

# **FIA**

The Fibreoptic Industry Association

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TECHNICAL SUPPORT DOCUMENT

FIA-TSD-2000-5-3

OPTICAL FIBRE

-

DISPOSAL OF WASTE

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## 1 FIA TECHNICAL SUPPORT DOCUMENTS

2  
3 This document is one a series of FIA Technical Support Documents. During the year 2000 all the existing FIA documents will  
4 be re-written or re-published in the format used throughout this document.

5  
6 More importantly, the way in which these Technical Support Documents is published has also changed.

7  
8 These documents are now **free** to **FIA members** via downloads from the FIA web-site ([www.fibreoptic.org.uk](http://www.fibreoptic.org.uk)). Non-members  
9 are also able to purchase these documents either by contacting the Secretariat (address shown below) or by on-line purchase.

0  
1 Members and non-members unable to benefit from this service may receive the documents in hard-copy or diskette/CD ROM by  
2 contacting the FIA Secretariat (contact details are shown at the bottom of each text page in this document). However, the  
3 rapidly changing nature of our technology means that web-based documents can be amended and revised easily and it is the  
4 responsibility of the reader to ensure that the latest issue of a document is used.

5  
6 The FIA web-site will indicate the issue status of each document and will have links to previous issues in order that changes  
7 made will be clear to readers.

8  
9 The complete list of FIA Technical Support Documents is shown in the Table below.

TOPIC	FIA-TSD-	TITLE
DESIGN	2000-1-1	OPTICAL FIBRE CABLING: LAN APPLICATION SUPPORT GUIDE
COMPONENT SELECTION	2000-2-1	OPTICAL FIBRE CABLING: CABLE SELECTION GUIDE
OPERATION	2000-3-3	OPTICAL FIBRE CABLING: POLARITY MAINTENANCE
INSTALLATION	2000-4-1-1	OPTICAL FIBRE CABLING: INSTALLATION PRACTICE: SPLICING
	2000-4-2-1	OPTICAL FIBRE CABLING: TESTING OF INSTALLED CABLING LSPM equipment
	2000-4-2-2	OPTICAL FIBRE CABLING: TESTING OF INSTALLED CABLING OTDR equipment
	2000-4-2-3	OPTICAL FIBRE CABLING: TESTING OF INSTALLED CABLING Specification, procurement and use of test cords
SAFETY	2000-5-1	OPTICAL POWER: SAFETY LEVELS
	2000-5-2	OPTICAL FIBRE: HANDLING OF PROCESSING CHEMICALS
	2000-5-3	OPTICAL FIBRE: DISPOSAL OF WASTE

## 1 FOREWORD

2 "Health and Safety" - not the most glamorous of subjects, but nonetheless a vital one.

3  
4 We all want to work in a safe environment and there is a general expectation that this will be the case. Indeed the expectation is  
5 backed by a rigorous regime of regulation that employers must observe and work in accordance with. If they do not, they  
6 expose themselves to the possibility of claims both for compensation from employees, who suffer injury during the course of  
7 their employment, and legal action from the authorities for non-compliance with their legal obligations.

8  
9 However, assembling all the information needed to implement a comprehensive set of documented workplace safety policies is  
0 not so easy, especially in the multi-discipline world of fibre optics. Whilst the required standards almost always are already in  
1 existence, the task of determining which ones are relevant and how they should be applied can be extremely time-consuming.

2  
3 Only the larger companies can afford to employ a dedicated safety officer who could be expected to become familiar with the  
4 range of subjects and documents involved.

5  
6 To assist all types of member organizations, the FIA has set out to produce a set of documents that define, for specific areas of  
7 activity, the appropriate references to existing standards. In most cases, the FIA is not seeking to create new requirements.  
8 Instead we seek to provide a comprehensive and detailed summary of the source documents. In addition to this, the FIA  
9 documents offer additional interpretation of the ways in which the standards may be implemented.

10  
11 This document addresses the disposal of the shards of bare optical fibre that are the waste product from the termination or  
12 splicing of optical fibre cable. These, although small, can easily penetrate the skin and cause painful inflammation and infection.  
13 Since the termination and splicing processes are manual, the shards can be transferred to other areas such as the mouth and  
14 eyes.

15  
16 The potential consequences of this could be serious. If shards are ingested, they can not be detected by normal methods of  
17 analysis including X-rays. Clearly it is important to implement effective procedures for the disposal of shards.

18  
19 The coverage of this issue by existing Standards can be traced to BS7718, which was originally published by the FIA as the  
20 Code of Practise for Cabling Installation. This new FIA document includes recommendations as to the practises to be adopted,  
21 and how these may be implemented.

