



SLOVENSKI STANDARD SIST EN 50411-3-3:2012

01-februar-2012

Delilniki za optična vlakna in kabelske spojnice za optične komunikacijske sisteme - Specifikacija izdelka - 3-3. del: Ščitniki spojev enorodnih optičnih vlaken

Fibre organisers and closures to be used in optical fibre communication systems -
Product specifications - Part 3-3: Singlemode optical fibre fusion splice protectors

LWL-Spleißkassetten und -Muffen für die Anwendung in LWL-Kommunikationssystemen
- Produktnormen - Teil 3-3: Fusionsspleißschutze für Einmodenfasern

Organiseurs et boîtiers de fibres destinés à être utilisés dans les systèmes de
communication par fibres optiques - Spécifications de produits - Partie 3-3: Protecteurs
d'épissures par fusion de fibres optiques unimodales

Ta slovenski standard je istoveten z: **EN 50411-3-3:2011**

ICS:

33.180.20	Povezovalne naprave za optična vlakna	Fibre optic interconnecting devices
-----------	---------------------------------------	-------------------------------------

SIST EN 50411-3-3:2012

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 50411-3-3:2012](https://standards.iteh.ai/catalog/standards/sist/dcddc92f-64c4-483b-b7eb-c8d5cfe8fd5/sist-en-50411-3-3-2012)

<https://standards.iteh.ai/catalog/standards/sist/dcddc92f-64c4-483b-b7eb-c8d5cfe8fd5/sist-en-50411-3-3-2012>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 50411-3-3

December 2011

ICS 33.180.20

English version

**Fibre organisers and closures to be used in optical fibre communication systems -
Product specifications -
Part 3-3: Singlemode optical fibre fusion splice protectors**

Organiseurs et boîtiers de fibres destinés à être utilisés dans les systèmes de communication par fibres optiques -
Spécifications de produits -
Partie 3-3: Protecteurs d'épissures par fusion de fibres optiques unimodales

LWL-Spleißkassetten und -Muffen für die Anwendung in LWL-Kommunikationssystemen -
Produktnormen -
Teil 3-3: Fusionssplice für Einmodenfasern

ITEH STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 50411-3-3:2012](https://standards.iteh.ai/catalog/standards/sist/dcdde92f-64c4-483b-b7eb-c8d5cfe8fd5/sist-en-50411-3-3-2012)

<https://standards.iteh.ai/catalog/standards/sist/dcdde92f-64c4-483b-b7eb-c8d5cfe8fd5/sist-en-50411-3-3-2012>

This European Standard was approved by CENELEC on 2011-11-14. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Contents	Page
1 Scope	6
1.1 Product definition	6
1.2 Interoperability	6
1.3 Expected performance	6
1.4 Operating environment	6
1.5 Reliability	6
1.6 Quality assurance	6
2 Normative references	6
3 Description	7
3.1 Fusion splice protector	7
3.1.1 General	7
3.1.2 Heat shrinkable splice protector type	8
3.1.3 Fold over or clam shell splice protector type	8
3.2 Materials	9
3.3 Dimensions	9
3.4 Colour and marking	9
4 Variants	9
5 Dimensional requirements	11
5.1 Heat shrinkable splice protector (S type)	11
5.2 Fold over or clam shell splice protector (F type)	13
6 Tests	13
6.1 Introduction	13
6.2 Test sample preparation	13
6.3 Test and measurement methods	13
6.4 Pass/fail criteria	14
7 Test report	14
8 Performance requirements	14
8.1 Dimensional and marking requirements	14
8.2 Installation requirement	14
8.3 Optical performance requirements	15
Annex A (normative) Fibre type	20
Annex B (normative) Sample size and product sourcing requirements	21
Annex C (normative) Test sample description and installation	22
C.1 Test sample layout for single fibre fusion splice protector	22
C.2 Preparation of single fibre test samples	22
C.3 Test sample layout for ribbon fibre fusion splice protector	24
C.4 Preparation of ribbon fibre test samples	24
Annex D (informative) Silicone band heat shrink fusion splice protectors	26

