



SPECIALTY AND HARSH ENVIRONMENT FIBER OPTIC CABLE

Downhole | Sensing | Subsea

Specialty Fiber Optic Cable

Customers around the world benefit from using AFL fiber optic cable and components for downhole sensing and subsea umbilicals. With its patented stainless steel tube technology, AFL can deliver robustness and flexibility of design to withstand the most extreme subsea pressures and temperatures.

AFL technical representatives understand the intricacies of the highly technical oil and gas industry and work closely with customers to determine temperature, pressure, chemical environment, depth and other criteria necessary to develop cable constructions that deliver results for upstream, midstream and downstream processes.

The AFL solution includes:

- **Fiber Optic Cable**
- **Stainless Steel Tubes**
- **Tactical Tight Buffered Cable for Extreme Conditions**

AFL also specializes in downhole fiber optic cabling structures and components that include:

- **Traditional**
- **High Temperature**
- **Low Profile (for Shallow, Land-Based Wells)**
- **Minibend™ Component for Downhole Double-Ended Systems**



As drilling moves further offshore, traditional copper wire won't handle the deeper water or greater distances with enough bandwidth. It will become imperative to employ fiber optic technologies that allow increased and improved data generation and analysis. AFL is already assisting customers as they deploy distributed acoustic and temperature monitoring.

Relationships with sensing equipment manufacturers enables AFL to participate in the development of new technologies. As the need for more sophisticated fiber optics develops, AFL remains on the leading edge in the customization of cables using different alloys and outer encapsulations.

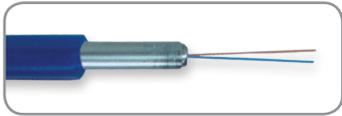
As part of the global fiber optic manufacturer Fujikura, AFL's vertical integration provides supply security. By producing the optical fiber, steel tubing and other key components in house, AFL can serve customers from any location worldwide.

Downhole Fiber Optic Cable

AFL is a leading supplier of downhole fiber optic cables used in the oil and gas industry. AFL provides the broadest portfolio of downhole products to ensure the optimal solution for each customer's specific sensing applications. With expertise in metallurgy and optical fiber, AFL provides the right fibers and associated materials to ensure success of the fiber optic cable.

AFL's downhole fiber optic cables have been used in a wide variety of downhole applications ranging from steam assisted gravity drain (SAGD), where temperatures can reach 300°C, to coiled tubing (CT), to some of the deepest offshore wells to shale gas. Along with our published offering of downhole cables, AFL has provided a variety of unique cables to our customers to allow them to differentiate themselves in the marketplace. Our goal is to help our customers be successful. Let us help you!

Low Profile Downhole Cable



Specifically designed for land-based wells where economics of sensing are challenging.

FEATURES

- Small Diameter
- Low Weight
- Redundant Hermetic Seal
- High Strength

APPLICATIONS

- Oil Wells
- Gas Wells
- Coiled Tubing

Traditional Downhole Cable



Designed to perform in the well and withstand elevated temperatures, high pressure and corrosive environments.

FEATURES

- Customizable
- Up to 150°C
- Up to 20,000 psi
- Loose Tube Design

APPLICATIONS

- Oil Wells
- Gas Wells
- High-Corrosive Environments

Hybrid Downhole Cable



Combines copper conductor and optical fibers within the same cable structure for simultaneous deployment. Withstands elevated temperatures, high pressure and corrosive environments.

FEATURES

- Up to 150°C
- Incorporates insulated 18AWG copper conductor
- Loose tube design for optical fibers
- Hydrogen scavenging gel
- Customized to customer specifications



Enhanced erosion-resistant cable extending cable life for fracking applications

StrataJac™ is the first cable encapsulation designed exclusively to protect downhole cables by resisting the extreme impact energies and abrasion encountered during run-in, and high pressure, high velocity frac' jobs.

FEATURES

- Highly Abrasion and Impact Resistant
- Suitable for use in severe chemical environments containing H₂S, CO₂, Methane, Oil, Diesel, Gasoline, Toluene and other organic solvents
- Wide operating temperature range from -40° C to 150° C
- Easy to strip using commercially available encapsulation strippers



Verrillon®

Harsh Environment Fibers

World's best hydrogen-resistant, high-temperature fiber. Verrillon Harsh Environment Fibers from AFL are available in a number of designs. Starting with fiber design, we offer both single-mode and multimode optical fibers having coatings and coating combinations, including Polyimide, Silicone-PFA, Silicone-MTA, MTA and Carbon, which can be applied in conjunction with any of these outer coatings. Typically, these fibers are used in downhole data logging, distributed sensing and imaging applications.

