



Safety Procedure

Optical Fiber Cable

APPLICATION NOTE

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ABSTRACT

This document describes some basic safety information applicable to Optical fiber cable installation & storage.

KEYWORDS

Safety, installation, cable handling, precaution

General

This document describes some basic safety information applicable to Optical fiber cable installation & storage. Personnel involved in Optical fiber cable installation must be aware of all the applicable Occupational and Health safety regulations, the NESC and local regulations along with the company safety practices. Failure to follow the same can lead to fatal consequences to them as well as people in the vicinity.

Cable Handling

All optical fibers cables are sensitive to damage during handling & installation. Handle the cable as per guidelines given in **STL/AEN/01**. Some of the important parameters that need to be special attention during cable installation are:



IMPORTANT: Cable Bending Radius

Optical fiber cables are designed with particular minimum bending radius. The cable should never be bent below minimum bending radius at any location. Doing so can result in higher bending losses and/or internal breaks in the fiber. Generally the bending radius of a cable is greater than $20D$, where D is the diameter of cable.

Exceeding the minimum bending radius of the cable can cause damage to the fibers, which cannot be seen from outer surface of the cable. This can also lead to expensive restoration of cables at later dates.



IMPORTANT: Cable Bending Radius

Optical fiber cables are designed for particular pulling tension and tensile strength. Exceeding the Cable Pulling Tension above the specified value in the Cable Data sheet / Specification, can alter cable's other characteristics.

Do not pull the cable above specified pulling tension. Use pulling grips with swivel to attach to the pull rope, lubricants compatible with cable jacket and duct material to achieve maximum pulling distance.



IMPORTANT: Cable Twisting

Optical fiber cables are designed for particular twisting/torsion. Exceeding the cable twisting greatly increase the probability of fiber damage. This is recommended to use anti twisting device during cable pulling.

Laser Precaution

Laser beam used in optical communication is invisible and can seriously damage the eyes. Viewing it directly does not cause any pain and the iris of Eye does not close automatically as it does while viewing the bright light. This can cause serious damage to the retina of eye.

Therefore-

- ◆ Never look into a fiber having a laser coupled to it.
- ◆ If eye is accidentally exposed to LASER beam, immediately rush for medical assistance.

Optical Fiber Handling Precaution

The broken ends of fibers created during termination and splicing can be dangerous. The ends are extremely sharp and can easily penetrate the skin. They invariably break off and are very hard to find and remove. Sometimes pair of tweezers and magnifying glass is needed to take them out. And any delay in taking the fiber out of body could lead to infection, which is dangerous.

Hence

- ◆ Be careful while handling the fibers.
- ◆ Do not stick the broken ends of fiber into your fingers.
- ◆ Do not drop fiber pieces on the floor where they will stick in carpets or shoes and be carried else where like home.
- ◆ Dispose all scraps properly.
- ◆ Do not eat or drink near the installation area.

Material Safety

Fiber optic splicing and termination processes require various chemical cleaners and adhesives. The safety instructions defined for these substances should also be followed. If there is confusion in usage of these products, ask the manufacturer for a MSDS (Material Safety Data Sheet). Remember the following instructions while working with materials.

- ◆ Always work in well-ventilated areas.
- ◆ Avoid skin contact to materials involved as much as possible.
- ◆ Avoid using chemicals that cause allergic reactions.

Even simple isopropyl alcohol, used as a cleaner is flammable and should be handle appropriately.

Hexane			Iso-Propanol	
Type of Exposure	Effect of exposure	Emergency Treatment	Effect of exposure	Emergency Treatment
Inhalation	Irritation of respiratory tract, cough	Maintain Respiration, Bed rest.	Irritation of upper respiratory tract	Remove victim to fresh air area, Administer artificial respiration if breathing is regular
Ingestion	Nausea, Vomiting, Headache	Do not induce vomiting, immediately seek, medical advice.	Drunkenness & vomiting	Have a victim drink water and milk, seek medical aid.
Contact with skin	Irritation	Wipe off affected area of skin & wash with soap & water	Harmless to skin	Wipe off affected area of skin & wash with soap & water
Contact with eyes	Irritation	Wash eyes with plenty of water for 15 min.	Irritation	Wash eyes with plenty of water for 15 min.

