



# SLOVENSKI STANDARD SIST EN 50411-2:2008

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Fibre organisers and closures to be used in optical fibre communication systems -  
Product specifications - Part 2: General and guidance for optical fibre cable joint  
closures, protected microduct closures, and microduct connectors

**iTeh STANDARD PREVIEW**

LWL-Spleißkassetten und -Muffen für die Anwendung in LWL-Kommunikationssystemen  
- Produktnormen - Teil 2: Allgemeines und Leitfaden für LWL-Kabel-Verbindungs-  
geschützte Röhrenmuffen und Röhrenverbindungen

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Organiseurs et boîtiers de fibres destinés a etre utilisés dans les systemes de  
communication par fibres optiques - Spécifications de produits - Partie 2: Généralités et  
lignes directrices relatives aux boîtiers communs aux câbles a fibres optiques, aux  
boîtiers a microconduits protégés, et aux connecteurs de microconduits

**Ta slovenski standard je istoveten z: EN 50411-2:2008**

**ICS:**

33.180.20 Ú[ ç^: [ çæ) ^Á æ] æ^Á æ Fibre optic interconnecting  
[ ] cã } æç|æ } æ devices

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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 Unique Acceptance Procedure and was approved by CENELEC as EN 50411-2 on 2008-04-01.

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) 2009-04-01
  - latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2011-04-01
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**Fibre organisers and closures to be used in optical fibre communication systems –  
Product specifications**

**Part 2: General and guidance for optical fibre cable joint closures, protected microduct closures,  
and microduct connectors**

**Construction:**

Sealed or non-sealed products covering both

- a) optical fibre cable splicing FMS or protected microduct closures MCS
- or
- b) microduct connectors

**Product specification document options:**

The closure or connector product specifications must align with one of the following titles; labelled, EN 50411-2-X:

- sealed dome closures with a FMS;
- sealed pan closures with a FMS;
- sealed inline closures with a FMS;
- sealed closures for ABF microducts;
- non-sealed closures for ABF microducts;
- microduct connectors for sealed closures;
- microduct connectors for non-sealed closures.

**Closure shape options:**

- dome, pan, and inline;
- 'T', 'Y', and 'X'.

**ABF microduct connector options:**

- straight;
- straight bulkhead;
- ID reducer/enlarger stem;
- ID reducer/enlarger;
- OD reducer/enlarger stem;
- OD reducer/enlarger;
- ID and OD reducer/enlarger stem;
- ID and OD reducer/enlarger;
- close down;
- liquid block;
- liquid block with barb;
- end stop.

**Cable seals:**

- heat activated;
- cold applied;
- both heat and cold applied.

**FMS closure additional requirements:**

- future proof – expandable;
- wave length range, 1 260 nm up to 1 650 nm.

**Applications:**

Optical fibre cable networks for underground and/or aerial  
Non-pressurised

Sealed closures (only)

EN 61753-1 category; S (subterranean) and A (aerial)

**Environmental protection requirements:**

- temperature extremes;
- resistance to solvents and contaminating fluids;
- resistance to water ingress;
- resistance to salt mist.

**Mechanical protection requirements:**

- vibration;
- closure crush and impact;
- cable entry tension, torsion and bending;
- resistance to shotgun fire (aerial only).

**Common base configurations:**

- track joint: configuration used on inline cable, with minimum of 2 cable entries;
- spur joint: configuration used on local feeder cable with minimum of 3 cable entries;
- distribution joint: configuration used on customer feed cable with minimum of 8 cable entries.

**Fibre Management System options:**

SC, SR, SE, ME, MR.

