

How to make a telecommunications fiber optic cable



Overview

How To Make A Fiber Optic Cable While many of us rely on fiber optic cables every day, few know how they are actually made. In this article, we will delve.

Key Takeaways

Telecommunications fiber optic cables are made by transforming ultra-pure silica into thin glass fibers through a precise process of preform creation, fiber drawing, coating, and assembly.

Step 1: Preparing the Raw Material

The process begins with silica (silicon dioxide), chosen for its purity and excellent light transmission properties. The silica is refined and formed into large cylindrical glass rods called preforms, which are essentially scaled-up versions of the final fiber. This is achieved by depositing ultra-pure silica particles inside a hollow tube or onto a solid rod using high-temperature chemical vapor deposition, where silicon-based gases are burned to form pure glass particles that fuse together .

Step 2: Drawing the Fiber

Once the preform is ready, it is placed in a vertical furnace heated to around 2,000°C. The end of the glass rod softens, and a thin strand of glass is drawn downward at a controlled speed. This strand, typically 125 microns in diameter, is continuously monitored using lasers and micrometers to ensure uniformity. This step is called fiber drawing and produces the core optical fiber that will carry light signals .

Step 3: Coating and Protection

The drawn fiber is immediately coated with a protective polymer layer to prevent physical damage and reduce signal loss. This coating is cured using ultraviolet light and may include multiple layers for mechanical strength, moisture resistance, and flexibility. The coated fiber is then wound onto spools for further processing .

Step 4: Cabling and Assembly

Multiple fibers are grouped together and encased in a cable jacket, which can be designed for aerial, underground, or indoor use. The cable may include strength members like aramid yarn or steel wires to enhance tensile strength and durability. For telecommunications, fibers are often arranged in singlemode for long-distance, low-loss transmission or multimode for shorter distances .

Step 5: Termination and Testing

Finally, the fiber ends are terminated with connectors or spliced to pigtails for integration into networks. Fusion splicing or mechanical splicing ensures low-loss connections. Each fiber undergoes rigorous quality control, including diameter checks, attenuation testing, and tensile strength verification, to ensure it meets telecommunications standards .

Summary

Creating a telecommunications fiber optic cable involves high-precision engineering from raw silica to finished cable. The key stages—preform creation, fiber drawing, coating, cabling, and testing—ensure that the final product can reliably transmit data as light signals over long distances with minimal loss, making it suitable for modern telecom networks .

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(Here is a table of link losses from industry standards for many links.) The designer should analyze link loss early in the design stage

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