BS EN 50411-2-3:2012

BSI Standards Publication

Fibre organisers and closures to be used in optical fibre communication systems — Product specifications -

Part 2-3: Sealed inline fibre splice closures Type 1, for category S & A

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National foreword

This British Standard is the UK implementation of EN 50411-2-3:2012. It supersedes BS EN 50411-2-3:2007 which is withdrawn.

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 secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Fibre organisers and closures to be used in optical fibre communication systems - Product specifications - Part 2-3: Sealed inline fibre splice closures Type 1, for category S & A

Organiseurs et boîtiers de fibres à utiliser dans les systèmes de communication par fibres optiques - Spécifications de produits - Partie 2-3: Boîtiers à épissures de fibres alignées scellés Type 1, pour catégories S & A

LWL-Spleißkassetten und -Muffen für die Anwendung in LWL-Kommunikationssystemen - Produktnormen - Teil 2-3: Abgedichtete LWL-Muffen Bauart 1 für die Kategorien S & A

CENELEC

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Foreword

This document (EN 50411-2-3:2012) 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)	2012-12-21
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2012-12-21

This document supersedes EN 50411-2-3:2007.

EN 50411-2-3:2012 includes the following significant technical changes with respect to EN 50411-2-3:2007:

— the variant XX2 additional distribution closures with more cable entrance ports were defined (new versions D2, D3 and D4 were added);

— no other technical changes were made to the document.

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

Fibre organisers and closures to be used in optical fibre communication systems - Product specifications

Part 2-3: Sealed inline fibre splice closures Type 1, for category S & A

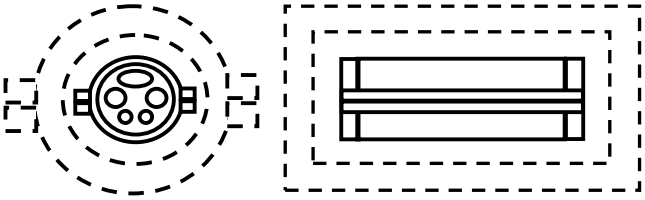
Description		Performance	
Construction:	Sealed Inline	**Applications:**	
Cable seals:	Heat activated and/or cold applied	**Optical fibre cable networks**	
Fibre management:	Single circuit, Single element, Multiple element and/or Single/Multiple Ribbon	**for underground:**	EN 61753-1 category S
		for aerial:	EN 61753-1 category A

Related documents:

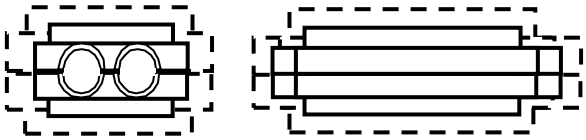
EN 60793-2-50	Optical fibres - Part 2-50: Product specifications - Sectional specification for class B single-mode fibres (IEC 60793-2-50)
EN 60794-2	Optical fibre cables - Part 2: Indoor cables - Sectional specification (IEC 60794-2)
EN 60794-3	Optical fibre cables - Part 3: Sectional specification - Outdoor cables (IEC 60794-3)
EN 61300 series	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures (IEC 61300 series)
EN 61753-1	Fibre optic interconnecting devices and passive components performance standard - Part 1: General and guidance for performance standards (IEC 61753-1)
ETSI EN 300 019-1-4	Environmental Engineering (EE) - Environmental conditions and environmental tests for telecommunications equipment - Part 1-4: Classification of environmental conditions - Stationary use at non-weather protected locations

Construction and splice capacity:

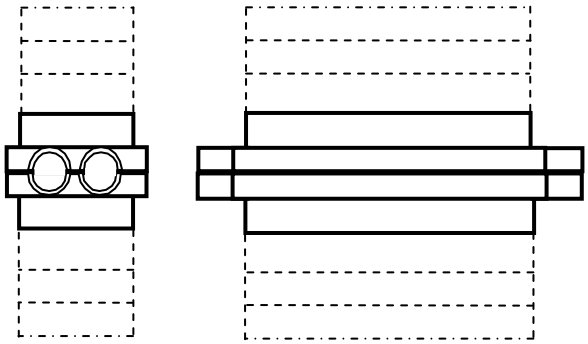
Closure Type 1 (A-E):



Closure Type 2A (F-G):



Closure Type 2B (H-L):



Variant: Number Fibre Splices - Maximum capacity & fibre management system – SC, SE, SR, ME and MR

S organiser			M organiser	
Single Circuit (SC)	**Single Element (SE)**	**Single Ribbon (SR)**	**Multiple Element (ME)**	**Multiple Ribbon (MR)**
A 8 Splice	**A** 48 Splice	**A** 48 Splice	**A** 144 Splice	**A** 288 Splice
B 16 Splice	**B** 96 Splice	**B** 96 Splice	**B** 288 Splice	**B** 1152 Splice
C 24 Splice	**C** 144 Splice	**C** 120 Splice	**C** 360 Splice	**C** 1728 Splice
D 48 Splice	**D** 288 Splice	**D** 288 Splice	**D** 864 Splice	**D** 3456 Splice
E 144 Splice	**E** 432 Splice	-	**E** 864 Splice	**E** 5184 splice
F 6 Splice	**F** 36 Splice	-	**F** 216 Splice	-
G 12 Splice	**G** 72 Splice	**G** 72 Splice	**G** 144 Splice	**G** 24 Splice
H 16 Splice	**H** 96 Splice	**H** 96 Splice	**H** 384 Splice	**H** 1152 Splice
J 22 Splice	**J** 132 Splice	**J** 132 Splice	**J** 528 Splice	**J** 1584 splice
K 40 Splice	**K** 240 Splice	-	**K** 480 Splice	
L 96 Splice	**L** 288 Splice	-	**L** 648 Splice	**L** 1152 Splice

1 Scope

1.1 Product definition

This specification contains the initial, start of life dimensional, optical, mechanical and environmental performance requirements of a fully installed splice closure in order for it to be categorised as an EN standard product.

1.2 Operating environment

The tests selected combined with the severity and duration is representative of outside plant for subterranean and/or aerial environments defined by:

ETSI EN 300 019-1-4 class 8.1: underground locations (without earthquake requirement)

EN 61753-1 category S: subterranean environment

category A: aerial environment

1.3 Reliability

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

1.4 Quality assurance

Compliance with this specification does not guarantee the manufacturing consistency of the product. This should be maintained using a recognised quality assurance programme.

1.5 Allowed fibre and cable types

Although the performance tests are carried out on test samples with dispersion un-shifted singlemode fibre (see Annex A), the closure, once tested according to this product specification, will be also suited for other fibre types like dispersion shifted, non-zero dispersion shifted and multimode fibres.

This closure standard allows both singlemode and multimode fibre to be used and covers all EN standard optical fibre cables with their various fibre capacities, types and designs. This includes, but is not limited to, optical fibre cable standards EN 60794-2 (indoor), EN 60794-3 (outdoor).

2 Normative references

The following referenced documents are indispensable for the application 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 60793-2-50, *Optical fibres — Part 2-50: Product specifications — Sectional specification for class B single-mode fibres (IEC 60793-2-50*)

EN 60794-2, *Optical fibre cables — Part 2: Indoor cables — Sectional specification (IEC 60794-2*)

EN 61300 (all parts), *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures (IEC 61300 all parts)*

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

EN 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 61300-2-10, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-10: Tests — Crush resistance (IEC 61300-2-10)*

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 61300-2-23, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-23: Tests — Sealing for non-pressurized closures of fibre optic devices (IEC 61300-2-23)*

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 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 61300-2-38, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-38: Tests — Sealing for pressurized fibre optic closures (IEC 61300-2-38)*

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 61753-1, *Fibre optic interconnecting devices and passive components performance standard — Part 1: General and guidance for performance standards (IEC 61753-1)*

3 Description

3.1 Closure housing

An inline optical closure comprises a closure housing that is attached to the ends of the joined cable sheaths and a means for containing and protecting the fibres, fibre splices and other passive optical devices. The closures covered in the specification are those that are split at the cable entry ports. This allows for assembly over pre-installed cables or where there is no access to the cable end (i.e. uncut looped fibre).

