IEC 61756-1

Edition 2.0 2019-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Fibre optic interconnecting devices and passive components – Interface standard for fibre management systems –
Part 1: General and guidance

Dispositifs d'interconnexion et composants passifs fibroniques – Norme d'interface pour les systèmes de gestion de fibres –
Partie 1: Généralités et recommandations

IEC 61756-1:2019-11(en-fr)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,…). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary
67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

IEC 61756-1

Edition 2.0 2019-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Fibre optic interconnecting devices and passive components – Interface standard for fibre management systems – Part 1: General and guidance

Dispositifs d'interconnexion et composants passifs fibroniques – Norme d'interface pour les systèmes de gestion de fibres – Partie 1: Généralités et recommandations

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 33.180.01 ISBN 978-2-8322-7511-5

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

____

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – INTERFACE STANDARD FOR FIBRE MANAGEMENT SYSTEMS –

Part 1: General and guidance

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61756-1 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 2006. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) addition of figures to show the interface between protective housing and fibre management system;
b) addition of definitions for protective housing, closure, box, street cabinets and optical distribution frame modules;
c) addition of table with dimensions of fusion splice protectors and mechanical splices;
d) addition of method to identify the minimum bending radius for stored fibres;

e) addition of clause for other factors relevant to fibre management systems;

f) addition of annex A for example of calculating the minimum bending radius of stored fibres in a fibre management system.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
86B/4228/FDIS	86B/4240/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – INTERFACE STANDARD FOR FIBRE MANAGEMENT SYSTEMS –

Part 1: General and guidance

1 Scope

This part of IEC 61756 covers general information on fibre management system interfaces. It includes the definitions and rules under which a fibre management system interface is created and it provides also criteria to identify the minimum bending radius for stored fibres.

This document allows both single-mode and multimode fibre to be used.

Liquid, gas or dust sealing requirements at the cable entry area or cable element ending are not covered in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60793-2-10, *Optical fibres - Part 2-10: Product specifications - Sectional specification for category A1 multimode fibres*

IEC 60793-2-50, *Optical fibres - Part 2-50: Product specifications - Sectional specification for class B single-mode fibres*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Fibre management related definitions

3.1.1
distribution element
element for a fibre management system providing fibre branching, holding and distribution function

3.1.2
fibre management system
system to control, protect and store splices, connectors, passive optical components and fibres from incoming to outgoing cables

Note 1 to entry: A fibre management system is intended for installation within a protective housing.

Note 2 to entry: A fibre management system is often called an "organiser".

3.1.3
multiple element
physical fibre separation level consisting of more than one single element

Note 1 to entry: This separation level has fibres from multiple cable elements on one splice tray and is also called mass storage. It is the lowest (worst) degree of physical circuit separation.

3.1.4
multiple element management system
system which provides all necessary equipment to connect a defined number of incoming and outgoing fibres/cables

Note 1 to entry: It comprises storage and protection of fibres/ribbons and interconnections in one tray for more than one single element (see Figure 1).

Note 2 to entry: There are many different names for this structure, for example "mass storage". In this document, "multiple element" will be used.

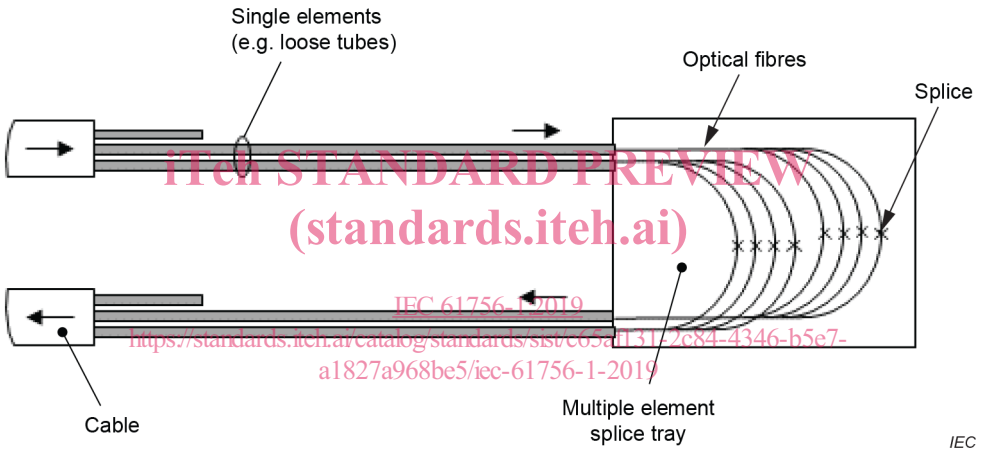


Figure 1 – Multiple element management system

3.1.5
multiple ribbon
multiple element consisting of multiple optical fibres (circuits) arranged in ribbons (fibres in parallel) which are also arranged (for example, in stacks)

3.1.6
optical performance stability
stability of the system to transient loss introduced by external disturbances of the fibres

3.1.7
single circuit
physical fibre separation level where the optical circuit consists of one fibre (single fibre), or more than one fibre, providing all services for one subscriber

Note 1 to entry: This fibre separation level has the fibre(s) of only one customer on one splice tray. It is the highest (best) degree of physical circuit separation.

