

Fiber Optic Cable Construction

Fiber Elements

Fiber optic cable provides the most advanced communication media available today. An increasing amount of fiber will be installed in the future as we find more and more uses for this technology. Fiber optic cable can support voice, data, video, and other types of transmission, and offers many advantages over standard copper circuits which we will discuss later in this section.

Core

This is the very center of the cable and is the light guiding area used for light transmission. The size of the core will determine the amount of light to be transmitted into the fiber. The larger the core, the greater the amount of light will that will be transmitted.

Cladding

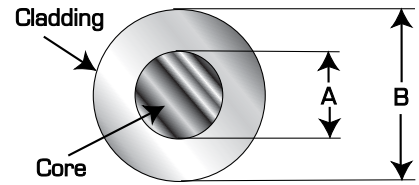
The cladding surrounds the core glass and serves to refract the light back into the core. The cladding has a different index of refraction than the core so that the lightwaves are re-directed back into the core allowing continued light transmission through the fiber.

Coating

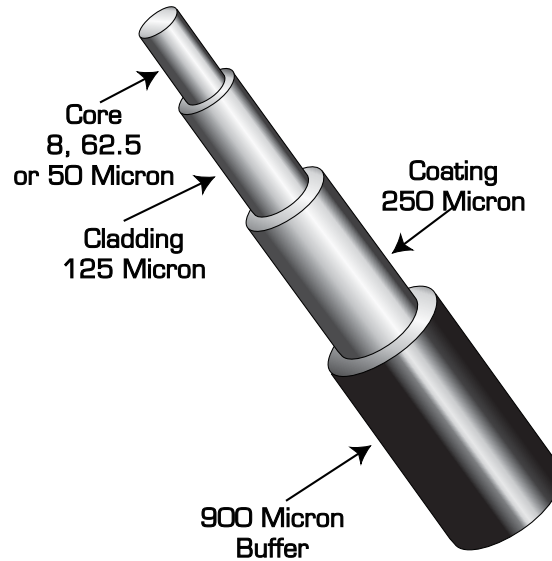
Several coatings of acrylate are usually applied to the fiber to provide tensile strength and protection to the glass fiber core.

Jacket

The cable jacket works along with the aramid fibers to provide strength, integrity, and overall protection of the fiber member. There are a variety of jacketing materials that are used in fiber optic cable construction. Standard compounds and special variations of these compounds can be used in making the jacket. The jacket should be appropriate for the environmental conditions that the fiber optic cable will be subjected to. Environmental parameters that should be considered include temperature variations, chemical reactance, sunlight resistance, mechanical and abrasion resistance.



Buffered Fiber



Fiber Optic Cable Types

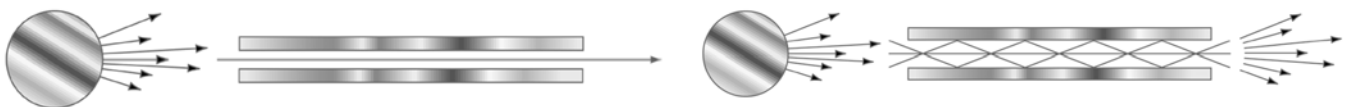
Fiber Optic Size - This is measured by comparing the core size to the cladding size. This is expressed by the core diameter and then the cladding with coating diameter.

Example: 62.5/125, 62.5 being the core diameter and 125 being the cladding with coating diameter.

Fiber Optic Modes - There are basically two types or modes of fiber optic cable, single-mode and multimode.