This is not to be confused with an optical closure for blowing cable or fibre. This comprises an access housing that allows the interconnection of cable ducts or tubes and is attached to the ends of the ducts or cables

containing empty tubes. However, this document shall be used when air blown fibres are spliced inside this type of closure.

The fibre management closure provides facilities for the environmental protection, housing for fibre management systems and sealing of input and output optical cables. In order to comply with the standard, the optical functionality, physical, geometrical and mechanical requirements are defined.

The design of the closure housing shall allow the jointing of two or more cable ends in the following configurations or applications:

Common base covering:

(T) Track Joint configuration used on trunk cable, with minimum of 2 cable entries

(S) Spur joint configuration used on local feeder cable with minimum of 3 cable entries

(D) Distribution joints have 4 entry port configurations used typically on FTTH customer feed cable with minimum of 8, 18, 36, and 66 cable entry options.

NOTE Cable entries can be more than one cable per cable entry port.

The design of the distribution and spur joint closure housing shall 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 distribution joint or external node, but also called a mid-span closure or balloon splice.

It is desirable that the closure can be re-opened when necessary without interruption or disturbance of the traffic of the live circuits.

3.2 Closure overpressure safety

Overpressure can build up in sealed closures due to temperature differentials, or due to atmospheric pressure changes over a period of time, to flash testing of the seals after installation, to incorrect installation techniques. Care should be taken when opening the closure.

Provision shall be made to relieve any internal pressure differential prior to completely opening the closure.

For air blown fibre applications an overpressure release system is required for all sealed closures.

3.3 Cable seals

Cable entry seal systems can be either, but not limited to:

(H) Dedicated heat activated heat source, for example, electrical, infrared, hot air or flame

- Thermo-shrinkable materials
- Hot melt adhesives
- Polyethylene injection welding

(R) Dedicated cold applied

- Mastic, tapes, pastes, potting compounds, gels and cold adhesives
- O-rings, grommets, rubber shapes, pre-expanded tubing are cold processes

(U) Combined heat activated and cold applied

The fibre management closure allows for a physical housing structure that provides for optical cable fixing, sealing, anchoring, water and gas blocking, storage and routing up to the input and output fibres of the fibre management system.

3.4 Organiser system

The organiser system provides means for routing, storing and protecting of fibres and fibre splices or other passive optical devices in a predetermined order, from one cable sheath opening to another.

Fibre circuits may be separated to an appropriate separation level. This will limit the risk of interruption of traffic to those fibres that belong to the same group of circuits.

- **Single Circuit (SC)** is a fibre management system that is a group of fibres providing one termination or service of 1 or 2 fibre(s). In this document a Single Circuit is considered to be a circuit of 2 fibres.

- **Single Element (SE)** is a fibre management system that is a cable subassembly comprising one or more optical fibres inside a common covering e.g. tube or inside one groove of a grooved cable (slotted core cable). Single Elements provide more than one termination or circuit of typically 12 fibres. In this document a Single Element is considered to be a group of 12 fibres.

- **Single Ribbon (SR)** is a fibre management system that is a cable subassembly comprising one optical ribbon. Single Ribbon is a group of fibres providing one termination or service of typically 4, 8 or 12 fibres.

- **Multiple Element (ME)** is a fibre management system that provides all necessary equipment to connect a defined number of incoming and outgoing fibres/cables. It comprises storage and protection of fibres and interconnections in one splice tray for more than one Single Element. Typically splice tray capacities between 24 and 144 fibres.

- **Multiple Ribbon (MR)** fibre management provides all necessary equipment to connect a defined number of incoming and outgoing fibre ribbons that are generally housed within a singe tube within the cable. This tube is typically fixed to the entry and exit ports of a splice tray. It comprises storage and protection of more than one single ribbon, but typically six or more fibre ribbons and their interconnections in a single splice tray for ribbons between 4 and 36 fibres, but typically 12 fibre ribbons. There are also many different names for this structure, e.g. mass storage or mass ribbons. Typically splice tray capacities are between 36 and 144 fibres.

NOTE The families of organiser systems covered in this document are listed in Annex C.

3.5 Materials

All materials that are likely to come in contact with personnel shall meet appropriate health and safety regulations.

Closure and sealing materials shall be compatible with each other and with the materials of the cables.

All components of the closure shall be resistant to solvents and degreasing agents that are typically used to clean and degrease fibres and cables.

The effects of UV light on all exposed polymeric materials shall not affect product performance. The effects UV light shall be determined by measuring a suitable property (e.g. tensile strength) both before and after exposure.

Metallic parts shall be resistant to the corrosive influences they may encounter during the lifetime of the product.

3.6 Colour and marking

Marking/Identification of the ‘variant number’ (see Clause 4) to be on the product or packaging label along with the following:

— identification of manufacturer;

— manufacturing date code: year / month.

The preferred colour for the outer closure material is black for polymeric materials.

4 Variants

Table 1 — Sealed inline fibre splice closure Type 1, for category S - Variants

EN 50411 - 2- 3 – X_1 - XX_2 - X_3 - XX_4 - XXX_5- X_6

Variant No. X_1	**Operating environment**
S	Subterranean environment
A	Aerial environment
B	Both subterranean and aerial environments

Variant No. XX_2	**Closure Application - base number of cables**
T1	Track closure (2 cables min.)
S1	Spur closure (3 cables min.)
D1	Distribution (8 cables min.)
D2	Distribution (18 cables minimum)
D3	Distribution (34 cables minimum)
D4	Distribution (66 cables minimum)

Variant No. X_3	**Cable sealing technology – heat, non-heat or both**
R	Cold applied
H	Heat activated (heat source required)
U	Universal, both methods in a single cable entry base

Variant No. XX_4	**Type of organiser system**	
SC	Single Circuit (1 or 2 fibres)	**S** organisers NOTE In some cases an M organiser tray can be used as SC or SE organiser tray (by reducing number of stored splices per tray).
SE	Single Element (4 or more fibres)	
SR	Single Ribbon (4 or more fibres per ribbon)	
ME	Multiple Element (two or more units)	**M** organisers
MR	Multiple Ribbon (six or more ribbons 4 fibres per ribbons)	

Depending on the selection of **XX4**, refer to one of the following Tables 1a) to 1k) to find **XXX5** and **X6**.

Table 1a) — SC tray and closure selection

XXX_5 --> SC trays		003	004	006	008	010	012	016	018	020	024	030	036	048	072
Maximum splice capacity (reference)		6	8	12	16	20	24	32	36	40	48	60	72	96	144
X_6 Closure															
A	Type 1	■	■												
B		■	■	■	■										
C		■	■	■	■	■	■								
D		■	■	■	■	■	■	■	■	■	■				
E		■	■	■	■	■	■	■	■	■	■	■	■	■	■
F	Type 2A	■	■												
G		■	■	■											
H	Type 2B	■	■	■	■										
J		■	■	■	■	■	■								
K		■	■	■	■	■	■	■	■	■					
L		■	■	■	■	■	■	■	■	■	■	■	■	■	

NOTE SC contains 2 fibre splices.