22  
23 We at the FIA believe that this document offers a great deal of help to companies operating in the field of optical fibre  
24 communications. I can wholeheartedly recommend it to you.

25  
26  
27 By Paul Bateson, Chairman of the FIA  
28

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## 1 INTRODUCTION

The installation of optical fibre cabling brings with it a number of health and safety issues. Specifically, these are the risks associated with optical power together with the processing chemicals used and the optical fibre waste created during the installation process.

There are also other health and safety issues raised by the presence of metallic elements within some designs of optical fibre cables. In some cases these elements are part of the construction of the cable and, in the UK, are treated as extraneous metal within BS 7671 thereby requiring appropriate earthing to prevent electric shock – addressed in BS 6701 and the [BS] EN 50174 series of standards. In other cases, the metallic elements take the form of conductors and are used to provide either power and/or signal transmission. In such circumstances a complex array of rules apply within which safety vies with electromagnetic interference - albeit with safety always coming out on top.

In the UK there are a number of existing standards and elements of legislation which cover the issues of safety in relation to optical fibre technology.

Cabling issues are covered by:

- BS 6701;
- BS 7671;
- BS 7718 (now withdrawn but historically important);
- the [BS] EN 50174 series of standards;
- ISO/IEC 14763-2;
- the Control of Substances Hazardous to Health (COSHH) legislation.

Optical power safety issues within systems are addressed in [BS EN] IEC 60825-1 and [BS EN] IEC 60825-2.

This FIA Technical Support Document collates the available requirements and recommendations in relation to the handling of optical fibre waste created during the installation and operation of optical fibre cabling infrastructures. As such the contents of the document represent the definition of good practice for FIA members.

## 1 SCOPE

This document defines appropriate references to, and provides additional interpretation of, existing standards in relation to the handling of optical fibre waste created during the installation and operation of optical fibre cabling infrastructures.

## 2 REFERENCES

### 2.1 Standards

ANSI/TIA/EIA-568-C.1 BS 6701:2010	Commercial building telecommunications cabling standard Telecommunications equipment and telecommunications cabling - Specification for installation, operation and maintenance
BS 7671:2008 + A1:2011	Requirements for electrical installations. IEE Wiring Regulations. Seventeenth edition
BS 7718	Code of Practice for the installation of fibre optic cabling (now withdrawn but historically important)
[BS] EN 50173-2:2009 + A1:2010	Information technology - Generic cabling systems - Part 2: Office premises
[BS] EN 50173-3:2009 + A1:2010	Information technology - Generic cabling systems - Part 3: Industrial premises
[BS] EN 50173-5:2009 + A1:2010	Information technology - Generic cabling systems - Part 3: Data centres
[BS] EN 50174-1:2009 + A1:2011	Information technology - Cabling installation - Part 1: Installation specification and quality assurance
[BS] EN 50174-2:2009 + A1:2011	Information technology - Cabling installation - Part 2: Installation planning and practices inside buildings
[BS] EN 50174-3:2003	Information technology - Cabling installation - Part 2: Installation planning and practices outside buildings
[BS EN] IEC 60825-1:2007	Safety of Laser Products - Part 1: Equipment classification, requirements and users guide
[BS EN] IEC 60825-2:2004 + A2:2010	Safety of Laser Products - Part 2: Safety of optical fibre communication systems
ISO/IEC 11801	Information technology - Generic cabling for customer premises
ISO/IEC 24702	Information technology - Generic cabling - Industrial premises
ISO/IEC 24764	Information technology - Generic cabling systems for data centres
ISO/IEC 14763-2:2012	Information technology - Implementation and operation of customer premises cabling - Part 2: Planning and installation
FIA-CCP-1/91	Code of Practice for the installation of fibre optic cabling (withdrawn when BS 7718 published)

### 2.2 Regulations

Reporting of Injuries, Diseases and Dangerous Occurrences Regulations: 1995 – RIDDOR

## 3 DEFINITIONS AND ABBREVIATIONS

### 3.1 Definitions

For the purpose of this Technical Support Guide the following definitions apply:

Buffer	See "Secondary coating"
Cladding	The dielectric material of an optical fibre surrounding the core (BS 7718).
Loose tube	A cable construction in which the optical fibres are free to move (enabling the cable to receive high tensile loads without risk of damage to the optical fibre).
Primary coating	A thin coating applied directly to the cladding to preserve the integrity of the cladding surface (BS7718)
Secondary coating	Coating applied directly to the primary coating to reinforce the protection of the optical fibre during handling and cabling (BS 7718).

### 3.2 Abbreviations

For the purpose of this Technical Support Guide the following definitions apply:

HSE  
RIDDOR  
TSD

Health and Safety Executive  
Reporting of Injuries, Diseases and Dangerous Occurrences Regulations  
Technical Support Document (FIA Publication)

1  
2

## 4 CONFORMANCE

This document provides guidance and does not seek to modify or replace the requirements of any of standards referred to in clause 2 above. There are no specific conformance requirements.

