



BSI Standards Publication

Fibre management systems and protective housings to be used in optical fibre communication systems — Product specifications

Part 3-1: Wall or pole mounted box for splices, for category C and A

National foreword

This British Standard is the UK implementation of EN 50411-3-1:2025. It supersedes BS EN 50411-3-1:2012, which will be withdrawn on 31 October 2026.

The UK participation in its preparation was entrusted to Technical Committee GEL/86/2, Fibre optic interconnecting devices and passive components.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Date	Text affected

English Version

**Fibre management systems and protective housings to be used
in optical fibre communication systems - Product specifications -
Part 3-1: Wall or pole mounted box for splices, for category C
and A**

Systèmes de gestion des fibres et boîtiers de protection
destinés à être utilisés dans les systèmes de
communication par fibres optiques - Spécifications de
produits - Partie 3-1: Boîte de montage mural ou sur poteau
pour les épissures, pour les catégories C et A

LWL-Spleißkassetten und -Muffen für die Anwendung in
LWL-Kommunikationssystemen - Produktnormen - Teil 3-1:
Faser Management System, Wandspleißverteiler für die
Kategorien C und A

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 50411-3-1:2025) has been prepared by CLC/TC 86BXA “Fibre optic interconnect, passive and connectorised components”.

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2026-10-31
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2026-10-31

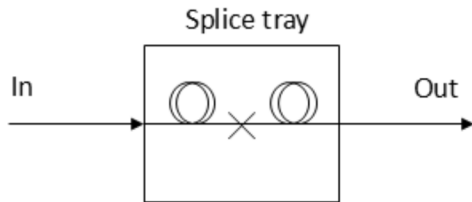
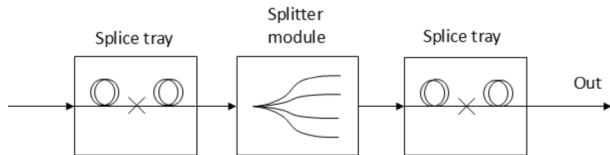
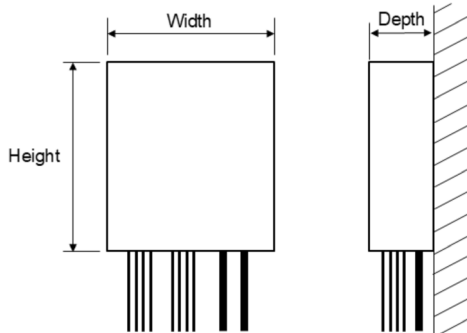
This document supersedes EN 50411-3-1:2012 and all of its amendments and corrigenda (if any).

EN 50411-3-1:2025 includes the following significant technical changes with respect to EN 50411-3-1:2012:

- update of the product category in title to Fibre management systems and protective housings;
- update of the product type in title to wall or pole mounted box for splices;
- addition of the application for pole mounting;
- update of the environmental categories to C and A according to EN IEC 61753-1:2018 ed2;
- update of the definition according to EN IEC 61753-1:2018;
- update of the description similar to EN 50411-3-4;
- replacement of the seven tables with box sizes, number of trays and splice capacity with one table reducing the number of sizes to seven;
- deletion of box sizes V and W;
- improvement of the description and figures for the example configurations of box test sample preparation;
- update of the test specifications similar to EN 50411-3-4, that are based on EN IEC 61753-1:2018;
- removal of the smoke emission test method that was applicable for cables only.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Fibre management systems and protective housings to be used in optical fibre communication systems — Product specifications —						
Part 3-1: Wall or pole mounted box for splices, for category C and A						
Description		Typical installation configuration		Typical mounting options		
Wall or pole mounted box		Track box (2 cables minimum) Spur box (3 cables minimum) Distribution box (6 cables minimum)		Vertical wall (external or internal)		
				Pole mounted (above ground)		
Inside street furniture (cabinet or pedestals)						
Typical fibre management configurations						
						
Operating service environments						
Applications: Optical fibre cable networks. For indoor and/or for external above ground applications			EN IEC 61753-1, category C EN IEC 61753-1, category A			
Fibre separation levels in Fibre Management System						
Single circuit (1, 2 or 4 fibre splices per tray), Single element (6, 8 or 12 fibre splices per tray), Multiple element (144 fibre splices per tray)			Single ribbon (1 ribbon fibre splice per tray), Multiple ribbon (12 ribbons fibre splices per tray)			
Box sizes, splice capacities and dimensions						
		Box size	Fibre splice capacity max.	Maximum overall box dimensions		
				Width mm	Height mm	Depth mm
		A	24	280	450	100
		G	48	400	450	150
		D	72	400	600	200
		E	96	460	600	180
		K	144	460	610	210
		L	192	420	550	180
N	288	460	600	180		

1 Scope

1.1 Product definition

This document contains the dimensional, optical, mechanical and environmental performance requirements of a fully installed optical fibre wall or pole mounted box for up to 288 fibre splices, in order for it to be categorized as a European standard product.

The typical configuration is splicing of incoming fibres to optional splitters, connecting on the other side to outgoing fibres.