Table 1b) — SE tray and closure selection

XXX_5 → SE tray		001	002	003	004	005	006	007	008	012	016	018	024	036	042	048	060	072
Maximum splice capacity (reference)		12	24	36	48	60	72	84	96	144	192	216	288	432	504	576	720	864
X_6 Closure																		
A	Type 1	■	■	■	■													
B		■	■	■	■	■	■	■	■									
C		■	■	■	■	■	■	■	■	■								
D		■	■	■	■	■	■	■	■	■	■	■	■					
E		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
F	Type 2A	■	■	■														
G		■	■	■	■	■	■											
H	Type 2B	■	■	■	■	■	■	■	■									
J		■	■	■	■	■	■	■	■	■								
K		■	■	■	■	■	■	■	■	■	■	■	■					
L		■	■	■	■	■	■	■	■	■	■	■		■	■	■		

NOTE SE contains 12 fibre splices.

Table 1c) — SR tray and closure selection

XXX_5 → SR tray		001	002	003	004	005	006	007	008	011	012	018	024
Maximum splice capacity (reference)		12	24	36	48	60	72	84	96	132	144	216	288
X_6 Closure													
A	Type 1	■	■	■	■								
B	Type 1	■	■	■	■	■	■	■	■				
C	Type 1	■	■	■	■	■	■	■	■	■	■		
D	Type 1	■	■	■	■	■	■	■	■	■	■	■	■
G	Type 2A	■	■	■	■	■	■						
H	Type 2B	■	■	■	■	■	■	■	■				
J	Type 2B	■	■	■	■	■	■	■	■	■			

NOTE 1 SR tray has 1 ribbon per tray.

NOTE 2 1 ribbon has 12 fibres. When using ribbons with a different fibre count than 12 fibres per ribbon, the maximum splice capacity should be changed accordingly.

Table 1d) — ME 18 fibre trays with closure selection

XXX_5 → ME 18 fibre trays		01N	02N
Maximum splice capacity (reference)		18	36
X_6 Closure			
A	Type 1	■	■

Table 1e) — ME 24 fibre trays with closure selection

XXX_5 → ME 24 fibre trays		01P	02P	03P	04P	05P	06P	07P	08P	11P	12P	16P	20P	24P	36P
Maximum splice capacity (reference)		24	48	72	96	120	144	126	144	264	288	384	480	576	864
X_6 Closure															
B	Type 1	■	■	■	■	■	■	■	■						
C	Type 1	■	■	■	■	■	■	■	■	■	■				
D	Type 1	■	■	■	■	■	■	■	■	■	■	■	■	■	
E	Type 1	■	■	■	■	■	■	■	■	■	■	■	■	■	■
F	Type 2A	■	■	■											
G	Type 2A	■	■	■	■	■	■								
H	Type 2B	■	■	■	■	■	■	■	■	■					
J	Type 2B	■	■	■	■	■	■	■	■	■	■	■	■		

Table 1f) — ME 36 fibre trays with closure selection

XXX_5 → ME 36 fibre trays		01S	02S	03S	04S	05S	06S	07S	08S	10S	12S	16S	20S	24S	36S
Maximum splice capacity (reference)		36	72	108	144	180	144	126	288	360	432	576	720	864	1296
X_6 Closure															
A	Type 1														
B															
C															
D															

Table 1g) — ME 48 fibre trays with closure selection

XXX_5 → MR 48 fibre tray		01T	02T	03T	04T	05T	06T	07T	08T	11T
Maximum splice capacity (reference)		48	96	144	196	240	288	336	384	528
X_6 Closure										
H	Type 2B									
J										
NOTE A ME tray contains the following numbers of fibre splices per tray 18, 24, 36, 48, 72.										

Table 1h) — ME 72 fibre trays with closure selection

XXX_5 → ME 72 fibre tray		01V	02V	03V	04S	05V	06V	07V	08V	09V
Maximum splice capacity (reference)		72	177	216	196	360	432	504	576	648
X_6 Closure										
F	Type 2A									
L	Type 2B									
NOTE A ME tray can contain the following numbers of fibre splices per tray 18, 24, 36, 48and 72.										

Table 1i) — MR 24 fibre trays with closure selection

XXX_5 → MR 24 fibre trays		01W	02W	03W	04W
Maximum splice capacity (reference)		24	24	72	96
X_6 Closure					
A	Type 1				
NOTE When using ribbons with a different fibre count than 12 fibres per ribbon, the maximum splice capacity should be changed accordingly.					

Table 1j) — MR 144 fibre trays with closure selection

XXX_5 → ME 144 fibre trays		01Y	02Y	03Y	04Y	05Y	06Y	07Y	08Y	11Y	12Y	24Y	36Y
Maximum splice capacity (reference)		144	288	432	576	720	864	1008	1152	1584	1728	3456	5184
X_6 Closure													
A	Type 1	■	■										
B		■	■	■	■	■	■	■	■				
C		■	■	■	■	■	■	■	■	■	■		
D		■	■	■	■	■	■	■	■	■	■	■	
E		■	■										
H	Type 2B	■	■	■	■	■	■	■	■				
J		■	■	■	■	■	■	■	■	■			
L		■	■	■	■	■	■	■	■	■	■	■	■

NOTE When using ribbons with a different fibre count than 12 fibres per ribbon, the maximum splice capacity should be changed accordingly.

Table 1k) - MR 288 fibre trays with closure selection

XXX_5 → MR 288 fibre trays		01Z	02Z	03Z	04Z
Maximum splice capacity (reference)		288	576	864	1152
X_6 Closure					
L	Type 2A	■	■	■	■

NOTE 1 A MR tray contains 288 fibre splices per tray.

NOTE 2 1 ribbon has 12 fibres; trays contain 24 ribbons.

NOTE 3 When using ribbons with a different fibre count than 12 fibres per ribbon, the maximum splice capacity should be changed accordingly.

Examples:

EN 50411 – 2- 3- S – D2 – R – SC – 006 – C
Distribution 18 cable minimum closure for underground application with cold applied cable seals and SC fibre management system, with 6 SC trays (72 splices) in a size C closure.

EN 50411 – 2- 3- A – T1 – U – MR – 04Y – H
A Track 2 cable minimum joint closure for aerial application with universal method cable seals and MR fibre management with 4 splice trays type MR-Y in a size H closure.

5 Dimensional requirements

5.1 Dimensions of Type 1 closures

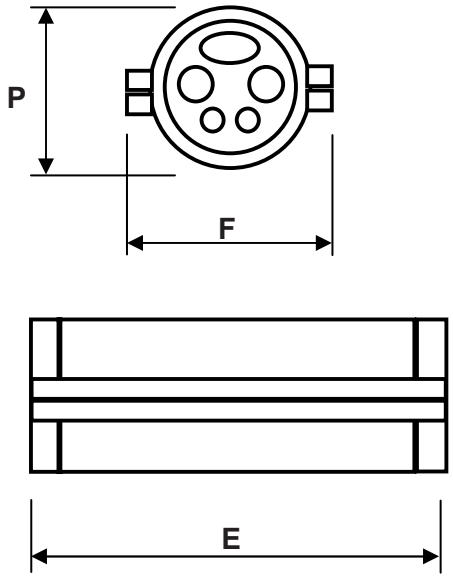


Figure 1 — Outline dimensions of Type 1 closures

Table 2 — Dimensions of Type 1 closures

Closure size	Maximum capacity - Number of fibres (without storage basket)					Envelope dimensions max.		
	Organiser system					Overall length mm **E**	Overall width mm **F**	Overall height mm **P**
	Single Circuit	Single Element	Single Ribbon	Multiple Element	Multiple Ribbon			
A	8	48	48	144	288	655	219	184
B	16	96	96	288	1152	914	273	235
C	24	144	120	360	1728	914	318	254
D	48	288	288	864	3456	975	394	330
E	144	432	NA	864	5184	914	318	305
NOTE Additional information on the organiser system can be found in Annexes C, D, E and F.								

