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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components – Mechanical splices and fusion splice protectors for optical fibres and cables – Part 1: Generic specification

Dispositifs d'interconnexion et composants passifs à fibres optiques – Protecteurs d'épissures mécaniques et d'épissures par fusion pour fibres et câbles optiques – Partie 1: Spécification générique

IEC 61073-1:2009

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – MECHANICAL SPLICES AND FUSION SPLICE PROTECTORS FOR OPTICAL FIBRES AND CABLES –

Part 1: Generic specification

FOREWORD

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International Standard IEC 61073-1 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This fourth edition cancels and replaces the third edition published in 1999. This edition constitutes a technical revision. The main changes with respect to the previous edition are as follows:

- terms and definitions have been reconsidered;
- style has been added in classification of requirement;
- environmental category has been deleted from classification of requirement;
- standardisation structure and standards interlink have been reconsidered.

This bilingual version (2013-01) corresponds to the monolingual English version, published in 2009-01.

The text of this standard is based on the following documents:

FDIS	Report on voting
86B/2773/FDIS	86B/2805/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – MECHANICAL SPLICES AND FUSION SPLICE PROTECTORS FOR OPTICAL FIBRES AND CABLES –

Part 1: Generic specification

1 Scope

This part of IEC 61073 applies to fibre optic splice hardware (mechanical splices and fusion splice protections) for optical fibres and cables.

It includes:

– fibre optic splice hardware requirements;

– quality assessment procedures.

This standard does not cover test and measurement procedures, which are described in IEC 61300-1, IEC 61300-2 series and IEC 61300-3 series.

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.

References made to a specific clause or subclause of a standard include all subclauses of the reference unless otherwise specified.

IEC QC 001002-3, *IEC Quality Assessment System for Electronic Components (IECQ) – Rules of Procedure – Part 3: Approval procedures*

IEC Guide 102, *Electronic components – Specification structures for quality assessment (Qualification approval and capability approval)*

IEC 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60050-731, *International Electrotechnical Vocabulary – Chapter 731: Optical fibre communication*

IEC 60617 (all parts), *Graphical symbols for diagrams*

IEC 60695-11-5, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

IEC 60793-1 (all parts), *Optical fibres – Measurement methods and test procedures*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification and requirements*

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

IEC 61300-2 (all parts), *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2: Tests*

IEC 61300-3 (all parts), *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3: Examinations and measurements*

IEC 61930: *Fibre optic graphical symbology*

IEC 61931, *Fibre optic – Terminology*

ISO 129-1, *Technical drawings – Indication of dimensions and tolerances – Part 1: General principles*

ISO 286-1, *ISO system of limits and fits – Part 1: Bases of tolerances, deviations and fits*

ISO 1101, *Geometrical Product Specifications (GPS) – Geometrical tolerancing – Tolerances of form, orientation, location and run-out*

ISO 8601, *Data elements and interchange formats – Information interchange – Representation of dates and times*

3 Terms and definitions

For the purposes of this document, the terms and definitions contained in IEC 60050-731, IEC 61931, and IEC 60874-1 as well as the following definitions apply.

3.1
cable joint
protective joint of two or more optical fibre cables. It may consist of fibre splices, organizers and closures

3.2
capillary mechanical splice
mechanical splice where the fibres are aligned by inserting them in a precision capillary tube

3.3
fibre splice
permanent or separable splice (see **separable splice**)

3.4
fusion splice
splice in which fibre ends are joined in a permanent manner by means of fusion

3.5
hybrid splice
cable splice with fibre splice(s) and electrical conductor splice(s)

3.6
interchangeable splice sets
splice sets are considered to be interchangeable when they both have the same installation geometry and functional performance

3.7
mechanical splice
splice in which the fibre ends are joined either permanently or separably by any mechanical means as long as the fibre ends are not fused together

3.8
permanent splice
splice which cannot be separated

3.9
precision rods mechanical splice
mechanical splice where the fibres are aligned using two or more precision rods

3.10
separable splice
splice which can be disassembled and reassembled but is intended for permanent use

3.11
shape memory alloy splice
mechanical splice where the fibres are aligned by using special materials which have the property to regain their original macroscopic shape when they are heated up (shape memory effect) or after an applied load is released, at higher temperature (superelasticity)

3.12
splice protector
protection of bare fibre after the primary coating has been stripped off for the splice procedure

NOTE Additionally, the splice protector reinforces the splice area and provides a possibility to mount this in a holder.

3.13
splice sub-family
range of fibre optic splice technologies as defined in the relevant specification

3.14
V- groove mechanical splice
mechanical splice where the fibres are aligned by using a precision V-groove

4 Requirements

The requirements for fibre optic splice hardware and accessories covered by this specification are specified in this clause and in the relevant specification.

4.1 Classification

Fibre optic splice hardware and accessories are classified, either totally or in part, by the following categories (see Table 1):

– type;
– arrangement ;
– style;
– variant;
– assessment level;
– normative reference extensions.

See Table 1 for an example of a complete fibre optic splice hardware classification.

