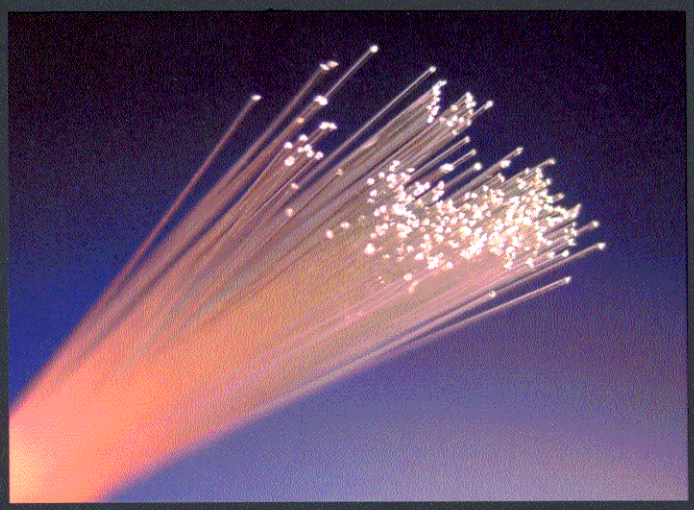
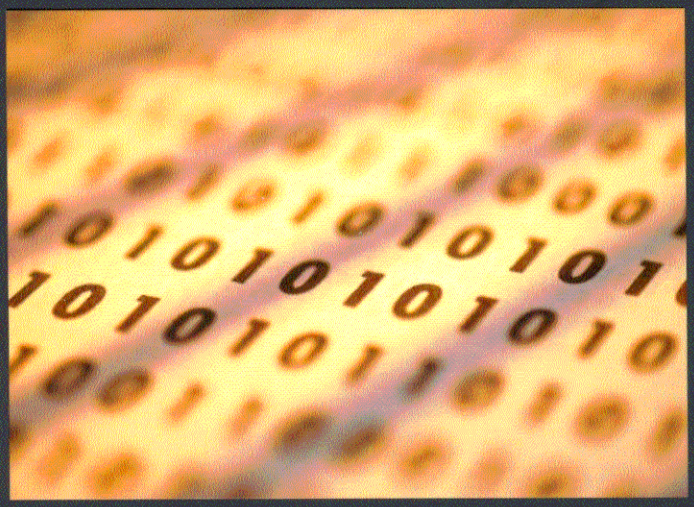
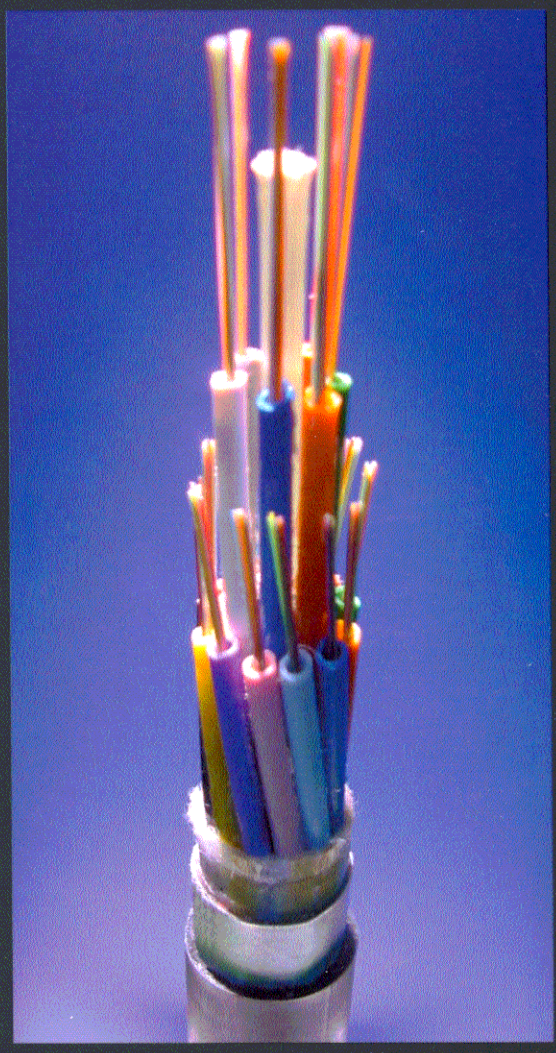
Loose Tube Fiber Optic Cable

Quality Cable for the World's Communication



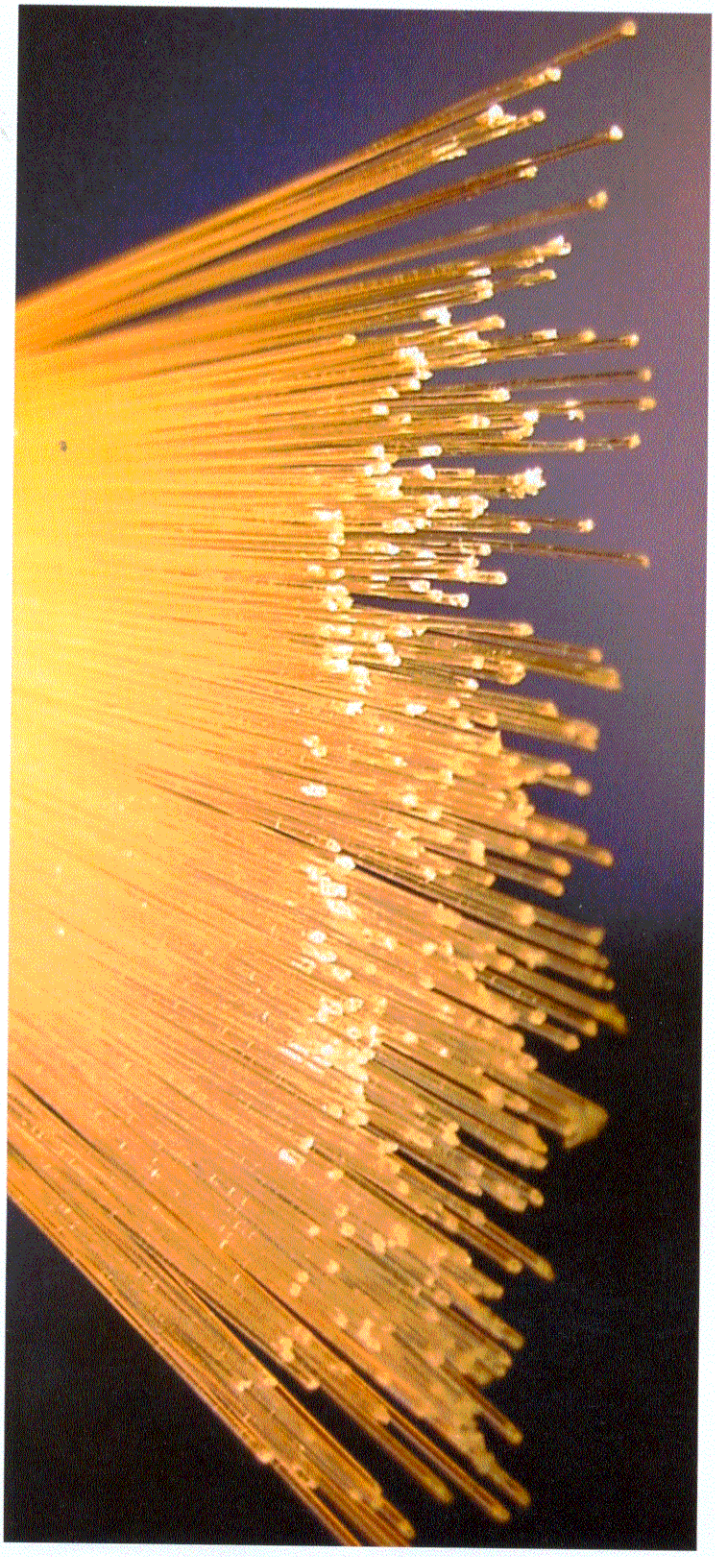




TFOC

THAI FIBER OPTICS CO., LTD.

Nothing travels faster than light, optical fiber is the ultimate transmission medium for today's complex communications networks. Demand for increased bandwidth, rapid transmission speeds, and expanded capacity have made fiber the prime solution for a wide range of transmission needs.



Thai Fiber Optics Co., Ltd. (TFOC) was established in 1996 as a joint venture between Loxley Public Co., Ltd. and Bangkok Telecom Co., Ltd. (BTC). With an initial investment of 100 millions baht. TFOC is the first manufacturer in Thailand to produce single-mode loose tube fiber optic cables that meet international standards.

TFOC receive fully support from The Furukawa Electric Co., Ltd. (OFS Fitel) which is one of the world leader in optical fiber, Cable and Network (Furukawa Fitel have acquired Optical Fiber Solution, the optical fiber and cable division of Lucent Technologies, since July 2001.)

TFOC's production management is based on BTC's local experience accumulated more than twenty-five years of operation. In marketing and its products, TFOC can fully utilize the know-how and facilities of Loxley and BTC as well as their co-ordination functions.

An extremely high performance of our products is assured by a strict quality control, resulting in standard far above requirements. The international quality certifications ISO 9001 and ISO 14001 awarded by BVQI-Bureau Veritas Quality International confirm such performance.

Support systems such as those mentioned above will be powerful and unique features of the new TFOC joint venture.

"TFOC –Optical fiber cable partner for today and tomorrow"

Optical Fiber Performance for your Most Demanding Application

Our optical fiber cables are available with three types of fibers;

1. Multimode Fiber (50/125 and 62.5/125), Our 50/125 μm optical fiber is typically used for high bandwidth, low attenuation applications spanning several kilometers, such as private premise networks. Our 62.5/125 μm optical fiber is widely used for a broad range of data communications applications. This fiber combines good coupling efficiency with premier optical performance.

2. Dispersion Unshifted, Zero-OH Fiber (ITU-T G.652 table D) is low water peak attenuation fiber for full spectrum transmission range from 1280 nm to 1625 nm, which is capable of 50% more usable transmission wavelengths over conventional single-mode fiber (Note; ITU-T G.652 define standard single-mode fibers for use across a broad wavelength range including the extended band (1360 nm - 1530 nm.)

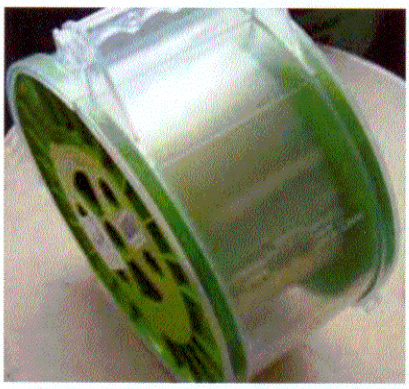
3. Non-Zero, Dispersion Shifted Fiber (ITU-T G.655) is offered for optimized system operation at 1550 nm (third window) systems designed for Dense Wavelength Division Multiplexing (DWDM) with erbium-doped fiber amplifiers (EDFA). Emerging systems will also use the 1565 to 1620 nm fourth window.

