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**Organizatorji in ohišja za uporabo v komunikacijskih sistemih z optičnimi kablji – Specifikacije izdelka – 2-4. del: Ohišja za neločljivi optični spoj z zatesnjenim pokrovom tipa 1, kategorije S&A**

Fibre organisers and closures to be used in optical fibre communication systems – Product specifications – Part 2-4: Sealed dome fibre splice closures Type 1, for category S&A

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English version

**Fibre organisers and closures to be used  
in optical fibre communication systems –  
Product specifications  
Part 2-4: Sealed dome 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 2-4: Boîtiers à épissure de fibres  
sous dôme scellés Type 1,  
pour catégories S & A

LWL-Spleißkassetten und -Muffen  
für die Anwendung  
in LWL-Kommunikationssystemen –  
Produktnormen

Teil 2-4: LWL-Muffen Bauart 1  
mit abgedichteter Haube  
für die Kategorien S und A

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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## CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

## Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 86BXA, Fibre optic interconnect, passive and connectorised components.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50411-2-4 on 2005-12-01.

The following dates were fixed:

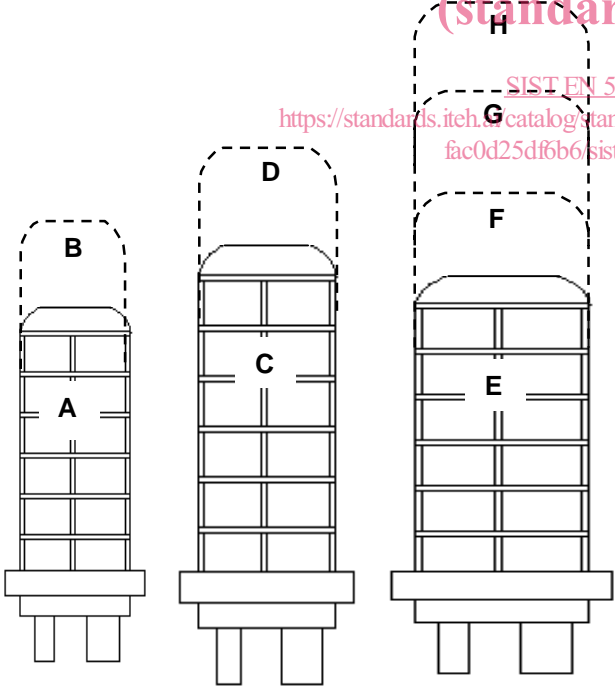
- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2006-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2008-12-01

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Fibre organisers and closures to be used in optical fibre communication systems – Product specifications							
Part 2-4: Sealed dome fibre splice closures Type 1, for category S & A							
Description			Performance				
<b>Construction:</b>	Sealed dome ended		<b>Applications:</b>				
<b>Cable seals:</b>	Heat activated and or cold applied		Optical fibre cable networks				
<b>Fibre management:</b>	Single Circuit, Single Element, Multiple Element and/or Single/Multiple Ribbon		for underground;	IEC 61753-1 category S			
			for aerial;	IEC 61753-1 category A			
<b>Related documents:</b>							
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 61753-1 <sup>1)</sup>	Fibre optic interconnecting devices and passive components – Part 1: General and guidance for performance standard (IEC 61753-1)						
EN 61300 series	Fibre optic interconnecting devices and passive components – Basic test and measurement procedures (IEC 61300 series)						
ETS 300 019	Equipment Engineering (EE) - Environmental conditions and environmental tests for telecommunication equipment						
<b>Construction and splice capacity:</b>			<b>Variant: Number fibre splices - Maximum capacity &amp; fibre management system – SC, SE, SR, ME and MR</b>				
			<b>S organiser</b>			<b>M organiser</b>	
			<b>Single Circuit (SC)</b>	<b>Single Element (SE)</b>	<b>Single Ribbon (SR)</b>	<b>Multiple Element (ME)</b>	<b>Multiple Ribbon (MR)</b>
			<b>B</b> 12 splices	<b>B</b> 72 splices	<b>B</b> 36 splices	<b>A</b> 72 splices	
			<b>C</b> 24 splices	<b>C</b> 144 splices	<b>C</b> 72 splices	<b>B</b> 96 splices	
			<b>D</b> 48 splices	<b>D</b> 288 splices	<b>D</b> 144 splices	<b>C</b> 144 splices	
			<b>E</b> 84 splices	<b>E</b> 216 splices	<b>E</b> 144 splices	<b>D</b> 576 splices	
			<b>F</b> 144 splices	<b>F</b> 432 splices	<b>F</b> 288 splices		
			<b>G</b> 192 splices	<b>G</b> 624 splices	<b>G</b> 384 splices	<b>G</b> 288 splices	
			<b>H</b> 240 splices	<b>H</b> 864 splices	<b>H</b> 432 splices	<b>H</b> 1 152 splices	

<sup>1)</sup> At draft stage.

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## 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 are representative of an outside plant for subterranean and/or aerial environments defined by:

ETS 300 019 class 8.1: underground locations (without earthquake requirement)

IEC 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 unshifted single mode 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 multi-mode fibres.