**Optical functionality:**

Transient losses:

≤ 0,5 dB at 1 550 nm and ≤ 1 dB at 1 625 nm per active circuit during test

Residual losses:

≤ 0,1 dB at 1 550 nm and 1 625 nm per active circuit on test

**Related documents:**

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)
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 60794-5	Optical fibre cables - Part 5: Sectional specification - Microduct cabling for installation by blowing (IEC 60794-5)
ETSI EN 300 019 series	Environmental Engineering (EE) - Environmental conditions and environmental tests for telecommunications equipment

**Contents**

1 Scope .....6

1.1 Rules and conventions .....6

1.2 Product definition.....6

1.3 Operating environment.....7

1.4 Reliability .....7

1.5 Quality assurance.....7

1.6 Safety .....7

1.7 FMS closure future proof requirement .....7

1.8 Fibre types and cable designs .....7

1.9 FMS to closure interfaces - Informative information .....7

2 Normative references .....8

3 Definitions and abbreviations .....9

3.1 Definitions.....9

3.2 Abbreviations.....12

4 Closure options defined .....12

4.1 Closure with FMS housing functionality .....12

4.2 ABF closure housing functionality .....12

4.3 Closure shape options defined.....13

4.4 Product specification options defined.....13

4.5 Common base options defined .....13

4.6 Cable entry seal options.....13

4.7 Fibre management system options defined .....14

4.8 ABF microduct connector options defined .....14

5 Closure options, geometrical forms and dimensioning requirements .....14

5.1 Dome and pan closure geometrical forms .....14

5.2 Inline closure geometrical form .....14

5.3 Air blown microduct geometrical forms .....15

6 Closure with FMS general functional requirements .....16

6.1 Closure with FMS functional parts .....16

6.2 FMS functional parts .....16

6.3 General functional requirements of a closure with FMS .....17

6.4 General functional requirements of the FMS .....17

6.5 FMS - Functional options housed in closures .....17

6.6 FMS splicing to closure interfaces .....17

6.7 FMS optical fibre connector to closure interfaces .....19

6.8 ABF closure interface - Microduct minimum bend radius .....19

7 Closure with ABF microduct connectors general functional requirements.....19

7.1 Air blown fibre systems .....19

7.2 Future proof closures, functional requirements.....20

7.3 All closure outside profile, dimensional conventions .....20

7.4 All microduct connector outside/bulkhead profile, dimensional conventions .....21

8 General product descriptions .....21

8.1 Materials.....21

8.2 Colour and marking.....21

8.3 Environmental, functional requirements.....22

9 Variants layouts - Closure and microduct connector.....22

10 Tests.....24

10.1 Sealed closure sample size .....24

10.2 Sealed closure with FMS test sample preparation.....24

10.3 Closures with FMS optical test sample construction.....24

10.4 Closure with FMS test and measurement methods .....	25
10.5 Closure with FMS test sequence .....	25
10.6 Closure with FMS pass/fail criteria .....	25
11 Performance requirements .....	26
11.1 Dimensional and marking requirements .....	26
11.2 Sealed closure sealing, optical and appearance performance criteria .....	26
11.3 Sealed closure environmental and mechanical performance test methods .....	27
11.4 Unsealed closure environmental and mechanical performance test methods .....	28
11.5 Microduct connector sealing, optical and appearance performance criteria .....	29
11.6 Microduct connector - Environment and mechanical performance test methods .....	29
Bibliography .....	30
Figures	
Figure 1 - Dome .....	14
Figure 2 - Pan .....	14
Figure 3 - Inline closure - End plate type (1a) .....	14
Figure 4 - Inline closure - Shell type - Short and fat (2a) .....	15
Figure 5 - Inline closure - Shell type - Long and thin (2b) .....	15
Figure 6 - Closure Y .....	15
Figure 7 - Closure T (single ports) .....	15
Figure 8 - Closure T (double ports) .....	15
Figure 9 - Closure X .....	16
Figure 10 - Closure functional parts diagram .....	16
Figure 11 - FMS system functional parts diagram .....	16
Figure 12 - Small angled semi-circular, or rectangular tree type organiser .....	18
Figure 13 - Large rectangular trays "book type" organiser .....	18
Figure 14 - Large circular/rectangular trays - Juke box type organiser .....	18