These Fibers feature a dual UV curable acrylate coating system, which provides unparalleled performance in a wide range of environmental conditions. The advantages of this coating structure are excellent resistance to micro-bending induced losses, superior hydrolytic stability and long term preservations of color code integrity. The coating is easily strippable using mechanical methods.

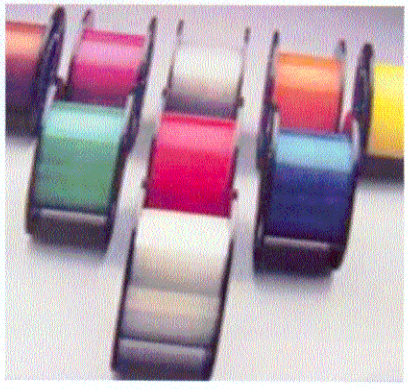
Each fiber is proof-tested to ensure that it will survive installation loads and associated long term residual stresses, ever under extreme environmental conditions. The optical, dimensional, and mechanical properties are measured for compliance to Industry specifications (Bellcore, EIA/TIA, IEC, etc.). Excellent control of fiber geometry permits low loss splicing using either mechanical or fusion techniques. In addition, all single mode fibers are manufactured to meet a low polarization mode dispersion (PMD) specification.

(Note : The SM optical fibers outlined herein are our most popular optical fiber, but for requirements not address in this catalog, please contact us for details fiber specifications and performance data. (e.g. TrueWave Reach® for the Long Haul terrestrial routes, UltraWave® for ultra Long Haul terrestrial routes, UltraWave® IDF with SLA or TrueWave® SRS with XL for submarine network)

Bare Fiber



Colored Fiber



Multimode fibers (50/125 & 62.5/125)

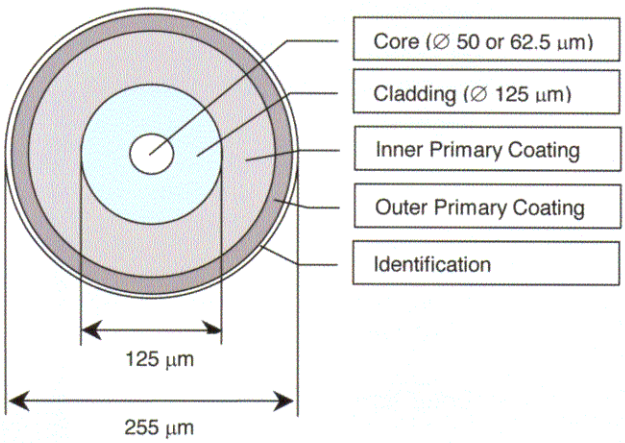
Features:

- Versatility in 850 nm and 1300 nm applications
- Economical support for short reach applications

OVERVIEW/DESCRIPTION

In data communications where high reliability, high data capacity, and ease of connectivity are required, OFS multimode optical fibers have become the medium of choice. Among U.S. manufacturers, OFS offers the widest range of graded index multimode fibers as standard selections.

The OFS Fitel's 50.0 and 62.5 µm multimode fibers are fully compatible with all standard multimode fiber optic network protocols, including fiber distributed data interface (FDDI), Fast Ethernet and 155 Mb/s asynchronous transfer mode (ATM)



Fiber Attribute	MM 50/125
Cladding Diameter	125 ± 1 µm
Cladding Non-Circularity	≤ 1%
Core/Cladding Concentricity error	≤ 1.5 µm
Cladding/Coating concentricity error	≤ 6 µm
Core Diameter	50 µm
Coating Diameter	245 ± 10 µm
Colored Fiber Diameter	255 ± 10 µm
Proof test stress (Equivalent to 1% strain for 1s dwell time)	0.69 GN/m^2(100 kpsi)
Zero-Dispersion Wavelength	1297 - 1316 nm
Zero-Dispersion Slope	≤ 0.101 ps/(nm^2.km)
Numerical Aperture (NA)	0.200 ± 0.015
Bandwidth	≥ 500 MHz.km @ 850 nm ≥ 500 MHz.km @ 1300 nm
Macrobend Attenuation (100 turns- 75 mm Diameter)	≤ 0.5 dB @ 850 and ≤ 0.5 dB @ 1310 nm
Coating Strip Force (@ 0°C to +45°C)	2.2 N ≤ F ≤ 4.4 N
Attenuation at 850 nm (Cabled)	≤ 3.0 dB/km
Attenuation at 1300 nm (Cabled)	≤ 1.0 dB/km
Attenuation difference between 1300 nm and 1380 nm	≤ 1.5 dB/km
Point Discontinuity at 850 / 1300 nm	≤ 0.1 dB

Fiber Attribute	MM 62.5/125
Cladding Diameter	125 ± 1 µm
Cladding Non-Circularity	≤ 1%
Core/Cladding Concentricity error	≤ 1.5 µm
Cladding/Coating concentricity error	≤ 6 µm
Core Diameter	62.5 µm
Coating Diameter	245 ± 10 µm
Colored Fiber Diameter	255 ± 10 µm
Proof test stress (Equivalent to 1% strain for 1s dwell time)	0.69 GN/m^2(100 kpsi)
Zero-Dispersion Wavelength	1320 - 1365 nm
Zero-Dispersion Slope	≤ 0.097 ps/(nm^2.km)
Numerical Aperture (NA)	0.275 ± 0.015
Bandwidth	≥ 200 MHz.km @ 850 nm ≥ 500 MHz.km @ 1300 nm
Macrobend Attenuation (100 turns- 75 mm Diameter)	≤ 0.5 dB @ 850 and ≤ 0.5 dB @ 1310 nm
Coating Strip Force (@ 0 °C to + 45 °C)	2.2 N ≤ F ≤ 4.4 N
Attenuation at 850 nm (Cabled)	≤ 3.5 dB/km
Attenuation at 1300 nm (Cabled)	≤ 1.3 dB/km
Attenuation difference between 1300 nm and 1380 nm	≤ 0.1 dB/km
Point Discontinuity at 850 / 1300 nm	≤ 0.1 dB

Note : Every effort has been made to ensure that the information given in this table is correct. Anyway TFOC reserves the right to improve, enhance and modify the specification of this table without prior notification.

Dispersion-Unshifted, Zero Water Peak, SM Fibers (G.652.D)

OVERVIEW / DESCRIPTION

AllWave® fiber is ITU-T G.652.D compliant. AllWave® Zero Water Peak (ZWP) single-mode optical fiber is the industry's first full-spectrum fiber designed for optical transmission systems operating over the entire wavelength range from 1280 nm to 1625 nm. Before AllWave ZWP fiber was introduced, systems operated in either the O-band (1310 nm window) or the C-band and L-band (1530 nm to 1625 nm). Today, with AllWave ZWP fiber, the E-band (1400 nm window) is available to expand the capacity of optical networks. It is an excellent platform for cost effective Coarse Wavelength Division Multiplexing (CWDM).

AllWave ZWP fiber enables use of the entire optical fiber spectrum thanks to a manufacturing process that virtually eliminates the high attenuation, or water peak, that typically occurs in conventional single-mode fiber due to hydroxyl (OH^-) absorption in the E-band of the fiber. The removal of the water peak is permanent, and the attenuation of AllWave fiber at 1400 nm is always lower than at 1310 nm.

The dispersion characteristics of AllWave fiber at 1400 nm are ideal for high data rates, such as 10 Gb/s applications. By removing the water peak, not only does AllWave fiber open up the E-band for communication, but it is ideal for high-speed networks. Increased usable wavelengths, ideal dispersion characteristics and tremendous flexibility for network design make AllWave fiber the choice.

WHY ALLWAVE FIBER FOR METROPOLITAN LOCAL AND ACCESS NETWORKS?

Metropolitan local and access networks are made up of many different architectural designs, such as ring, mesh, and hybrid fiber coaxial (HFC) networks. They support many different applications, including 10 Gigabit Ethernet, Internet Protocol (IP), Asynchronous Transfer Mode (ATM) and Synchronous Optical Network (SONET), using single channel, Dense Wavelength Division Multiplexing (DWDM) and Coarse Wavelength Division Multiplexing (CWDM) transmission. Finding an ideal, low-cost fiber solution for all these architectures and applications is not easy. AllWave fiber helps network planners and operators to build cost efficient, high-speed metropolitan optical networks with unique characteristics as shown to the right in "Features".

These unique characteristics translate into greater information capacity with maximum flexibility and lower total system cost for metropolitan and access networks. When designing today's network, look for the fiber that will provide you the greatest capacity and flexibility both now and in the future.

Features:

- Operation over the entire wavelength range from 1280 nm to 1625 nm, an increase of more than 50% in usable wavelength range over conventional single-mode fiber
- Opens the 1400 nm window, having ideal dispersion characteristics for 10 Gb/s applications
- Supports 16 low cost CWDM channels, providing at least 33% more CWDM channels than conventional single-mode fiber can support.
- Enables low cost HFC systems with multiple CWDM channels as return paths for video, video on demand, data and IP telephone applications
- Flexible configurations for multiple service platforms
- Fully compatible with legacy 1310 nm equipment
- Long term reliability

MORE WAVELENGTH CAPABILITY

AllWave Fiber provides over 50% more (100 nm) usable wavelengths than that of conventional single-mode Fiber (G.652.A,B). By opening the full spectrum, AllWave Fiber offers maximum upgrade flexibility and maximum wavelengths for CWDM and DWDM applications.

HIGH SPEED APPLICATION IN THE E-BAND

AllWave Fiber provides all of the capability available today with conventional single-mode Fiber, while supporting higher transmission rates without dispersion compensation in the E-band. Being the First to recognize the capability of WDM in the E-band, OFS is pioneering efforts to support systems operating with multiple channels in this band. This effort includes working with vendors to develop WDM systems for the E-band.

FULL SPECTRUM CWDM WITH ALLWAVE FIBER

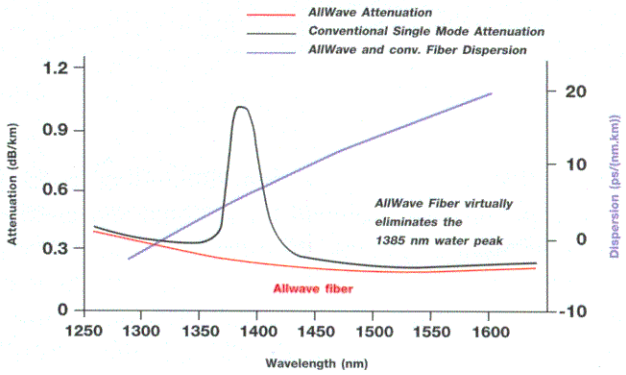
The nature of service requirements for metropolitan area networks determines that metropolitan optical networks are multiple service platforms with several types of network architectures. Therefore, metro optical networks are very sensitive to cost. Coarse wavelength division multiplexing allows the use of low-cost, uncooled lasers with direct modulation technology and lower cost multiplexers due to the large wavelength separation. The overall system cost reduction of a CWDM system on AllWave fiber relative to that of a DWDM system over conventional single-mode fiber can be greater than 35%! CWDM has many characteristics that fit the need of metro networks and will greatly reduce metro network costs.

