

Description

Cold Joint Terminal for Optical Fibers

Technical field

- [1] The present invention relates to a connection unit used for butt installation of the optical fibers and particularly relates to a cold joint terminal for optical fibers.

Background technique

- [2] Presently, the products of cold joint terminal used for butting the optical fiber adopt two ways to fix the optical fibers:
- [3] In one way, the optical fibers are butted by compressing a folded sheet metal to fix the terminals of two optical fibers. Wherein, the folded sheet metal is arranged with a V-groove for butting the optical fibers; drop liquid substances at the joint of terminals to improve transmission of light; the action of compressing devices reduces the gap of the folded sheet metal by pushing the wedge-shape fixed block and thus the two fibers are compressed and butted; the tail optical fiber is jam-packed only in the hole formed in the device.
- [4] The sheet metal with above structure will become deformed due to expansion and contraction as temperature changes and aging with time variation. This will make the distance between the end faces of the two impacted optical fibers increase, resulting in a seriously declining connection indicator.
- [5] In the other way, the optical fibers are butted by hitching the folded plastic blocks to fix the ends two optical fibers. Wherein, one of the folded plastic blocks is arranged with a V-groove for butting the optical fibers and a compressing block higher than the outer flank of the housing body is arranged on the backside; drop liquid substances at the joint of terminals to improve transmission of light; the action of the compressing devices reduce the gap of the folded plastic blocks by pushing the compressing block on the backsides of the folded plastic blocks and thus the two optical fibers are compressed and butted; the tail optical fiber is jam-packed only in the hole formed in the device.
- [6] The plastic block with above structure has a lower degree of finish than that of the sheet metal and its surface is not smooth. The plastic parts may be scratched by the fiber cutting edge when the fiber is threaded, thus generating plastic scrap, which will pollute the butting fluid. This will also make the distance between the end faces of the two impacted optical fibers increase, resulting in a seriously declining connection indicator.
- [7] The constructions in both ways above need special tools during the operation of butting the optical fiber. Two optical fibers stuffed according to a fixed-length and the pre-defined specifications, are inserted into the special tool from the two sides at the same time. Then the optical fiber connectors and optical fiber sheath are fixed by the action of the special tool. The special tool is complicated, large, expensive and inconvenient to carry.

Disclosure of the invention

Technical problems

- [8] The present invention is to solve the problems in the existing technology and provides a cold joint terminal for optical fiber which can achieve the quick connection of optical fibers which are stuffed according to a fixed length and pre-defined specifications without any special tool and has a high success rate.

Technical Solution

- [9] To resolve the above-mentioned technical problems, the technical solution of the present invention is as follows: a cold joint terminal for optical fiber, including a box-type casing in

which a fixing device for fixing the sheath after the optical fiber is inserted in place and a compressing device for compressing the two optical fibers with joint end faces into the V-groove will be arranged. Connection chambers will be arranged on both sides of the box-type case. The center of the box-type case will be arranged with a floating block which has a caulking groove and a building groove on each side separately; the fixing device includes: a caudal peduncle, an ejector sleeve and a guide block. The guide block is internally equipped with a small positioning taper hole and a fiber hole. The caudal peduncle is pushed into the connection chambers on the two sides of the box-type casing and the guide block is pushed into the container on the caudal peduncle. The caudal peduncle is internally equipped with a big positioning taper hole and a compressing chamber. The taper hole is conical. The caudal peduncle is equipped with at least one hanging block which is connected to the caudal peduncle by a bar to be broken as well as a connecting bar. The ejector sleeve is attached to the caudal peduncle and it can push the hanging block to rupture the bar to be broken. Then the hanging block at one side can be pushed. Grip the scarfskin of the optical fiber into the side of pushed hanging block and the space in the caudal peduncle becomes smaller. In this way, the sheath of the optical fiber threading the space is fixed; the compressing device includes: a V-groove metal block and a building cover. The V-groove metal block is embedded in the caulking groove of the box-type casing; the optical fiber through hole is formed between the V-groove and the floating block; the building cover is pushed into the caulking groove in the box-type casing; the floating block is pressed to compress the optical fiber connector in the V-groove metal block in the caulking groove; the optical fiber hole of the guide block in the container of the two caudal peduncles and the caudal peduncle compressing chamber should be in the same axis.