Figures

Figure 1 — Heat shrinkable splice protector	8
Figure 2 — Fold over or clam shell splice protector	8
Figure 3 — Single fibre splice protector variant S1 as assembled	11
Figure 4 — Ribbon fibre splice protectors variants S2, S3, S4, S5 as assembled.....	11
Figure 5 — Single fibre splice protector variant S1 (fully recovered).....	12
Figure 6 — Ribbon fibre splice protectors variants S2, S3, S4, S5 (fully recovered)	12
Figure 7 — Fold over or clam shell splice protector (as delivered)	13
Figure 8 — Fold over or clam shell splice protector (installed).....	13
Figure C.1 — Test sample layout for single fibre fusion splice protector	22
Figure C.2 — Test sample preparation - Step 1	22
Figure C.3 — Test sample preparation - Step 2	23
Figure C.4 — Test sample preparation - Step 3	23
Figure C.5 — Test sample layout for ribbon fibre fusion splice protector.....	24
Figure C.6 — Test sample preparation for ribbon – Step 1	24
Figure C.7 — Test sample preparation for ribbon - Step 2.....	25
Figure C.8 — Test sample preparation for ribbon - Step 3.....	25
Figure D.1 — Heat shrink splice protector with silicone band	26
Figure D.2 — Typical silicone band dimensions for recovered diameters 2,2 mm to 2,4 mm	26

SIST EN 50411-3-3:2012

<https://standards.iteh.ai/catalog/standards/sist/dcdde92f-64c4-483b-b7eb-c8d5cfe8fd5/sist-en-50411-3-3-2012>

Tables

Table 1 — Optical fibre fusion splice protector, for category U – Variants	9
Table 2 — Outline and maximum dimensions for heat shrinkable fusion splice protectors	12
Table 3 — Dimensions fold over or clam shell splice protector	13
Table 4 — Test details and requirements.....	15
Table A.1 — Fibre type characteristics	20
Table B.1 — Sample size per test	21

Foreword

This document (EN 50411-3-3:2011) has been prepared by CLC/TC 86BXA "Fibre optic interconnect, passive and connectorised components".

The following dates are 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) 2012-11-14
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2014-11-14

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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 50411-3-3:2012](https://standards.iteh.ai/catalog/standards/sist/dcddc92f-64c4-483b-b7eb-c8d5cfe8fd5/sist-en-50411-3-3-2012)

<https://standards.iteh.ai/catalog/standards/sist/dcddc92f-64c4-483b-b7eb-c8d5cfe8fd5/sist-en-50411-3-3-2012>

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

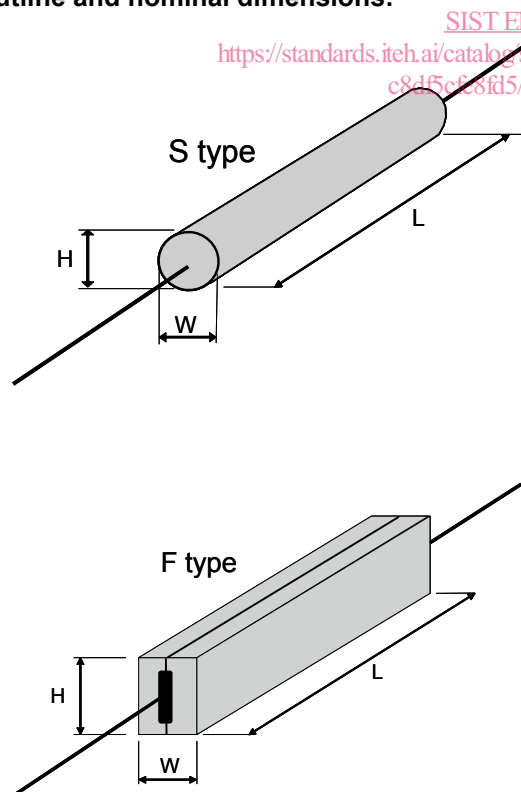
Part 3-3: Singlemode optical fibre fusion splice protectors

Description		Performance	
Type:	Fibre splice protector	Application:	EN 61753-1:2007, Category U
Style:	Fusion		
Operating wavelength:	1 260 nm to 1 625 nm	Attenuation grades	Maximum allowed change in attenuation $\leq \pm 0,2$ dB for 5 protected fusion splices placed in series
Fibre category	EN 60793-2-50 Type B 1.1 and B 1.3	Return loss grades	Not applicable