MULTI-SERVICES PLATFORM WITH ALLWAVE FIBER

The full spectrum opened by AllWave fiber has great system-enabling potential. AllWave fiber gives system designers and operators more flexibility in providing a wider range of services on a single fiber.

COMPATIBILITY WITH LEGACY EQUIPMENT

AllWave fiber is G.652.D compliant, and the attenuation and dispersion characteristics at 1310 nm and 1550 nm are the same as that of conventional G.652.B single-mode fiber. Therefore, AllWave fiber supports legacy transport equipment and applications.



Fiber Attribute	G.652.D, AllWave®
Cladding Diameter	125 ± 0.7 µm
Cladding Non-Circularity	≤ 1%
Core/Cladding Concentricity error	≤ 0.5 µm
Cladding/Coating concentricity error	≤ 12 µm
Core Diameter	8.3 µm
Coating Diameter	245 ± 10 µm
Colored Fiber Diameter	255 ± 10 µm
Mode Field Diameter at 1310 nm	9.2 ± 0.4 µm
Mode Field Diameter at 1550 nm	10.4 ± 0.5 µm
Proof test stress (Equivalent to 1% strain for 1s dwell time)	0.69 GN/m^2(100 kpsi)
Zero-Dispersion Wavelength	1300 - 1324 nm
Zero-Dispersion Slope	≤ 0.092 ps/(nm^2.km)
Dispersion from 1288 to 1339 nm	≤ 3.5 ps/(nm.km)
Dispersion at 1550 nm	≤ 18 ps/(nm.km)
Macrobend Attenuation (1 turns- 32 mm Diameter)	≤ 0.50 dB @ 1550nm
Macrobend Attenuation (100 turns- 50 mm Diameter)	≤ 0.05 dB @ 1310 nm ≤ 0.10 dB @ 1550 and 1625 nm
Polarization mode dispersion Link Design Value	≤ 0.10 ps/km$^{0.5}$
Coating Strip Force (@ 0 °C to +45 °C)	1.3 N ≤ F ≤ 8.9 N
Operating Temperature Range	-60 °C to +85 °C
Cable Cut-off Wavelength (λ_{cc})	≤ 1260 nm
Temp. Dependence of Attenuation Induced Attenuation -60 °C to +85 °C	≤ 0.05 dB/km @ 1310, 1550 and 1625 nm
Temperature-Humidity Cycling Induced Attenuation -10 °C to +85 °C	≤ 0.05 dB/km @ 1310, 1550 and 1625 nm
Accelerated Aging (Temperature) Induced Attenuation due to Temperature Aging at 85 ± 2 °C for 30 days	≤ 0.05 dB/km @ 1310, 1550 and 1625 nm
Water Immersion Induced Attenuation due to Water Immersion at 23 ± 2 °C for 30 days	≤ 0.05 dB/km @ 1310, 1550 and 1625 nm
Point Discontinuity at 1310 / 1550 nm	≤ 0.05 dB
Attenuation at 1310 nm (Cabled)	< 0.35 dB/km
Attenuation at 1383 nm (Cabled)	< 0.35 dB/km
Attenuation at 1490 nm (Cabled)	< 0.24 dB/km
Attenuation at 1550 nm (Cabled)	< 0.21 dB/km
Attenuation at 1625 nm (Cabled)	< 0.23 dB/km
Attenuation difference from 1310 nm value at any wavelength between 1285-1330 nm	≤ 0.03 dB/km
Attenuation difference from 1550 nm value at any wavelength between 1525-1575 nm	≤ 0.02 dB/km

Note : Every effort has been made to ensure that the information given in this table is correct. Anyway TFOC reserves the right to improve, enhance and modify the specification of this table without prior notification.

Non-Zero Dispersion-Shifted, SM Fibers (G.655)

OVERVIEW / DESCRIPTION

TrueWave RS® reduced dispersion slope fiber is an ITU-T G.655 compliant fiber designed for regional and metropolitan optical transmission systems. With the lowest dispersion slope amongst NZDFs in the industry, TrueWave RS fiber enables performance in Dense Wavelength Division Multiplexing (DWDM) systems traditionally operating in the C-band (1530 nm - 1565 nm), as well as in emerging L-band (1565 nm - 1625 nm) systems.

The low dispersion slope found in TrueWave RS fiber improves performance and lowers total network cost by reducing the need for complex and expensive dispersion compensation a problem that can arise with other NZDFs, particularly those that have large effective areas. TrueWave RS fiber's low dispersion and dispersion slope combine to allow the longest uncompensated reach for metropolitan and regional networks operating at 2.5 or 10 Gb/s.

The low dispersion slope also enables more accurate compensation as the need arises. As a result, TrueWave RS fiber has much lower residual dispersion than other NZDFs, which is critical for next generation optical cross-connect based networks, such as optical transport network, and for supporting a migration to 40 Gb/s data rates.

UNIFORM AND OPTIMUM PERFORMANCE WITH A LOW DISPERSION SLOPE

The chromatic dispersion of all fibers changes with wavelength, with the rate of change expressed as dispersion slope. The smaller the dispersion slope, the less dispersion changes with wavelength. For high speed, multi-channel DWDM networks, a lower dispersion slope enables more uniform and optimum performance across the entire wavelength band. Another advantage to TrueWave RS fiber's low dispersion slope is around the phenomenon of Four Wave Mixing (FWM). Very low dispersion, which can happen at the lower end of the C-band in NZDFs with high dispersion slope, can result in FWM and degradation of multi-channel DWDM system performance. Because of its low dispersion slope, TrueWave RS fiber allows its minimum dispersion to be increased in this region to better suppress FWM, while keeping the fiber's maximum dispersion small enough for signals to travel over long distances with minimum need for costly dispersion compensation.

Clearly, minimizing dispersion compensation costs benefits the total system cost for regional and metro express networks. See your OFS representative to hear about the latest system demonstration that illustrates TrueWave RS fiber's capabilities.

Features:

- Lowest dispersion slope over both C-band and L-band wavelength windows
- Longest uncompensated reach for regional and metropolitan applications
- Lowest residual dispersion, an important requirement for fiber of the next generation OXC-based optical network and future very high data rates, such as 40 Gb/s
- Low bending induced loss at 1550 nm and at the more sensitive 1625 nm wavelength
- First fiber with attenuation and dispersion specifications in the L-band
- Attenuation and Dispersion specification in third and fourth window.

REDUCE SIGNAL INTERFERENCE

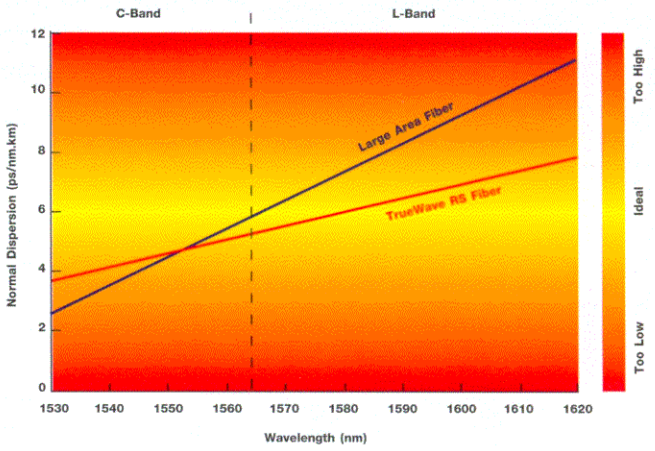
The moderate dispersion of TrueWave RS fiber suppresses non-linear crosstalk related to FWM by providing a controlled amount of chromatic dispersion throughout the C-band and L-band. This level of dispersion effectively destroys the phase matching between the various wavelengths, thereby virtually eliminating FWM interference in DWDM systems. The dispersion is also small enough that TrueWaveRS fiber allows for minimum compensation in regional and metro express networks.

LOW SYSTEM PMD

OFS was the first to adopt specifications for Polarization Mode Dispersion (PMD) in single-mode fibers, a critical parameter for high performance optical systems. Manufactured using a patented fiber drawing process, TrueWave RS fibers meet stringent PMD specifications. OFS recognizes that PMD values can depend on the geometrical and mechanical condition of the fiber. Therefore, OFS has chosen to use the PMD of cabled fiber — representing the way the fiber will be used in an installation -- as the best indicator of true PMD.

REDUCE SYSTEM COST WITH TRUEWAVE RS FIBER

Dispersion unshifted (conventional) fiber was designed to minimize loss and maximize bandwidth for 1310 nm systems. The fiber's high chromatic dispersion at 1550 nm (approximately 17 ps/nm-km) may require the additional cost of dispersion compensation and/or more transmission equipment when used in high capacity amplified systems. TrueWave RS fiber keeps the cost of dispersion compensation to a minimum compared with unshifted and other NZDFs. For example, NZDFs having larger effective areas tend to have large dispersion variability with wavelength. For long DWDM systems, this large variability necessitates the use of complex dispersion compensation schemes. The wavelength band must be split into several sub-bands each of which are individually compensated with different amounts of dispersion compensation. TrueWave RS fiber reduces the need for this complexity and added cost. TrueWave RS fiber uses a special refractive index profile in the core, surrounded by synthetic silica cladding layers having different refractive indices, to achieve low attenuation and nonzero-dispersion in the third and fourth operating wavelength windows. This reduces and can even eliminate the cost of dispersion compensation.



