
Sistemi za upravljanje z optičnimi vlakni in zaščitna ohišja za optične komunikacijske sisteme - Specifikacije izdelka - 3-2. del: Enorodovna mehanska optična spojnica

Fibre management systems and protective housings to be used in optical fibre communication systems - Product specifications - Part 3-2: Single-mode mechanical fibre splice

LWL-Spleißkassetten und -Muffen für die Anwendung in LWL Kommunikationssystemen - Produktnorm - Teil 3-2: Mechanische Spleiße für Einmodenfasern

Systèmes de gestion des fibres et boîtiers de protection destinés à être utilisés dans les systèmes de communication par fibres optiques - Spécifications de produits - Partie 3-2: Epissures mécaniques de fibres unimodales

Ta slovenski standard je istoveten z: EN 50411-3-2:2023

ICS:

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

SIST EN 50411-3-2:2023**en**

EUROPEAN STANDARD

EN 50411-3-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2023

ICS 33.180.20

Supersedes EN 50411-3-2:2011

English Version

**Fibre management systems and protective housings to be used
in optical fibre communication systems - Product specifications -
Part 3-2: Single-mode mechanical fibre splice**

Systèmes de gestion des fibres et boîtiers de protection destinés à être utilisés dans les systèmes de communication par fibres optiques - Spécifications de produit - Partie 3-2: Épissures mécaniques de fibres unimodales

LWL-Spleißkassetten und -Muffen für die Anwendung in LWL Kommunikationssystemen - Produktnorm - Teil 3-2: Mechanische Spleiße für Einmodenfasern

This European Standard was approved by CENELEC on 2023-03-27. 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



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

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

Contents

	Page
European foreword	3
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	7
3 Terms and definitions.....	8
4 Description	8
4.1 General.....	8
4.2 Mechanical splice	8
4.3 Materials.....	9
4.4 Dimensions.....	9
4.5 Colour and marking	9
5 Variants	9
6 Dimensional requirements.....	10
7 Tests	11
7.1 Introduction	11
7.2 Test sample preparation	11
7.3 Test and measurement methods.....	11
7.4 Pass/fail criteria	11
8 Test report	12
9 Performance requirements	12
9.1 Dimensional and marking requirements	12
9.2 Assembly yield requirement.....	12
9.3 Pass/fail criteria	12
9.4 Optical performance requirements	13
Annex A (normative) Fibre type for test sample.....	19
Annex B (normative) Sample size and product sourcing requirements.....	20
Bibliography	21

European foreword

This document (EN 50411-3-2:2023) has been prepared by CLC/TC 86BXA "Fibre optic interconnect, passive and connectorised components".

The following dates are proposed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2024-01-21
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2024-07-21

This document supersedes EN 50411-3-2:2011 and all of its amendments and corrigenda (if any).

EN 50411-3-2:2022 includes the following significant technical changes with respect to EN 50411-3-2:2011:

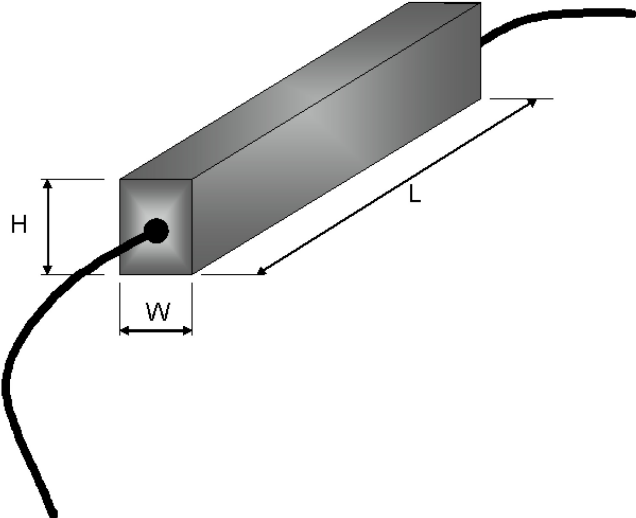
- terms and definitions are added;
- the EN 61753-1:2007 category U tests and test severities are replaced by the EN IEC 61753-1:2018 category OP test and test severities;
- the references are updated.

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

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

Fibre management systems and protective housings to be used in optical fibre communication systems - Product specifications			
Part 3-2: Single mode mechanical fibre splice			
Description		Performance	
Type:	Fibre splice	Application:	EN IEC 61753-1, Category OP
Style:	Mechanical		With extension of lower temperature to $-40\text{ }^{\circ}\text{C}$
Operating wavelength:	1 260 nm to 1 625 nm	Attenuation grades:	Grade B: $\leq 0,25\text{ dB max for } \geq 97\% \text{ of connections}$ $\leq 0,12\text{ dB average}$ Grade C: $\leq 0,50\text{ dB max for } \geq 97\% \text{ of connections}$ $\leq 0,25\text{ dB average}$
Fibre category:	EN IEC 60793-2-50	Return loss grades:	Grade 1: $\geq 60\text{ dB}$ Grade 2: $\geq 45\text{ dB}$ Grade 3: $\geq 35\text{ dB}$
Related documents:			
EN IEC 60793-2-50	Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres (IEC 60793-2-50)		
EN 60794-2-50:2008	Optical fibre cables – Part 2-50: Indoor cables – Family specification for simplex and duplex cables for use in terminated cable assemblies (IEC 60794-2-50:2008)		
EN 61300 series	Fibre optic interconnecting devices and passive components – Basic test and measurement procedures (IEC 61300 series)		
EN IEC 61753-1	Fibre optic interconnecting devices and passive components performance standard – Part 1: General and guidance for performance standards (IEC 61753-1)		

