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Choosing The Right Fiber Optic Cable

Decisions, Decisions

There are so many cable options available that one might wonder where to start. This article will set you on the right path in the decision process. Note that the centerfold contains a handy reference poster that summarizes key cable features.

Let's begin by focusing on the broad categories of fiber optic cable. Below you can make "Either/Or" decisions and use the checkboxes to record your decisions. After that, your FIS Sales Associate can help you make your final choice.

Multimode or Single Mode?

Multimode Cable - Applications: Multimode fiber is used to transport high volumes of data over relatively short distances (compared to single mode fiber). Common applications include Data Centers and other Local Area Network (LAN) applications. Note that multimode distance capabilities have increased over the years (see distance chart in centerfold). Multimode cable now offers an economical alternative to single mode cable for certain applications.

Design: Multimode cable has a relatively large core (either 50 or 62.5µm) that enables multiple streams of data to be transported simultaneously.

Single Mode Cable - Applications: Telcos and CATV companies use single mode cable to transport signals over long distances. Business campuses and other institutions also use single mode cable for longer cable runs, such as links between buildings.

Design: The core diameter of single mode fiber is so small (9µm) that it permits only one mode of light to pass through it at any given time. This characteristic reduces attenuation and enables light to be transmitted over great distances.

While the purchase price of single mode cable is less than multimode cable in general, single mode transceivers and network interfaces are generally more expensive than that used for multimode.

Simplex or Duplex?

Applications: Simplex and Duplex cables are typically used for

patch cords and desktop installations that don't require a high fiber count.

Design: Simplex cables contain a single 900µm coated fiber or a combination of a 900µm coated fiber surrounded by an aramid yarn strength member with an outer jacket diameter varying from 3, 2, 1.8 and 1.6mm.

Duplex cables contain two 900µm coated fibers surrounded by an aramid yarn strength member with an outer jacket diameter varying from 3, 2, 1.8 and 1.6mm.

Loose Tube or Tight Buffer?

Loose Tube Cable - Applications: Loose tube cable is ideal for use in long distance outside plant applications that require a high fiber count. The cable is designed to withstand harsh outdoor environments; the cable's unjacketed fibers are free to expand and contract with temperature changes.

Design: Fibers within loose tube cables are surrounded by a water blocking component (either gel or a dry water-blocking material). Although loose tube cables are engineered to withstand damp outdoor environments, they are not designed to be submerged in water, but can come in contact with water.

Terminating Loose Tube Fibers - Fibers within gel-filled tube cable have a very thin tight buffer coating of only about 250µm in diameter. Before terminating, the fibers must be put into small plastic tubes (called a breakout kit or box). The tubes protect the thin fibers and make them easier to handle when terminating and connecting to network equipment.

Tight Buffer Cable - Applications: Tight buffer cable is typically used indoors. A tight buffer (cable jacket) encapsulates each fiber. The buffer enables the fibers to be directly terminated without requiring a breakout kit, which saves substantial time. Although optimized for indoor use, the robust construction of these cables offers advantages over loose tube in certain outdoor applications.

Design: Tight buffer cables have two protective coatings; a plastic jacket and acrylate tight buffer.

Continued on back page.

Inside - Cable Reference Chart from FIS!

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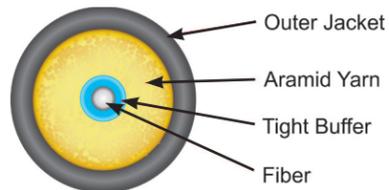
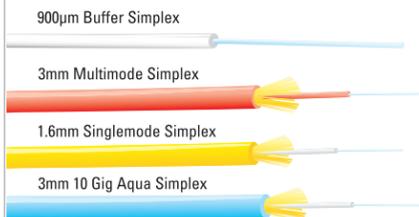
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Fiber Optic Cable Reference

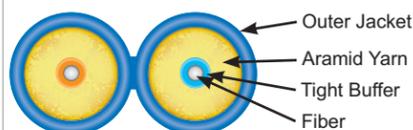
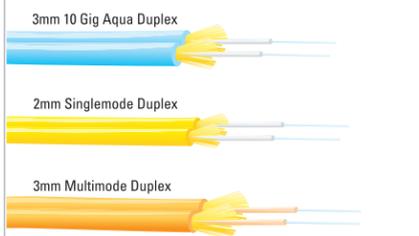
SIMPLEX CABLE

A single cable structure with a single fiber. Simplex cable varieties include 1.6mm & 3mm jacket sizes.