- [10] The box-type casing is arranged with card slot on the surface. The building cover is equipped with a buckle. The buckle is clipped in the card slot, thus the box-type casing is clipped with the building cover. A positioning table is further arranged on both sides of the outside surface of the box-type casing and matches with the starting card slot and the ending card slot on the two sides of the building cover to control the location of the building cover.
- [11] The two sides of the V-groove in the V-groove metal block are arranged with guide faces.
- [12] The floating block and the box-type casing are connected by the floating bar. The floating block is also arranged with a guide slope and a guide fiber surface. The body of the building cover is arranged with a chamfer angle matching with the guide slope. The building cover pushes the floating block through the guide slope and thus pressing the two pairs of butted optical fibers is realized. The guide fiber face and the guide face of the V-shaped metal block form a complete optical fiber guide surface.
- [13] The big positioning taper hole and the small positioning taper hole are both of a conical surface.
- [14] The ejector sleeve is arranged with a lead-in conical surface.
- [15] For the cold joint terminal for optical fiber of the present invention, a wire jacket can be arranged in the caudal peduncle. Through the forcipression performed by the hanging block in the caudal peduncle, the wire jacket contracts to compress the minor sized optical fiber sheath.
- [16] The cold joint terminal for optical fiber of the present invention initially locates the penetration depth of the optical fiber by the big positioning taper hole and the small positioning taper hole. The optical fiber sheath suffers forcipression by the hanging block and the two butting optical fibers are compressed through box-building type floating block; for connection, one optical fiber which is stuffed according to a fixed length and the pre-defined specifications can be inserted from one side to the other side, Push the ejector sleeve where the optical fiber is inserted and compress the optical fiber sheath. Then insert another

optical fiber which is stuffed according to a fixed length and the pre-defined specifications from the other side until the end faces of the two optical fibers hug closely. Push the ejector sleeve where the optical fiber is inserted and compress the optical fiber sheath. Finally compress the building cover and compress the ends of the two optical fibers in the metal V-groove through the floating block to complete the connection work. The joint terminal has the following advantages: a reliable structure, a long service life, convenience for connection, a high success rate, much lower cost and no special tool required.

Beneficial effects

- [17] Compared to the prior art, the invention has advantages as follows:
- [18] 1. The cold joint terminal for optical fiber of the present invention firstly compresses the optical fiber scarfskin to be connected in steps and then fix the optical fiber connector. No special tool is required and it is of low cost, easy operation and a high success rate.
- [19] 2. The cold joint connector optical fiber of the present invention initially locates the penetration depth of the optical fiber by the big positioning taper hole and the small positioning taper hole, thus it is applicable to optical fibers with different sizes of sheath diameter.
- [20] 3. The cold joint connector for optical fiber of the present invention adopts a caudal peduncle fixing device. Push the optical fiber firstly, then push the ejector sleeve in the caudal peduncle toward the same direction with that of the optical fiber. Forcipation by the hanging block of the caudal peduncle reduces the space in the caudal peduncle hole and then the sheath of the optical fiber threading the space is fixed. As the sheath is fixed in the inserted direction of the optical fiber, the optical fiber always suffers a jointing force to be pushed forward, which greatly improves the success rate of connection. Additionally, the naked fiber is fully protected from fracture during the complete process of connection.
- [21] 4. In the cold joint terminal for optical fiber of the present invention, the hanging block is connected with the caudal peduncle on the radial side. Therefore, the optical fiber is threaded smoothly and the end faces of the optical fiber can be free of damage.
- [22] 5. The cold joint terminal for optical fiber of the present invention adopts a V-groove metal block and a suspension type floating block. The V-groove is made of metal materials and the surface has a high degree of smoothness. Additionally, in the initial state, it is open between the V-groove and the floating block, which is in favor of threading the optical fibers. The operation of threading the optical fiber will not generate plastic scrap, pollute the matching fluid or affect the performance of connection.
- [23] 6. In order to compress the two butted optical fibers of the present invention, the building cover is pressed into the building slot and then the floating block is pushed to compress the optical fibers in the V-groove. The compression force is great and reliable. The connection quality is not affected by the temperature variation and aging of materials and it has a long operation life.
- [24] 7. In the cold joint terminal for optical fiber of the present invention, the floating block is made of nonmetal materials with a great friction coefficient and a low coefficient of thermal expansion. After compression, the influence of thermal expansion and contraction and other forms of deformation of the V-groove metal block on the quality of the optical fiber connection can be greatly reduced.
- [25] 8. The present invention can also be placed in a casing, both sides of which can be connected with the optical fiber sheath. In this way, reliable butting of optical fiber can be truly realized.

