is of a T-shaped structure, one end, connected to the third conductor 3, of the fourth conductor 4 is of a T-shaped structure, one end, connected to the first conductor 1, of the first welding layer protrudes from the second conductor core 21 by 10 to 20 mm, and one end, connected to the fourth conductor 4, of the second welding layer protrudes from the third conductor core 31 by 10 to 20 mm.

[41] The first welding layer protrudes from the second conductor core 21 by 10 to 20 mm, and the second welding layer protrudes from the third conductor core 31 by 10 to 20 mm, which facilitates stronger welding between the first conductor 1 and the second conductor 2, and between the fourth conductor 4 and the third conductor 3 by using more welding surfaces, so that the tensile strength of the submarine cable heterogeneous conductor is considered while the bending performance of the submarine cable heterogeneous conductor is improved. The protruding parts of the first welding layer and the second welding layer are adapted to the T-shaped structure.

[42] If the first welding sections/second welding sections are too few, some of the first welding sections/second welding sections may easily fall off or be damaged to have a significant impact on the performance of the submarine cable heterogeneous conductor, so that the effect is rapidly reduced, and if the first welding sections/second welding sections are too much, a complicated welding process may be easily caused, so that preferably, three to six first welding sections are provided, and three to six second welding sections are provided.

[43] In another embodiment of the present disclosure, as shown in Fig. 3, the second conductor 2 further includes a third welding layer, the third welding layer being a third friction welding layer, the third welding layer and the second conductor core 21 being coaxially arranged on an outer surface of the first welding layer, the third welding layer including a plurality of third welding sections, the third welding sections being each independently a third sector-ring welding section, the inner diameters of the third sector-ring welding sections being the same and the outer diameters of the third sector-ring welding sections being the same, and the third welding sections and the second conductor 2 being conductors of the same material. The third conductor 3 further includes a fourth welding layer, the fourth welding layer being a fourth friction welding layer, the fourth welding layer and the third conductor core 31 being coaxially arranged on an outer surface of the second welding layer, the fourth welding layer including a plurality of fourth welding sections, the fourth welding sections being each independently a fourth sector-ring welding section, the inner diameters of the fourth sector-ring welding sections being the same and the outer diameters of the fourth sector-ring welding sections being the same, the fourth welding sections and the third conductor 3 being conductors of the same material, the third sector-ring welding sections and the fourth sector-ring welding sections being friction