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 61300 series	Fibre optic interconnecting devices and passive components – Basic test and measurement procedures (IEC 61300 series)
EN 61753-1:2007	Fibre optic interconnecting devices and passive components performance standard – Part 1: General and guidance for performance standards (IEC 61753-1:2007)

Outline and nominal dimensions:



SIST EN 50411-3-3:2012

<https://standards.iteh.ai/catalog/standards/sist/dcdde92f-64e4-483b-b7eb-c8df5cf6fd5/sist-en-50411-3-3-2012>

Product as installed or fully recovered

Type	Fibre	<i>W</i> mm	<i>H</i> mm	<i>L</i> Available lengths mm
F1	Single fibre	1,2	3,2	30
S1-12	Single fibre	1,25	1,25	15/20/25/30
S1-13	Single fibre	1,3	1,3	15/20/25/30
S1-16	Single fibre	1,6	1,5	15/20/25/30/40
S1-22	Single fibre	2,2	2,2	25/30/35/40/45
S1-24	Single fibre	2,4	2,4	20/25/35/40/45/60
S1-26	Single fibre	2,6	2,6	35/40/45/60
S1-32	Single fibre	3,2	3,2	45/60
S1-37	Single fibre	3,7	3,7	68
S2-37	Ribbon 4	3,7	3,5	40/45
S3-40	Ribbon 8	4,0	3,7	40/45
S4-45	Ribbon 12	4,5	4,0	25/30/40/45

1 Scope

1.1 Product definition

This European Standard contains the initial, start of life dimensional, optical, mechanical and environmental performance requirements, which a singlemode fusion splice protector need to meet in order for it to be categorised as an EN standard product.

Although in this document the product is qualified for EN 60793-2-50 type B1.1 and B1.3 singlemode fibres it may also be suitable for fusion splice protection of multimode fibre with 125 µm diameter glass cladding and other singlemode fibres with 125 µm diameter glass cladding at other wavelengths.

1.2 Interoperability

The installed fusion splice protector needs to fit into optical fibre splice cassettes or splice trays. This European Standard specifies the following physical interface dimensions:

- cross sectional profile with width, height or diameter(in millimetres);
- length (in millimetres).

1.3 Expected performance

In this European Standard, the performance of the fusion splice protector is given with selected fibres as specified in Annex A.

1.4 Operating environment

The tests selected combined with the severities and durations are representative of an outdoor enclosed environment defined as category U in EN 61753-1. To ensure that the product can be used in closures, boxes or street cabinet for categories C, A, G and S (as defined EN 61753-1) the specified lower temperature is extended to -40 °C and requirements for temporary flooding have been added.

1.5 Reliability

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

1.6 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.

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

EN 61300-1, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 1: General and guidance (IEC 61300-1)*

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 61300-2-7, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-7: Tests — Bending moment (IEC 61300-2-7)*

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

EN 61300-2-17, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-17: Tests — Cold (IEC 61300-2-17)*

EN 61300-2-18, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-18: Tests — Dry heat — High temperature endurance (IEC 61300-2-18)*

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

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

EN 61300-2-45, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-45: Tests — Durability test by water immersion (IEC 61300-2-45)*

EN 61300-2-46, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-46: Tests — Damp heat cyclic (IEC 61300-2-46)*

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 61753-1:2007, *Fibre optic interconnecting devices and passive components performance standard – Part 1: General and guidance for performance standards (IEC 61753-1:2007)*

3 Description

3.1 Fusion splice protector

3.1.1 General

A singlemode fibre fusion splice protector is a passive component, which provides mechanical and environmental protection to a single fibre or ribbon fibre fusion splice. The fused fibres are protected against ingress of dust or temporary flooding by a sealing material, generally a polymer material like hot melt adhesive or mastic.