Fiber Attribute	G.655
Cladding Diameter	125 ± 0.7 µm
Cladding Non-Circularity	≤ 0.7%
Core/Cladding Concentricity error	≤ 0.5 µm
Cladding/Coating concentricity error	≤ 10 µm
Core Diameter	6.0 µm
Coating Diameter	245 ± 10 µm
Colored Fiber Diameter	255 ± 10 µm
Mode Field Diameter at 1550 nm	8.4 ± 0.6 µm
Proof test stress (Equivalent to 1% strain for 1s dwell time)	0.69 GN/m^2(100 kpsi)
Zero-Dispersion Slope	≤ 0.05 ps/(nm^2.km)
Dispersion from 1530 to 1565 nm (C-band)	2.6 to 6.0 ps/(nm.km)
Dispersion from 1565 to 1625 nm (L-band)	4.0 to 8.9 ps/(nm.km)
Macrobend Attenuation (1 turns- 32 mm Diameter)	≤ 0.50 dB @ 1550 and 1625 nm
Macrobend Attenuation (100 turns- 60 mm Diameter)	≤ 0.05 dB @ 1550 and 1625 nm
Polarization mode dispersion Link Design Value	≤ 0.10 ps/$km^{0.5}$
Coating Strip Force (@ 0 °C to +45 °C)	1.3 N ≤ F ≤ 8.9 N
Operating Temperature Range	-60 °C to +85 °C
Cable Cut-off Wavelength (λ_{cc})	≤ 1260 nm
Temp. Dependence of Attenuation Induced Attenuation -60 °C to +85 °C	≤ 0.05 dB/km @ 1310, 1550 and 1625 nm
Temperature-Humidity Cycling Induced Attenuation -10 °C to +85 °C	≤ 0.05 dB/km @ 1310, 1550 and 1625 nm
Accelerated Aging (Temperature) Induced Attenuation due to Temperature Aging at 85±2 °C for 30 days	≤ 0.05 dB/km @ 1310, 1550 and 1625 nm
Water Immersion Induced Attenuation due to Water Immersion at 23± 2 °C for 30 days	≤ 0.05 dB/km @ 1310, 1550 and 1625 nm
Point Discontinuity at 1310 / 1550 nm	≤1.0 dB
Attenuation at 1550 nm (Cabled)	< 0.25 dB/km
Attenuation at 1625 nm (Cabled)	< 0.30 dB/km
Attenuation difference from 1550 nm value at any wavelength between 1525-1575 nm	≤ 0.02 dB/km
Attenuation difference from 1550 nm value at any wavelength between 1550-1625 nm	≤ 0.05 dB/km

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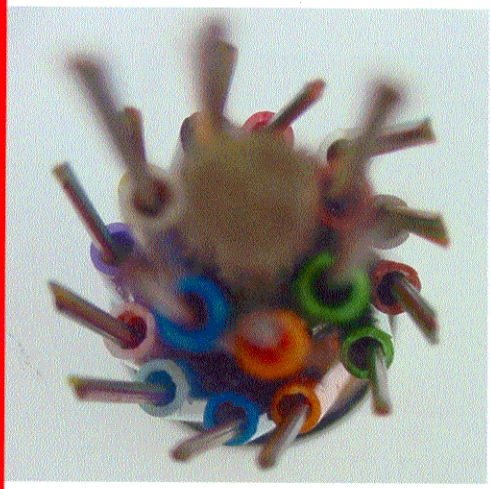


Loose Tube Fiber Optic Cable

Thai Fiber Optics designs and manufactures loose tube optical fiber cable. We offer a complete line of standard and special cable types for the full range of outside plant applications. Fiber type is single mode in counts from 2 to 216. Our loose tube construction ensures exceptional long-term cable performance and reliability by protecting the optical fibers in a virtually stress-free environment.

Our cable designs conform to stringent industry standards, including;
Electronic Industries Association (EIA), Telecommunications Industry Association (TIA), International Telecommunications Union (ITU), International Electrotechnical Commission (IEC), American Society for Testing and Materials (ASTM)

Buffer Tube

The basic building block of loose tube consists of the thermoplastic buffer tubes containing 1 to 12 loose optical fibers. Positive identification is provided by color coding both the optical fibers and the buffer tubes. All buffer tubes are provided with the filling compound to provide water penetrations resistance.

Cable Core

To form the cable core, the individual buffer tubes are stranded about a central strength element of either Glass Reinforced Plastic or Steel. The stranding process, via the Reverse Oscillating Lay (ROL, S-Z) technique, which periodically reverses the rotation of stranding, is employed to facilitate cable mid-span entry. Once a reversal point is located, the tubes can be easily unwrapped from the central strength member. A water blocking material is then applied to the cable core region to prevent water migration.

- Flooding Compound
Conventional loose tube cable designs have a flooding compound introduced into core that effectively blocks the penetration of water.

- Dry Core
Dry core technology uses dry water-reactive materials for excellent water resistance without using flooding compound. Dry core cables weight less, save on preparations and installation time, and virtually eliminate the need for cleaning solvents.

Sheathing

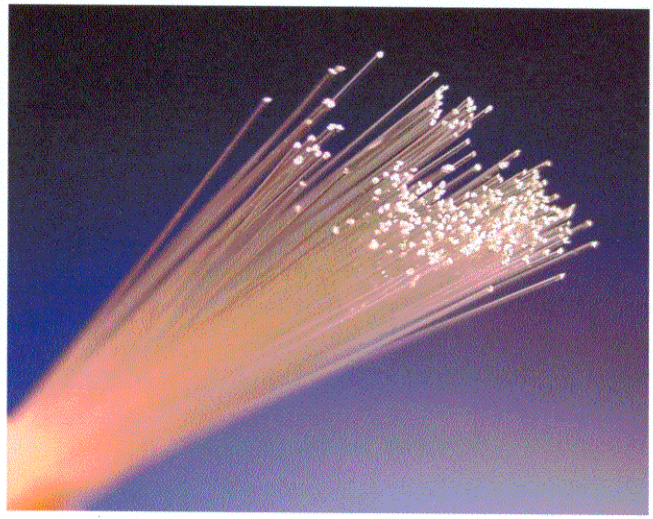
In the final steps, dielectric strength elements are applied over the cable core. The quantity of dielectric strength shall be selected to minimize cable cost while meeting the performance requirements of the cable application.
A variety of sheaths are available to withstand the rigors of duct, buried, aerial, and outdoor/indoor installations including:

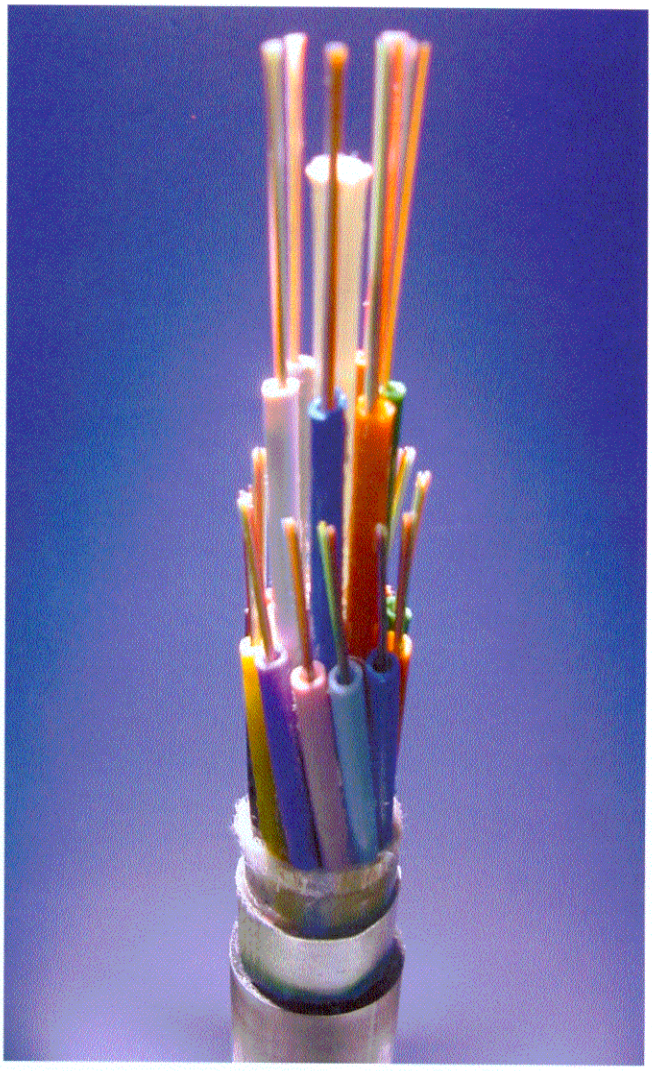
- Single Jacket, Loose Tube Cable
- Double Jacket, Loose Tube Cable
- Triple Jacket, Loose Tube Cable
- Single Jacket, Single Armor Loose Tube Cable
- Double Jacket, Single Armor Loose Tube Cable
- Single/Double Jacket, All-dielectric, Self-supporting (ADSS) Loose Tube Cable
- Single Jacket, Low Smoke/Zero Halogen, All-Dielectric Out door/Indoor Loose Tube Cable
- Single Jacket, Laminated Aluminum Loose Tube Cable
- Double Jacket, Single Armor, Laminated Aluminum Loose Tube Cable
- Single Jacket, Single Armor, Laminated Aluminum Loose Tube Cable
- Single Jacket, Self-supporting Aerial Loose Tube Cable
- Single Jacket, Laminated Aluminum, Self-supporting Aerial Loose Tube Cable
- Double Jacket, Single armor, Self-supporting Aerial Loose Tube Cable
- Drop Cable
- Central Loose Tube Cable
- Central Loose Tube Cable with Armor

Thai Fiber Optics primary loose tube optical fiber cable products outlined here are our most popular fiber optic cable product, but for requirements not address in this cable product, please contact us for details cable specifications and performance data.

Features & Advantages

- Full range of fiber type for the performance you need. (Ask for details)
- Fiber count available up to 216 for full communications capacity.
- Small minimum bend radius of 15 x cable outer diameter during installation and 10 x cable outer diameter post-installation, excellent for confined space installations
- Full range of cable construction to provide the strength and protections needed for duct, buried, aerial, outdoor/indoor and indoor application
- Dry Core technology for a more craft-friendly, jelly-free cable core - permitting quicker cable preparation and splicing.
- ROL buffer tube stranding technique permits quick and easy mid-span fiber access
- 5 Position structure, Smaller, Lighter and more economical
- Ripcords for fast sheath removal
- Abrasion-resistant outer PE jacket with UV-resistant for reliable service in direct sunlight.
- Nylon Jacket for Rodent Resistance
- Special Tracking Resistance Sheath available for ADSS cable where electric field space potentials up to 25 kV
- Low-smoke, Zero Halogen and Flame Retardant Sheath for indoor, outdoor/indoor installations
- Plastic coated Aluminum Tape on both sides encases cable core and provides additional moisture barrier
- Electrolytic chrome-coated steel (ECCS) armor or stainless steel armor for enhanced rodent protection and crush resistance.
- Color stripes run longitudinally along the outer sheath is available upon request.
- Fully qualified in accordance with;
  - Electronic Industries Association (EIA)
  - Telecommunications Industry Association (TIA)
  - International Telecommunications Union (ITU)
  - International Electrotechnical Commission (IEC)
  - Telecordia Technologies (GR-20-CORE)
  - American Society for Testing and Materials (ASTM)
- ISO 9001&14001 certified manufacturer.





