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**Delilniki za optična vlakna in kabelske spojnice za optične komunikacijske sisteme - Specifikacija izdelka - 3-1. del: Sistem za upravljanje optičnih elementov, stenska omarica s spojnicami, za kategoriji C in G**

Fibre organisers and closures to be used in optical fibre communication systems - Product specifications - Part 3-1: Fibre management system, splice wall box, for category C & G

LWL-Spleißkassetten und -Muffen für die Anwendung in LWL-Kommunikationssystemen - Produktnormen - Teil 3-1: Faser Management System, Wandspleißverteiler für die Kategorien C und G

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Organiseurs et boîtiers de fibres destinés à être utilisés dans les systèmes de communication par fibres optiques - Spécifications de produits - Partie 3-1: Système de gestion de fibres, boîtier mural d'épissures, pour les catégories C & G

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**Fibre organisers and closures to be used in optical fibre communication systems -  
Product specifications -  
Part 3-1: Fibre management system, splice wall box, for category C & G**

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## Foreword

This document (EN 50411-3-1:2012) 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) 2013-05-28
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2015-05-28

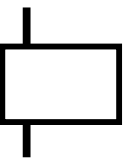
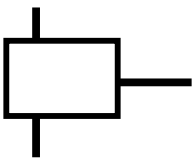
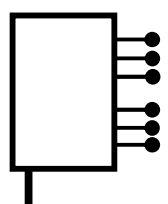
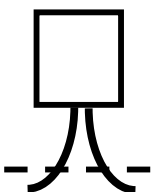
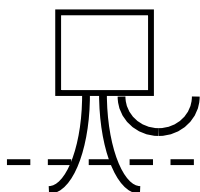
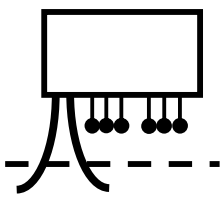
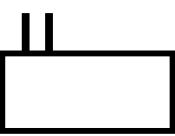
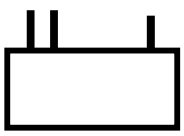
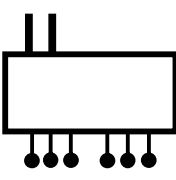
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Fibre organisers and closures to be used in optical fibre communication systems – Product specifications Part 3-1: Fibre management system, splice wall box, for category C & G					
Description			Typical installation application		
<b>Construction:</b> Wall mounted box			<b>Track box</b> (2 cables minimum) <b>Spur box</b> (3 cables minimum) <b>Distribution box</b> (6 cables minimum).		
Performance					
<b>Applications:</b> Optical fibre cable networks For indoor; for external above ground;			IEC 61753-1:2007, category C IEC 61753-1:2007, category G		
Fibre separation level - FMS splice trays:					
Single circuit (>2 fibres per tray), Single element (>12 fibres per tray), Multiple element (>144 fibres per tray)			Single ribbon (>4 fibres per tray), Multiple ribbon (>144 fibres per tray)		
For reference on how fibre separation levels fits into the modularity of FMS organisers, see also FMS organiser options in Annexes C to E					
Construction and splice tray capacity:					
FMS –Number splice trays (maximum) – for each fibre separation level – SC, SE, SR, ME and MR					
Number of trays needed for:	S organiser			M organiser	
	Single circuit SC (4f)	Single element SE (12f)	Single ribbon SR (4f)	Multiple element ME (144f)	Multiple ribbon MR (144)
Typical capacity 12 fibres	6	1	3	1	1
Typical capacity 144 fibres	36	12	36	1	1(12 f/R)
Box type - minimum no of cable entries:	Track box - 2		Spur box - 3		Distribution box - 6
<b>Schematic diagrams</b> (Cable entries can be in any orientation)					
<b>Typical installations A</b> Street cabinet or external configurations					
<b>Typical installations B</b> Office internal configurations					

## 1 Scope

### 1.1 Product definition

This European Standard covers wall boxes for up to 288 fibre splices. Wall boxes for connectors will be covered in a future part of the EN 50411-3 series.

This European Standard covers two environmental service requirements, for use inside a building under category C and externally of buildings under category G both to EN 61753-1:2007.

This European Standard contains the initial, start of life dimensional, optical, mechanical and environmental performance requirements of a fully installed optical fibre wall box, in order for it to be categorised as an EN standard product.

The wall box must be suitable for fixing to a vertical internal or external surface above ground level.

The wall box is a housing containing a fibre management system, containing splice trays of various fibre separation levels, and may contain one or more of the following:

- storage and/or routing of cable;
- through-box/uncut fibre, cable storage;
- passive devices.

This document specifies the number of splice trays for each fibre separation level.

### 1.2 Operating environment

The tests selected combined with the severity and duration is representative of indoor and outside plant for above ground environments defined by:

- EN 61753-1:       - category C: Controlled environment  
                           - category G: Ground level environment

### 1.3 Reliability

Whilst the anticipated service life expectancy of the product in this environment is 20 years, compliance with this European Standard 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 European Standard 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

All types of fibre are permitted for a FMS with a minimum bend radius of 30 mm. A minimum bend of 20 mm can only be used with a B 6 fibre. The box, once tested according to this product specification, will be also suited for other fibre types, for example bend insensitive, dispersion shifted, non-zero dispersion shifted and multimode fibres.

This wall box standard allows both single-mode and multi-mode fibre to be used and covers all IEC standard optical fibre cables with their various fibre capacities, types and designs as long as fitting in the box does not contravene the minimum bend radius.