This closure standard allows both singlemode and multimode fibre to be used and covers all IEC 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 series	Fibre optic interconnecting devices and passive components – Basic test and measurement procedures (IEC 61300 series)
EN 61300-2-1	Part 2-1: Tests – Vibration (sinusoidal)

EN 61300-2-4	Part 2-4: Tests – Fibre/cable retention
EN 61300-2-5	Part 2-5: Tests – Torsion/twist
EN 61300-2-10	Part 2-10: Test – Crush resistance
EN 61300-2-12	Part 2-12: Tests – Impact
EN 61300-2-22	Part 2-22: Tests – Change of temperature
EN 61300-2-23	Part 2-23: Tests – Sealing for non-pressurised closures of fibre optic devices
EN 61300-2-26	Part 2-26: Tests – Salt mist
EN 61300-2-33	Part 2-33: Tests – Assembly and disassembly of closures
EN 61300-2-34	Part 2-34: Tests – Resistance to solvents and contaminating fluids
EN 61300-2-37	Part 2-37: Tests – Cable bending for closures
EN 61300-2-38	Part 2-38: Tests – Sealing for pressurised closures of fibre optic devices
EN 61300-3-1	Part 3-1: Examinations and measurements – Visual examination
EN 61300-3-3	Part 3-3: Examinations and measurements – Active monitoring of changes in attenuation and return loss
EN 61300-3-28	Part 3-28: Examinations and measurements – Transient loss
EN 61753-1 <sup>2)</sup>	Fibre optic interconnecting devices and passive components – Part 1: General and guidance for performance standard (IEC 61753-1)
ES 300 019	Equipment Engineering (EE) - Environmental conditions and environmental tests for telecommunications equipment

### 3 Description

#### 3.1 Closure housing

An 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, splices and other passive optical devices.

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:

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<sup>2)</sup> At draft stage.



**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

**Common base covering:**

**(D) Distribution joint** configuration used on customer feed cable with minimum of 8 cable entries

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, or due to flash testing of the seals after installation, or due to incorrect installation techniques. Care should be taken when opening a sealed closure.

Provisions shall be made that overpressure is exhausted when opening the closure prior to complete removal of the cover.

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 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 fibres. 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 are 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 single tube or slot within the cable. This tube is fixed to the entry and exit ports of the 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 and fungi on all exposed polymeric materials shall not affect product performance. The effects of fungus and 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:

- a) identification of manufacturer;
- b) manufacturing date code: year / month.

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

## 4 Variants

Table 1 – Sealed dome fibre splice closure Type 1, for category S - Variants

### EN 50411-2-4 – X<sub>1</sub> – X<sub>2</sub> – X<sub>3</sub> – XX<sub>4</sub> – XX<sub>5</sub> – X<sub>6</sub>

Variant No. X <sub>1</sub>	Operating environment
S	Subterranean environment
A	Aerial environment
B	Both subterranean and aerial environments

Variant No. X <sub>2</sub>	Closure application – base number of cables
T	Track closure (2 cables minimum)
S	Spur closure (3 cables minimum)
D	Distribution (8 cables minimum)

Variant No. X <sub>3</sub>	Cable sealing technology – heat, non-heat or both (standards.iteh.ai)
R	Cold applied
H	Heat activated (heat source required)
U	Universal, both methods in a single cable entry base

Variant No. XX <sub>4</sub>	Type of organiser system	
SC	Single Circuit (1 or 2 fibres)	<b>S organisers</b>  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)	<b>M organisers</b>
MR	Multiple Ribbon (six or more ribbons 4 fibres per ribbons)	

Depending on the selection of XX<sub>4</sub>, refer to one of the following Tables 1a, 1b, 1c, 1d and 1e to find XX<sub>5</sub> and X<sub>6</sub>:

**Table 1a – SC tray and closure selection**

XX <sub>5</sub> → SC trays	06	12	18	24	30	36	42	48	54	60	66	72	96	120
Maximum splice capacity (reference)	12	24	36	48	60	72	84	96	108	120	132	144	192	240
X <sub>6</sub> Closure														
B	■													
C	■	■												
D	■	■	■	■										
E	■	■	■	■	■	■	■							
F	■	■	■	■	■	■	■	■	■	■	■	■	■	
G	■	■	■	■	■	■	■	■	■	■	■	■	■	■
NOTE	A SC tray contains 2 fibre splices per tray.													

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**Table 1b – SE tray and closure selection**

XX <sub>5</sub> → SE tray	01	02	03	04	05	06	07	08	12	16	18	24	36	42	48	52	60	72
Maximum splice capacity (reference)	12	24	36	48	60	72	84	96	144	192	216	288	432	504	576	624	720	864
X <sub>6</sub> Closure																		
B	■	■	■	■	■	■	■											
C	■	■	■	■	■	■	■	■										
D	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
E	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
F	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
G	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
..	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
NOTE	A SE tray contains 12 fibre splices per tray.																	