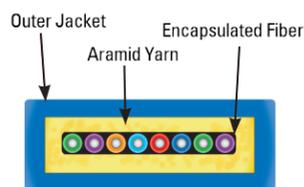
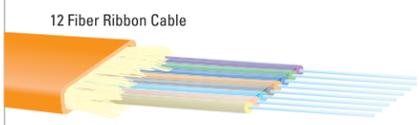
DUPLEX - ZIP CABLE

This cable contains two optical fibers in a single cable structure. Light is not coupled between the two fibers; typically one fiber is used to transmit signals in one direction and the other receives.



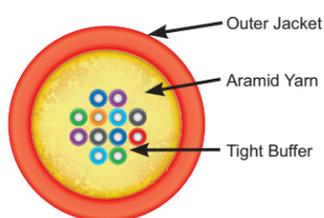
RIBBON CABLE

Consists of up to 12 fibers contained side by side within a single jacket. Often used for network applications and data centers.



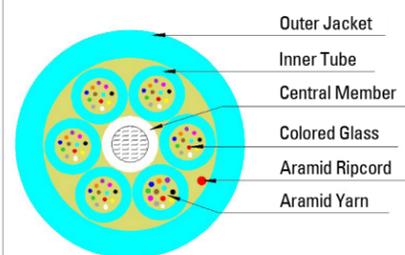
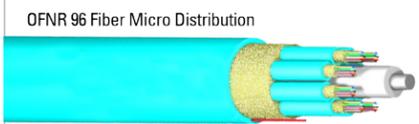
DISTRIBUTION CABLE

This compact building cable consists of individual 900µm buffered fiber, is smaller in size and costs less than breakout cable. Connectors may be installed directly on 900µm buffered fiber at breakout box location.



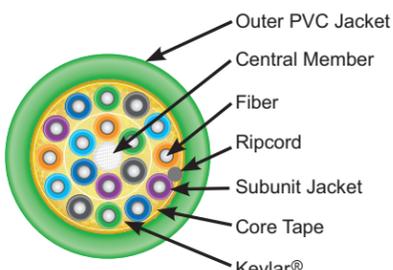
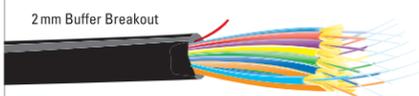
MICRO-DISTRIBUTION CABLE

Packages 250µm coated colored fibers within subunits, which reduces the size of the outer cable jacket. Popular for data center applications, this high-density cable can be terminated with MTP/MPO connectors (breakout kit required).



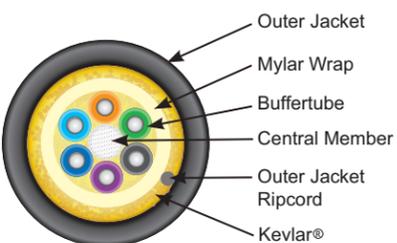
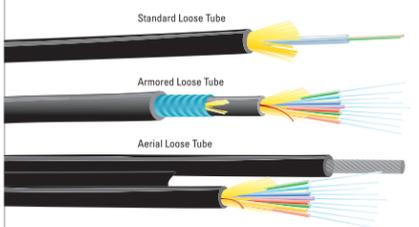
BREAKOUT CABLE

This cable consists of several simplex tight buffer fibers contained within an outer jacket. Breakout cable enables the quick installation of connectors onto 2mm robust jacketed fiber.



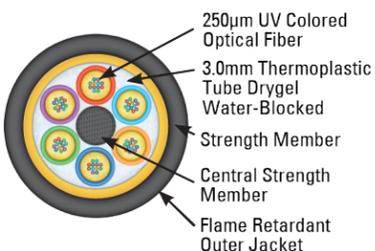
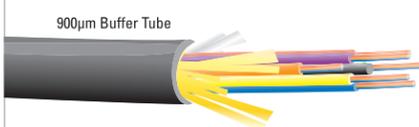
LOOSE TUBE CABLE

Tube encloses multiple coated fibers that are surrounded by a gel compound that protects the cable from moisture in outside environments. Cable is restricted from indoor use, typically allowing entry not to exceed 50 feet.



