Comms Cabling Regulations & Standards Update

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Issue 2

Optical Fibre
Are Your Practices Safe?
by
ACMA

(Part 1)

There are significant health and safety issues for cablers working on active optical fibre equipment.

Introduction

The Australian Communications and Media Authority (ACMA) is aware of several incidences of severe eye damage (including blindness) occurring as a result of incorrect procedures when handling and working on optical fibre cable systems, particularly at patch panels.

Outlined below are the risks associated with working on or installing optical fibre systems and measures that cablers need to take to minimise the risk of injury. The applicable standards that cablers should be familiar with when working on optical fibre systems will be covered in Part 2.

Risks Associated with Installing Optical Fibre Systems

1. Eye damage caused by incorrect handling of laser signals

Risks associated with optical fibre systems arise when laser signals are used to transmit data over an optical fibre installation. As these signals do not operate in the visible light spectrum (but in the infra-red region of the electromagnetic spectrum) they are invisible to the naked eye, thereby increasing the health risk to cablers. Cabling installers are at risk of instant and

permanent damage to the retina in their eyes if this signal is viewed without protection as the light energy is very concentrated.

When working with laser-based systems the following safety precautions must be taken.

- Use protective eyewear designed specifically for laser work. Glasses are now available with special filters to protect the eyes from laser signals.
- Do not look into transmitter ports of active equipment (eg router ports) without first turning off the equipment.
- The equipment should be unplugged for added protection.
- The active equipment should also be labeled to warn other people not to plug the equipment back in without notifying you that it has been re-connected. This is particularly important if working remotely from the active equipment.
- Never look into the end of an optical fibre cable, terminated or unterminated, unless you are sure it is not connected to active equipment.
- Never unplug patch leads without first turning off the active equipment.
- Always use and take note of appropriate warning labels.
- Know the colour codes used to identify the various types of fibre and what sort of signals these cables would normally carry [refer to AS/NZS 3080 2003 – Telecommunications Installations – Generic cabling for commercial premises].

FAQ: I only work on systems that use Light Emitting Diodes (LED) as their signal source. Aren't they safe?

The difference with light generated by light emitting diodes (LED) when compared with laser sources is that they operate at much lower power levels than most lasers. They are, therefore, considered to be fairly safe.

However, care still needs to be taken. A recent incident highlighting these risks occurred when an inexperienced cabler looked at the end of an optical fibre connector thinking it was a LED signal source, only to discover that it was, in fact, a laser-based system without any warning notices affixed.

These types of incidents can be avoided if cablers take the following steps.

- Always use protective eyewear.
- Turn off all active equipment and unplug it before examining any transmitter ports.
- When examining connectors with a microscope for contamination, chips or fractures etc, use only the built-in or another form of safe light source, not the active light source generated by the equipment.
- Ensure patch cords are disconnected from the active equipment (after turning off the equipment) and unplugged at both ends before examining with a microscope.
- Where possible, use the newer types of microscope (which have a built-in filter) to further protect the eye from such risks.

2. Eye and other damage caused by incorrect handling of leftover sharps

When a connector or splice is terminated (depending on the type and method of connector being used) it may create left over glass fragments which are often called sharps. Sharps are thinner than a human hair and, as the name implies, are as sharp as needles.

Sharps can be extremely dangerous if they become embedded in your eye or skin. The sharps are virtually impossible to see with the naked eye or remove without seeking medical attention.

Anecdotal evidence suggests that there is also a risk that, if not removed, they could get into the bloodstream and, over time, may cause acute medical conditions.

This risk can be minimised by never disposing of sharps into an ordinary rubbish or tidy bin, or allowing them to fall on to the floor. Incorrect disposal of sharps by leaving them on site can place other people at risk, particularly cleaning staff, who may be unaware they have come into contact with a sharp. Cablers need to be aware that sharps are fine enough that when vacuumed can become airborne and inhaled.