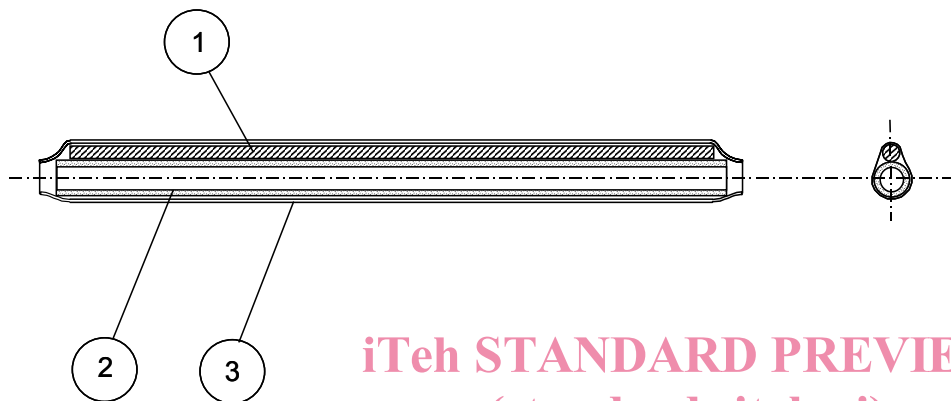
The products described in this standard are based on various protection types:

- heat shrinkable splice protector;
- fold over splice protector (also called clam shell splice protector).

3.1.2 Heat shrinkable splice protector type

Prior to the splicing, the splice protector is put over one of the fibre or ribbon ends. After the fusion of the fibres, the splice protector is placed over the spliced area. After visual centring over the fused area the splice protector is shrunk by heating equipment.

The typical fusion splice protector is composed of three elements:



iTeh STANDARD PREVIEW
(standards.iteh.ai)

Key

- SIST EN 50411-3-3:2012
https://standards.iteh.ai/catalog/standards/sist/cddc9210-04c4-4636-b7c0-c8d5cfe8fd5/sist-en-50411-3-3-2012
- 1 a reinforcement member to give rigidity after the protector is installed in the heater;
 - 2 an adhesive tube that will encapsulate the spliced region and bonds directly to the bare glass and primary or secondary coating of the fibres;
 - 3 a cross-linked polyethylene heat-shrinkable tube, which encloses the adhesive insert tube and the reinforcement member.

Figure 1 — Heat shrinkable splice protector

3.1.3 Fold over or clam shell splice protector type

The fused area of the optical fibre is centred and kept in place by the adhesive strips and then the splice protector is fold over and closed by the use of a crimping tool. In general the following elements are available:

- rigid flat strip hinged in the centre;
- compressible material adhered to the flat strip.



Figure 2 — Fold over or clam shell splice protector

3.2 Materials

Materials which are not specified or which are not specifically described are left to the discretion of the manufacturer. However, the following requirements shall be met:

- all materials that are likely to come in contact with personnel shall meet appropriate health and safety regulations;
- the sealing materials shall be compatible with the materials of the fibres and the mechanical splice parts;
- the sealant or encapsulant material shall be free of dirt and air inclusions;
- all components of the splice shall be resistant to solvents and degreasing agents that are typically used to clean and degrease fibres and cables (like alcohols, white spirit and cable cleaners);
- exposed metallic parts shall be resistant to the corrosive influences they may encounter during the lifetime of the product;
- exposed polymer materials shall be resistant to mould growth.

3.3 Dimensions

Outline dimensions are specified in Clause 5. All other dimensions are left to the discretion of the manufacturer.

3.4 Colour and marking

Marking of the product or packaging shall be in the following order of precedence:

- a) identification of supplier or manufacturer;
<https://standards.iteh.ai/catalog/standards/sist/dcdde92f-64c4-483b-b7eb-c8d5cfe8fd5/sist-en-50411-3-3-2012>
- b) manufacturing date code: year/week;
- c) manufacturers part number;
- d) variant identification number.

4 Variants

Table 1 — Optical fibre fusion splice protector, for category U – Variants

EN 50411-3-3– XX₁ – XX₂ – XX₃ – X₄ – X₅– XX₆

Variant No. XX ₁	Fusion splice protector type
S1	Heatshrink single fibre
S2	Heatshrink ribbon fibre (up to 4 fibres)
S3	Heatshrink ribbon fibre (up to 8 fibres)
S4	Heatshrink ribbon fibre (up to 12 fibres)
F1	Fold over type 1 (metal/mastic) single fibre