5.2 Dimensions of Type 2A closures

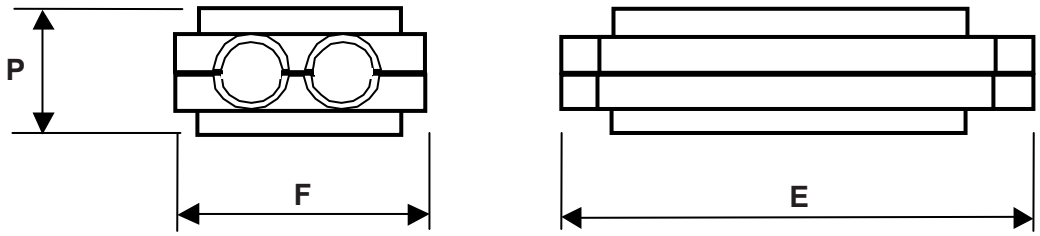


Figure 2 — Outline dimensions of Type 2A closures

Table 3 — Dimensions of Type 2A closures

Closure size	Maximum capacity - Number of fibres (without storage basket)					Envelope dimensions max.		
	Organiser system					Overall length mm **E**	Overall width mm **F**	Overall height mm **P**
	Single Circuit	Single Element	Single Ribbon	Multiple Element	Multiple Ribbon			
F	6	36	NA	216	NA	828	274	152
G	12	72	72	144	24	648	160	150
NOTE Additional information on the organiser system can be found in Annexes C, D, E and F.								

5.3 Dimensions of Type 2B closures

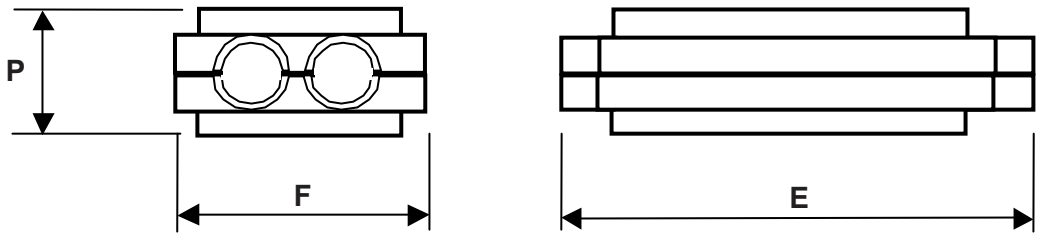


Figure 3 — Outline dimensions of Type 2B closures

Table 4 — Dimensions of Type 2B closures

Closure size	Maximum capacity - Number of fibres (without storage basket)					Envelope dimensions max.		
	Organiser system					Overall length mm **E**	Overall width mm **F**	Overall height mm **P**
	Single Circuit	Single Element	Single Ribbon	Multiple Element	Multiple Ribbon			
H	16	96	96	384	1152	557	216	119
J	22	132	132	528	1584	557	216	287
K	40	240	NA	480	NA	557	216	401
L	96	288	NA	648	1152	828	274	254
NOTE Additional information on the organiser system can be found in Annexes C, D, E and F.								

6 Tests

6.1 Sample size

Separate test samples for sealing performance and optical evaluation may be used. For the purposes of this standard, a sealing performance test sample is defined as a closure installed with several cable ends.

Optical test samples shall be constructed as described in 6.2. Due to their complexity, consecutive testing on the same optical sample is allowed.

The minimum recommended sample sizes are given in Annex B.

6.2 Test sample preparation

Sealing performance test samples shall be provided with an air pressure test access valve. The length of the cables extending the closure shall be at least 1 m. The open ends of the cables shall be sealed. Each applicable cable type with minimum and maximum cable dimensions shall be represented in the test program.

Optical test samples shall be constructed in such a way that they will cover all allowed functions of a track joint and/or distribution joint. This shall be realised by building optical circuits for each fibre separation level (typical SC, SE, SR, ME or MR splicing and uncut fibre storage). The fibres for the optical test samples are covered in Annex A.

Optical test sample construction:

Both extremities of a looped cable are terminated in the Track Joint closure (see Figure 4). The length of the looped cable is chosen in such a way that it is longer than the “dead zone” of an OTDR. This will allow the location of the potential causes of optical losses and differentiate if a change in signal is induced by the organiser system in a single location or distributed over the whole circuit length. The required length depends on the selected pulse width and dynamic range of the OTDR. Typically a cable loop length of 25 m to 50 m is applied for this purpose.

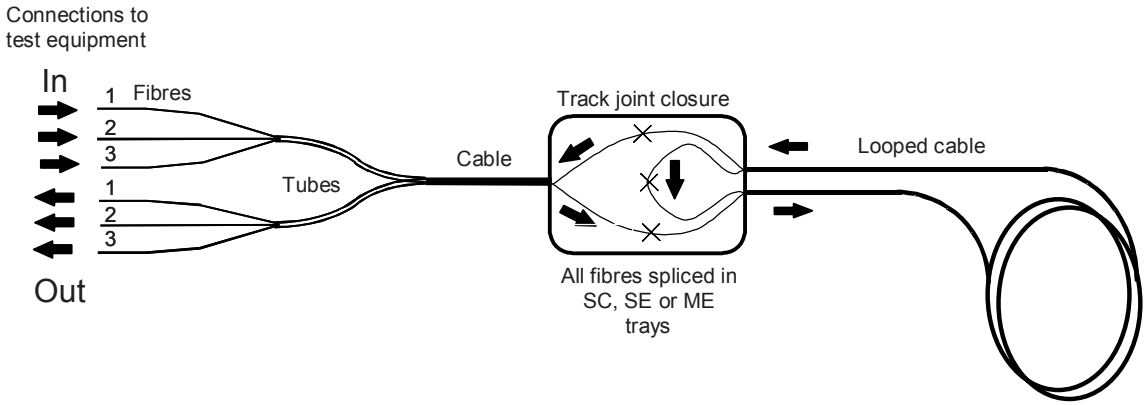


Figure 4 — Track joint configuration sample

In the Track Joint closure the fibres from one cable end are connected to the fibres of the other cable end in such a way that light will sequentially flow through 10 selected fibres in the cable loop. The first and the last fibre of this circuit will be spliced to the fibres of a drop cable for making external connections to a light source and optical power meter.

All relevant fibre separation levels (SC, SE, SR, ME or MR) are to be represented in the test sample, preferably in separate circuits.

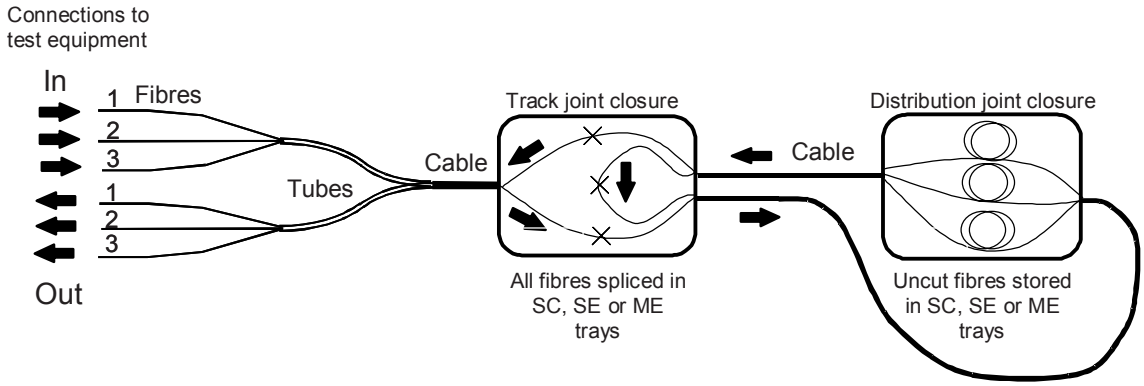


Figure 5 — Distribution joint configuration sample

In the middle of the looped cable, the cable jacket will be removed over a distance (= window cut) according to the installation instructions (see Figure 5). The bundle of uncut fibres will be inserted and stored inside the distribution joint closure. If uncut fibres can be stored in different separation levels (SC, SE, SR, ME or MR) each of these options shall be executed, preferably in separate circuits.