## 5 THE HAZARD

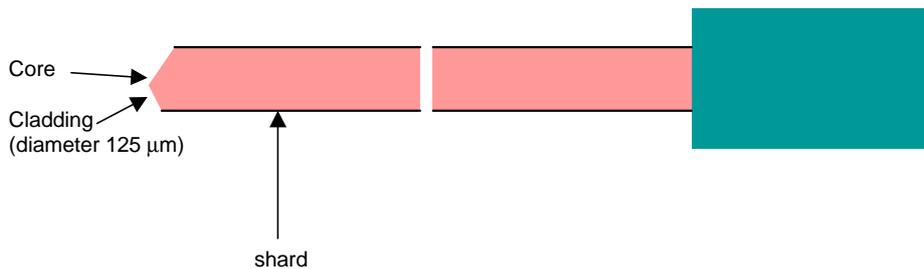
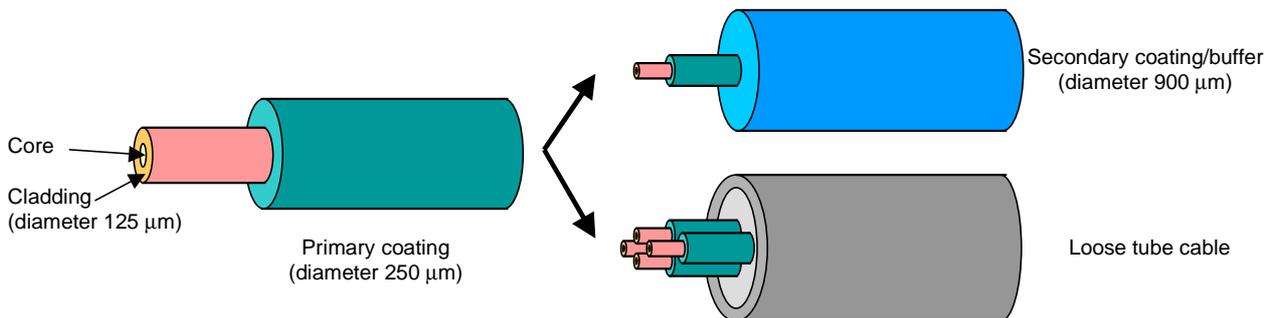
### 5.1 Optical fibre waste: creation

Optical fibre is generally produced as primary coated optical fibre. The application of the primary coating is necessary to provide the cladding surface with resistance against moisture and other contamination and which would weaken the bare optical fibre. Other coatings may be applied as required by the cable construction.

During jointing or termination processes it is usual to remove the primary coating thereby exposing the cladding surface. This enables:

- a good bond to be obtained between the cladding and the adhesives used in many terminations
- a good cleaved end to be obtained for fusion splice jointing or polishing in the case of termination.

The cleaving process involves the removal of a length of bare optical fibre that is sometimes called a "shard" or given the generic term "optical fibre waste". The term "optical fibre waste" is also given to short lengths of primary or secondary coated optical fibre that may be cut from a cable during the installation process.



The ends of optical fibres are also often exposed in longer off-cuts of primary coated or secondary coated/buffered optical fibres and cables. In these cases, the primary coating may or may not be present around the ends of the optical fibre. The cable off-cuts are given the generic term "optical fibre cable waste".

## 5.2 Optical fibre waste: the problems

Optical fibre shards are only 125 µm (1/8 mm) in diameter and can easily penetrate the skin. Penetration of the skin causes pain (sometimes intense if the shard is long enough to reach a nerve fibre or bone) and can cause irritation and inflammation of the affected area. In extreme cases, the wound can become infected.

Also shards are difficult to see, particularly in when they are of short length, and can be carried on the surface of the skin and transferred to other areas such as eyes and mouth.

A significant feature of optical fibre waste is that once inside the body it is invisible to normal type of analysis including X-rays. It is therefore imperative to implement measures targeted to minimize the risk of ingestion of optical fibre shards during the installation process and afterwards when non-expert users may enter the areas containing optical fibre cabling.

## 6 EXISTING STANDARDS

### 6.1 British Standards

The first standard to contain recommendations for the treatment of optical fibre waste was BS 7718.

Section 4.3.1 of BS 7718: 1996 states

*“Good housekeeping should be adopted to minimize the quantity of optical fibre waste. Exposed optical fibre ends must be kept away from the skin and eyes”.*

Section 4.3.2 of BS 7718: 1996 states

*“Waste fragments should be treated with care and collected (not with bare or unprotected hands) together with other waste materials and disposed on in suitable containers via an approved agency”.*

### 6.2 European Standards

[BS] EN 50174-2:2009 (including A1:2011) was written in CENELEC but large parts of the text were based upon BS 7718 and early versions of BS 6701.