Description of the drawings

- [26] Figure 1 is the 2D structural schematic diagram of the cold joint terminal for optical fiber according to example 1 of the present invention.
- [27] Figure 2 is the 3D schematic view of a embodiment of the cold joint terminal for optical fiber according to example 1 of the present invention. Wherein, Figure a is the 3D section view of the starting state and Figure b is the 3D section view of the ending state.
- [28] Figure 3 is the 3D schematic diagram of the box-type casing of the present invention. Wherein, Figure a is the 3D section view and Figure b is the 3D outside view.
- [29] Figure 4 is the 3D schematic diagram of the structure of the V-groove metal block of the present invention.
- [30] Figure 5 is the 3D schematic diagram of the structure of the building cover of the present invention. Wherein, Figure a is the 3D structural schematic diagram of the building cover and Figure b is its 3D section view.
- [31] Figure 6 is the 3D schematic diagram of the structure of the caudal peduncle of the present invention. Wherein, Figure a is the 3D structural schematic diagram of the caudal peduncle and Figure b is its 3D section view.
- [32] Figure 7 is the 3D structure section view of the ejector sleeve of the present invention.
- [33] Figure 8 is the 3D structure section view of the wire jacket of the present invention.
- [34] Figure 9 is the 3D structure section view of the guide block of the present invention.
- [35] Figure 10 is the 3D exploded view of the cold joint terminal for optical fiber according to example 2 of the present invention.
- [36] Wherein, 1. box-type casing, 2. V-groove metal block, 3. building cover, 4. caudal peduncle, 5. ejector sleeve, 6. wire jacket, 7. guide block; 1-1.caulking groove, 1-2. floating block, 1-3. guide slope, 1-4. floating bars, 1-5. building slot, 1-6. connection chamber, 1-7.card slot, 1-8.positioning table, 1-9. guide fiber face; 2-1. V-groove, 2-2. guide face, 2-3. optical fiber through hole; 3-1. building body, 3-2. buckle, 3-3.chamfer angle, 3-4. starting card slot, 3-5. ending card slot; 4-1.the outer end of the caudal peduncle, 4-2. container, 4-3. big positioning taper hole, 4-4. hanging block, 4-5. guide taper hole, 4-6. ambulatory slot, 4-7. compressing chamber, 4-8. bar to be broken, 4-9. connecting bar; 5-1. ejector sleeve body, 5-2. lead-in taper surface; 6-1. threading hole, 6-2. lead-in taper hole; 7-1. small positioning taper hole, 7-2. optical fiber hole.

Description of the embodiments

- [37] The invention will be illustrated in combination with the attached drawings in the next part.
- [38] As Figures 1 to 10 show, a cold joint terminal for optical fiber mainly consists of box-type casing (1), a fixing device for fixing the sheath after the optical fiber is inserted in place and a compressing device for compressing the laminating end faces of the optical fiber into the V-groove.
- [39] Wherein, the fixing device includes: caudal peduncle (4), ejector sleeve (5), wire jacket (6), guide block (7).The caudal peduncle (4) is compressed into connection chambers (1-5) at the two sides of box-type casing (1). The guide block (7) is compressed into the container (4-2) in the caudal peduncle (4). The wire jacket (6) can be placed into the compressing chamber (4-7) of the caudal peduncle (4). The ejector sleeve (5) is attached to the outside end (4-1) of the caudal peduncle (4). The caudal peduncle (4) can be arranged with built-in big positioning taper hole (4-3) which is conical surface, and the caudal peduncle (4) is arranged with at least one hanging block (4-4) which can be connected with the caudal peduncle by a bar to be broken as well as a connecting bar. When the optical fiber is threaded, the two ends of hanging block (4-4) are connected, which is in favor of smooth optical fiber threading.