FEATURES

- Hermetic
- 150°C and 300°C Coatings
- Inherent Hydrogen Resistance

APPLICATIONS

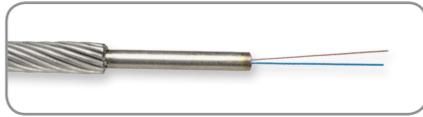
- Oil Wells
- Gas Wells
- Coiled Tubing
- Logging Cables

Sensing Fiber Optic Cable

AFL has a portfolio of Sensing Fiber Optic Cables that are suitable for a wide variety of applications that would monitor for temperature, strain, acoustics and pressure. With cables suitable from -200°C to 700°C and pressures from ambient to 50,000 psi, AFL's cables can cover the most extreme of environments.

AFL's cables have been used for fire detection, vibration monitoring, industrial plant temperature sensing, hydrological studies of streams, lakes, reservoirs, rivers and canals, turbine temperature sensing, temperature and strain of curing concrete, temperature gradients in soil, pipeline leak and intrusion detection, cable strain monitoring, building intrusion detection, steam plant temperature and strain sensing and many more. AFL will customize the cable to ensure it provides the best product at the best value to ensure your success.

Armored Stainless Steel Tubes



Designed for sensing and control applications where ruggedness and flexibility in a small diameter are desired.

FEATURES

- Hermetic Stainless Steel Tube
- High Strength Wire
- Jacket Options
- Gel Options

APPLICATIONS

- Industrial Temperature Sensing
- Surface Cables
- Armored Tactical Cable

Ruggedized Indoor/Outdoor Breakout Cable



Suited for applications requiring a water-blocked, high performance fiber optic cable.

FEATURES

- Fungus, water and UV-resistant PVC jacket
- Riser-rated with water-blocked sub-units

APPLICATIONS

- Harsh Environment
- Mining
- Industrial
- Campus Environment

Stainless Steel Fiber Optic Tubes



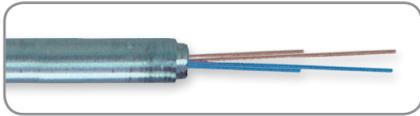
AFL offers a range of tube sizes and fiber counts for a variety of applications.

APPLICATIONS

- Umbilical Cables
- Downhole Cables for Oil and Gas
- Towed Arrays
- High Temperature Cables
- Hybrid Cables
- Sensor Cable
- OPGW



Stainless Steel Sensing Cable



Provides a unique combination of size, robustness and strength that enables it to be the product of choice for temperature sensing applications.

FEATURES

- High Strength
- High Crush Resistance
- Rodent Resistant
- Armored

APPLICATIONS

- Pipeline
- High Traffic Areas
- Industrial
- Surface Cables



Tactical Tight Buffered Cable



Ideal for use in installations where extreme environmental conditions are present.

FEATURES

- Cut Resistant
- Flame Retardant
- High Flexibility
- Wide Temperature Range

APPLICATIONS

- Harsh Environments
- Temporary Installations
- High Traffic Areas
- Security and Sensing



Fiber Rod



Fiber Rod takes an optical fiber of the customer's choice and encases it in a glass re-enforced matrix.

FEATURES

- Adjustable Strength
- Bend Diameter - 50X the Outer Diameter
- Temperature Performance - 200°C
- Ruggedized Option



Subsea Fiber Optic Cable

AFL is a leading supplier of subsea fiber optic cable and components into the umbilical and towed array products for the oil and gas sector. The key technology for these products is AFL's patented stainless steel fiber optic tube technology which packages the optical fiber in the best possible way resulting in a robust, compact product that is suitable for the high pressure of the subsea environment. AFL will customize the design to meet your needs to include different fiber counts, fiber types, metal types, tube sizes, belting materials, armor type, armor size, armor count, encapsulation types, color, print, packaging and length.

AFL's subsea / submarine fiber optic cables are also used as a standalone communication and control cable for telecommunications and oil and gas applications. Whether the right of way is a river, lake, estuary, or sea, AFL can provide a suitable cable designed to meet the requirements of ruggedness, durability, and length.

Fiber Optic Component for Umbilical Cables



Designed for subsea umbilical applications.