Outline and nominal dimensions:



Variant	Dimension W mm	Dimension H mm	Dimension L mm
Type M1	3,8	6,4	38
Type M2	4,0	4,0	36
Type M3	3,2	3,2	46
Type M4	4,2	4,2	44
Type M5	4,0	4,0	40
Type M6	Ø 5,0		65

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 50411-3-2:2023](https://standards.iteh.ai/catalog/standards/sist/a108d6a5-62d0-4619-9f87-962bd539b1f7/sist-en-50411-3-2-2023)

<https://standards.iteh.ai/catalog/standards/sist/a108d6a5-62d0-4619-9f87-962bd539b1f7/sist-en-50411-3-2-2023>

EN 50411-3-2:2023 (E)

1 Scope

1.1 Product definition

This document contains the initial, start of life dimensional, optical, mechanical and environmental performance requirements, which single mode mechanical splice needs to meet in order for it to be categorized as a European standard product.

Although, in this document, the product is qualified for EN IEC 60793-2-50 type B-652.D single mode fibres, it is also suitable for mechanical splicing of other single mode fibres with 125 µm diameter glass cladding.

Also mechanical splices designed for connections of buffered or secondary coated fibres and cords according to EN 60794-2-50:2008 are covered by this document.

1.2 Interoperability

The installed mechanical splice fits into optical fibre management system with optical splice cassettes or splice trays as defined in EN IEC 61756-1. This document specifies the following two physical interface dimensions:

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

1.3 Expected performance

In this document, the performance of the mechanical splice is given with identical fibres only as specified in Annex A. Losses associated with tolerances in fibre cladding diameter and mode field mismatch are not taken into account. The measured attenuation is a function of the core concentricity, cladding non-circularity and alignment capability. The optical return loss performance is a function of the index matching gel and the fibre end face preparation.

1.4 Operating environment

The tests selected combined with the severities and durations are representative of an outdoor enclosed environment defined as category OP in EN IEC 61753-1. To ensure that the product can be used in outdoor closures, boxes or street cabinets for categories A, G or S (as defined in EN IEC 61753-1) the specified lower temperature is extended to -40 °C and a water immersion requirement for temporary flooding conditions has 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 document does not guarantee the reliability of the product. This is expected to be predicted using a recognized reliability assessment programme.

1.6 Quality assurance

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

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

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

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

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

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

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

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*

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

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

EN 61300-2-27, *Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-27: Tests - Dust - Laminar flow*

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

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*

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

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*

EN 50411-3-2:2023 (E)

EN 61300-3-4, *Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-4: Examinations and measurements - Attenuation*

EN 61300-3-6, *Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-6: Examinations and measurements - Return loss*

EN 61300-3-7, *Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-7: Examinations and measurements - Wavelength dependence of attenuation and return loss of single mode components (IEC 61300-3-7)*

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

3 Terms and definitions

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

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

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

3.1**fibre splice**

permanent or separable joint the purpose of which is to couple optical power between two optical fibres, achieved by either a fusion or a mechanical technique

[SOURCE: IEC 731-05-05, modified]

4 Description**4.1 General**

A single mode mechanical fibre splice is a passive optical interconnection component, which provides optical and mechanical continuity between two optical fibres or cables. The products described in this document are based on mechanical alignment of two cleaved fibres. The fibres are protected against ingress of dust or water by a sealing material, generally an index matching gel, to both minimize reflections and to improve attenuation at the glass/gel/glass interface.

Some splices could have a limited reinstallation capability. In this case the re-installability shall be clearly stated and the re-installation test 8 of Table 4 in 9.4 shall be conducted.

4.2 Mechanical splice

An optical fibre mechanical splice body contains the following pre-assembled elements:

- an alignment device;
- a sealing and index matching gel inside;
- a fibre alignment activation device like a spring, wedge or plunger;
- a fibre clamping or fixing able to withstand axial fibre loads.

Mechanical splices designed for use with cables shall contain strain relief fixing.

4.3 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:

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

- the sealing and index matching materials shall be compatible with the fibre materials and/or the mechanical splice parts;
- all splice components shall be resistant to solvents and degreasing agents that are typically used to clean and degrease fibres and cables (e.g. alcohols, white spirit and cable cleaners);
- exposed metallic parts shall be resistant to any corrosive influences they could encounter during the lifetime of the product;
- exposed polymer materials shall be resistant to mould growth.

4.4 Dimensions

Outline dimensions are specified in Clause 6. All other dimensions are left to the discretion of the manufacturer.

4.5 Colour and marking

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

- a) identification of supplier or manufacturer;
- b) manufacturing date code: year/week;
- c) manufacturer's part number;
- d) variant identification number.

There is no preferred colour specified.

5 Variants

Variants are given in Table 1.

Table 1 — Optical fibre mechanical splice, for category OP – Variants

EN 50411-3-2 – XX₁ – X₂ – X₃ – X₄ – X₅

Variant No. XX ₁	Mechanical splice type
M1	Mechanical splice Type 1
M2	Mechanical splice Type 2
M3	Mechanical splice Type 3
M4	Mechanical splice Type 4
M5	Mechanical splice Type 5
M6	Mechanical cable splice Type 6