A non-active drop cable will be installed in the distribution joint closure and the fibres will be stored randomly on the organiser system in between the uncut fibres.

NOTE These fibres will be accessed again during the intervention/reconfiguration Test 23.

6.3 Test and measurement methods

All tests and measurements have been selected from EN 61300 series.

Unless otherwise stated in the individual test details, all attenuation measurements shall be performed at (1 310 ± 25) nm, (1 550 ± 25) nm and (1 625 ± 25) nm for the environmental optical tests, and at (1 550 ± 25) nm and (1 625 ± 25) nm for the mechanical optical tests.

All optical losses indicated are referenced to the initial attenuation at the start of the test.

An “incoming fibre” is defined as a part of an optical circuit containing the fibre entering the product, spliced to a fibre leaving the product. One optical circuit can contain many “incoming fibres”. Light will sequentially flow through all “incoming fibres”.

No deviation from the specified test method is allowed.

6.4 Test sequence

There is no defined sequence in which Tests 6 - 24 must be run.

6.5 Pass/fail criteria

A product will have met the requirements of this specification provided no failures occur in any test.

In the event of a failure occurring on a sealing performance test sample, the test shall be re-run using a sample size double that of the original.

Due to the complexity of the optical test samples, consecutive testing on the same optical sample is allowed In case of a failure during the consecutive testing, a new sample shall be prepared and the failed test shall be re-done.

7 Test report

A fully documented test report and supporting data shall be prepared and must be available for inspection as evidence that the tests described in Clause 8 have been carried out in accordance with this specification.

8 Product qualification requirements

8.1 Dimensional and marking requirements

Dimensions and marking of the product shall be in accordance with the requirements of Clause 5 and shall be measured using the appropriate EN test method.

8.2 Sealing, optical and appearance performance criteria

Table 5 — Tightness, optical and appearance performance criteria

No.	Test	Category	Requirement	Details	
1	Sealing performance after test	S & A	No emission of air bubbles indicating a leak.	Method: Test temperature: Test pressure: Immersion depth: Duration: Pre-conditioning procedure:	EN 61300-2-38 Method A (23 ± 3) °C Internal overpressure (40 ± 2) kPa Just below surface of water 15 min Sample should be conditioned to room temperature for at least 2 h.
2	Pressure loss during test	S	Difference in pressure before and after test shall be less than 2 kPa. Measurements taken at same atmospheric conditions	Method: Test temperature: Test pressure: Pressure detector: Pre-conditioning procedure:	EN 61300-2-38 Method B As specified by individual test Internal overpressure (40 ± 2) kPa at test temperature Minimum resolution 0,1 kPa Sample should be conditioned to specified temperature at test pressure for at least 4 h.
3	Visual Appearance	S & A	No defects which would affect functionality of the closure	Method: Examination:	EN 61300-3-1 Product shall be checked with naked eye.
4	Change in attenuation (Note 1, Note 2)	S & A	Excursion losses: δIL ≤ 0,2 dB at 1 310 nm and 1 550 nm per incoming fibre during test. δIL ≤ 0,5 dB at 1 625 nm per incoming fibre during test. Residual losses: δIL ≤ 0,1 dB at 1 310 nm, 1 550 nm and 1 625 nm per incoming fibre after test.	Method: Wavelengths: Source stability: Detector linearity: Measurements required: Sampling rate:	EN 61300-3-3 Method 1 (1 310 ± 25) nm (1 550 ± 25) nm (1 625 ± 25) nm Within ± 0,05 dB over the measuring period Within ± 0,05 dB over the dynamic range to be measured Before, during and after the test Every 10 min
5	Transient loss (Note 1)	S & A	Transient losses: δIL ≤ 0,5 dB at 1 550 nm per active circuit during test. δIL ≤ 1 dB at 1 625 nm per active circuit during test. Residual losses: δIL ≤ 0,1 dB at 1 550 nm and 1 625 nm per active circuit after test.	Method: Wavelengths: Source stability: Detector linearity: Measurements required: Active circuit:	EN 61300-3-28 (1 550 ± 25) nm (1 625 ± 25) nm Within ± 0,05 dB over the measuring period Within ± 0,05 dB over the dynamic range to be measured Before, during and after the test 10 incoming fibres in series

NOTE 1 All optical losses indicated are referenced to the initial attenuation at the start of the test.

NOTE 2 An “incoming fibre” is defined as a part of an optical circuit containing the fibre entering the product, spliced to a fibre leaving the product. One optical circuit can contain many “incoming fibres”. Light will sequentially flow through all “incoming fibres”.

8.3 Mechanical sealing performance requirements

Table 6 — Mechanical sealing performance requirements

No.	Test	Category	Requirement	Details	
6	Vibration (sinusoidal)	S	Sealing performance (Test 1) Visual appearance (Test 3)	Method: Frequency: Amplitude Duration: Test temperature: Test pressure: Pre-conditioning procedure:	EN 61300-2-1 10 Hz 3 mm 10 days (23 ± 3) °C Internal overpressure (40 ± 2) kPa Sample should be conditioned to room temperature for at least 2 h
		A	Sealing performance (Test 1) Visual appearance (Test 3)	Method: Frequency range: Amplitude /acceleration force: Cross-over frequency: Number of sweeps No. of axes: Test temperature: Test pressure: Pre-conditioning procedure:	EN 61300-2-1 (5 – 500) Hz at 1 octave/min 3 mm or 1 g_n max. 9 Hz 10 sweeps (5-500-5) 3 mutually perpendicular (23 ± 3) °C Internal overpressure (0 ± 2) kPa Sample should be conditioned to room temperature for at least 2 h.
7	Cable retention	S	Sealing performance (Test 1) Pressure loss (Test 2) Visual appearance (Test 3)	Method: Test temperatures: Load: Duration: Test pressure: Pre-conditioning procedure:	EN 61300-2-4 -15 °C ± 2 °C and +45 °C ± 2 °C $\varnothing_{Cable}$ (mm)/45*1 000 N or 1 000 N max. 1 h per cable Internal overpressure (40 ± 2) kPa Sample should be conditioned to specified temperature for at least 4 h.
		A	Sealing performance (Test 1) Visual appearance (Test 3)	Method: Test temperatures: Load: Duration: Test pressure: Pre-conditioning procedure:	EN 61300-2-4 -15 °C ± 2 °C and +45 °C ± 2 °C $\varnothing_{Cable}$ (mm)/45*1 000 N or 1 000 N max. 1 h per cable Internal overpressure (0 ± 2) kPa Sample should be conditioned to specified temperature for at least 4 h.