When the ejector sleeve (5) is pushed upwards, the hanging block (4-4) is pushed down by the ejector sleeve (5). The bar to be broken at the front end fractures and the hanging block is pushed down to clamp the optical fiber. Then the internal space becomes smaller and the threaded optical fiber sheath is fixed.

- [40] The compressing device includes: a V-groove metal block (2) and a building cover (3); wherein, the V-groove metal block (2) is embedded in the caulking groove (1-1) of the box-type casing (1); the building cover (3) is pushed into the building slot (1-5) of the box-type casing. The floating block (1-2) is arranged between the caulking groove (1-1) and the building slot (1-5) of the box-type casing (1) to compress the optical fiber connector in the V-groove metal block (2) of the caulking groove (1-1). The connection chambers (1-6) are arranged on the two sides of the box-type casing to connect with the caudal peduncle (4).
- [41] The box-type casing (1) is arranged with the card slot (1-7) on the outside surface to be jointed with the building cover (3); the box-type casing (1) is arranged with the positioning tables (1-8) on both sides of the outer surface which match with the starting card slot (3-4) and the ending card slot (3-5) on the two sides of the building cover to control the location of building cover (3).
- [42] The building cover (3) is arranged with a building body (3-1), a chamfer angle (3-3), a starting card slot (3-4), an ending card slot (3-5) and a buckle (3-2).
- [43] The V-groove metal block (2) and the floating block (1-2) are arranged with V-groove (2-1) on the opposite surfaces. The optical fiber through hole (2-3) is formed between the V-slot (2-1) and the floating block (1-2); the V-groove (2-1) of the V-groove metal block (2) is arranged with a guide surface (2-2) on both ends.
- [44] The Floating block (1-2) are connected with the box-type case (1) by the floating bar (1-4). The floating block (1-2) is arranged with the guide slope (1-3) and the guide fiber surface (1-9). The guide slope (1-3) matches with the chamfer angle (3-3) of the building body. During the implementation, the building body (3-1) pushes the floating block through the guide slope (1-3) and thus pressing the two butted optical fibers tightly; the guide fiber face (1-9) and the guide face (2-2) of V-shaped metal block (2) form a complete optical fiber guide surface. The guide block (7) is arranged with the small positioning taper hole (7-1) and the optical fiber hole (7-2). The big positioning taper hole (4-3) and the small positioning taper hole (7-1) are both in a conical surface. The ejector sleeve (5) is arranged with the lead-in conical surface (5-1).
- [45] For the optical fiber cold joint connector in this invention, the described optical fiber through hole (2-3) formed between V-slot (2-1) and floating block (1-2), optical fiber hole (7-2) of guide block in container (4-2) of the two caudal peduncles (4), and threading hole (6-1) of wire jacket (6) of caudal peduncle (4) compaction container (4-7) are in the same axis.
- [46] For the cold joint terminal for optical fiber of the present invention, a wire jacket (6) can be arranged in the caudal peduncle (4). Through the compression performed by the hanging block in the caudal peduncle, the wire jacket contracts to compress the minor sized optical fiber sheath.
- [47] The method for using the joint terminal of the present invention is as follows:
1. One optical fiber to be connected should be stuffed according to the fixed length and the pre-defined specifications.
 2. Determine whether the wire jacket placed in the insertion end of the cold terminals in advance should be taken out according to the thickness of the optical fiber sheath (coating).
 3. Directly insert the cut optical fiber to the end.

4. Push upwards the ejector sleeve of the insertion end and compress the optical fiber sheath.
5. The other optical fiber to be connected should be stuffed according to the fixed length and the pre-defined specifications.
6. Determine whether the wire jacket placed in insertion end of the cold connectors in advance should be taken out according to the thickness of the optical fiber sheath (coating).
7. Directly insert the cut optical fibers until the end faces of the two optical fibers hug closely.
8. Push upwards the ejector sleeve of the insertion end and compress the optical fiber sheath.
9. Compress the building cover and compress the ends of the two optical fibers in the metal V-groove through the floating block to complete the connection work.