Table 1 – Example of a typical mechanical splice and fusion splice protection hardware

Type	Name: V-groove mechanical splice Type of splice: mechanical splice Configuration: separable splice	Name: fusion splice protection Type of splice: fusion splice hardware Configuration: permanent splice
Arrangement	Kit arrangement with assembling tool	Splice protection kit
Style	Splice method: V-groove Alignment method: cladding (outside surface, axis) Number of simultaneously spliced fibres: one or more Index matching: gel Fibre coating removal: required, mechanical Splice protection hardware: sandwich or others	Fibre category: B1, A1 Single fibre protection Splice protection: shrinkable tubing
Variants	.....	.....

4.1.1 Type

Mechanical splices and fibre optic splice hardware shall be defined by the following items.

– Type name

Example: “brand name” mechanical splice

“brand name” splice protector

– Type of splice

Examples: mechanical splice

fusion splice hardware

– Configuration

Examples: permanent splice

separable splice

4.1.2 Arrangement

The fibre optic splice hardware arrangement shall define the delivered form of the item and the assembling tool, if needed.

Examples: kit arrangement

splice hardware arrangement

4.1.3 Style

Fibre optic splice style shall be defined by the following items, which may differ depending on the type of splice hardware.

4.1.3.1 Mechanical splice

Fibre category (according to the series IEC 60793-1)

– Splice method

Examples: V-groove

capillary tube
ferrule/sleeve
shape memory-based shrinkable tube
precision rod
adhesive bonding
crimping

– Alignment method
  Examples: cladding (outside surface, axis)
  core (transmitted power, visual)
  self-alignment
  secondary reference surface (for example termini)

– Number of simultaneously spliced fibres
  Examples: single/multiple (state the maximum number)

– Index matching
  Examples gel
  fluid
  cured resin
  none

– Fibre coating removal
  Examples: not required
  required
  - mechanical
  - chemical

4.1.3.2 Fusion splice

– Fibre category (according to the series IEC 60793-1)
– Number of simultaneously spliced fibres
  Examples: single
  multiple (state the maximum number)

4.1.3.3 Splice protection hardware

Examples: shrinkable tubing
capillary tubing
metal crimping
gel or fluid
cured resin
injection moulding
sandwich
soft layer

4.1.4 Variant

The splice hardware variants shall define additional features of structurally similar components (see 3.2).

Examples of feature variables which creates variants:

additional fibre and coating sizes accommodated

alternative mounting or fixing points

4.1.5 Assessment level

Assessment level defines the inspection levels and the acceptable quality level (AQL) of groups A and B and the periodicity of inspection of groups C and D. Detail specifications shall specify one or more assessment levels, each of which shall be designated by a capital letter.

The following are preferred levels.

– Assessment level A
  - Group A inspection: inspection level II, AQL = 4 %
  - Group B inspection: inspection level II, AQL = 4 %
  - Group C inspection: 24-month periods
  - Group D inspection: 48-month periods
– Assessment level B
  - Group A inspection: inspection level II, AQL = 1 %
  - Group B inspection: inspection level II, AQL = 1 %
  - Group C inspection: 18-month periods
  - Group D inspection: 36-month periods
– Assessment level C
  - Group A inspection: inspection level II, AQL = 0,4 %
  - Group B inspection: inspection level II, AQL = 0,4 %
  - Group C inspection: 12-month periods
  - Group D inspection: 24-month periods

4.1.6 Normative reference extensions

Normative reference extensions are utilised to identify integration of independent standards specifications or other reference documents into blank detail specifications.

Unless specified exception is noted, additional requirements imposed by an extension are mandatory. Usage is primarily intended to merge associated components to form hybrid devices, or can involve integrated functional application requirements that are dependent on technical expertise other than fibre optics.

Published reference documents produced by ITU consistent with the scope statements of the relevant IEC specification series may be utilised as extensions. Published documents produced by other regional standardisation bodies such as TIA, ETSI, JIS, etc., may be referenced in an informative annex attached to the generic specification.

Some optical fibre splice configurations require special qualification provisions that are not necessary to impose universally. These accommodate individual component design configurations, specialised field tooling, or specific application processes. In such cases, requirements may be necessary to assure repeatable performance or adequate safety, and provide additional guidance for complete product specification. These extensions are mandatory whenever utilised to prepare, assemble or install an optical fibre splice, either for field application usage or preparation of qualification test specimens. The relevant specification shall clarify all stipulations. However, design- and style-dependent extensions shall not be imposed universally.

In the event of conflicting requirements, precedence shall be given, in descending order, as follows: generic over mandatory extension, over blank detail, over detail, over application specific extension.

Examples of requirements in normative extensions include the following:

- some commercial or residential building applications may require direct reference to specific safety codes and regulations or incorporate other specific material flammability or toxicity requirements for specialised locations;
- specialised field tooling may require an extension to implement specific ocular safety, electrical shock or burn hazard avoidance requirements, or require isolation procedures to prevent potential ignition of combustible gases.

4.2 Documentation

4.2.1 Symbols

Graphical and letter symbols shall, whenever possible, be taken from the series IEC 60027, the series IEC 60617 and IEC 61930.

4.2.2 Specification system

This specification is part of a three-level IEC specification system. Subsidiary specifications shall consist of blank detail specifications and detail specifications. This system is shown in Table 2.