Table 6 — Mechanical optical performance requirements *(continued)*

No.	Test	Category	Requirement	Details	
8	Cable bending	S	Tightness Sealing performance (Test 1) Pressure loss (Test 2) Visual appearance (Test 3)	Method: Test temperatures: Force: Force application: Number of cycles: Test pressure: Pre-conditioning procedure:	EN 61300-2-37 -15 °C ± 2 °C and +45 °C ± 2 °C 30° or maximum 500 N 400 mm from end of seal 5 cycles per cable Internal overpressure (40 ± 2) kPa Sample should be conditioned to specified temperature for at least 4 h.
		A	Tightness Sealing performance (Test 1) Visual appearance (Test 3)	Method: Test temperatures: Force: Force application: Number of cycles: Test pressure: Pre-conditioning procedure:	EN 61300-2-37 -15 °C ± 2 °C and +45 °C ± 2 °C 30° or maximum 500 N 400 mm from end of seal 5 cycles per cable Internal overpressure (0 ± 2) kPa Sample should be conditioned to specified temperature for at least 4 h.
9	Torsion/Twist	S	Sealing performance (Test 1) Pressure loss (Test 2) Visual appearance (Test 3)	Method: Test temperatures: Torque: Force application: Number of cycles: Test pressure: Pre-conditioning procedure:	EN 61300-2-5 -15 °C ± 2 °C and +45 °C ± 2 °C 90° or maximum 50 Nm 400 mm from end of seal 5 cycles per cable Internal overpressure (40 ± 2) kPa Sample should be conditioned to specified temperature for at least 4 h.
		A	Sealing performance (Test 1) Visual appearance (Test 3)	Method: Test temperatures: Torque: Force application: Number of cycles: Test pressure: Pre-conditioning procedure:	EN 61300-2-5 -15 °C ± 2 °C and +45 °C ± 2 °C 90° or maximum 50 Nm 400 mm from end of seal 5 cycles per cable Internal overpressure (0 ± 2) kPa Sample should be conditioned to specified temperature for at least 4 h.

Table 6 — Mechanical optical performance requirements *(continued)*

No.	Test	Category	Requirement	Details	
10	Impact (free fall)	S and A	Sealing performance (Test 1)	Method:	EN 61300-2-12 Method A
				Test temperatures:	-15 °C ± 2 °C and +45 °C ± 2 °C
				Severity:	Drop height 75 cm
				Number of drops:	1
				Test pressure:	Internal overpressure 0 kPa
				Pre-conditioning procedure:	Sample should be conditioned to specified temperature for at least 4 h.
11	Impact	S	Sealing performance (Test 1) Pressure loss (Test 2) Visual appearance (Test 3)	Method:	EN 61300-2-12 Method B
				Test temperatures:	-15 °C ± 2 °C and +45 °C ± 2 °C
				Impact tool:	Steel ball of 1 kg
				Drop height:	2 m
				Impact locations:	0°, 90°, 180° and 270°
				Number of impacts:	1 per location
				Test pressure:	Internal overpressure (40 ± 2) kPa
				Pre-conditioning procedure:	Sample should be conditioned to specified temperature for at least 4 h.
		A	Sealing performance (Test 1) Visual appearance (Test 3)	Method:	EN 61300-2-12 Method B
				Test temperatures:	-15 °C ± 2 °C and +45 °C ± 2 °C
				Impact tool:	Steel ball of 1 kg
				Drop height:	1 m
				Impact locations:	0°, 90°, 180° and 270°
				Number of impacts:	1 per location
				Test pressure:	Internal overpressure (0 ± 2) kPa
				Pre-conditioning procedure:	Sample should be conditioned to specified temperature for at least 4 h.

Table 6 — Mechanical optical performance requirements *(continued)*

No.	Test	Category	Requirement	Details	
12	Crush resistance	S	Sealing performance (Test 1) Pressure loss (Test 2) Visual appearance (Test 3)	Method: Test temperatures: Load: Application area: Locations: Duration: Test pressure: Pre-conditioning procedure:	EN 61300-2-10 -15 °C ± 2 °C and +45 °C ± 2 °C 1 000 N 25 cm^2 Centre of closure at 0° and 90° around longitudinal axis of closure. 10 min Internal overpressure (40 ± 2) kPa Sample should be conditioned to specified temperature for at least 4 h.
13	Re-entries	S & A	Sealing performance (Test 1) Visual appearance (Test 3)	Method: Test temperature: Conditioning between each re-entry: Number of re-entries:	EN 61300-2-33 +23 °C ± 3 °C Ageing of minimum 1 temperature cycle as specified in Test 14. 10

8.4 Environmental sealing performance requirements

Table 7 — Environmental sealing performance requirements

No.	Test	Category	Requirement	Details	
14	Change of temperature	S	Sealing performance (Test 1) Visual appearance (Test 3)	Method: Extreme temperatures: Dwell time: Rate of change Number of cycles: Test pressure:	EN 61300-2-22 -30 °C ± 2 °C and +60 °C ± 2 °C 4 h 1 °C/min 20 Internal overpressure regulated at (40 ± 2) kPa during test
		A	Sealing performance (Test 1) Visual appearance (Test 3)	Method: Extreme temperatures: Dwell time: Rate of change Number of cycles: Test pressure:	EN 61300-2-22 -40 °C ± 2 °C and +65 °C ± 2 °C 4 h 1 °C/min 20 Internal overpressure (0 ± 2) kPa sealed at room temperature
15	Water immersion	S	No water ingress Visual appearance (Test 3)	Method: Test temperatures: Water column height: Wetting agent: Duration: Test pressure:	EN 61300-2-23 Method 2 +23 °C ± 3 °C 5 m or an equivalent external water pressure of 50 kPa None 7 days 0 kPa overpressure
16	Salt mist	S & A	Sealing performance (Test 1) Visual appearance (Test 3)	Method: Test temperatures: Salt solution: Duration: Test pressure:	EN 61300-2-26 +35 °C ± 2 °C 5 % NaCl (pH 6,5-7,2) 5 days 0 kPa overpressure
17	Resistance to solvents and contaminating fluids	S	Sealing performance (Test 1) Visual appearance (Test 3)	Method: Test temperatures: Submersion in: Drying time at 70 °C: Duration: Test pressure:	EN 61300-2-34 +23 °C ± 3 °C HCl at pH2 NaOH at pH 12 Kerosene (lamp oil) ISO 1998/I 1 005 Petroleum jelly Diesel fuel for cars EN 590 None 5 days Internal overpressure (40 ± 2) kPa

Table 7 — Environmental sealing performance requirements *(continued)*

No.	Test	Category	Requirement	Details	
18	Resistance to stress cracking solvents	S	Sealing performance (Test 1) Visual appearance (Test 3) No visible cracking allowed	Method: Test temperatures: Submersion in: Drying time at 70 °C: Duration: Test pressure:	EN 61300-2-34 +50 °C ± 2 °C 10 % detergent solution (Igepal) None 5 days Internal overpressure (40 ± 2) kPa
19	Resistance to shot gun blast	A	Sealing performance (Test 1) Visual appearance (Test 3) No damage to fibre management system	Method: Test sample: Test temperature: Distance: Calibre: Lead pellets: Test pressure:	EN 60794-1-2 Method E13 It is allowed to use an external protection (example: cover) for this test +23 °C ± 3 °C 20 m 12/70 Size number 5 (3 mm) Internal overpressure 0 kPa

8.5 Mechanical optical performance requirements

Table 8 — Mechanical optical performance requirements

No.	Test	Category	Requirement	Details	
20	Vibration (sinusoidal)	S & A	Transient loss (Test 5) Visual appearance (Test 3)	Method: Test temperature: Frequency range: Amplitude /acceleration force: Cross-over frequency: Number of sweeps No. of axes: Optical circuit:	EN 61300-2-1 +23 °C ± 3 °C 5 Hz - 500 Hz at 1 octave/min 3 mm or 1 g_n max. 9 Hz 10 sweeps (5-500-5) 3 mutually perpendicular 10 live fibres placed in series
21	Cable bending	S & A	Transient loss (Test 5) Visual appearance (Test 3)	Method: Test temperatures: Force: Force application: Number of cycles: Optical circuit:	EN 61300-2-37 +23 °C ± 3 °C 30° or maximum 500 N 400 mm from end of seal 5 cycles per cable 10 live fibres placed in series
22	Torsion/Twist	S & A	Transient loss (Test 5) Visual appearance (Test 3)	Method: Test temperature: Torque: Force application: Number of cycles: Optical circuit:	EN 61300-2-5 +23 °C ± 3 °C 90° or maximum 50 Nm 400 mm from end of seal 5 cycles per cable 10 live fibres placed in series
23	Intervention and reconfiguration	S & A	Transient loss (Test 5) Visual appearance (Test 3) Operations shall be carried out on fibres in splice trays, installed between other active splice trays (that contain the 10 live fibres) For the distribution joint configuration only Circuit separation (type of organiser system) defined by parameter XX4 in Table 1.	Method: Test temperature: Operations: Optical circuit:	EN 61300-2-33 +23 °C ± 3 °C All manipulations that will normally occur during an intervention after initial installation. These are typically: 1. Moving closure to working location. Handling of cables attached to node 2. Open/close closure 3. Gaining access to previously installed fibres in the organiser system 4. Adding /installing drop cables 5. Break splice and connect to other fibre 6. Cut one or more uncut fibres and splice them to other fibres 7. Adding splicing trays 10 live fibres placed in series