FEATURES

- Hermetic
- High Strength
- Hydrogen Resistant

APPLICATIONS

- Umbilical
- Subsea
- Lakes and Rivers

Stainless Steel Fiber Optic Tubes

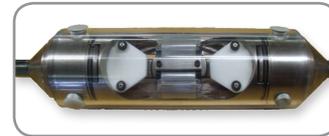


AFL offers a range of tube sizes and fiber counts for a variety of applications.

APPLICATIONS

- Umbilical Cables
- Downhole Cables for Oil and Gas
- Towed Arrays
- High Temperature Cables
- Hybrid Cables
- Sensor Cable
- OPGW

Umbilical and Power Cable Repair Joint



Designed to splice two lengths of fiber optic cable as typically used within subsea umbilical or power cables.

FEATURES

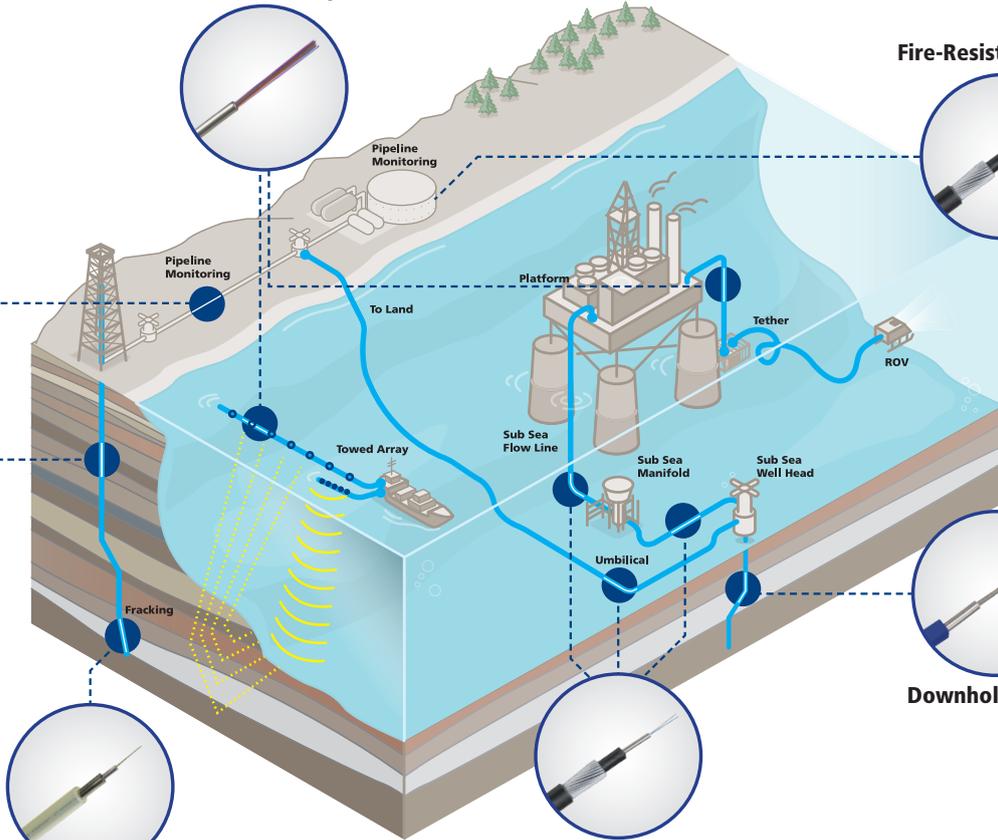
- Available for armored and unarmored cable designs
- Suitable for fiber optic cables diameters of 8.6mm to 25mm
- Splice up to 48 fibers

Specialty Cable Environments

Stainless Steel Fiber Optic Tubes

Fire-Resistant Cables

Armored Stainless Steel Tubes



Downhole Cables

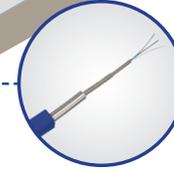


StrataJac™

Fiber Optic Component for Umbilical Cables



Downhole Cables



For more information about Specialty Fiber Optic Cables, Fusion Splicers, Test Equipment, Fiber Management Systems, Closures and accessories, contact us at **(800) 235-3423** or online at **www.AFLglobal.com**

**FIBER OPTIC CABLE
(OPGW, ADSS, Loose Tube)**



TEST AND INSPECTION EQUIPMENT



SPLICE EQUIPMENT



FIBER OUTSIDE PLANT EQUIPMENT





AFL



www.AFLglobal.com or (800) 235-3423

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