Section 5.1.1.3 (Installation requirements: optical fibre cabling) of [BS] EN 50174-2: 2009 (including A1:2011) states *“The following practices shall be adopted:*

- a) ..
- b) *the quantity of optical fibre waste shall be minimized;*
- c) *waste fragments shall be treated with care and collected (not by hand.)*

### 6.3 International Standards

[BS EN] IEC 60825-2:2004 covers more than is suggested by its title “Safety of Laser Products - Part 2: Safety of optical fibre communication systems”.

Section D.6.3 of BS EN 60825-2: 2004 states that good practice requires operators to *“collect all fibre off-cuts and dispose of them in an approved container”* and that *“the container itself should be disposed of in an approved manner”.*

## 7 EXISTING LEGISLATION (UNITED KINGDOM)

The United Kingdom legislation covering injuries or illness caused by mishandling optical fibre or optical fibre cable waste is as follows:

- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations: 1995 – RIDDOR (see 9.2).

## 8 FIA REQUIREMENTS

For the purposes of this document the Fibreoptic Industry Association has selected the requirements of the BS EN 50174 standards to be the foundation of any further recommendations. The justification for this position is that the BS EN 50174 series of documents are "true" standards that contain normative requirements (defining conformance to the standard) as opposed to Codes of Practice.

Therefore the following practices **shall** be adopted:

- a) exposed optical fibre ends **shall** be kept away from the skin and eyes;
- b) the quantity of optical fibre waste **shall** be minimized;
- c) waste fragments **shall** be treated with care and collected (not by hand) and disposed of in suitable containers via an approved agency.

Safe disposal via an approved agency **shall** be achieved by means of a waste disposal organization competent to handle the relevant materials. Local authorities are often able to either provide the service or recommend alternative service providers.

## 9 MECHANISMS OF COMPLIANCE

### 9.1 FIA

The FIA requirements define the "whats" rather than the "hows". This section provides information on how to meet the requirements.

- do not touch the end of optical fibres in any type of cable construction;
- where possible, without restricting the capability of the installation operative, the use of safety glasses and Latex (or similar) gloves should be considered;  
NOTE: In certain cases Latex causes allergic reactions, particularly following extended periods of exposure.
- when cutting or cleaving it is recommended that long lengths of optical fibre be removed that are clearly visible;
- ensure that all waste produced is placed in a small well defined area to enable maximum collection efficiency;
- optical fibre waste shall be treated with care and collected (not by hand) together with other waste materials and placed in "sharps containers";
- in the UK the sharps containers shall meet the requirements of BS 7320;
- sharps containers should not be filled above the maximum fill line and should be temporarily or permanently closed as required in accordance with the instructions supplied with the container;
- the exposed ends of optical fibre cable waste shall be taped and shall be placed in tough plastic bags;
- the bags shall be standard biohazard bags or be labelled "CAUTION, FIBRE OPTIC OFFCUTS";
- excess cable on drums should have the ends taped over and the end should be secured to the drum;
- before contractual handover of cabinets or closures within which optical fibres have been installed, ensure that all optical fibre waste and optical fibre cable waste has been removed.



Example sharps container meeting the requirements of BS 7320



Example bags for disposal of optical fibre cable waste

## 9.2 RIDDOR

If you are an employer, self-employed or in control of work premises, you are required under RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995) to report some work-related accidents, diseases and dangerous occurrences.

Reporting accidents and ill health at work is a legal requirement. The information enables the Health and Safety Executive (HSE) and local authorities to identify where and how risks arise and to investigate serious accidents.

All the following shall be reported:

- a death or major injury;
- an over-three-day injury (that is when an employee or self-employed person has an accident at work and is unable to work for over three days, but does not have a major injury);
- a work-related disease; and
- a dangerous occurrence (this is when something happens that does not result in a reportable injury, but which clearly could have done).

More information can be found at [www.RIDDOR.gov.uk](http://www.RIDDOR.gov.uk).

## 10 TRAINING

Training of operators in the curricula surrounding City & Guilds 3666 series qualifications will assist in practical implementation of processing chemical safety in the course of installation tasks.

A list of FIA members providing training is available in the Members e-Guide which can be downloaded from [www.fia-online.co.uk](http://www.fia-online.co.uk).

A list of companies meeting the requirements for FIA Approved Training Providers can be accessed at [www.fia-online.co.uk/eatps02.htm](http://www.fia-online.co.uk/eatps02.htm).