Figure 15 - Small circular/oval/rectangular trays - Shelf type organiser .....	18
Figure 16 - Space for cables .....	19
Figure 17 - ABF system functional parts diagram - Microduct intercept (only) .....	19
Figure 18 - ABF functional parts diagram - Blow from point .....	19
Figure 19 - Examples - Future proof closure expansion - Diagram .....	20
Figure 20 - Examples - Closure outside profile, dimensioning conventions .....	20
Figure 21 - Examples microduct connector outside/bulkhead profile .....	21
Figure 22 - Example - Track joint configuration sample .....	24
Figure 23 - Example - Distribution joint configuration sample .....	25
Tables	
Table 1 - Typical variant table layout - Sealed FMS closures (dome, pan and inline) EN 50411-2-X – X <sub>1</sub> - X <sub>2</sub> - X <sub>3</sub> - XX <sub>4</sub> - XX <sub>5</sub> - X <sub>6</sub> .....	22
Table 2 - Typical closure and tray selection - FMS fibre separation levels .....	23
Table 3 - Typical variant table layout - Sealed ABF closures EN 50411-2-X – X <sub>1</sub> - X <sub>2</sub> - X <sub>3</sub> - X <sub>4</sub> - XXX <sub>5</sub> - XX <sub>6</sub> - XX <sub>7</sub> - XX <sub>8</sub> .....	23
Table 4 - Typical all ABF closure capacity selection to microduct connector capacity .....	23
Table 5 - Typical variant table layout - Microduct connectors - Sealed and non-sealed closures EN 50411-2-X – XXX/XXX <sub>1</sub> – XXX/XXX <sub>2</sub> – XX <sub>3</sub> – X <sub>4</sub> .....	23
Table 6 - Sealed closure sealing, optical and appearance performance criteria .....	26
Table 7 - Sealed closure environmental and mechanical performance test methods .....	27
Table 8 - Unsealed closure environmental and mechanical performance test methods .....	28
Table 9 - Microduct connectors sealing, optical and appearance performance criteria .....	29
Table 10 - Microduct connector - Environment and mechanical performance test methods .....	29

## 1 Scope

### 1.1 Rules and conventions

This general and guidance document provides a framework for new product specification in the series EN 50411-2-X rules and conventions under which a closure interface is created, and provides a consistent structure:

- headings;
- format;
- abbreviations;
- definitions;
- references;
- descriptions;
- document structure details;
- tables;
- diagrams;
- dimensions; and
- product variants.

This general and guidance document provides general information that defines the closure options, including the following:

- level of sealing, sealed or non-sealed;
- closure configurations, shape and/or entry port orientation;
- 'fibre management system' or 'microduct' connectors contained within the housing;
- cable port entry configurations, number of ports;
- cable sealing method, heat or non-heat activated.

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In order to comply with the specification, the following closure and/or FMS requirements must be defined:

- sealing and optical functionality;
- physical dimensioning, giving the maximum outer perimeters for all sizes;
- geometrical form and or shape; [SIST EN 50411-2:2008](https://standards.iteh.ai/catalog/standards/sist/8d6e4b0d-5ca7-4bee-b04c-57fd86a58cd7/sist-en-50411-2-2008)
- dimensioning. <https://standards.iteh.ai/catalog/standards/sist/8d6e4b0d-5ca7-4bee-b04c-57fd86a58cd7/sist-en-50411-2-2008>

### 1.2 Product definition

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

The product specification should provide external overall dimensioning of closures to fit in their external location, e.g. underground chambers, street furniture or aerial applications.

A fibre splice closure product specification includes both the parameters of the closure housing, the fibre splicing management system. These systems are always supplied together with the closure as a matched set including other functional or ancillary parts of an optical node.

An air blown fibre closure product specification includes only the parameters of the closure housing. Air blown fibre closures are normally supplied without a microduct connector, largely because of uncertainty over connector method, microduct sizes, quantity and type of connector used.

This closure specification allows single mode fibre to be used, and covers all IEC or EN standards of optical fibre cables as listed in the normative references with their various fibre, capacities, types and designs.