Fire Safety

- ♦ The fusion splices use an electric spark to make splice, so ensure that there are no flammable gases in the space where fusion splicing is done.
- ♦ Splicing should never be done in places manholes where gases can accumulate.
- ♦ The cables are brought up to the surface into a splicing trailer where all fiber work is done. So the splicing trailer is temperature-controlled and kept spotlessly clean to ensure good splicing.
- ♦ Smoking should not be allowed around fiber optic work. The ashes from smoking can contribute to the dust problems in fibers, apart from the danger of explosion posed by them due to presence of combustible substances.

Safety During Duct Installation:

Manhole /Underground Vaults Safety

- ♦ Explosive gases or vapors might be present in manholes due to leaking of nearby gas or liquid pipelines. Before entering any manhole test the manhole atmosphere with an approved test kit for flammable and poisonous gases.
- ♦ Avoid usage of any device that produces spark or flame in manhole.

Working Safety:

- ♦ To minimize the risks of an accident in the work area follow specified rules for setting up barricades, manhole guards and warning signs.
 - ♦ Before pulling cable directly from the Figure 8 shape, make sure that the area inside the loop of the cable is clear of personnel and equipment. Failure to do so may result in injury to personnel or damage to the cable due to entanglement.
- Ensure that the tools and equipments used for cable installation are in proper condition. Corrosion of equipments may damage cable or cause injury to personnel.**
- ♦ Take care of electric hazards, if electrical lines are passing through the manholes or vaults where installation is being done.

Safety During Aerial Installation

Pole Safety

- ♦ Before climbing a pole, inspect it for various safety issues like splintering, insect nests, sharp protrusions.
- ♦ Use leather gloves when climbing or getting down on pole and when working with sharp instruments or materials.

- ◆ Wear rubber gloves when working near exposed electrical circuits to avoid electric shock.
- ◆ Follow electrical safety rules when working near power lines.

Cable Pulling Safety

- ◆ Personnel normally should stay away from the area where a cable is being pulled around a piece of stationary hardware under tension. Appropriate safety measures should be taken while working near the installation site.
- ◆ Keep hands free from tools when climbing or getting down on pole or ladder.
- ◆ Suitable accessories must be used during installation to ensure smooth and safe working.
- ◆ Only essential skilled personnel should stay near the installation site during tensioning operation can minimize risk of injury or death. Nobody should allow climbing on intermediate poles, while tensioning. Passerby on ground should be kept away from poles during tensioning. Suitable warning / Safety display board should be put on installation site.
- ◆ Ground every metallic component to avoid electric hazards due to spark produced by power lines or any other means.

Safety summary

- ☑ Keep all food and beverages out of the work area. If fiber particles are ingested they can cause internal hemorrhaging.
- ☑ Wear disposable aprons to minimize fiber particles on your clothing. Fiber particles on your clothing can later get into food, drinks, and/or be ingested by other means.
- ☑ Always wear safety glasses with side shields, suitable safety Helmet, Safety belts and protective gloves. Handle the fiber optic splinters similar to glass splinters.
- ☑ Never look directly through the end of fiber cables till you ensure that there is no light source at the other end. Use a fiber optic power meter to make sure that fiber is dark. When using an optical tracer or continuity checker.
- ☑ Look at the fiber from an angle at least 6 inches away from your eye to determine if the visible light is present.
- ☑ Only work in well-ventilated areas.
- ☑ Do not touch your eyes while working with fiber optic systems until they have been thoroughly washed.
- ☑ Keep all combustible materials away from the curing ovens.
- ☑ Dispose the fiber scraps properly Thoroughly clean your work area after completion of installation
- ☑ Do not smoke while working with fiber optic systems.



About STL - Sterlite Technologies Ltd

STL is an industry-leading integrator of digital networks.

We design and integrate these digital networks for our customers. With core capabilities in Optical Interconnect, Virtualized Access Solutions, Network Software and System Integration, we are the industry's leading end-to-end solutions provider for global digital networks. We partner with global telecom companies, cloud companies, citizen networks and large enterprises to deliver solutions for their fixed and wireless networks for current and future needs. We believe in harnessing technology to create a world with next generation connected experiences that transform everyday living. With intense focus on end-to-end network solutions development, we conduct fundamental research in next-generation network applications at our Centre of Excellence. STL has a strong global presence with next-gen optical preform, fibre and cable manufacturing facilities in India, Italy, China and Brazil, optical interconnect capabilities in Italy, along with two software-development centres across India and one data centre design facility in the UK.