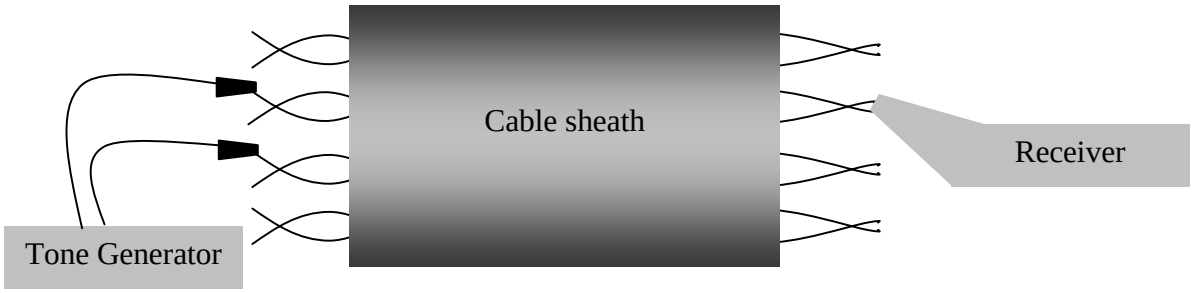
All sharps must be placed in what is known as a 'sharps container' and disposed of correctly (ie treated as medical waste). It is also essential that eyewear protection is used when splicing or terminating fibres. Always terminate and splice connectors on a black background to make it easier to see stray sharps.

TECHNICAL by Milcom Communications P/L

USING A CABLE AND PAIR IDENTIFIER (PART B)

Can't detect any tone
If you can't detect any tone what you can do is insert a flat blade into the termination in question as this can act as an antenna and make the tone audible. If you are trying to identify a tone on Cat 5 or Cat 6 cable you are better off connecting the generator across split pairs as the Cat 5 or 6 cable does not radiate the tone as well as ordinary telephone cable.

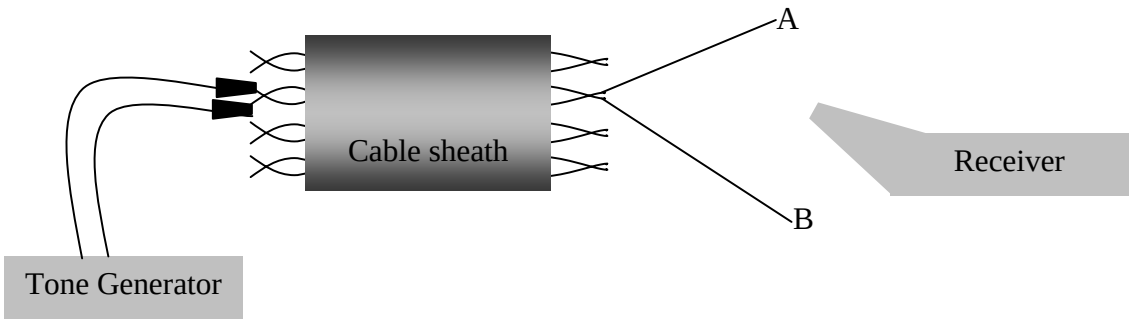
The reason for the twist in the cable is to reduce the signal within the cable from radiating so Cat 5 which has a much higher twist ratio than ordinary telephone cable achieves this and it is reflected when you are suing a pair identifier.



This is a technique to use when trying to identify cat 5 or 6 cables, connect the generator into different pairs

Figure 4

Tone seem to be in more than one pair
In some cases the tone will seem to be coming from more than one pair even though the generator is connected to one pair only. This can be caused due to problems in the cable but a way to determine which the pair in question is look for the Null.



Extend the pair out and keep each leg of the pair about 5 to 10 cm apart.

Figure 5

Holding the A and B leg of the pair in question around 5 to 10cm apart, now move the receiver from the A leg to the B Leg. The tone should be clear at the point closest to each conductor and when you get to the point that is in the middle between the A and B leg the tone should be at a null or no tone.

It should be noted the F set is not a continuity tester and if one leg is open circuit you will still get a tone on the pair. The tone will be a little fainter. You can use the method above of detect which leg has the tone because there will be no null.

Another method to detect an open is to hold the receiver in one hand and using a screw or small nail in the other detect tone on one leg only.