INDOOR/OUTDOOR CABLE

This cable is suitable for both indoor and outdoor applications. One advantage of this cable is that it eliminates the need for a splice or connector at the point where the cable transitions between an outdoor and indoor environment.



ARMORED CABLE

Typically incorporates a metal structure to protect fibers in cable. Applications include plant installations where protection against crushing and rodent penetration. Indoor cables are available with metal that allow placement underground such as those within data centers.

HYBRID CABLE

Combines the functionality of more cable types. For example, cables include both optical and copper wire. The optical fiber provides video signal transport and the wire provides electrical power for cameras.

TACTICAL CABLE

Typically packages together 900µm fibers in very durable polyurethane outer jacket. This cable is designed for heavy-duty environment applications such as mobile TV cameras, military commercial field operations, and re-deployable communications.

DROP CABLES

Typically small-diameter, low-loss cable to a subscriber's premises.

FLAT DROP CABLE

Contains two dielectric strength members, which give the cable lateral strength and crush resistance. Fiber count is typically on the order of 12, although cables with up to 48 fibers are available.

FIGURE-8 AERIAL DROP CABLE

Designed for aerial installation, this cable is affixed to a steel wire and supporting structure. Fiber count typically ranges from 2 to 48 fibers.

ROUND DROP CABLE

Typically contains a single dielectric strength member. The tight dielectric strength member and outer jacket provide strength and durability.



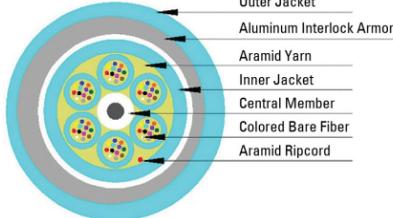
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Reference Guide



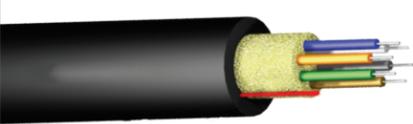
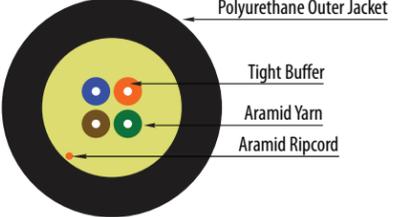
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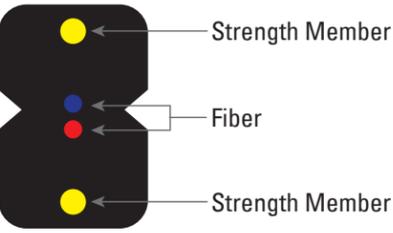


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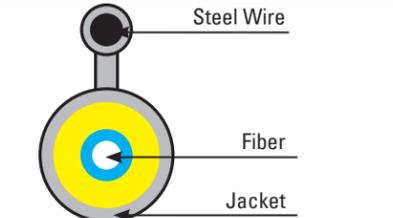



ow fiber count cables used to connect the terminal of a distribution emises. A drop cable can be installed aerially, or underground.

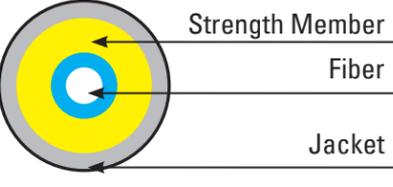
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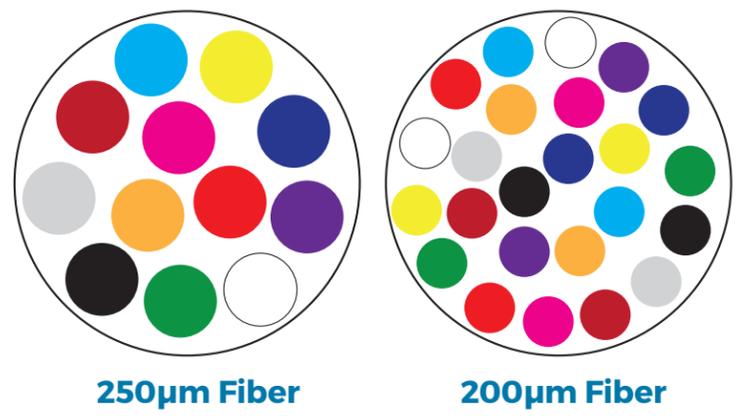
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Did You Know?