For convenience the term "cable" in this document may refer to different types of optical fibre cable designs, including 'air blown fibre', 'protected microduct', or 'microduct'.



### 1.3 Operating environment

All tests for closures combined with the severity and duration, and are representative of an outside plant for subterranean and/or aerial environments defined by:

ETSI EN 300 019 series	Class 8.1: underground locations (without earthquake requirement)
EN 61753-1	Category S: subterranean environment
	Category A: aerial environment.

### 1.4 Reliability

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

### 1.5 Quality assurance

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

### 1.6 Safety

All closures to be supplied free of sharp edges or pointed projections that can harm the installation operator. Materials, which are likely to come into contact with personnel, shall be non-toxic and shall not be a potential health or environmental hazard.

For all air blown micro-duct system contained within sealed closures, the closures must be fitted with an over pressure safety system.

In addition for subterranean closure applications or applications where a high level of contamination is expected provision should be taken to ensure that the over pressure safety system is functional.

In choosing the over pressure air safety system, attention should be given to the following:

- blow off pressure setting – accuracy and repeatability;
- the size of micro-ducts likely to fail, ensuring that the safety valve has adequate area to exhaust fast enough without building up a high back pressure;
- metallic corrosion and its effect on the operation;
- if a valve is used it should never be used as an electrical grounding connection.

### 1.7 FMS closure future proof requirement

Conventional optical fibre cables splicing organiser with closure, must in service be capable of being expanded to increase fibre splicing capacity at some future point in time (additional trays).

### 1.8 Fibre types and cable designs

This closure standard must allow single mode fibres to be used and covers all IEC or EN standards for 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) and EN 60794-5 (microduct cabling).

### 1.9 FMS to closure interfaces – Informative information

A FMS system consists of a set of grouped splice trays or organiser. They often dictate the shape and future proof features of a closure. Therefore, splice trays or organiser information found in Clause 8 is contained within a standard and is recommended that it is contained in each closure with FMS product specification, as an informative annex.

## 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 60068-2-10	Environmental testing - Part 2-10: Tests - Test J and guidance: Mould growth (IEC 60068-2-10)
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 60794-1-2	Optical fibre cables - Part 1-2: Generic specification - Basic optical cable test procedures (IEC 60794-1-2)
EN 60794-5	Optical fibre cables - Part 5: Sectional specification - Microduct cabling for installation by blowing (IEC 60794-5)
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	Part 2-4: Tests - Fibre/cable retention (IEC 61300-2-4)
EN 61300-2-5	Part 2-5: Tests - Torsion/twist (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	Part 2-12: Tests - Impact (IEC 61300-2-12)
EN 61300-2-22	Part 2-22: Tests - Change of temperature (IEC 61300-2-22)
EN 61300-2-23	Part 2-23: Tests - Sealing for non-pressurized closures of fibre optic devices (IEC 61300-2-23)
EN 61300-2-26	Part 2-26: Tests - Salt mist (IEC 61300-2-26)
EN 61300-2-33	Part 2-33: Tests - Assembly and disassembly of closures (IEC 61300-2-33)
EN 61300-2-34	Part 2-34: Tests - Resistance to solvents and contaminating fluids (IEC 61300-2-34)
EN 61300-2-37	Part 2-37: Tests - Cable bending for closures (IEC 61300-2-37)
EN 61300-2-38	Part 2-38: Tests - Sealing for pressurized closures of fibre optic devices (IEC 61300-2-38)
EN 61300-3-1	Part 3-1: Examinations and measurements - Visual examination (IEC 61300-3-1)
EN 61300-3-3	Part 3-3: Examinations and measurements - Active monitoring of changes in attenuation and return loss (IEC 61300-3-3)
EN 61300-3-28	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)
EN 187105	Single mode optical cable (duct/direct buried installation)
ETSI EN 300 019 series	Environmental Engineering (EE) - Environmental conditions and environmental tests for telecommunications equipment

