What are the components of optical fiber cable

Overview

This guide breaks down the five core components of a fiber optic cable — from the specification package to the actual installation considerations.

Key Takeaways

An optical fiber cable consists of five main components: the core, cladding, coating, strength members, and outer jacket, each serving a specific role in signal transmission and protection.

Core

The core is the central part of the fiber where light signals travel. It is typically made of ultra-pure silica glass or, in some cases, plastic. The core's diameter varies depending on the fiber type: single-mode fibers usually have a core of 8–10 microns, while multimode fibers range from 50 to 62.

5 microns. The core's high transparency and precise refractive index allow light to propagate over long distances with minimal loss.

Cladding

Surrounding the core is the cladding, which has a slightly lower refractive index. This difference ensures total internal reflection, keeping light confined within the core and minimizing signal loss. The cladding is essential for maintaining signal integrity over long distances.

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Coating or Buffer

The coating (also called the buffer) is a protective polymer layer applied directly over the cladding. It shields the fiber from physical damage, moisture, and environmental stress. Common materials include acrylate, PVC, or LSZH (low-smoke zero-halogen) polymers.

The coating also prevents microbending and macrobending, which can degrade signal quality.

Strength Members

Strength members provide mechanical support to the fiber, preventing stretching, crushing, or breaking during installation and use. They can be made of aramid fibers (Kevlar), fiberglass, or steel rods. In outdoor or armored cables, additional strength members may be included to withstand tension and environmental stress.

Outer Jacket

The outer jacket is the external protective layer that shields the cable from physical damage, UV exposure, moisture, and chemicals. Jacket materials vary depending on the application and environment, with PVC, LSZH, or polyethylene being common choices. The jacket also helps meet building codes and fire safety standards.

Additional Features

Some fiber optic cables include ripcords for easier jacket removal, tight buffer tubes for additional protection, and armoring for extreme environmental conditions. The combination of these components ensures reliable, high-speed data transmission and long-term durability. By understanding these components, one can select the appropriate fiber optic cable for specific applications, whether for telecommunications, data centers, or enterprise networks.

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