YOFC_17001_WP

Applications of FT-Dry All-Dry Optical Cable

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The FT-Dry all-dry optical cable developed by YOFC is a new type of optical cable product, which is first created in China and advanced in the world. It adopts new materials and technologies, and reduces the weight and cost of the optical cable. The minimum bending radius of loose tube is less than 10mm, and it has good bending insensitive performance and can meet high requirements of users in cable installation and splicing. Innovative dry water-blocking technology shortens the time required for cable installation and termination, which can effectively improve the convenience of cable installation and splicing. The environmental, mechanical and water-blocking performance of the products can meet the requirements of relevant standards to ensure the safe use of the optical cable and the stable quality of the optical fibre transmission.

1. Research Background

Water-blocking performance is an important index of optical cables. Water can not only cause the attenuation of optical fibre water peak, but also lead to optical fibre fractures through penetration and corrosion. In humid conditions, it can bring potential hazards to the communication system and even cause service interruption. At present, the loose tube structure optical cables in domestic market can be divided into two types: the filling compounds filled type and the semi-dry type according to the water-blocking forms. The filling compounds filled type refers to the optical cables with fibre filling filled in the loose tube and the cable filling filled in the cable core gap (as shown in Figure 1a). The semi-dry type refers to the optical cables with fibre filling filled in the loose tube and the dry water-blocking materials such as water-blocking yarn and water-blocking tape filled in the cable core gap to meet the water-blocking requirement (see Figure 1a).

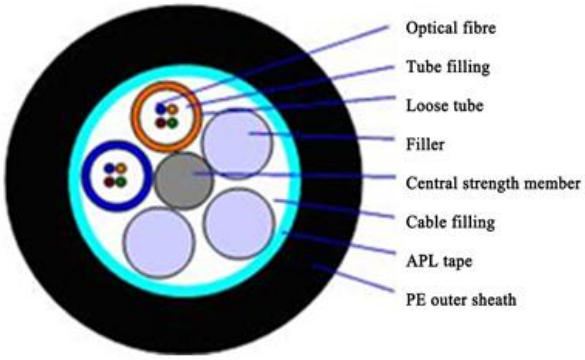

Figure 1a

The traditional water-blocking measure for the loose tube optical cable is to fill all the spaces in the tube with water-blocking filling compounds to achieve the water-blocking effect. The filling compounds has excellent thixotropy and water resistance, can provide great buffering, and shock and water resistance for optical fibres, so filling compounds filled and semi-dry optical cables have been widely used in the field. But with the constant deepening of access network construction, Fibre To The Home becomes more and more common. As both filling compounds filled and semi-dry optical cables contain filling compounds, in the process of construction, the optical cable filled with filling compounds must be cleaned, and the optical cable core and optical fibre must be cleaned with the aid of detergent, which brings a lot of troubles to the construction of various distribution optical cables and indoor optical cables, such as the pollution of detergent and cleaning paper, the increase of construction time and construction cost, and so on.

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With technology development, the all-dry loose tube optical cable without filling compounds is developed in response to the application needs. This optical cable completely abandons the traditional filling compounds filled water-blocking method and adopts dry water-blocking materials in the loose tube and cable core of the optical cable. It has many advantages such as environment friendly, light weight, no more filling compounds wiping, easy stripping and easy splicing, and can meet various requirements of network construction and greatly improve the cable installation and splicing efficiency.

2. Introduction to FT-DRY All-Dry Optical Cable

The so-called all-dry optical cable, literally, is a type of optical cable without filling compounds, and usually refers to the optical cables for outdoor use or for both indoor and outdoor use. Broadly speaking, in addition to the loose tube structure optical cables without filling compounds, the slotted-core cables with the water-blocking tape water-blocking technology can also be classified into this category, while the tight buffered optical cables are generally outside the scope of discussion.

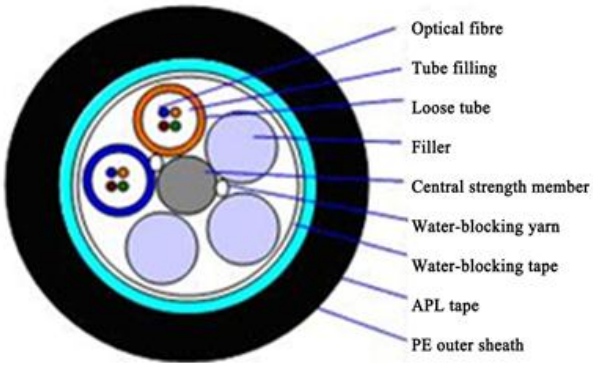
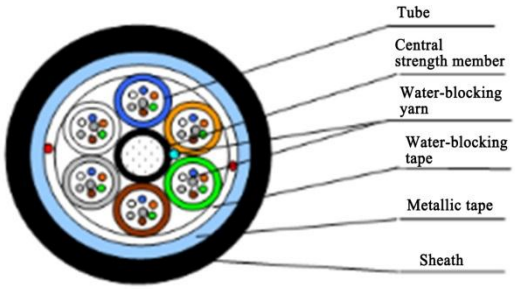


Figure 1b

Over ten years, YOFC has launched the all-dry slotted-core fibre ribbon cable, combined with the 6-fibre ribbon series, FTTH series and other product with unique features developed successively according to the market practice. Those are widely used in the metropolitan area network and access network, and have been fully recognized by users.