A box is a protective housing containing a fibre management system with splice trays of various fibre separation levels. The box can contain one or more of the following:

- storage and routing for fibre and cable;
- uncut fibre cable storage;
- splice trays;
- passive optical devices (optical splitters or WDM).

A box can be installed on a vertical indoor or outdoor surface above ground level. If the box is required to be relocatable with cables attached, the following additional tests are expected to be performed:

- cable bending;
- cable torsion.

This document specifies the number of splice trays and splice capacity for each fibre separation level. The maximum capacity is 288 splices. For housings with a higher number of splices, EN 50411-4-1 (street cabinets) can be used.

Boxes for fibre splice and patchcord connections are covered in EN 50411-3-4.

1.2 Operating environment

The tests selected, combined with the severity and duration, are representative of indoor and outside plant for above ground environments defined by EN IEC 61753-1:

- category C: Controlled (indoor) environment;
- category A: Aerial (outdoor above ground) environment.

1.3 Reliability

Whilst the anticipated service life expectancy of the product in this environment is 20 years, compliance with this document does not guarantee the reliability of the product. This is expected to be predicted using a recognized reliability assessment programme.

1.4 Quality assurance

Compliance with this document does not guarantee the manufacturing consistency of the product. This is expected to be maintained using a recognized quality assurance programme.

1.5 Allowed fibre and cable types

This box standard accommodates EN IEC 60793-2-50 single-mode fibres and EN IEC 60793-2-10 A1-OM2 to A1-OM5 and A1-OM1 multimode fibres and all EN 60794 series optical fibre cables with various fibre capacities, types and designs.

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.

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*

EN 60695-11-10, *Fire hazard testing — Part 11-10: Test flames — 50 W horizontal and vertical flame test methods (IEC 60695-11-10)*

EN 60754-1, *Test on gases evolved during combustion of materials from cables — Part 1: Determination of the halogen acid gas content (IEC 60754-1)*

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

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

EN IEC 61300-2-1, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-1: Tests - Vibration (sinusoidal) (IEC 61300-2-1)*

EN IEC 61300-2-4, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-4: Tests - Fibre or cable retention (IEC 61300-2-4)*

EN IEC 61300-2-5, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-5: Tests — Torsion (IEC 61300-2-5)*

EN 61300-2-9, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-9: Tests — Shock (IEC 61300-2-9)*

EN 61300-2-12, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-12: Tests — Impact (IEC 61300-2-12)*

EN 61300-2-22, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-22: Tests — Change of temperature (IEC 61300-2-22)*

EN 61300-2-26, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-26: Tests — Salt mist (IEC 61300-2-26)*

EN 61300-2-33, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-33: Tests — Assembly and disassembly of fibre optic mechanical splices, fibre management systems and closures (IEC 61300-2-33)*

EN 61300-2-34, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-34: Tests — Resistance to solvents and contaminating fluids of interconnecting components and closures (IEC 61300-2-34)*

EN 61300-2-37, *Fibre optic interconnecting devices and passive components - Basic test and measurement procedures — Part 2-37: Tests — Cable bending for fibre optic closures (IEC 61300-2-37)*

EN 61300-3-1, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 3-1: Examinations and measurements — Visual examination (IEC 61300-3-1)*

EN 61300-3-3, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 3-3: Examinations and measurements — Active monitoring of changes in attenuation and return loss (IEC 61300-3-3)*

EN 61300-3-28, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 3-28: Examinations and measurements — Transient loss (IEC 61300-3-28)*

EN IEC 61756-1, *Fibre optic interconnecting devices and passive components — Interface standard for fibre management systems — Part 1: General and guidance (IEC 61756-1)*

3 Terms and definitions

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

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

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

3.1

active fibre

live fibre

fibre in an optical circuit or node that is carrying an optical signal

3.2

box

free breathing housing that is permanently fixed to a 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

cable element

grouping of fibres in the cable sheath

3.4

fan-out

passive optical component providing a transition between a single ribbon or single element into individual fibres

3.5

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 systems is often called an “organiser”.

3.6

free breathing housing

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

Note 1 to entry: Limited water ingress and/or limited dust ingress is possible. Free breathing housings are not intended for use in areas that are subject to flooding or water immersion. Free breathing housings are used in aerial environments for the interconnection of cables.

Note 2 to entry: A free breathing housing is not designed to hold a varying overpressure or underpressure caused by temperature changes or atmospheric pressure changes.

3.7

microduct

small, flexible lightweight tube with an outer diameter between 3 mm and 16 mm

3.8

multiple element

ME

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.

3.9

multiple ribbon

MR

multiple element consisting of multiple optical fibres (circuits) arranged in ribbons (fibres in parallel) which are arranged e.g. in stacks

3.10

passive optical component

optical component or assembly which does not require any source of energy for its operation other than optical input signals, or controls the dynamic or static characteristics of optical signals using a source of energy

Note 1 to entry: A passive optical component never generates an optical gain of signal power.

Note 2 to entry: Examples include optical attenuators and passive branching devices.