Cables with stranded loose tubes represent the fiber optic cable design which is most frequently used all over the world and can certainly be referred to as the standard cable type. Beyond the mechanical properties stemming from stranding, such as flexibility, it also provides the optical fibers with the clearance necessary to protect them from external loads. TFOC's loose tube fiber optic cables are specially designed to provide a stress-free environment for the fiber when install/operating within their designed load and temperature range. The following cable construction outlined here are our most popular fiber optic cable construction;

Single Jacket, Loose Tube Fiber Optic Cable

Design / Overview

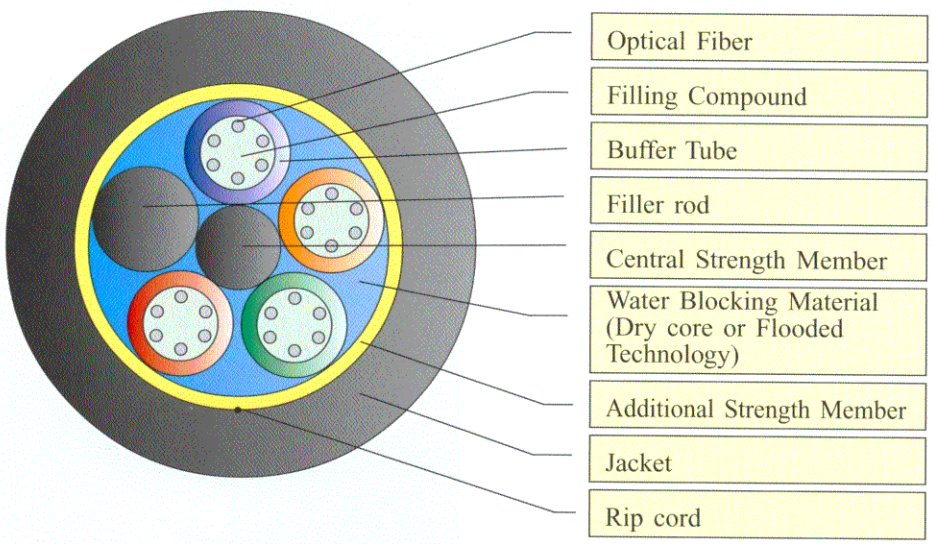
The cross-section of the dielectric single sheath cable is shown below. Dielectric strand elements are stranded about the cable core. A High-Density Polyethylene sheath is extruded about the cable core and strength elements.

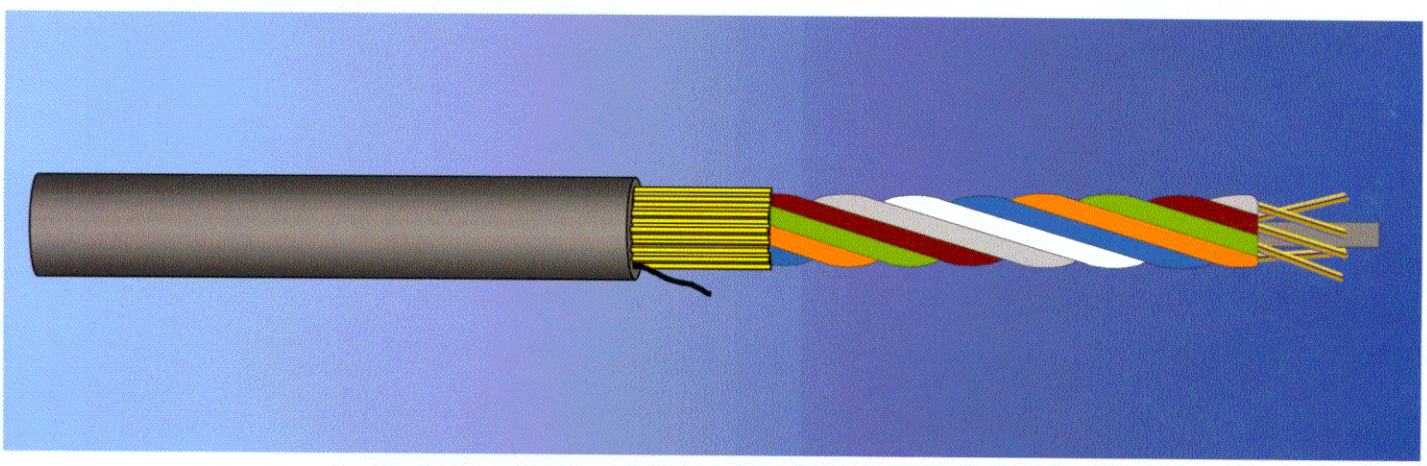
Applications

- Design for duct and lashed aerial installations

Features/Advantages or Optional

- Please refer to sub-heading "Features and Advantages"





Double Jacket, Single Armor Loose Tube Fiber Optic Cable

Design / Overview

The Armored sheath is shown below. A layer of Polyethylene, the inner sheath, is extruded about the cable core prior to the application of the steel tape. An overlapped armor layer of 0.15 mm corrugated electrolytic chrome coated steel (ECCS) envelopes the inner sheath of the cable. The steel armor is coated to inhibit corrosion and to bond to the outer jacket. The sheath is completed with black High-Density Polyethylene (HDPE) jacket. This cable design is rated to Bellcore's superior armor rating for cable crush resistance to 440 N/cm.

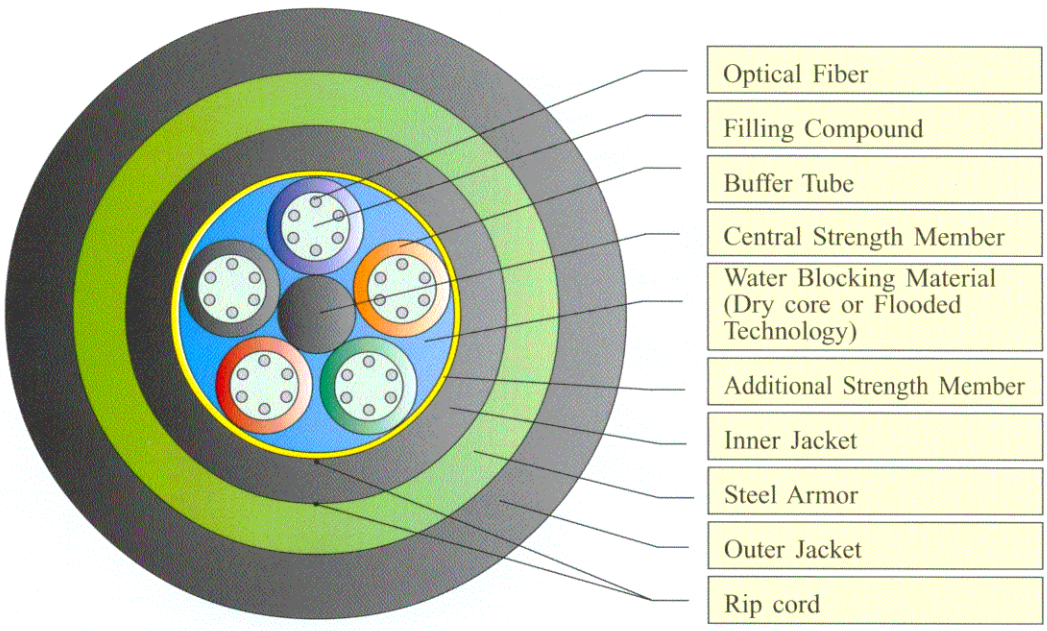
Applications

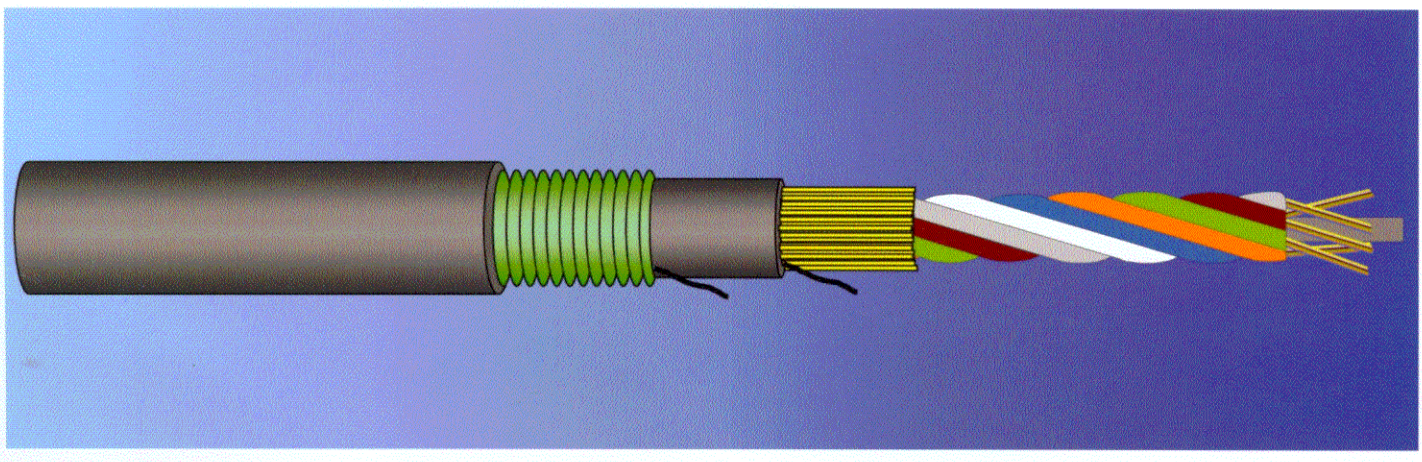
- Design for demanding duct, aerial and direct-buried installations

- Provides outstanding mechanical protection and rodent resistance

Features/Advantages or Optional

- Please refer to sub-heading "Features and Advantages"





Single Jacket, Self-Supporting, Aerial Loose Tube Fiber Optic Cable (Figure-8, Self-supporting sheath)

Design / Overview

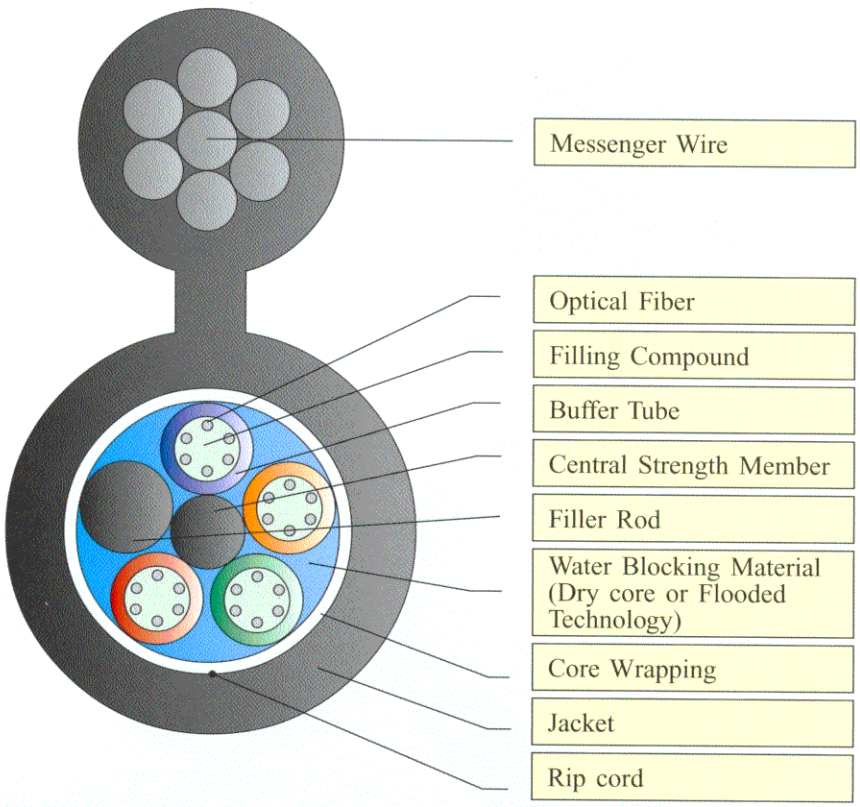
The figure-8 Self-supporting sheath is shown below. A strand 7/1.32 or 7/1.57 or 7/2.03 mm, extra high strength galvanized steel is used as the tensile bearing element. The strand is flooded with a polymer compound for corrosion protection and adhesion to the jacket. A black High-Density Polyethylene (HDPE) sheath connects the cable core to the steel messenger wire via an integral web.