3.1.8
single circuit management system
system which provides all necessary equipment to connect a defined number of incoming and outgoing fibres/cables

Note 1 to entry: It comprises storage and protection of fibres/ribbons and interconnections with one single circuit per splice tray (Figure 2).

Note 2 to entry: Disturbance of operational circuits by accessing any other adjacent circuit should be minimised. The disturbance should stay within allowable tolerances given in related performance standards.

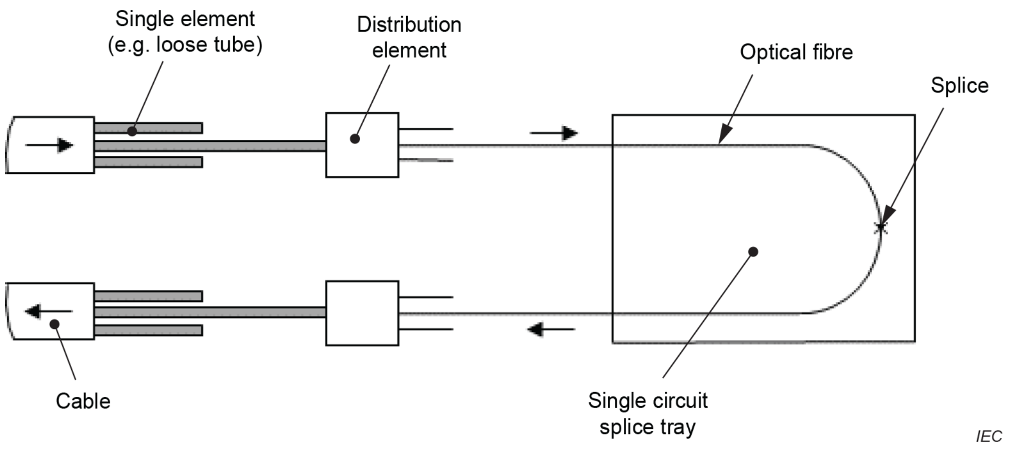


Figure 2 – Single circuit management system

3.1.9
single element
physical fibre separation level in the cable subassembly comprising one or more optical fibres inside a common covering for example in a tube or inside one groove of a grooved cable (slotted core cable)

Note 1 to entry: A single element provides services to more than one subscriber.

Note 2 to entry: This fibre separation level has all fibres from a cable element (e.g. loose tube) on one splice tray. It is an intermediate degree of physical circuit separation (between single circuit and multiple element).

3.1.10
single element management system
system which provides all necessary equipment to connect a defined number of incoming and outgoing fibres/cables

Note 1 to entry: It comprises storage and protection of fibres/ribbons and interconnections in one tray for each single element (see Figure 3).

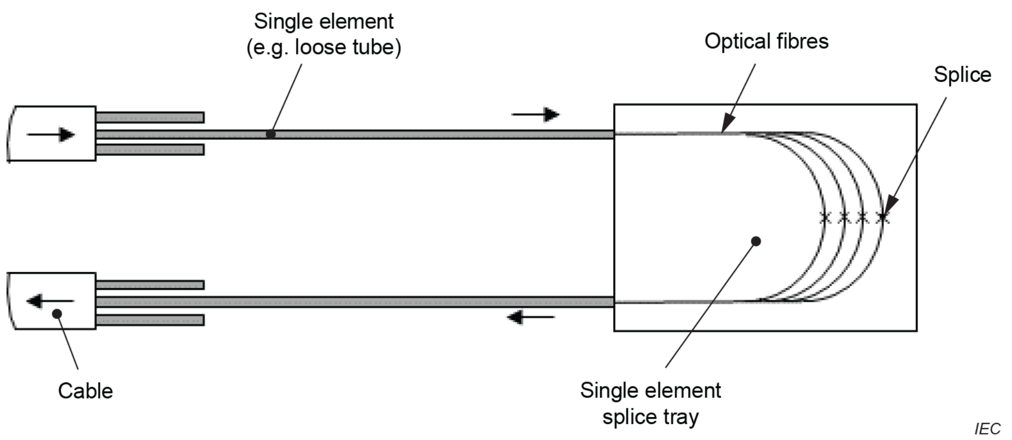


Figure 3– Single element management system

3.1.11
single ribbon
single element designed to carry all fibres of one ribbon

Note 1 to entry: Depending on the fibres deployment', a single ribbon can contain all the fibres of one circuit (single circuit) or the fibres of more than one circuit (single element).