8.6 Environmental optical performance requirements

Table 9 — Environmental optical performance requirements

No.	Test	Category	Requirement	Details	
24	Change of temperature	S	Change in attenuation (Test 4) Visual appearance (Test 3)	Method: Low temperature: High temperature: Duration at temperature extreme: Rate of change of temperature: Number of cycles: Measurements required: Recovery procedure:	EN 61300-2-22 -30 °C ± 2 °C +60 °C ± 2 °C 4 h 1 °C/min 20 Before, during (max. interval 10 min) and after the test. 4 h at normal ambient conditions.
		A	Change in attenuation (Test 4) Visual appearance (Test 3)	Method: Low temperature: High temperature: Duration at temperature extreme: Rate of change of temperature: Number of cycles: Measurements required: Recovery procedure:	EN 61300-2-22 -40 °C ± 2 °C +65 °C ± 2 °C 4 h 1 °C/min 20 Before, during (max. interval 10 min) and after the test. 4 h at normal ambient conditions.

Annex A
(informative)

Fibre references

Fibre type:	Dispersion un-shifted single mode fibre (EN 60793-2-50 Type B1.1)
Proof stress strain:	≥ 1 %
Mode field diameter at 1 310 nm:	9,3 µm ± 0,7 µm
Mode field diameter at 1 550 nm:	10,5 µm ± 1,0 µm
Cabled fibre cut off wavelength:	≤ 1 260 nm
1 550 nm loss performance:	< 0,5 dB for 100 turns on 60 mm mandrel diameter
Cladding diameter:	125 µm ± 1 µm
Non coloured primary coating diameter:	245 µm ± 10 µm
Coloured primary coating diameter:	250 µm ± 15 µm

Annex B
(informative)

Minimum sample size requirements

No.	Test	Sample size	
		Sealing performance	Optical
NA	Dimensional	3	NA
1.	Sealing performance	Criterion	NA
2.	Pressure loss during test	Criterion	NA
3.	Visual Appearance	Criterion	Criterion
4.	Change in attenuation	NA	Criterion
5.	Transient loss	NA	Criterion
6.	Vibration (sinusoidal)	3	NA
7.	Cable retention	3	NA
8.	Cable bending	3	NA
9.	Torsion/twist	3	NA
10.	Impact (free fall)	3	NA
11.	Impact	3	NA
12.	Crush resistance	3	NA
13.	Re-entries	3	NA
14.	Change of temperature	3	NA
15.	Water immersion	3	NA
16.	Salt mist	3	NA
17.	Resistance to solvents and fluids	3	NA
18.	Resistance to stress cracking solvents	3	NA
19.	Resistance to shot gun blast	3	NA
20.	Vibration (sinusoidal) (optical)	NA	1
21.	Cable bending (optical)	NA	1
22.	Torsion/Twist (optical)	NA	1
23.	Intervention and reconfiguration (optical)	NA	1
24.	Change of temperature (optical)	NA	1
NA = not applicable			

Tests 1 to 5 are performance criteria tests that need to be performed during other mechanical or environmental Tests (6 to 24).

Annex C
(informative)

Families of organiser systems covered in this standard

'Tree' style organiser (See Figure C 1a)). Small hinged angled, semicircular, rectangular or oval tray profiles, for: Single Circuit (SC), Single Element (SE) and Single Ribbon (SR).

'Book' style organiser (See Figure C.1b)). Medium to large hinged or stacked rectangular tray profiles, for: Multiple Element (ME) and Multiple Ribbon (MR).

'Juke box' style organiser (See Figure C.1c)), Large circular or rectangular tray profiles, for:
Single Circuit (SC), Single Element (SE), Single Ribbon (SR), Multiple Element (ME) and Multiple Ribbon (MR).

'Shelf' style organiser (See Figure C.1d)), Small pull out semicircular, rectangular or oval tray profiles, for: Single Circuit (SC), Single Element (SE).

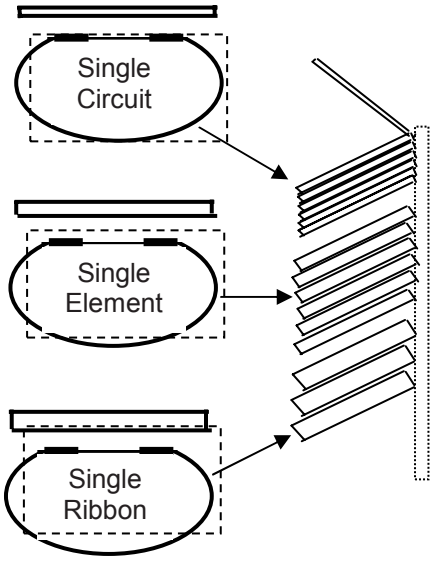


Figure C.1a) - 'Tree' style organiser

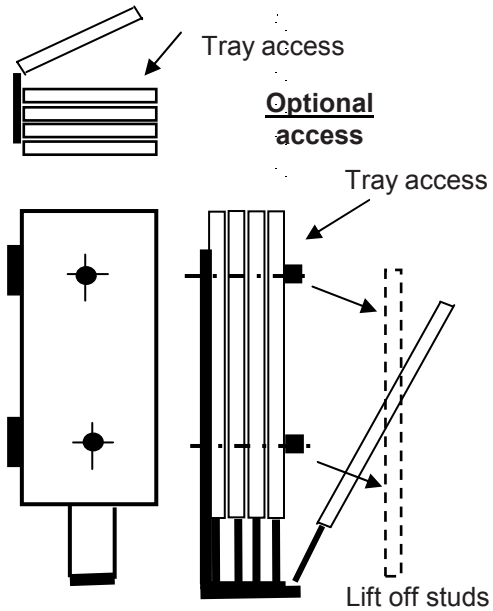


Figure C.1b) - 'Book' style organiser

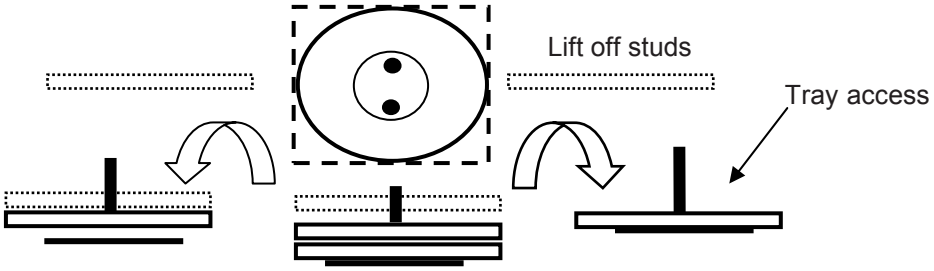


Figure C.1c) - 'Juke box' style organiser

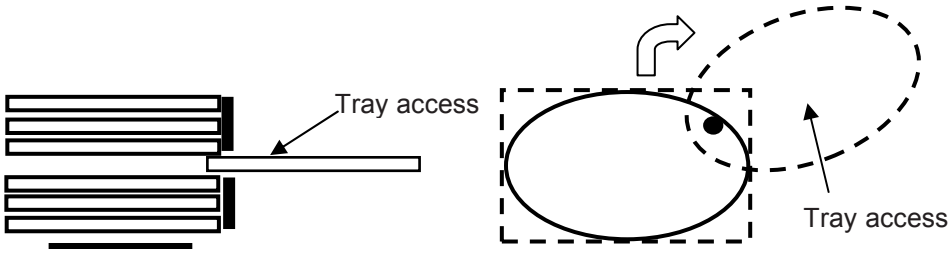


Figure C.1d) - 'Shelf' style organiser

Figure C.1 — Families of organiser systems

Annex D
(informative)