Claims

1. A cold joint connector for optical fiber comprises a box-type casing (1), a fixing device for fixing the scarfskin after the optical fiber is inserted in place and a compressing device for compressing the laminate end faces of the optical fiber into the V-groove, wherein, connection chambers (1-6) are arranged on both sides of the box-type casing (1), the center of the box-type casing (1) is arranged with a floating block (1-2) with a caulking groove (1-1) and a building slot (1-5) on each side respectively; the fixing device includes: two caudal peduncles (4), two ejector sleeves (5) and two guide blocks (7), the guide block (7) is arranged in the box-type casing (1) and the ejector sleeve (5) is arranged outside the box-type casing (1), one side of the caudal peduncle (4) is arranged in the box-type casing (1) and the other side is arranged outside the box-type casing (1); the guide block (7) is equipped with a small positioning taper hole (7-1) and an optical fiber hole (7-2), one side of the caudal peduncle (4) arranged in the box-type case (1) is pushed into the connection chambers (1-6) on the two sides of the box-type casing (1), the guide block (7) is pushed into the container (4-2) in the caudal peduncle (4), the caudal peduncle (4) is arranged with a big positioning taper hole (4-3) and a compressing chamber (4-7) inside, the big positioning taper hole (4-3) is in a conical surface; the caudal peduncle (4) is equipped with at least one hanging block (4-4) which is connected with the caudal peduncle (4) by a bar to be broken (4-8) as well as a connecting bar (4-9), the ejector sleeve (5) is attached to the other side of the caudal peduncle (4) and can push down the hanging block (4-4) to compress the optical fiber scarfskin and clamp the optical fiber by rupturing the front end of tendon to be broken (4-8), the space in the caudal peduncle becomes smaller and thus the optical fiber scarfskin threading the space is fixed;

the compressing device includes: a V-groove metal block (2) and a building cover (3), the V-groove metal block is embedded in the caulking groove (1-1) of the box-type casing (1); the optical fiber hole (2-3) is formed between the V-groove (2-1) and the floating block (1-2); one side of the building cover (3) is pushed into the caulking groove (1-5) in the box-type casing (1); the floating block (1-2) is pressed to compress the optical fiber connector in V-groove metal block (2) in the caulking groove (1-1); the other side of the building cover (3) is arranged outside the box-type casing (1); the floating block (1-2) and the box-type casing (1) are connected by a floating bar (1-4), the floating block (1-2) is also arranged with a guide slope (1-3), the body (3-1) of the building cover is arranged with a chamfer angle (3-3) matching with the guide slope (1-3), the building cover (3) pushes the floating block (1-2) through the guide slope (1-3) and thus pressing the two butted optical fibers tightly; the optical fiber holes (7-2) of the guide block (7) in the containers (4-2) of the two caudal peduncles (4) and the compression chamber (4-7) of the caudal peduncles (4) are in the same axis.

2. The cold joint terminal for optical fiber according to claim 1, wherein, the box-type casing (1) is arranged with a card slot (1-7) on the outside surface, the building cover (3) is equipped with a buckle (3-2), the box-type casing (1) snaps in the card slot (1-7) and is jointed with the building cover (3) by the buckle (3-2); a positioning table (1-8) is also arranged on both sides of the outside surface of the box-type casing (1) and it matches with the starting card slot (3-4) and the ending card slot (3-5) on the two sides of the building cover (3) to control the location of the building cover (3).

3. The cold joint terminal for optical fiber according to claim 1 or claim 2, wherein, the two sides of the V-groove (2-1) of the V-groove metal block (2) are arranged with guide faces (2-2).

4. The cold joint terminal for optical fiber according to claim 1, wherein, the big positioning taper hole (4-3) and the small positioning taper hole (7-1) are both of a conical surface.

5. The cold joint terminal for optical fiber according to claim 4, wherein, the ejector sleeve (5) is arranged with a lead-in taper surface (5-1).

6. The cold joint terminal for optical fiber according to claim 5, wherein, the ejector sleeve (5) is

arranged with a lead-in taper surface (5-1).

7. The cold joint terminal for optical fiber according to claim 1, wherein, the caudal peduncle (4) is arranged with a wire jacket (6) for compressing the optical fiber scarfskin.