3.1.12
splice tray
structure that organises and controls storage of fibre splices in an orderly manner, together with the associated excess uncabled fibre length

Note 1 to entry: It can be a part of a fibre management system.

3.1.13
transient loss
short term (ms) reversible change of optical transmission characteristics arising from optical discontinuity, physical defects and modifications of the attenuation (e.g. bending loss) normally caused by mechanical stress

3.1.14
uncut fibre
fibres from a continuous cable with the cable sheath removed over a defined length without cutting the fibres or tubes

Note 1 to entry: The uncut tubes or fibres are stored e.g. in a space saving loop. When required, the fibres are cut and spliced or connected.

3.2 Component related definitions

3.2.1
active optical component
optical component exhibiting one or more of the following functions:

– generation or detection of optical power;
– conversion of an electronic signal to a corresponding optical one or vice versa;
– optical amplification or optical regeneration (2R or 3R) of an optical signal;
– direct conversion of the optical frequency of an optical signal

3.2.2
adapter
component in which two or more ferrules are aligned

Note 1 to entry: A ferrule is the fibre holding component part of the plug.

[SOURCE: IEC 60874-1:2011, 3.1, modified – The note has been added.]

3.2.3
fan-out
passive optical component providing a transition between a single ribbon or single element into individual fibres

3.2.4
fusion splice
permanent joint accomplished by the application of localised heat sufficient to fuse or melt the ends of two lengths of optical fibre, to produce a continuous single optical fibre

[SOURCE: IEC 60050-731:1991, 731-05-06, modified – The words "a splice" has been replaced by "permanent joint".]

3.2.5
fusion splice protector
component which protects the weak fusion zone and the bare fibres of a fusion splice

Note 1 to entry: The most common types used in fibre management systems are heat shrinkable or mechanical fusion splice protectors.

3.2.6
live fibre
transmitting fibre
fibre optical circuit that is carrying an optical signal

3.2.7
mechanical splice
fibre splice accomplished by fixtures or materials, rather than by thermal fusion

[SOURCE: IEC 60050-731:1991, 731-05-07]

3.2.8
non-transmitting fibre
optical circuit that is not carrying an optical signal

3.2.9
optical connector set
complete assembly of components required to provide demountable coupling between optical fibres

[SOURCE: IEC 60874-1:2011, 3.15, modified – The word "fibre" has been deleted from the term, and the definition has been rephrased.]

3.2.10
optical fibre connector
component normally attached to an optical cable or piece of apparatus for the purpose of providing optical interconnection and disconnection of optical fibres or cables

Note 1 to entry: The interconnection usually consists of two plugs mated together in an adapter or 1 plug mated in a socket.

[SOURCE: IEC 60050-731:1991, 731-05-01, modified – The definition has been rephrased, and the note added.]

3.2.11
optical fibre splice
permanent or separable joint whose purpose is to couple optical power between two optical fibres, realised by either a fusion or a mechanical technique

[SOURCE: IEC 60050-731, 731-05-05, modified – The words "or separable" and "realised by either a fusion or a mechanical technique" have been added.]

3.2.12
passive optical component
optical component or assembly which does not require any source of energy for its operation other than optical input signals

Note 1 to entry: A passive optical component might need external power to control the stability of its optical characteristics. Example is controlling the temperature of the component.

Note 2 to entry: A passive optical component never generates an optical gain of signal power.

[SOURCE: IEC TS 62538 modified]

3.2.13
patchcord
length of optical fibre or cable, permanently terminated at both ends with a plug

Note 1 to entry: See Figure 4.

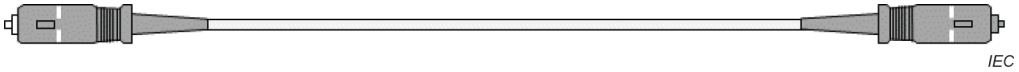


Figure 4– Patchcord

[SOURCE: IEC 60874-1:2011, 3.17, modified –The words "optical fibre" and "or jumper" have been deleted from the term. The note and figure have been added.]

3.2.14
pigtail
length of optical fibre or cable, permanently terminated at one end with a plug

Note 1 to entry: See Figure 5.

Figure 5– Pigtail

[SOURCE: IEC 60874-1:2011, 3.18, modified –The words "optical fibre" have been deleted from the term. The note and figure have been added.]

3.2.15
plug
male-type part of an optical fibre connector

Note 1 to entry: Optical fibre connectors are either two plugs mated in an adapter or one plug mated into a socket (female part).

[SOURCE: IEC 60874-1:2011, 3.20, modified – The words "fibre optic" have been added to the definition, and the note has been added.]

