

# Installation of Fibre Optic Cable: Internal

## 1. General

This document describes general precautions to be taken when installing fibre optic cable in a building and the safe handling and disposal of optical cable. The methods and instructions provided are intended only as guidelines, as each installation will be influenced by local conditions and user preferences.

### The reader should be experienced in fibre optic cable installation

Methods used for installing fibre optic cables are very similar to those used for installing standard copper cable. However the qualities and characteristics fibre optic cable can be degraded when it is subjected to:

- Excessive pulling.
- Excessive tension.
- Crushing forces.

## 2. Safety Precautions

It is important to observe the following safety precautions when installing cable in a building and between buildings. These practices may change, or may not be suitable for a specific situation, so are therefore only suggested guidelines. **Your company's safety precautions and practices take precedence over any conflicting recommendations given in this document.**

**Caution:** *Before starting any cable installation, all personnel must be thoroughly familiar with all applicable Occupational Safety and Health regulations, local regulations, and company practices and policies. To minimise hazards to yourself and others in or near the work area, follow all company rules for setting up barricades, ladders, scaffolding, and warning signs. Any material used above the floor should be arranged so that it cannot fall and hit individuals underneath. Observe standard safety precautions. Wear safety headgear, eye protection, gloves, etc., as specified in your company's practices.*

### 2.1 Pulling Precautions:

- Personnel normally should not remain in an area where a cable is being pulled under tension around a piece of hardware. Personnel can remain in such an area (e.g., to observe the alignment of a cable around a corner block), if he or she stays clear of the hardware under tension and has a clear path to safety.
- If you use a cable lubricant during a pull operation, make provisions to clean up any spilled lubricant to prevent slipping and possible injury. *(Care must be taken if using lubricants as they may react with certain cable sheath types.)*

### 2.2 Laser Precautions:

Laser light can damage your eyes. Laser light is invisible. Viewing it directly does not cause pain. The iris of the eye will not close involuntarily as when viewing a bright light. Consequently, serious damage to the retina of the eye is possible. Never look into the end of a fibre, which may have a laser, coupled to it. Should accidental eye exposure to laser light be suspected, arrange for an eye examination immediately.

### 3. Cable Handling Precautions and Specifications

The following section provides general guidelines for internal installation of fibre optic cable. (This information is based upon standard cable designs). Mechanical specifications, minimum bend radii and cable temperature ranges can be obtained by contacting Amp Netconnect.

**Caution:** *Fibre optic cable is sensitive to excessive pulling, bending, and crushing. Any such damage may alter the cable's characteristics to the extent that the cable may have to be replaced. To ensure all specifications are met, consult the specific cable specification sheet for the cable being installed.*

**Note:** *Zip twin and Single Fibre Cables are designed for use as "jumpers," "patch cords," or "pigtails". These cables are not intended for use in installations requiring long or difficult "pulls" or routing between buildings.*

- Leave the protective covering on the reel intact until it arrives at the installation site. If the covering has been previously removed, secure the cable end(s) during transit to prevent damage.
- Cable reels should be stored vertically on their flanges, end-to-end in rows and chocked to prevent rolling. Make sure that reels rest edge-to-edge with reels in adjacent rows to prevent damage to cables.
- Before the installation begins, carefully inspect the cable reel for protrusions such as nails and broken flanges which might cause damage to the cable as it is unreeled.
- Take precautions to protect reeled cable from mishaps or other sources of possible damage. Any damage to a section of cable may require replacement of the entire section.
- Whenever unreeled cable is placed on the floor in high traffic areas, provide barricades or similar to preventing vehicular or pedestrian passage through the area.
- If the cable must be unreeled during installation, use the "figure-eight" configuration to prevent kinking or twisting. Do not coil fibre optic cable in a continuous direction except for lengths of 30 m (100 ft.) or less.

### 4. Installation Considerations

Fibre optic cable can be installed inside buildings using the same methods as coax or twisted pair; however, the following guidelines should be observed:

- Do not deform the cable sheath, specifically when using cable fasteners or ties to secure the cable to a support or hardware
- Do not exceed the cable's maximum pulling tension.
- Do not pull fibre optic cables with copper cables
- Do not pull fibre optic cables over existing cables. The friction could be excessive

and cause cable damage. The cables may also become entangled, resulting in damage to the fibre optic cable.

- Do not exceed minimum (installed and long-term) bend radius. (The minimum bend radius varies with the cable diameter. Consult the appropriate Cable specification.)
- Do not pull the cable around sharp corners, such as support brackets.
- Provide additional crush / mechanical protection in high-risk environments.
- Secure the cable to larger permanent cables or available supports when possible. Do not attach the cable to cables that may be removed later or to steam or water lines

**Caution:** *Installation tension exerted on fibre cables may cause the buffered fibres to assume a sinusoidal “wave” appearance. This effect is caused by installing the cable incorrectly. Tyco Electronics recommends that all tight-buffered cable pulls employ a grip on the pull end of the cable coupled to the aramid strength member, not the cable jacket.*

*Pulling grips should be used regardless of the length or duration of the pull. If the pulling end of the cable has not been connectorised, then a knot can be tied in the pull-end of the cable before attempting the pull. If cables are pulled without coupling to the strength member, the cable jacket will stretch. When the jacket relaxes, it may bunch up the fibres underneath the jacket, which may result in degraded fibre performance.*

#### 4.1 Conduit/Inner duct

Use the following guidelines when installing cable in a rigid conduit:

- Ensure the conduit system does not exceed minimum bend radius.
- Do not pull the cable through pull boxes or junction boxes unless the cable's bend radius can be maintained through the use of conduit or inner duct
- Avoid the use of elbows if possible and use an elbow only if the cable's long-term bend radius can be maintained. Never pull cable "through" an elbow. Pull the cable out of the elbow and “back-feed” it into the conduit exiting the elbow for a second pull.
- Inner duct is semi-rigid plastic tubing commonly used in fibre optic installations to subdivide the duct and to provide for future cable pulls. Proper size and installation of the inner duct is critical for ease of cable installation.
- If additional cables, specifically larger, bulkier cables, are to be installed in the same conduit, install the fibre optic cable inside an inner duct for mechanical protection
- Eliminate sharp edges.

#### 4.2 Tension Monitoring Equipment

- Fibre optic cable is subject to damage if the cable's specified maximum tensile force is exceeded. Except for short runs or hand pulls, tension must be monitored.

Maximum pulling tension varies with the cable fibre count. Refer to cable specification sheets for maximum tension.

- All pulling equipment and hardware which will contact the cable during installation must maintain the cable's minimum bend radius.

#### **4.3 Vertical Runs**

- Each fibre optic cable in the vertical run needs to be supported by its own support grip at the top of the run.
- Never use fibre optic cables as support for other cables.
- Cables that are individually supported may be taped or cable-tied together every 3 meters (10 ft.) **for cable management - not support.**

#### **5. Fibre Optic Cable Disposal**

At the end of the products service life there is the potential to recover and recycle component parts of the cable.

When handling and disposing of waste fibre optic cable, observe the following guidelines:

- Comply with Local legislation.
- Consider recycling opportunities.
- Fibre waste should be disposed of safely, the use of sharps containers is recommended for waste fibre shards.