Dimensions of organisers for multiple elements and multiple ribbon

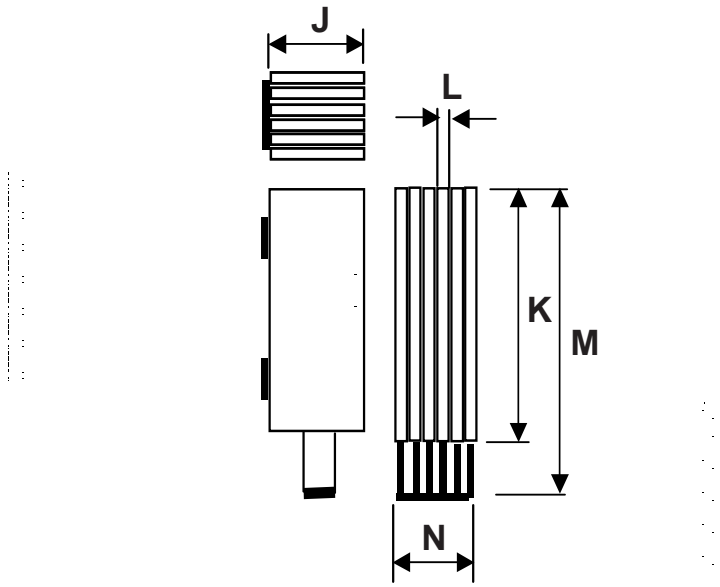


Figure D.1 — Outline dimensions of the M organiser

Table D.1 — M organiser - Guide to fibres or splices per closure

Closure size		Maximum number of fibres or splices per closure (tray)		Organiser envelope 'Guide'	
		Multiple Element ME	Multiple Ribbon MR	Length M	Depth N
A	Type 1	144(36)	288(144)	762	127
B		288(36)	1 152(144)		
C		360(36)	1 728(144)		
D		1 296(36)	3 456(144)		
E		864(24)	288(144)		
F	Type 2A	216(72)	1 152(144)	910	180
G		144(24)	NA		
H	Type 2B	384(48)	1 152(144)	557	401
J		528(48)	1 584(144)		
L		648(72)	5 184(288)		

Table D.2 — M organiser - Guide to the dimensions of trays

Number of splices per tray	Tray envelope		
	Width max. J	Length max. K	Thickness max. L
24	145	180	7,9
36	105	320	10
48	124	241	9,7
72	140	330	11
144(MR)	124	335	14
288(MR)	145	440	18,7

Annex E
(informative)

Dimensions of S organisers for Single Circuit, Single Element and Single Ribbon

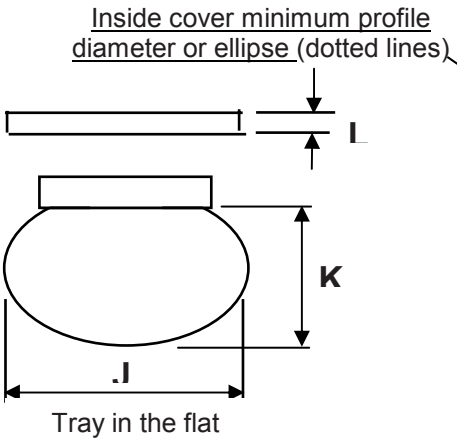


Figure E.1a)

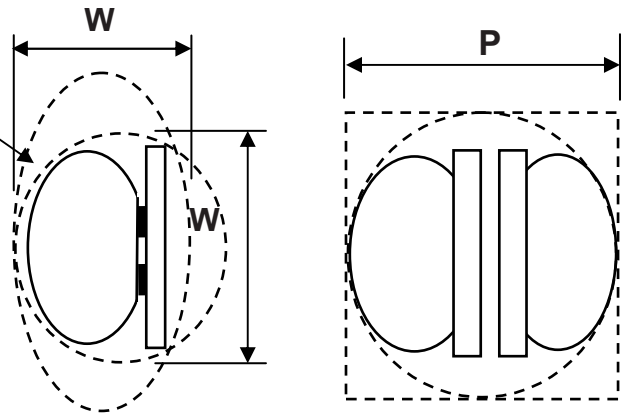


Figure E.1b)

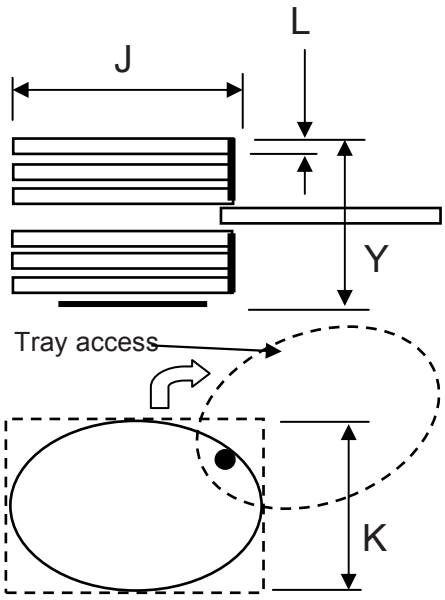


Figure E.1c)

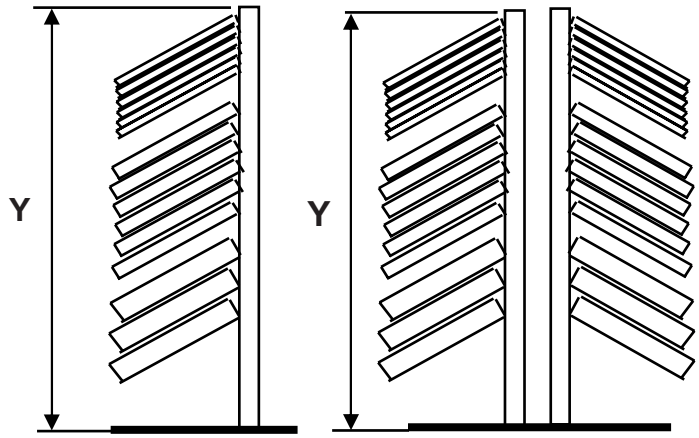


Figure E.1d)

NOTE Dimension “W” is used for the minor axis of all elliptical shapes (the major axis is not relevant).

Figure E.1 — Outline dimensions of the S organiser

Table E.1 — S organiser - SC, SE and SR

Closure Size	S organiser system	Outline S organiser envelope dimensions mm				
		Tray envelope			Organiser envelope	
		Width max. J	Length max. K	Thickness max. L	Single stack diameter max. W	Mixed stack diameter max. P
A, B, C, F and G Single stack only **D, E, J, K, and L** Single or double	Single Circuit	205	150	5	185	223
	Single Element			10		
	Single Ribbon			16		

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ETSI EN 300 019-1-4, *Environmental Engineering (EE) — Environmental conditions and environmental tests for telecommunications equipment — Part 1-4: Classification of environmental conditions — Stationary use at non-weather protected locations*

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