3.3 Protective housing related definitions

3.3.1
box
free breathing protective housing that is permanently attached to a vertical wall or pole

Note 1 to entry: A box is not specifically designed to allow cable movement (e.g. torsion, bending) at the cable ports during operation.

3.3.2
free breathing closure
protective housing that allows a free exchange of air with the environment

Note 1 to entry: A free breathing closure may look like a sealed closure, but it is not designed to hold a varying overpressure or underpressure caused by temperature changes or atmospheric pressure changes. Free breathing closures are used in aerial environments for the interconnection of cables.

Note 2 to entry: Limited water ingress and/or limited dust ingress is possible. Free breathing closures are not intended for use in areas that are subject to flooding or water immersion.

[SOURCE: IEC 61753-1:2018]

3.3.3
optical distribution frame module
sub rack
protective housing which is mountable in a supporting structure

Note 1 to entry: An optical distribution frame module contains a fibre management system and can provide rearrangeable interconnections between the fibres of the incoming and outgoing cables.

Note 2 to entry: The supporting structure that houses the ODFM is often called an equipment rack.

[SOURCE: IEC 61753-1:2018, 3.10, modified – The second preferred term "sub rack" has been added, and the word "protective" has been added in the definition.]

3.3.4
protective housing
indoor or outdoor housing utilised for the storage, distribution or protection of one or more cable joints or any passive or active components

Note 1 to entry: Examples of protective housings: closures, wall boxes, cabinets, cases, optical distribution frame modules, sub racks or pedestals. A closure can be either a "sealed closure" or a "free breathing closure".

Note 2 to entry: The protective housing contains a fibre management system.

[SOURCE: IEC 61753-1:2018, 3.16, modified – The definition and Note 1 have been rephrased, and the figure has been deleted.]

3.3.5
sealed closure
watertight and dust-tight housing that can hold a varying overpressure or underpressure caused by temperature changes or atmospheric pressure changes

Note 1 to entry: There is no exchange of air with the outside environment when exposed to temperatures over the specified operating temperature range.

Note 2 to entry: Although often referred to as hermetic sealed closures, humidity can enter the inner closure by diffusion.

Note 3 to entry: Sealed boxes or sealed wall outlets shall be treated as sealed closures.

Note 4 to entry: Complete inner filled housings are also considered to be sealed closures.

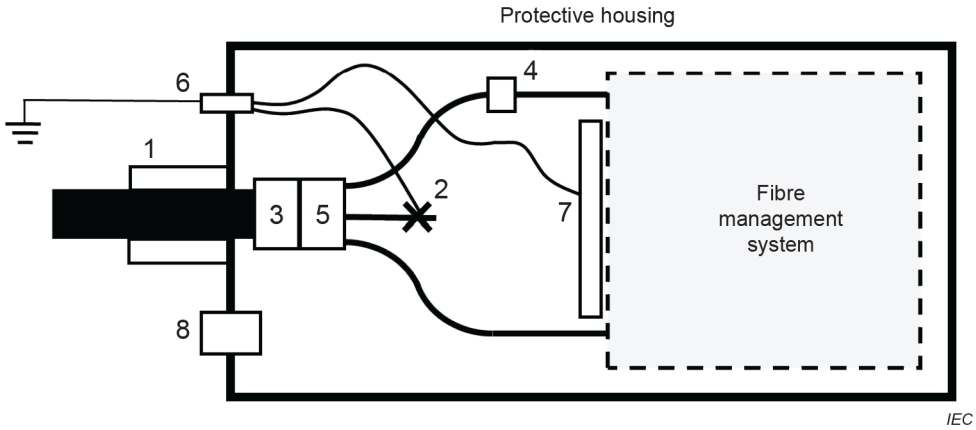
[SOURCE: IEC 61753-1:2018, 3.17]

4 Abbreviated terms

CO	central office
CWDM	coarse wavelength division multiplexer
DWDM	dense wavelength division multiplexer
FMS	fibre management system
FTTH	fibre to the home
ME	multiple element
MR	multiple ribbons
OADM	optical add drop multiplexer
ODFM	optical distribution frame module
SC	single circuit
SE	single element
SR	single ribbon
WWDM	wide wavelength division multiplexer

5 Description of a fibre management system

A fibre management system is typically installed inside a protective housing, normally a closure, wall box, distribution frame or street cabinet. Figures 6 and 7 illustrate and define the interface between the Fibre Management System and the protective housing.



Key

1 Cable sealing (required for outside plant, optional for indoor application)
2 Cable anchorage
3 Cable blocking (optional)
4 Gas blocking (optional)
5 Distribution element (optional)
6 Grounding (optional)
7 Fixing point for FMS in protective housing
8 Air pressure valve (input or overpressure exhaust) (optional)

Figure 6 – Functional parts diagram of a protective housing