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INTERNATIONAL STANDARD

colour inside

Fibre optic interconnecting devices and passive components – Non-wavelength-selective fibre optic branching devices – Part 1: Generic specification

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – NON-WAVELENGTH-SELECTIVE FIBRE OPTIC BRANCHING DEVICES –

Part 1: Generic specification

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60875-1:2015. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 60875-1 has been prepared by IEC technical committee 86B: Fibre optic interconnecting devices and passive components. It is an International Standard.

This seventh edition cancels and replaces the sixth edition published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) removal of variant and reference extensions in clause classification
b) removal of specification system in clause documentation
c) removal of interface standards, reliability standards and interlinking in clause standardization system

The text of this International Standard is based on the following documents:

Draft	Report on voting
86B/4868/FDIS	86B/4903/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60875 series, published under the general title *Fibre optic interconnecting and passive components – Non-wavelength-selective fibre optic branching devices*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – NON-WAVELENGTH-SELECTIVE FIBRE OPTIC BRANCHING DEVICES –

Part 1: Generic specification

1 Scope

This part of IEC 60875 applies to non-wavelength-selective fibre optic branching devices, all exhibiting the following features:

– they are passive, in that they contain no optoelectronic or other transducing elements;
– they have three or more ports for either the entry or exit, or both, of optical power, and share optical power among these ports in a predetermined fashion;
– the ports are optical fibres, or optical fibre connectors.

This document establishes uniform requirements for the optical, mechanical and environmental properties.

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.

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

~~IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at http://www.electropedia.org/)~~

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 60825 (all parts), *Safety of laser products*

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

IEC 61754 (all parts), *Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces*

IEC TR 61930, *Fibre optic graphic symbology*

IEC TS 62627-09, *Fibre optic interconnecting devices and passive components – Vocabulary for passive optical devices*

ISO 129-1, *Technical ~~drawings~~ product documentation (TPD) – ~~Indication~~ Presentation of dimensions and tolerances – Part 1: General principles*

ISO 286-1, *Geometrical product specifications (GPS) – ISO code system for tolerances on linear sizes – Part 1: Basis 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 given in IEC 60050-731 and IEC TS 62627-09 and the following apply.

ISO and IEC maintain terminology 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 Basic terms and definitions

~~**3.1.1**~~
~~**port**~~
~~optical fibre or optical connector attached to a passive component for the entry (input port) and/or exit (output port) of the optical power~~

3.1.1
optical pigtail
~~short length of jumper~~ fibre or cable terminated with or without a connector at the end forming an optical port for an optical component

~~**3.1.3**~~
~~**transfer matrix**~~
~~optical properties of a non-wavelength-selective optic branching device can be defined in terms of an $n \times n$ matrix of coefficients, n being the number of ports, with the coefficients representing the fractional optical power transferred between designated ports~~

~~Note 1 to entry: In general, the transfer matrix T is as follows:~~

$$T = \begin{bmatrix} t_{11} & t_{12} & \cdot & \cdot & \cdot & t_{1n} \\ t_{21} & & & & & \\ \cdot & & & & & \\ \cdot & & & t_{ij} & & \\ \cdot & & & & & \\ t_{n1} & & & & & t_{nn} \end{bmatrix}$$

~~where~~

~~t_{ij} is the ratio of the optical power P_{ij} transferred out of port j with respect to input power P_i into port i, that is:~~

$$t_{ij} = P_{ij}/P_i$$

~~The transfer matrix is used to classify the different types of non-wavelength-selective branching devices which are specified in this generic specification.~~

~~Note 2 to entry: In a non-wavelength-selective branching device, the coefficients t_{ij} may be a function of the input wavelength, input polarization or modal power distribution. The values of these parameters are provided in the detail specification, when necessary.~~

~~Note 3 to entry: Single-mode, non-wavelength-selective branching devices may operate in a coherent fashion with respect to multiple inputs. Consequently, the transfer coefficients may be affected by the relative phase and intensity of simultaneous coherent optical power inputs at two or more ports.~~

~~**3.1.4**~~
~~**transfer coefficient**~~
~~element t_{ij} of the transfer matrix~~

~~**3.1.5**~~
~~**conducting port pair**~~
~~two ports i and j between which t_{ij} is nominally greater than zero~~