### 3 Definitions and abbreviations

#### 3.1 Definitions

##### 3.1.1

##### **dome closure**

a cap ended cover sleeve, for access to its internal elements when the cover is removed. Cable entry ports are positions onto a base, which is attached the open end of the cover and is opposite to and on the same axis as the cover removal direction

##### 3.1.2

##### **pan closure**

it provides a cap ended cover sleeve, for access to its internal elements when the cover is removed. Cable entry ports are positions onto a base, which is attached the open end of the cover and at a 90 degree angle to the cover axis, in the direction of cover removal

##### 3.1.3

##### **inline closure (shell type 2a and 2b)**

it provides a cable entry ports onto a single base and protruding/positioned at each end of the closure and inline with it. The ports at each end are integral to a single base with only one lift off cover. Shell shaped closures are significantly different therefore are divided into two types; 2a, short and fat, and 2b, long and thin

##### 3.1.4

##### **inline closure (end plate type 1a)**

it provides a cable entry ports onto a base at each end of the closure and inline with it. The bases at each end are separate and plate shaped, the cable entry ports on the two bases, are plates linked with tie bars. There are two semi-circular shaped covers attached to the plates and attached to each other

##### 3.1.5

##### **air blown fibre closure**

any shaped closure, with cable, or duct ports, positioned in any direction from it, and has a cover to gain access to the microduct tubes connections inside

##### 3.1.6

##### **fibre management system**

a system to control fibre routing from the incoming to the outgoing fibres, containing one or more splice cassettes and additional functional elements

##### 3.1.7

##### **fibre splicing system**

it provides a 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, SC, SR, SE, ME and MR. This will limit the risk of interruption of traffic to those fibres that belong to the same of circuits

##### 3.1.8

##### **air blown fibre**

it provides for pressurised air to propel, fibres, fibre units and microduct optical fibre cables through a microduct tube system

##### 3.1.9

##### **microduct connector system**

it provides for routing blown fibres or microduct fibre units, between hollow conduits (microducts), and interconnects the microducts by use of pneumatic connectors, tube welding, crimp connectors or push on connectors. The microduct connection method is both air and water tight. It is organised into accessible rows within the closure

##### 3.1.10

##### **single circuit**

a fibre management system is a group of fibres providing 1 termination or service on 1 or 2 fibres. In this document a single circuit is considered to be a circuit of 2 fibres or a 4 fibre ribbon circuit

**3.1.11****single element**

a fibre management system is a cable subassembly. It comprises 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

**3.1.12****single ribbon**

a fibre management system is a cable subassembly. It comprises one optical ribbon. Single ribbon is a group of fibres providing one termination or service of typically 4, 8 or 12 fibres

**3.1.13****multiple elements**

a fibre management system 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

**3.1.14****multiple ribbons**

a fibre management system provides all necessary equipment to connect a defined number of incoming and outgoing fibre ribbons that are generally housed within a single tube 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

**3.1.15****single circuit fibre management system**

a fibre system separation level, that is down to the individual customer level achieving the minimum of customer circuit disturbance

**3.1.16****positive fibre management system**

fibre systems capable of controlling the fibre minimum bend radius throughout the network

**3.1.17****future proof fibre management system**

a fibre management system is capable of change, or expansion in the future, covering all FMS (SC, SE, SR, ME, MR) by modular adaptation

**3.1.18****future proof closures**

closures that should be capable to be able to change or expand in the future, without disturbing existing cables and fibre systems

**3.1.19****end to end solution, organiser**

fibre management systems that have the flexibility to be a common system for all and any part of the network, fibre/cable types and capacities, over all transmission wave lengths and media

**3.1.20****duct**

an underground direct buried tubular pipe, rigid supplied in lengths or flexible supplied in coils

**3.1.21****sub ducts**

two or more small sub ducts inserted/stored into a larger duct, to provide the ability to feed cables down each sub duct

**3.1.22****blow off pressure**

the air pressure level or valve which is considered the limit of safe working pressure inside the closure, which is exhausted to atmosphere at this valve