200µm Coating Increases Fiber Count

The cross-section of new 200µm coated fiber is 36% smaller than that of 250µm coated fiber. This allows many more fibers to be packed inside a microcable. The thinner fiber also enables ribbon cables and MPO connectors to have higher fiber counts.



Multimode Goes the Distance

In recent years, the introduction of laser optimized, 50µm fiber (OM 3 and 4) significantly increased the speed and distance capabilities of multimode fiber beyond that of older 62.5µm multimode fiber (OM 1). Also, new OM5 multimode fiber is now available that further improves performance at 40Gb and 100Gb speeds.

Type	Category	1 GbE Distance	1 GbE Distance	10 GbE Distance	10 GbE Distance
		Meters @ 850nm	Meters @ 1300nm	Meters @ 850nm	Meters @ 1300nm
Multimode					
OM1	Standard	300	530	33	na
OM2	Standard	750	600	150	na
OM3	Laser-Optimized	1000	600	300	na
OM4	Laser-Optimized	1000	600	550	na
Type	Category	10 GbE Distance	40 GbE Distance	100 GbE Distance	
Multimode		Meters @ 850nm	Meters @ SWDM (850, 880, 910, 940nm)	Meters @ SWDM (850, 880, 910, 940nm)	
OM5	Laser-Optimized	550	440	150	

Did You Know?

Color Coding Cable Colors

quickly identify most cables by noting their cable jackets.

Buffer / Jacket Color	Identification
Yellow	Singlemode optical fiber
Orange	Multimode optical fiber
Aqua	10 Gig laser-optimized OM3 Multimode fiber
Magenta	10 Gig laser-optimized OM4 Multimode fiber
Lime Green	10/40/100 Gig laser-optimized OM4 Multimode fiber

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Continued from front page.

□ Distribution or □ Breakout?

Distribution Cable - Applications: Distribution cable is ideal for networks that terminate multiple fibers at a common location, such as a patch panel or communications closet. Unlike breakout cable, fibers within a distribution cable don't have their own individual cable jackets. This space-saving feature enables up to 144 fibers to be bundled within the cable. "Micro Distribution" cable may contain up to 432 or more fibers. A disadvantage of micro-distribution cable is that the unjacketed fibers require the use of a breakout kit for termination.

Design - Distribution cable contains a number of 250µm - 900µm fibers that are color-coated for easy identification. The cable includes an aramid yarn strength member and a thick outer jacket that provides protection and strength during cable installation. If required, the cables can be purchased with interlocking armor.

Breakout Cable - Applications: Breakout cable is ideal for applications where fibers are connected directly to equipment, including local hubs. Also, the robust design of breakout cable makes them well suited for use as drop cables.

Design - Breakout cable differs from distribution cable in that each of the fibers in a breakout cable have their own cable jackets or "tight buffers" and can be terminated without requiring a breakout kit. This can save substantial time and installation cost.

One disadvantage of breakout cable is that the fiber jackets take up room within the cable, so breakout cable cannot contain as many fibers as distribution cable. Fiber counts for breakout cable are typically 2-24 fibers (maximum is 48 fibers).

□ Plenum or □ Riser?

Plenum-Rated Cable: A plenum is a pathway used for circulating air within a building. Plenum Cable (OFNP) has a fire rating that allows it to be routed through a plenum.

Riser-Rated Cable: Riser Cable (OFNR) may be run between floors but NOT through a plenum.

LSZH Cables: Low Smoke Zero Halogen (LSZH) cables produce minimal smoke or hazardous halogen compounds when burned.

Final Considerations

Identify your cable pathways before ordering cable. This will enable you to determine the length of the cables you need as well as the degree of physical protection the cables will require. Note that newer bend-insensitive optical fibers enable fiber optic cable to negotiate tight turns with little or no decrease in signal propagation. This new type of fiber greatly expands your cable path options.

It is highly recommended that you "future proof" your network by ordering cables that have a higher fiber count than you currently require. Optical fibers are relatively inexpensive compared to the cost of installing them at a future date.

Finally, if you already know the exact type of cable you require, you can use our Cable Configurators that appear on pages 28 and 32 of the FIS 2017 Product Catalog. There you can indicate all of the cable features you need and FIS will provide cables built to your exact specifications.

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July 24-26 | (Brightside) Raquette Lake, NY

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