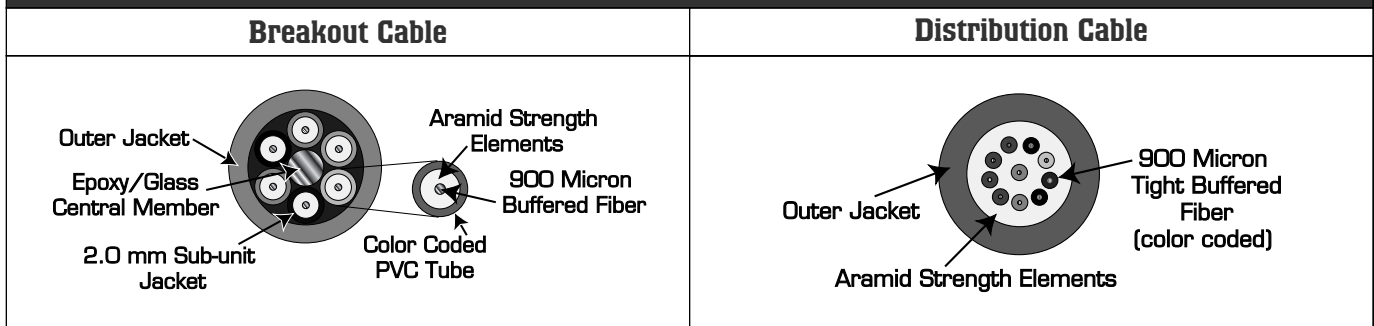
Single-Mode - The core on single-mode is about 8-10 micron. This small core size allows only one mode of light to travel within the core at a time. The higher the bandwidth, the more information carrying capacity the cable has. This type of cable is good for long distances, and is often used by telephone companies for long transmissions.

Multimode - The core on multimode is about 50 - 100 micron. A larger core allows many light pulses or modes to travel through the core simultaneously. Mode overlap can occur over extremely longer distances and may cause bit errors. Multimode is best used for lengths up to 2 kilometers.

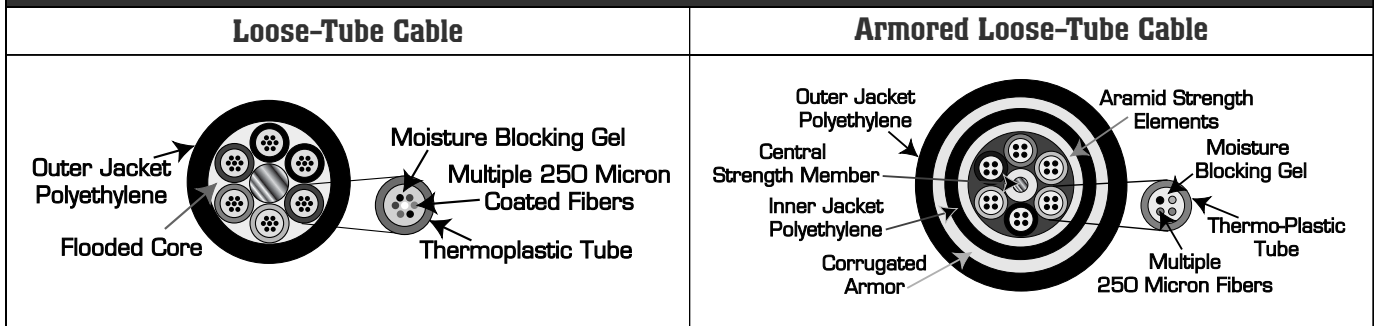


Fiber Optic Cable Construction

Fiber Optic Cable Used for Indoor Installations



Fiber Optic Cable Used for Outdoor Installations



Fiber Optic Cable Benefits

High Bandwidth - The higher the bandwidth, the greater the information carrying capacity. A higher bandwidth allows for higher data rates, more users and longer distances.

Easy Upgrades - Fiber optic cable allows for easy future upgrades. Because a variety of transmissions can use fiber optics, it is only necessary to change the electronics. The cable can stay in place. No need to pull new cable in the future.

Low Attenuation - This is a reduction of signal strength or loss of light power over the length of the fiber. Fiber optic cable usually has low attenuation characteristics which allow signals to travel over longer distances without reamplification. However, attenuation can be affected by extrinsic (environmental and physical bends), intrinsic (absorption and scattering) and wavelength. The longer the wavelength, the lower the attenuation.

EMI/RFI Immunity - Since fiber optic cable transmits light instead of electrical current, immunity to electromagnetic and radio frequency interference provides better signal quality, ensuring low bit error rates and/or low noise on the system.

Security - Again, since there is no electrical signal, fiber optic transmission is almost impossible to tap into without being detected.

Lightweight - Fiber optic cable is smaller and lighter than copper cable allowing for easier installation, especially when conduit and/or raceway space is at a premium.