Fiber Optic Safety

Handling optical fiber is not inherently dangerous as long as some basic safety precautions are followed. You can significantly reduce the risk of injury by knowing the risks associated with working with fiber and following some simple safety guidelines.

Prevent Injuries:

Fiber should be handled with care during preparation and termination. A bare optical fiber strand is difficult to see and can easily penetrate the skin. Keep your work area clean and use a dark, resilient work surface (such as a black foam mat) to prepare and terminate fiber. This type of work surface will make small scraps of fiber more visible and will minimize incidental movement, breakage and loss of bare fibers. Also, impact of a fiber onto a hard surface, such as a tabletop without a mat, may cause the fiber to "bounce back" and become lost or lodged into your skin, eyes or clothing. Keep a disposal container nearby and discard scraps promptly. In the event a fiber splinter becomes lodged in the skin, it should be removed immediately using tweezers. Avoid touching or rubbing your face and eyes to minimize possible transfer of glass particles. Because ingested fibers can cause internal damage, it is also important not to eat or drink during the termination process or in areas used to prepare or terminate optical fiber cables.

Protect Your Eyes and Vision:

Wear safety glasses with side shields to protect the eyes from errant pieces of fiber. However, safety glasses will not protect the retina from light damage. All optical fibers should be considered illuminated until proven otherwise. Never look at the end of a fiber cable or connector. The laser light will burn a hole right through your retina causing blindness. Never inspect a connector with a microscope without first securing the other end of the fiber and then testing the fiber with an optical power meter. **All optical fibers should be considered illuminated until proven otherwise.**

Cleaning Fiber Connectors:

One of the most common problems associated with optical communications is dirty optical connectors. In a lot of cases cleaning the optical connectors fixes the problems. Always inspect fiber connectors to make sure they are clean and undamaged. Dirty or scratched fiber is one of the leading causes for transmission issues in fiber systems. Clean both the fiber connector and the mating female jack before turning on any transmitter. Dirt can cause connector fiber damage and back reflections which could damage the transmitter.

Connector Type:

There are numerous connector types used in the fiber optic communications industries. Normally each industry focuses on a few. The data industry uses SC and ST, telephone uses LC, SC, Biconic and other small form connectors. Satellite communications uses FC and SC. Cable television uses SC, FC and some LC. There are many other types of connectors with limited use.

FC: This is a metal connetor with a threaded coupling. (PC, UPC, APC)
SC: This is a plastic bodied connector featuring a push-pull design (PC, UPC, APC)
ST: This is a metal connector with a bayonet coupling (PC, UPC)
LC: This is a small form plastic bodied connector with a latching tab to hold it in place (PC, UPC, APC)
E-2000: This is a small form plastic connector with a protection shutter to meet safety requirements. (PC, UPC, APC)

Connector Polish:

There are several different polish options on the fiber connectors. The polish typically determines the return loss of the connector. Today's connectors are curve polished to allow physical contact of the two mating fibers.
PC = Physical Contact | UPC = Ultra Polish Connector | APC = Angle Polish Connector

Singlemode Connectors:

Polish	Return Loss
PC	-40 dB
UPC	-55 dB
APC	-65 dB (Note: APC connectors are green in color for ease of identification)

APC Connectors:

In data, telecommunications and A/V fiber distribution systems, any of the above polish options can be used. In RF broadband systems for cable TV and satellite communications APC connectors must be used to reduce backreflections. Backreflections can cause lasers to be unstable and nonlinearity in the laser response.