

OPTICAL FIBER PRODUCT USE RESTRICTIONS AND CARE

Dear Customer!

Thanks for your confidence in purchasing our products.

Our products contain quartz fibers, which are very strong in some ways, but since they contain a very thin strand of glass, they are also quite fragile. They should be treated with the care. Optical fiber products may degrade in performance or can be damaged if handled improperly.

Follow the handling procedures outlined here, and you will minimize the time and expense associated with broken and damaged fibers and optical fiber products. This article outlines the proper procedure for handling these fragile optical fiber assemblies/ products.

FOS Inon Optics (FOS) will not guarantee or be held responsible for damage caused by not following these precautions.

RESTRICTIONS ON PRODUCT USE

Note the following cautions and warnings when handling them:

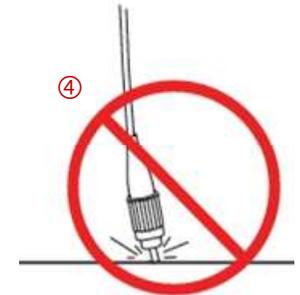
1. When connecting or unplugging the optical fiber item with connector, be sure to hold/ unplug the connector. Do not hold (unplug/ pull out) the protection jacket/ shrink tube elements or the fiber part. Doing so may break the optical fiber inside the product/cable/bundle, or remove the jacket from the connector. (See fig.1)



2. Do not allow kinks or knots to develop in the fiber. Do not pull the fiber when kinks or knots are present. Carefully work out any tangles. Knots, kinks, twists and bends in the optical fiber will ruin the fiber's ability to transmit light. When bending the optical fiber product, do not bend it excessively. Doing so may break the optical fiber inside the product. In many cases, a bend or break in an optical fiber will completely disrupt the system's performance. (See fig.2)



3. Never use the fiber to pick up or drag the device to which it is attached. Doing so may break the optical fiber inside the item. (See fig.3)
4. Since the fused end of ferrule/connector contains glass, be careful not to hit the end of the connector against anything hard such as the floor or a desk by dropping the optical fiber item. (See fig.4)
5. Does not let the fiber dangle over sharp corners. It will damage the fiber. (See fig.5)
6. Avoid mechanical load (for example by stepping on it, loading/dropping weights on) of the connectors and fiber. It may and will damage the product. (See fig.6)
7. Avoid any soiling of the connectors. It may damage fiber end surface or reduce light transmission.
8. Do not force the fiber into any retaining clips that may be used. Insert the fiber carefully inside retaining clip.
9. If the cable/ bundle is on rolls, unroll the product in the way it was rolled up. Prevent any twisting in cable/bundle. Do not simply straighten out the product. It will break fibers inside the cable/ bundle.
10. Do not disassemble optical connectors. Doing so may cause optical breakage or degradation of performance.

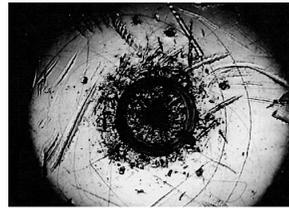


Any disregard of the above mentioned points will exclude any warranty claims.

OPTICAL FIBER PRODUCT USE RESTRICTIONS AND CARE

Always read and comply with these handling instructions

- Make sure that packaging and product is not damaged during transportation before the product has been removed from pack.
- Remove all the end cups from the light guide before using
- Do not touch the end of fiber/ fused end face of optical fiber product with bare hands as the fiber is extremely sensitive to dirt. Keep clean the end face and optic connector of the optical fiber.
- Optical fiber fused part in the connector is susceptible to damage that is not immediately obvious to the naked eye. This damage can have significant effects on performance of item. Keep in mind: any degradation of a ferrule or fiber end face, any stray particles or finger oil on the end face, can have a significant effect on connector performance.
- Repeated connections without removing the particles or using improper tools can lead to physical damage of the glass fiber end face as shown in the following pictures.

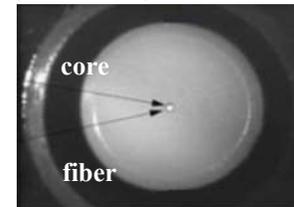


- Broken or damaged glass can lead to a number of problems that are often ascribed to other causes. This connector will probably damage any other fiber that is mated to it. It will be defined as severe abuse.

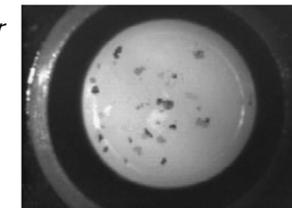
Optical Fiber Products Cleaning

- Connectors should be cleaned before interconnection. A microscopic bit of dirt or contamination can **DAMAGE** the connector or **DEGRADE PERFORMANCE**. In high power systems this dirt can act as a lens to focus the high power and actually 'burn' the interconnection.
- The fiber end face and ferrule must be absolutely clean before it is inserted into a transmitter or receiver or other device. Dust, lint, oil (from touching the fiber end face), or other foreign particles obscure the end face, compromising the integrity of the optical signal being sent over the fiber. From the optical signal's point-of-view, dirty connections are like dirty windows. Less light gets through a dirty window than a clean one.

- Fibers have cores that are only 60 μm and more in diameter. Human hair is 50-75 μm in diameter, approximately same! Dust particles can be 20 μm or larger in diameter. Dust particles smaller than 1 μm can be suspended almost indefinitely in the air. A 1 μm dust particle landing on the core of a fiber can cause up to 1 dB of loss. Larger dust particles can completely obscure the core of a fiber.
- Fiber optic connectors need to be cleaned every time they are mated and unmated; it is essential that fiber optics users develop the necessary discipline to always clean the connectors before they are mated.
- Always perform the cleaning procedure described below for optical fiber product connectors prior to fiber optic unit installation. Whenever possible, inspect each connector before connecting it to its mating device. This can be done using a simple 100x illuminated microscope (fiberscope). Here are what you could see for a clean and a dirty fiber:



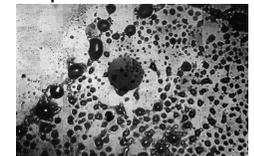
clean fiber



same fiber with
dust; attenuation
>15dB

The basics of cleaning are simple:

1. Use a pure grade of isopropyl alcohol on a clean lint-free tissue to wipe (can be used lens cleaning tissue) off the end face and ferrule/connector. Clean the tip and as much of the outside of the ferrule as possible.
2. After the wet scrub, wipe the surfaces with a dry lint-free tissue. As the following figure shows, leaving the fluid to air dry will leave behind the dissolved oils in little puddles which will interfere with the correct physical contact.
3. Whenever possible, inspect the ferrule end-face. If it is still dirty, repeat cleaning.



Important: Use only industrial grade 99% pure isopropyl alcohol. Commercially available isopropyl alcohol is for medicinal use and is diluted with water and a light mineral oil. Industrial grade isopropyl alcohol should be used exclusively.

Warning!

Do not touch the end of a broken optical fiber item. The broken optical fiber may pierce the skin, causing injury.