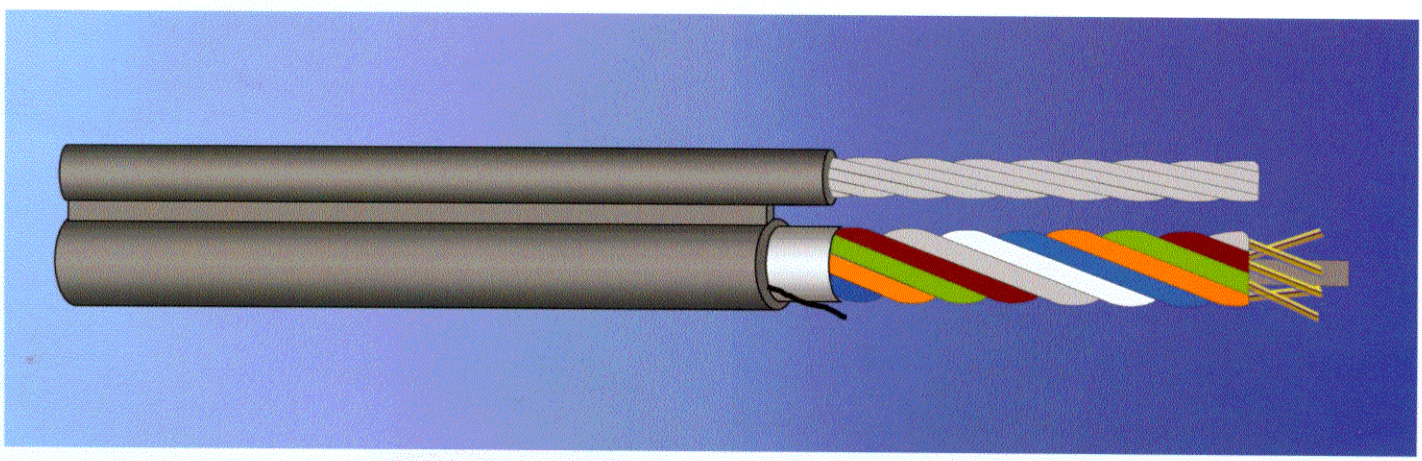
Applications

- Self-supporting design excellent for rapid one-step installation in aerial network

Features/Advantages or Optional

- Please refer to sub-heading "Features and Advantages"





Single Jacket, Self-Supporting, Laminated Aluminum, Aerial Loose Tube Fiber Optic Cable (Figure-8/LAP, Self-supporting sheath)

Design / Overview

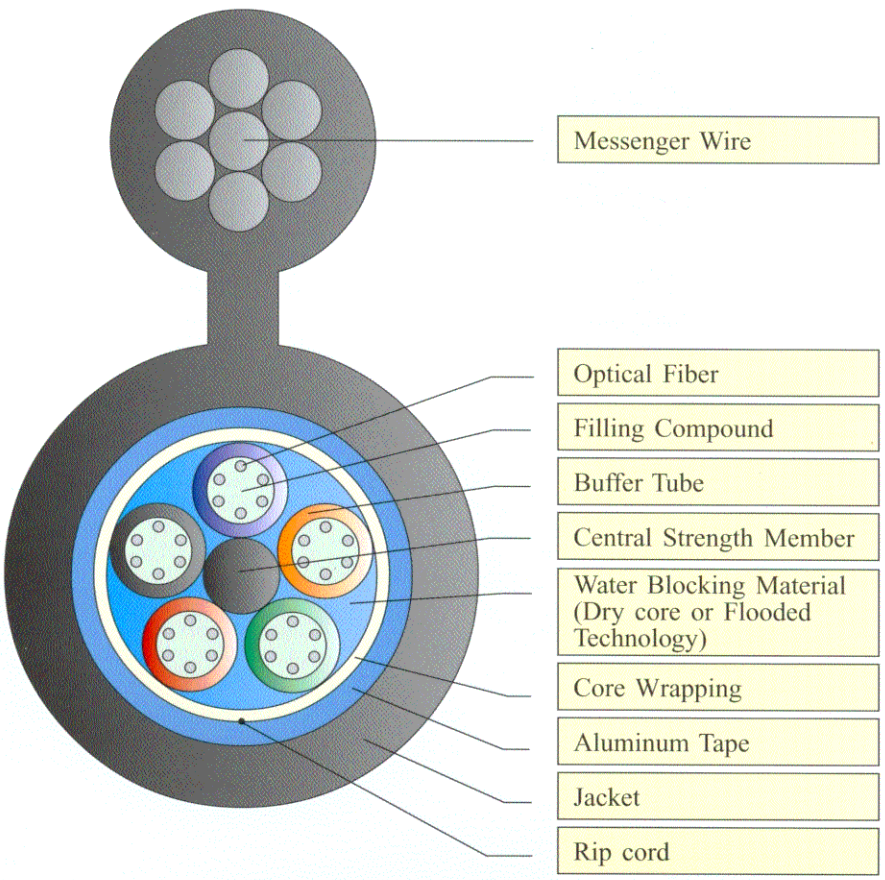
The LAP/figure-8 Self-supporting sheath has the same constructions as the LAP cable described above except that there is the addition of A strand 7/1.32 or 7/1.57 or 7/2.03 mm, extra high strength galvanized steel is used as the tensile bearing element instead of additional strength member. A black High-Density Polyethylene (HDPE) sheath connects the cable core to the steel messenger wire via an integral web.

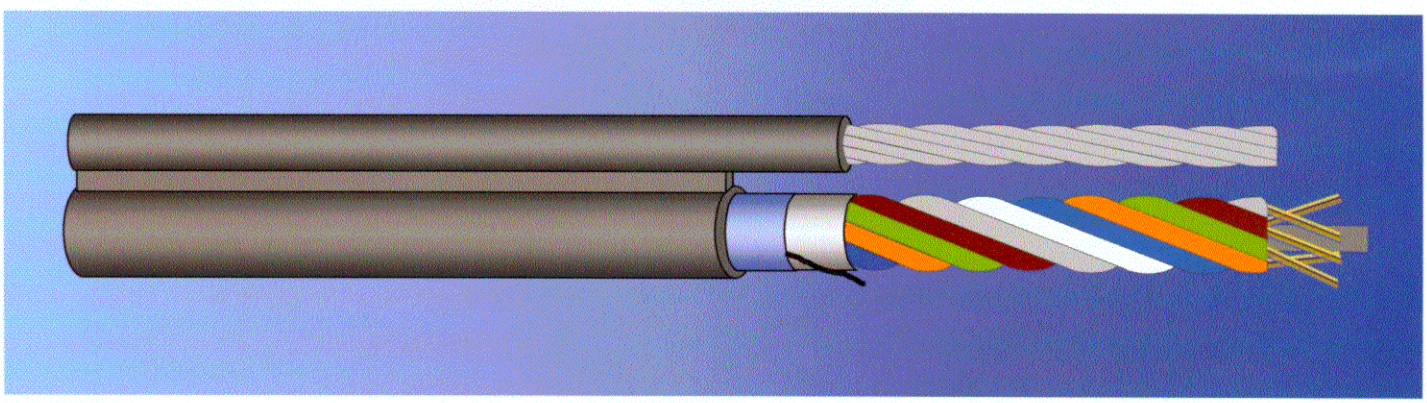
Applications

- Self-supporting design excellent for rapid one-step installation in aerial network
- Ideal for environments in which an additional moisture barrier is desired

Features/Advantages or Optional

- Please refer to sub-heading "Features and Advantages"





Double Jacket, Single Armor, Self-supporting, Aerial Loose Tube Fiber Optic Cable (Armored Figure-8, Self-supporting sheath)

Design / Overview

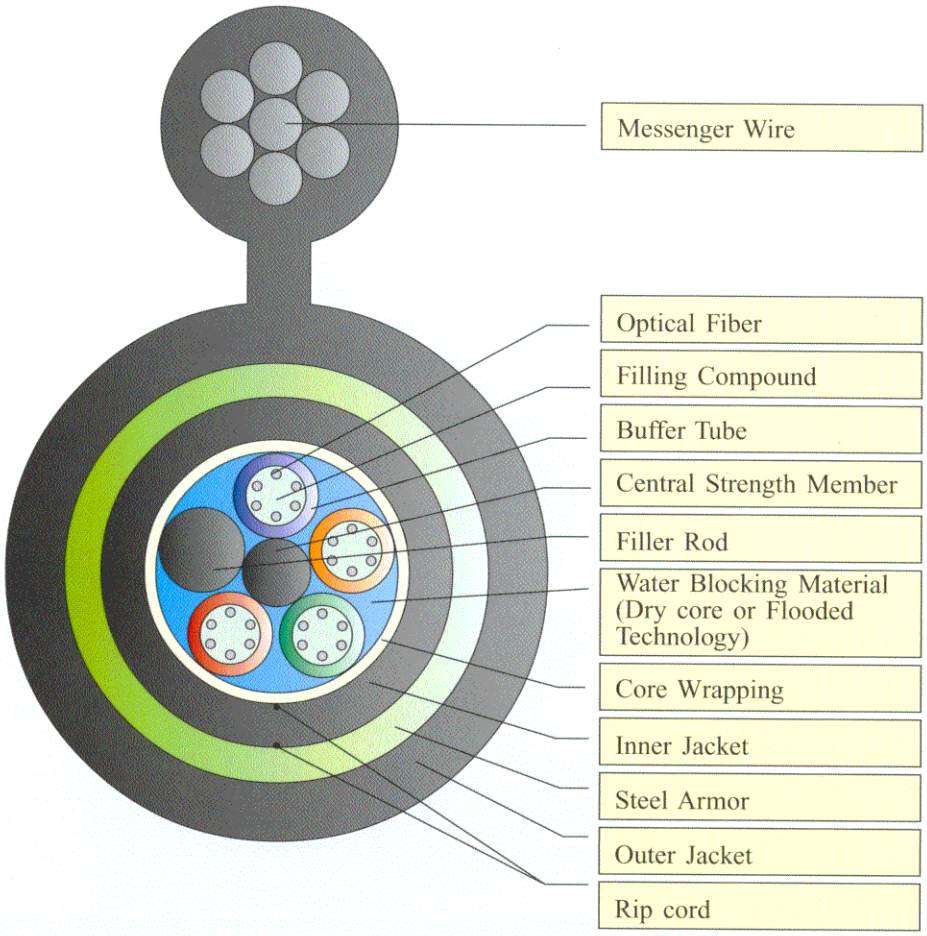
The armored Fig-8 is the same as the above design described with the addition of an armor/PE sheath The armor is a corrugated tape of 0.15 electrolytic chrome coated steel (ECCS). The electrically continuous metal shield is coated to bond to the outer jacket and is formed to enclose the core tube completely with an overlap. Over the shield is a black High-Density Polyethylene (HDPE) outer jacket. An integral outer jacket and web, of HDPE, covers the fiber optic cable and the supporting strand, connecting the two members.