The minimum bend radius of fibre depends on its type, and is applicable for all operational wavelengths:

- EN 60793-2-10, Type A1 multimode fibre is 30 mm;
- EN 60793-2-50, Type B 1.1 and B 1.3 singlemode fibre is 30 mm; (20 mm is accepted for total lengths less than 2 m)
- EN 60793-2-50, Type B6-a1, B6-a2 singlemode fibre (ITU-T G.657) is 20 mm (15 mm is accepted for total lengths less than 0,5 m)



## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- EN 50411-2 *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*
- EN 60529 *Degrees of protection provided by enclosures (IP Code)(IEC 60529)*
- EN 60695-11-10 *Fire hazard testing — Part 11-10: Test flames — 50 W horizontal and vertical flame test methods (IEC 60695-11-10)*
- EN 60793-2-50:2008 *Optical fibres — Part 2-50: Product specifications — Sectional specification for class B single-mode fibres (IEC 60793-2-50:2008)*
- EN 60793-2-10 *Optical fibres — Part 2-10: Product specifications — Sectional specification for category A1 multimode fibres (IEC 60793-2-10)*
- 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 61034-1 *Measurement of smoke density of cables burning under defined conditions — Part 1: Test apparatus (IEC 61034-1)*
- 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 61300-2-9 *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-9: Tests — Shock (IEC 61300-2-9)*
- EN 61300-2-12:2009 *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-12: Tests — Impact (IEC 61300-2-12:2009)*
- 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 61300-2-33 *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 61300-3-1 *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 3-1: Examinations and measurements — Visual examination (IEC 61300-3-1)*

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- EN 61300-3-3:2009 *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 61300-3-3:2009)*
- 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 standard (IEC 61753-1:2007)*
- EN 61756-1 *Fibre optic interconnecting devices and passive components — Interface Standard for fibre management systems — Part 1: General and guidance (IEC 61756-1)*
- EN 61758-1 *Fibre optic interconnecting devices and passive components — Interface standard for closures — Part 1: General and Guidance (IEC 61758-1)*
- IEC 60754-2 *Test on gases evolved during combustion of materials from cables — Part 2: Determination of acidity (by pH measurement) and conductivity*

### 3 Terms, definitions and abbreviations

#### 3.1 Terms and definitions

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

##### 3.1.1

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

assembly of fibre splicing cassettes built in such a way that the routing of fibres and the storage of the fibres and fibre splices is done in a controlled way. Controlled means in this case that the mechanical stress is controlled by ensuring a minimum bending radius of the fibres.

##### 3.1.2

##### **single circuit fibre management system**

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

##### 3.1.3

##### **cable element**

grouping of fibres under the cable sheath

#### 3.2 Abbreviations

<b>PS</b>	Product Specification
<b>OD</b>	Outside Diameter
<b>ID</b>	Inside Diameter
<b>FMS</b>	Fibre Management System

### 4 Description

#### 4.1 Optical fibre wall box housing

An optical fibre wall box comprises a housing that is attached to wall and the ends of the joined cable sheath. The wall box has a means of containing and protecting the fibres, splices, and other passive optical devices.

Wall boxes used for blowing cable or fibre comprises an access housing that allows the interconnection of cable microducts or tubes where the ends of the microducts or cables containing empty tubes are contained. The wall box also contains an FSM.

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

The following table illustrates the concept of a single wall box design/size being able to accommodate various fibre separation levels in a splice wall box for SC and SE.

**Table 1 — Common wall box sizes with splice capacities for fibre separation levels SC and SE**

EN 50411-3-1				
Compatible tray/box envelope (size)	Number Splices (SC)	Number trays SC (2 fibres/tray)	Number splices (SE)	Number trays SE (12 fibres/tray)
A and F	8	4	24	2
A and H	24	12	72	6
C and K	48	24	144	12
D and N	96	48	288	24

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

**Common wall boxes covering:**

**(T) Track wall box** configuration used on customer feed cable with a minimum of 2 cable entries specified for each wall box size in the tables, typical when joining two cables along a track.

**(S) Spur wall box** configuration used on local feeder cable with minimum of 3 cable entries, typically a cable drop off point to along a track feeder cable.

**(D) Distribution wall box** configuration used on a local feeder cable with a minimum of 6 cable entries to distribute smaller cables to different locations.

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

The design of the wall box 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 or balloon splice wall box.

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

## 4.2 Cable seals/fixings

For category G the cable entry or exit ports in the wall box must have a sealing and fixing system that can be either:

- a) Dedicated heat activated with heat source, for example, electrical, infrared, hot air or flame:
  - 1) thermo-shrinkable materials;
  - 2) hot melt adhesives;
  - 3) polyethylene injection welding;
- b) Cold applied:
  - 1) mastic, tapes, pastes, potting compounds, gels and cold adhesives;
  - 2) o-rings, grommets, rubber shapes, pre-expanded tubing are cold processes;
- c) Combined heat activated and cold applied:

- 1) The optical fibre wall box 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 or microduct management system.

### 4.3 FMS 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 1 termination or service of 1 or 2 fibres. In this document a Single Circuit is considered to be a circuit of 2 fibres. If the separation level for one termination is more than 2 fibres, then the appropriate number of fibres can be stored on one tray of the single circuit system.
- **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 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.

### 4.4 Air blown fibre microduct management system

Air blown fibre microduct and protected microduct cables storage and connection systems for microducts, outside diameters from 3 mm to 16 mm.

### 4.5 Storage and retrieval of fibre and cable element systems

The storage and retrieval of fibre and cable elements within the wall box, typically are one of the following types; single or multiple fibre bundles, ribbons fibres, fibre units, microducts, protected microducts and conventional slotted core, loose tube, compact, ribbon, and hybrid cables.

### 4.6 Passive optical components

Passive optical components that may be installed inside a FMS splice tray, or in a separately mounted cartridge or cassette. Typical passive devices system include, wave division multiplexers (WDM), fan outs and other unpowered devices.