In recent years, to meet the market needs, YOFC's R&D personnel focus on the research on the technology of the all-dry loose tube optical cable. Based on the all-dry PBT loose tube optical cable successfully launched in the earlier stage, and with new materials introduced, a dry tube with great bending insensitive performance and break resistance is developed. Furthermore, a series of optimization for the optical cable structure are carried out, thus developing a more advanced and ductile FT-Dry all-dry optical cable, making YOFC the first domestic optical cable manufacturer which has successfully developed the optical cable, as well as adopts home equipment and has realized batch supply. It reflects that YOFC as an industry benchmark has advanced technical concepts and powerful research and development strength.



Structure Drawing of FT-DRY Full-dry Optical Cable (Loose Tube Stranding Type)

The FT-Dry all-dry optical cable can provide good water resistance with special water-swelling type water-blocking materials in the loose tube containing optical fibre. It is a mixture of a fine and smooth super-absorbent powder and the resin matrix, rapidly expandable when in contact with water, and can absorb 50~100 times of its own weight of water, thus preventing further penetration and move of water to ensure the water resistance of optical cable. However, how to ensure the diameter and roundness of the tube without filling compounds and how to stably control the fibre excess length are the difficult points for the production technology of the dry loose tube, which are also the main problems to be solved in our development of FT-Dry all-dry optical cable.

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Due to the high cooling rate and incomplete crystallization of the loose tube, the phenomenon of retraction will occur after cooling, which is more obvious when there are no filling compounds. Therefore, it is difficult to control the fibre excess length in the tube, especially in the production of the tube with materials with large post shrinkage. For this reason, a special technique is adopted to compress the tube in the thermal state, so that the material crystallization is more sufficient, and the loose tube is very stable and without shrinkage after cooling. Thus the excess length of the optical fibre in the tube is well controlled. At the same time, the diameter of the loose tube can be well controlled by gas filling.

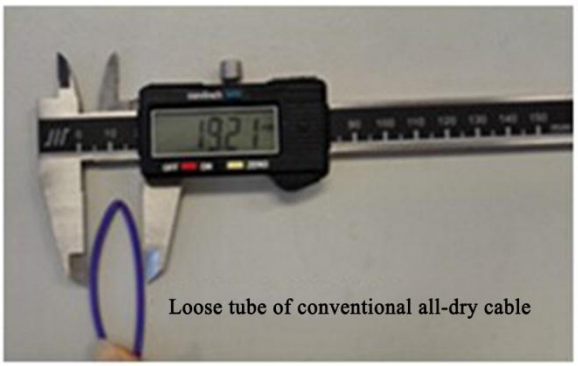
3. Performance of FT-DRY All-Dry Optical Cable

With accurate excess length control, the FT-Dry all-dry optical cable can ensure that the optical fibre will not be subjected to excessive stress when the tube expands and contracts with temperature or when the optical cable is subjected to tensile load. According to IEC60794, Telcordia GR-20, YD/T 901-2009 and other industry standards as well as the general requirements for optical fibres and cables, tests are conducted to test all the properties of the all-dry optical cable, and all the results meet or exceed the requirements of the relevant standards.

tube optical cable. Cleaning agent must be used to clean the cable core and optical fibre during the cable installation and splicing of the optical cable filled with filling compounds, which is a time consuming process. For all-dry optical cables, users can pull them out quickly and easily only with a scissor. If the optical fibres are terminated through the buffer tube, since there are no filling compounds on the surface of the optical fibres, they will not stick to each other in the bifurcation process, which simplifies the splicing operation. Thus the time required for preparation and cleaning of the optical fibres and cables is significantly shortened.

In addition to the above advantages, FT-Dry all-dry optical cable developed by us is more flexible than the general optical cables, especially the tube has better bending insensitive performance, its minimum bending radius is less than 10mm. It can be directly coiled in the splice closure without bending, and it can meet the customers' high requirements in the splicing operation.

Bending performance of the new dry loose tube



Bending performance of the conventional dry loose tube

4. Application of FT-DRY All-Dry Optical Cable

Filling compounds-free filling allows more convenient usage and splicing of the fully-dry loose

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Splicing of FT-Dry all-dry optical cable in the splice closure

Dry water-blocking technology provides a more efficient and friendly use experience, the convenient for construction, clean, environmentally friendly and other advantages are favored by customers. The filling compounds-free filling also has unique advantages for installation in corridors and shafts, aerial installation as well as installation in occasions with flame-retardant requirements. Therefore, the paste-filling optical cables have been replaced by the all-dry optical cables widely used in various indoor and outdoor occasions in foreign countries, especially in Europe and the United States. Compared with the traditional filling compounds-filling ADSS optical cable, the all-dry ADSS optical cable, which has been applied in some countries, is not only convenient for cable installation and splicing, but also has lower weight and load of the optical cable. It can better ensure the stable performance and safe use, and is also conducive for span lengthening.

In the domestic market, people are usually accustomed to using the traditional filling compounds filled optical cable, the application of the all-dry optical cable still has a long way to be popularized. YOFC has already made some efforts in this respect. Besides exporting to foreign markets, our FT-Dry all-dry optical cable has also been trialed for many times in cooperation with domestic operators (the following figure shows the construction scenarios for aerial and conduit laying respectively). Once the little known slotted-core fibre ribbon cable with fibre ribbons has now occupied a place in the domestic mainstream market, we believe that the all-dry loose tube optical cable with broader application prospect will also have greater development potential.

Aerial Installation

Conduit Laying

5. Conclusion

As a leading enterprise in the optical fibre and cable industry, YOFC always insists on taking talents, mechanisms and ideas as the important elements of the company's innovation culture, constantly driving forward the technological innovation of products,

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actively exploiting new markets and maintaining the leading position of our core technologies. FT-Dry all-dry optical cable series products are just another excellent work of YOFC in the process of continuous innovation. With its excellent product performance and convenient construction experience, it will receive more market recognition in the future optical communication network construction and become the representative leading the industry development trend.

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