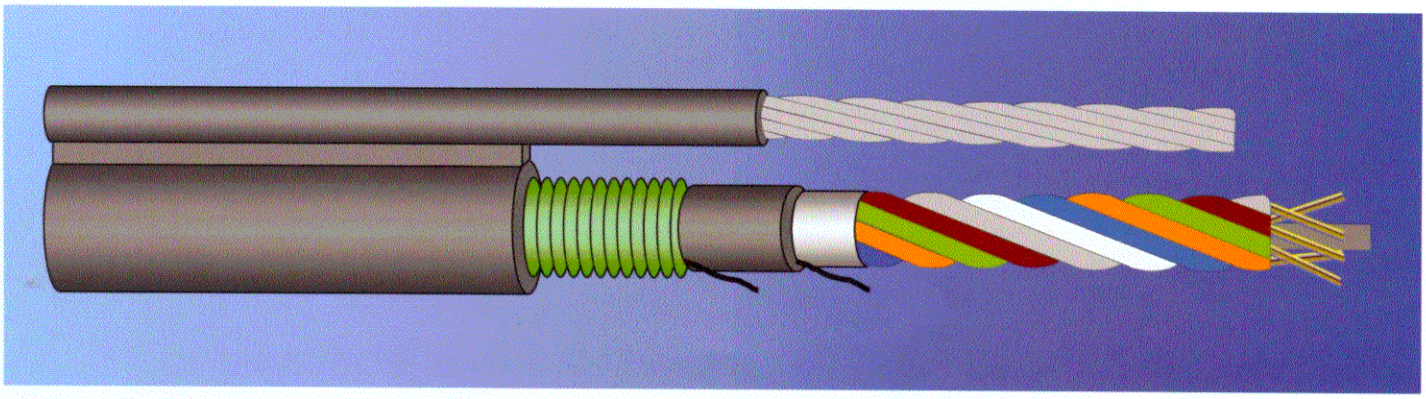
Applications

- Self-supporting design excellent for rapid one-step installation in aerial network
- Provides additional mechanical protection and squirrel/rodent resistance

Features/Advantages or Optional

- Please refer to sub-heading "Features and Advantages"





Single/Double Jacket, All-Dielectric Self-supporting Aerial Loose Tube Fiber Optic Cable (ADSS)

Design / Overview

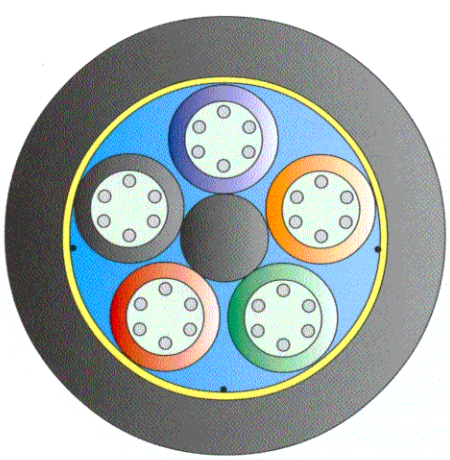
The construction of the Dielectric Circular Self-Supporting sheath is shown below. The Strength elements are stranded about the core or inner jacket to provide the cable with tensile strength. An outer PE sheath is extruded about the aramid strength elements. A standard HDPE sheath is utilized for aerial application in electric field that is less than 12 kV. Aerial Cable installed on transmission networks may be susceptible to a phenomenon known as dry band arching where field potentials at the cable attachment points exceed 12 kV. For applications where the space potentials are expected to exceed 12 kV. but remains below 25 kV., an optional tracking resistant jacket can be offered

Applications

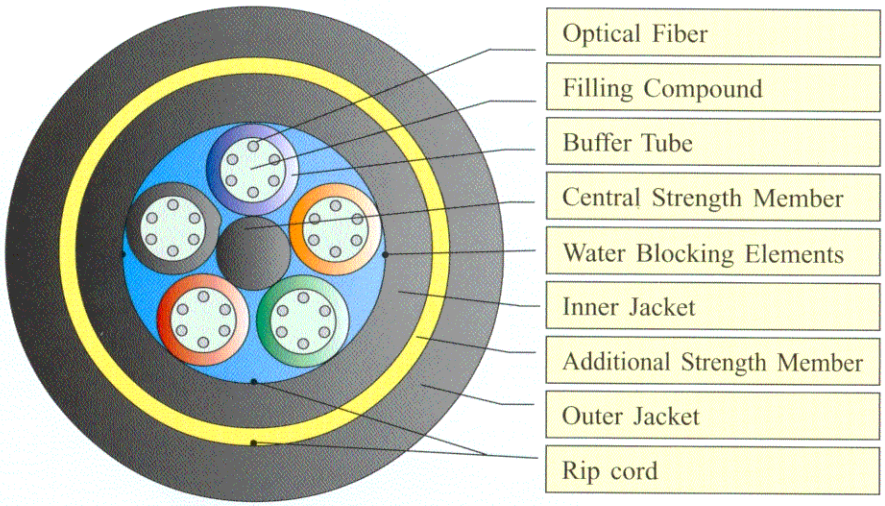
- Aerial use; self-supporting without a separate messenger
- Ideal for environments in which an all-dielectric cable is desired
- Ideal for transmission and distribution networks
- Direct use in ducts, enabling simple and cost-effective aerial-to-duct transitions

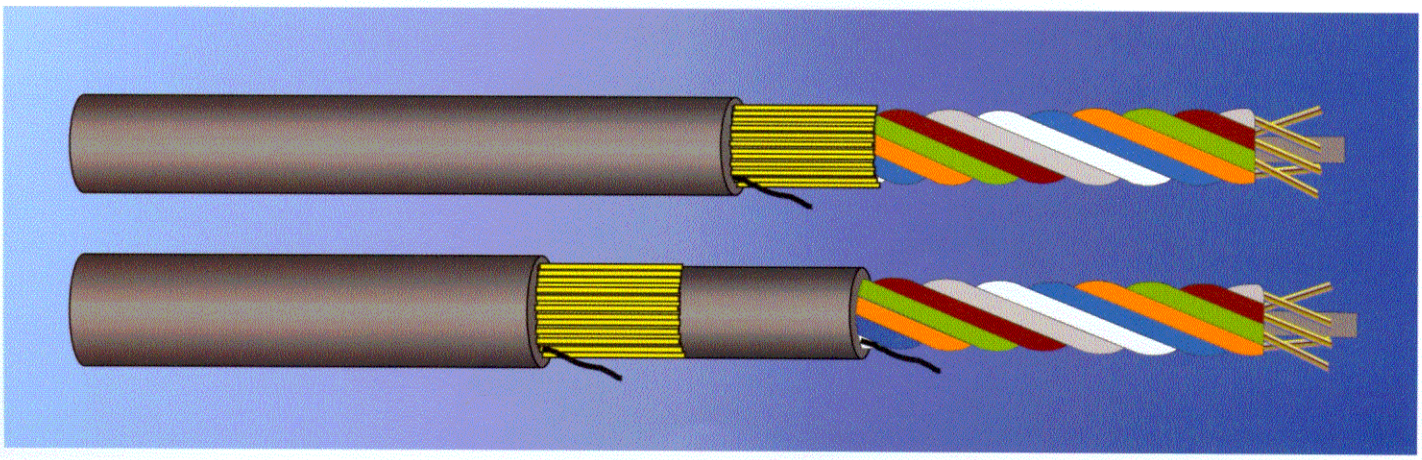
Features/Advantages or Optional

- Please refer to sub-heading "Features and Advantages"



Single Jacket for Short Pole Span
Double Jacket for Mid/Long Pole Span





Optical Drop Cable

Design / Overview

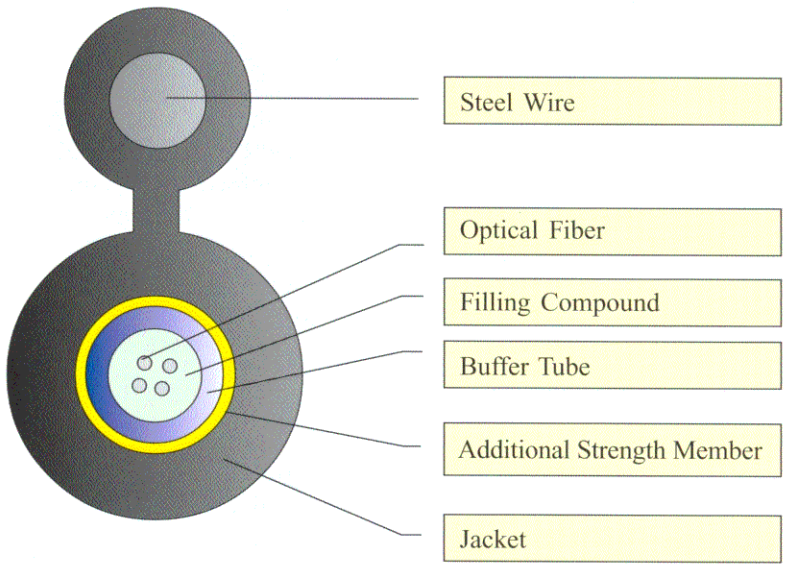
The construction of the drop cable is shown below. The upper half contains a single steel wire (messenger wire). The lower half contains the central buffer tube with water swellable strength member yarns runs longitudinally along the buffer tube. Two portions are jacketed with polyethylene sheath and connected via an integral web.