3.11

protective housing

indoor or outdoor housing utilised for the storage, distribution or protection of one or more cable joints or passive or active telecom equipment

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

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

3.12

single circuit

SC

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. Single circuit minimizes the disturbance of the operated circuits when accessing any adjacent circuit.

3.13

single element

SE

physical fibre separation level in the cable subassembly comprising one or more optical fibres inside a common covering e.g. 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).

3.14

single ribbon

SR

physical fibre separation level with all fibres grouped in 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).

3.15

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: A splice tray is a part of the fibre management system.

3.16

transient loss

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

3.17

uncut fibre

fibres from a continuous cable with the cable sheath removed over a defined length

Note 1 to entry: Uncut fibres typically comprise a section of cable where the cable sheath has been removed and the cable tubes or uncut fibres are cleaned as for installation. These uncut tubes or fibres are then stored, usually inside a protective housing, in a loop. When required the fibres or tubes are then cut and the fibres connected or spliced.

4 Abbreviations

For the purposes of this document, the following abbreviations apply.

FMS	Fibre Management System
FTTH	Fibre to the Home
ME	Multiple Element
MR	Multiple Ribbon
NA	Not applicable
SC	Single Circuit
SE	Single Element
SR	Single Ribbon
WDM	Wavelength Division Multiplexer

5 Description

5.1 Functions and configurations

An optical fibre box is a housing that is attached to a wall or pole and contains the ends of the terminated cables. The design of the box shall allow the interconnection of cable ends or fibre units.

A box has a means of containing and protecting the fibres, splices, and other passive optical devices.

A box used for blown cabling contains an area where the ends of the micro-ducts or the protected micro-ducts, which may be terminated with water and gas blocking, are placed.

The design of the box may allow the joining together of at least one pair of cables which are not at the end of a cable section without cutting all fibres between both cable openings. This application is generally known as track joint or external node, but also called a mid-span or balloon splice box. If more than or equal to three cables enter the box it is called a spur box and if more than or equal to six cables enter the box it is called a distribution box.

A box shall be able to be re-opened without interruption or disturbance of the traffic of the live circuits within the box.

The main fibre management configurations of the optical fibre distribution boxes in this specification is given in Figure 1.

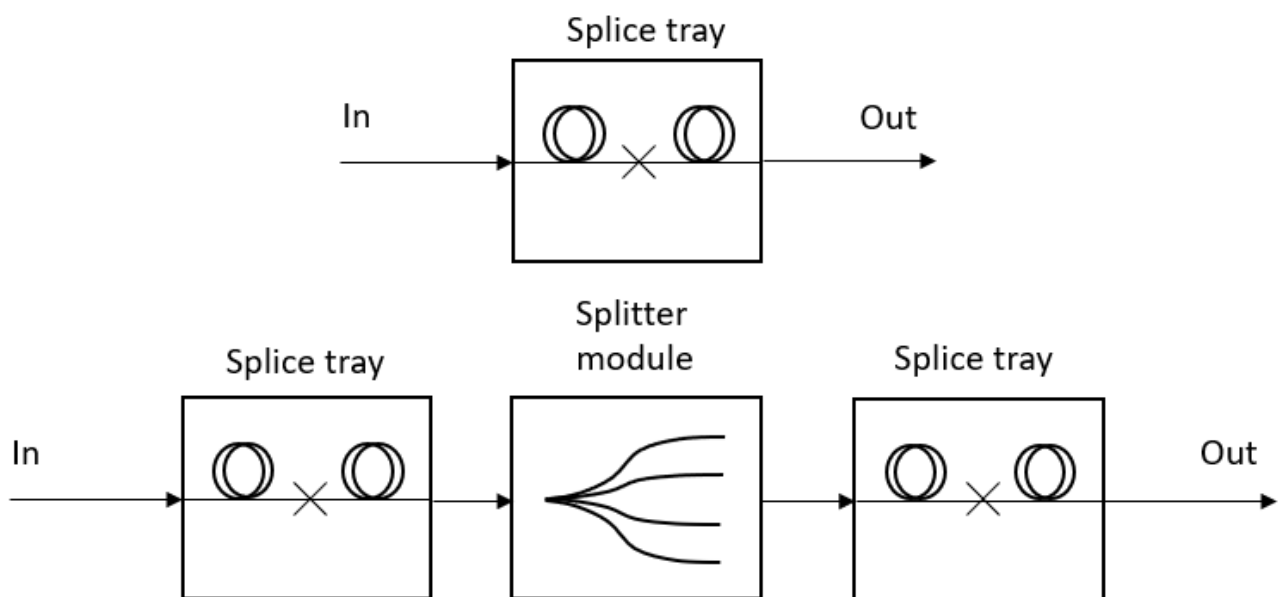


Figure 1 — Fibre management configurations in a track box

5.2 Cable seals

For environmental category A the cable entry or exit ports in the box shall have a sealing and attachment system that can be:

a) heat activated by a heat source, for example, electrical, infrared, hot air or flame:

- thermo-shrinkable materials;
- hot melt adhesives;
- polyethylene injection welding;

b) cold applied:

- mastic, tapes, pastes, potting compounds, gels and cold adhesives;
- o-rings, grommets, rubber shapes, pre-expanded tubing;