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# Sheathing Types

Sheathing has three core values for use in fiber optic design:

- Protect the fiber.
- Keep ambient or stray light from creating signal noise (for sensor applications).
- Improve component handling.

## PROTECT THE FIBER

Glass fiber and plastic fiber is fragile. When individual fibers break, light transmission and uniformity are reduced. After the first few fibers break at a stress point, a chain reaction occurs, hastening the destruction of the part. Surrounding fiber with a jacket or sheathe protects it from abrasion. Sheathing typically has a larger bend radius, which protects the fibers from breaking. Sheathing opacity controls the effects of outside light, and any light leaking from the fiber to optimize the application effect.

When designing the part, understanding the end application will help select the most effective/least expensive sheathing material.

Consider the following guidelines when specifying a fib

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3 minutes ago

## MINIMAL HANDLING



For applications requiring minimal handling, where the application is illumination, and heat exposure is low, consider inexpensive PVC sheathing. PVC offers good protection from corrosive mists and foreign debris, as well as protection from incidental abrasion and contact. This material is also manufactured in corrugated shape, offering some crush and kink resistance. PVC is relatively low cost with good availability and size selection. PVC also bonds readily to most ferrule materials. PVC without reinforcement will kink.. which makes it unsuitable for protecting fiber in repeated handling applications.

## **REPEATED HANDLING**

For repeated handling, where the application is illumination, and heat exposure is low, consider monocoil, which provides moderate crush and kink resistance in addition to debris protection. This choice is lighter and more flexible than SL type sheathing. In addition, it's available in many more ID/OD selections, making an efficient and cost effective package. Less expensive than SL or PVC covered SL sheathing. Good bend radius, will not kink, heavier than PVC alone, lighter than SL. SS monocoil is an option for rust resistance. However, could pull apart with effort (or abuse). Kevlar cord can be integrated into a monocoil sheathing to improve pull resistance..

## **RUGGED HANDLING**

For repeated handling around big equipment, where heavy objects can fall on, roll over, or simply compress the component, and where the application is illumination, and heat exposure is low, consider PVC covered stainless interlock (SL), which provides the best crush and kink resistance in addition to debris protection. This material is the most expensive selection in the handling application group. Offers good bend radius, resistance to breakage, pull resistant

## **DYNAMIC ENVIRONMENTS**

For components exposed to constantly moving environments, where the application is illumination, and heat exposure is medium, consider a simple silicone sheathing, which will protect the fiber, remains flexible without fatiguing, will not kink under all but the most extreme bending radius. Available in many colors, medically certified. Poor crush resistance.

## **HIGH HEAT ENVIRONMENTS**

For high heat applications, most plastic covered sheath could melt or burn. When burned, PVC gives off cyanide gas. PVC is restricted from use in commercial buildings, when it burns, PVC produces Cyanide gas. Bare metal, teflon tubing, or metal/teflon combinations would be recommended for use in high heat (over 70°C continuous) environments.

## PREVENTING SIGNAL NOISE

In sensing applications, the potential of signal noise must be eliminated. Sheathings designed to be totally opaque (PVC, silicone) should be considered, and in the case of multi-channel construction, both sender and receiver fibers should be individually sheathed inside a larger common sheathing. While it has nothing to do with sheathing, don't overlook other factors creating noise, including the fluorescing potential of epoxies at the signal-source end of the fiber optic component.

## EASY HANDLING & MINIMAL COST

If the fiber component will be installed in equipment and remain stationary, free from contact with foreign matter, a simple cotton or synthetic mesh might be all that's required to protect the fiber during shipment and installation.

## BENDING RADIUS

Sometimes fiber optic cables are routed through and around machinery. A rule of thumb when specifying sheathing: if interlocked metal ((SL)), plain or covered) sheathing is used, minimum bending radius is 4X the OD of the sheathing. "Soft" sheathing such as PVC or Silicone can withstand a bending radius as small as 2X the OD

## SPECIAL APPLICATIONS

In addition to the above selection, FTI offers scores of sheathing types, including teflon, metal braided, anti-fungal, tefzel (thin and heavy wall versions), rigid tube and pipe and Cole-Flex™, an all plastic convoluted construction for rugged applications where metal cannot be used.

Some special sheathings are subject to run lot charges, so when possible, specify sheathings normally carried in stock. But of course, FTI has one of the largest sheathing inventories on the planet!

Please check our [Sheathing Specs](#) document for more information on available styles.

*When designing the part, understanding the end application will help us (or you) select the most effective/least expensive sheathing material.*