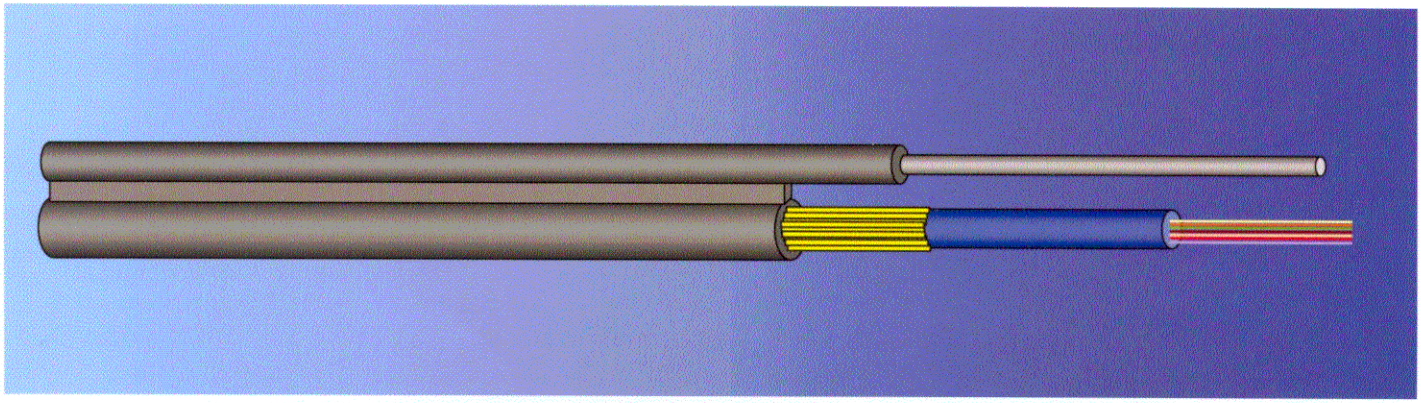
Applications

- Access Network
- Distribution
- Drop Cable

Features/Advantages or Optional

- Please refer to sub-heading "Features and Advantages"





Color Scheme for Fiber and Loose tube Identification (TIA/EIA-598-A)

No.	Fiber/Tube Identification		No.	Fiber/Tube Identification	
1	Blue		7	Red	
2	Orange		8	Black	
3	Green		9	Yellow	
4	Brown		10	Violet	
5	Slate		11	Rose	
6	White		12	Aqua	

The Quality You Can Trust

It is our goal to consistently provide the quality products that meet the quality and value requirements of our customers. So all of your cables are put through the most stringent tests to ensure that only those that meet the highest standards are delivered to our customers.

Raw Materials Test

At this stage, highly sophisticated equipment is used to measure and verify the quality of fibers and raw materials. All type of fiber and raw materials are verified and tested in accordance with International Standards, i.e. ITU, ISO, IEC, FOTP and ASTM. Besides that, our stringent raw material qualification programs and quality plan are established to ensure the best raw materials are being used to manufacture Optical Fiber Cable.

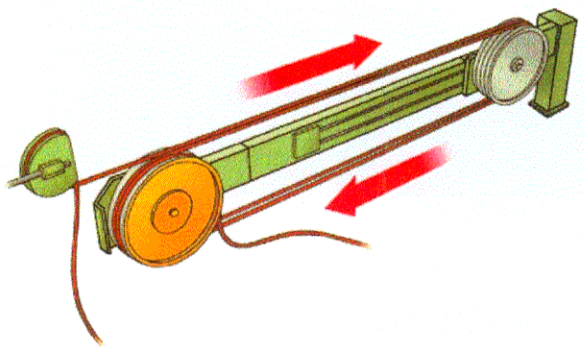
Optical Test

Considering long term performance of the optical fiber cables, routine test are conducted 100% at every stage of optical fiber cable process. Optical Time Domain Reflectometer (OTDR) is used to measure attenuation, optical loss, point discontinuity, fiber bending, and signature non-uniformity as required by ITU-T and FOTP. Tested with world class testing equipment, only optical fiber cables that meet or exceed the stringent International Standards will be delivered to our customers.

In addition, TFOC also conduct extensive test on other fiber characteristics utilizing state of the art equipment such as Fiber Analysis System, Geometry Analysis System, Dispersion Measurement System and Polarization mode dispersion.

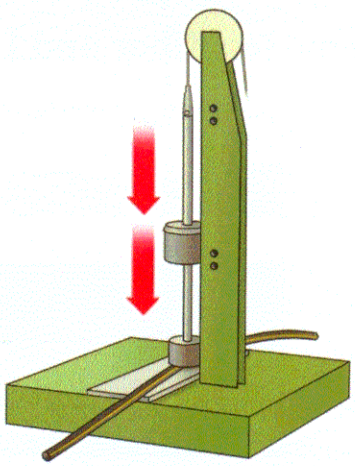
Mechanical and Environmental Test

Optical fiber cables installed in an outdoor environment are exposed to severe mechanical and environmental conditions. The Installation practices and installed system conditions can subject the cable to tensile, flexure, twisting, crush, impact, bending and extreme temperatures. To ensure maximum cable life in an outdoor environment the mechanical/environmental testing should not be overlooked. So the extensive environmental and mechanical testing is performed on each fiber optic cable style to develop its performance characteristics and to verify compliance on a continuing basis. Independent testing and verification laboratories verify IEC, EIA and other standards compliance. The Common Mechanical and Environmental Tests that are performed include:



Tensile Loading Test & Fiber Strain
(IEC-794-1-E1)

Optical cable used in the outside plant will be exposed to tensile load during installation and/or during service. The cable structure shall be capable of withstanding these force without fiber strain and attenuation change over its limit.

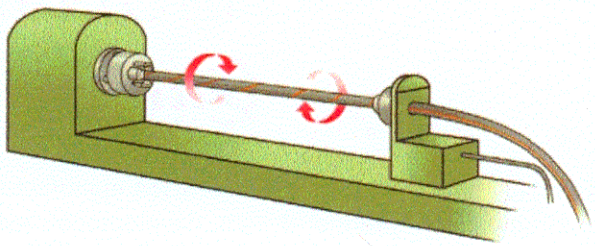


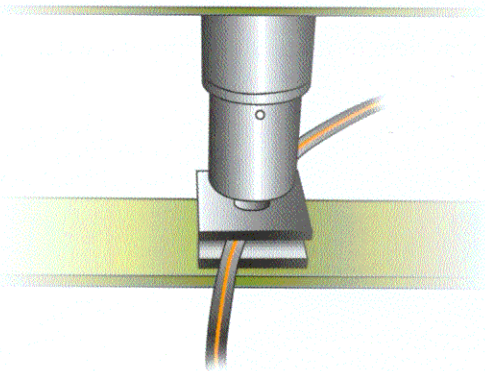
Impact Test
(EIA-455-25 or IEC 794-1-E4)

The fall of a heavy tool, device, stone, etc. onto the cable is simulated here. The weight is allowed to fall vertically onto an intermediate steel piece that transmits the force to the cable sample. No damage to the cable sheath may occur.

Torsion Test
(EIA-455-85 or IEC 794-1-E7)

During feeding, the fiber optic cable must withstand torsion forces in addition to tension, transverse pressure and bending loads. Thus a cable sample is turned about its own axis and attenuation deviations documented during the test. Neither fiber nor sheath materials may be damaged during the test.



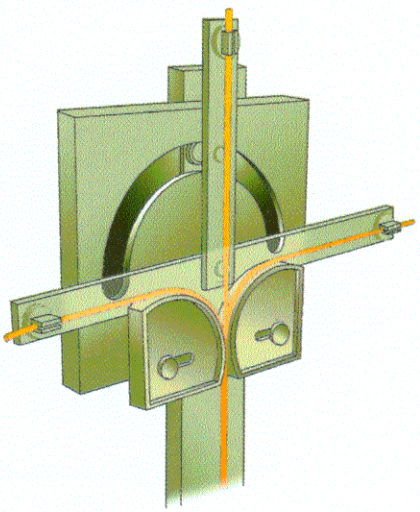


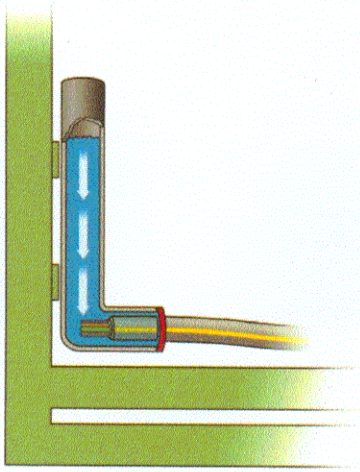
Compressive Test
(EIA-455-41 or IEC 794-1-E3)

The purpose of this test is to determine the ability of a fiber optic cable to withstand transverse pressure. In addition to test pressure itself, the length of time it can be applied is decisive.

Flexing Test
(EIA-455-104 or IEC 794-1-E6)

The resistance of a fiber optic cable to repeated bending is determined by a cable test sample bend forwards and backwards 180 degrees over a specific radius



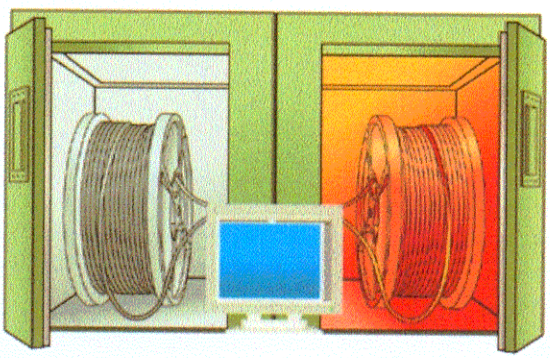


Water Penetration Test
(EIA-455-82 or IEC 794-1-F5)

This method checks whether all interstices of the fiber optic outdoor cable continuously filled with jelly compound or waterblocking gels to prevents water from entering the cable

Temperature Cycling Test
(EIA-455-3 or IEC 794-1-F1)

Optical cable used in the outside plant will be subjected to a wide range of temperatures. Since the thermal coefficient of expansion of glass fibers is lower than that of the composite cable structure, the dimensional changes in the cable structure may cause the fiber to move. Such movement may result in increased attenuation due to microbending



ISO 9001&14001
Quality Guarantee

We're an ISO 9001 and 14001 certified manufacturer that adheres to strict ISO quality management systems requirements for product design, development, manufacturing, business operations and environment.

Customer Support:
Even after our products have undergone careful scrutiny and examination within our factory, we continue to monitor product quality after shipment continuously by measuring customer satisfaction. If for some reason a product does not meet expectations, we do whatever is necessary to remedy the situation. When dealing with a customer, our service is prompt and courteous-customer suggestions, complaints or any other feedback are given the highest consideration.

"We are always available to meet your requirements"

THAI FIBER OPTICS CO., LTD.

Sales office : 191 Silom Complex Bldg. 16th Fl., Units 4C, Silom Road., Silom, Bangrak, Bangkok 10500
Tel. 66(0) 2632-1326, 66(0)2632-1327 Fax. 66(0) 2632-1329 Website: www.btc-tfoc.com
E-mail: tfocmkt@btc-tfoc.com
Head office and Factory : 233 Moo 6, Soi Watchangrueng, Suksawad Rd., Naiklongbangplakot, Phrasamutchedi, Samutprakarn 10290 Thailand. Tel: 66 (0) 2817-5590-3 Fax: 66 (0) 2817-5311 E-mail: tfoc@btc-tfoc.com