~~**3.1.6**~~
~~**isolated port pair**~~
~~two ports i and j between which t_{ij} is nominally zero, and a_{ij} is nominally infinite~~

3.2 Component definitions

3.2.1
non-wavelength-selective branching device
<optical> coupler
<optical> splitter
bidirectional passive component possessing three or more ports which operates non-selectively over a specified range of wavelengths, divides or combines optical power coming into one or more input port(s) among its one or more output port(s) in a predetermined fashion, without any amplification, switching, or other active modulation

3.2.2
bidirectional non-wavelength-selective branching device
device whose transfer matrix element of t_{ij} is equal to t_{ji} for all i and j

3.2.3
non-bidirectional non-wavelength-selective branching device
device which at least one transfer matrix element of t_{ij} is not equal to t_{ji}

3.2.4
balanced coupler
non-wavelength-selective branching device designed ~~and intended to produce~~ to ensure that the power at each output port ~~power~~ from the same input port is equal

3.2.5
unbalanced coupler
non-wavelength-selective branching device designed ~~and intended to produce~~ to ensure that the power at ~~least one~~ each output port ~~power~~ from the same input port is not equal

3.2.6
tap-coupler
unbalanced coupler

Note 1 to entry: Typically the coupling ratio is from 1 % to 20 %.

3.3 Performance parameter definitions

~~**3.3.1**~~
~~**insertion loss**~~
~~reduction in optical power between an input and output port of a passive component expressed in decibels and defined as~~

$$~~a = -10 \log_{10} (P_1/P_0)~~$$

~~where~~

~~P_0 is the optical power launched into the input port;~~

~~P_1 is the optical power received from the output port.~~

~~**3.3.2**~~
~~**return loss**~~
~~fraction of input power that is returned from a port of a passive component expressed in decibelsand defined as~~

$$~~RL = -10 \log_{10} (P_r/P_0)~~$$

~~where~~

~~P_0 is the optical power launched into a port;~~

~~P_r is the optical power received back from the same port.~~

~~**3.3.3**~~
~~**directivity**~~
~~optical attenuation expressed in decibels between ports which have conducting connections at any state within isolated port pairs~~

~~Note 1 to entry: It is a positive value expressed in dB. Generally, directivity for a passive device is defined as the minimum value of directivities of all ports.~~

~~Note 2 to entry: Directivity is the optical loss between ports which has no conducting connections within all operating wavelength ranges.~~

~~Note 3 to entry: Directivity is defined for port pairs which are expected to be isolated but not expressly intended to be isolated. That means it is expected to isolate leak light and/or stray light.~~

~~**3.3.4**~~
~~**excess loss**~~
~~total power lost in a non-wavelength-selective branching device when an optical signal is launched into port i, defined as~~

$$~~EL_i = -10 \log_{10} \sum_j t_{ij}~~$$

~~where the summation is performed only over those values j for which i and j are conducting ports~~

~~Note 1 to entry: For a non-wavelength-selective branching device with n input ports, there is an array of n values of excess loss, one for each input port i.~~

3.3.1
uniformity
U
difference between the maximum and minimum attenuation measured for all output ports for one input port

Note 1 to entry: For each input port, it is the maximum value over the operating wavelength range or ranges. The uniformity for a device with more than one input port is defined as the maximum value of uniformities of all input ports.

Note 2 to entry: Uniformity is expressed as difference of maximum and minimum value of each attenuation (insertion loss) from a common input port. It is expressed in decibels.

Note 3 to entry: Generally, uniformity for a passive device is defined as maximum value of uniformities of all ports.

3.3.2
coupling ratio
splitting ratio
CR
for a given input port i, the ratio of light at a given output port k to the total light from all output ports where j represents the operational output ports

Note 1 to entry: Coupling ratio is calculated by

$$CR_{ik} = t_{ik} / \sum_j t_{ij}$$

where t_{ij} is a transmission element from port i to port j.

~~**3.3.7**~~
~~**operating wavelength**~~
~~nominal wavelength λ, at which a passive component is designed to operate with the specified performance~~

~~**3.3.8**~~
~~**operating wavelength range**~~
~~specified range of wavelengths from $\lambda_{i\ min}$ to $\lambda_{i\ max}$ about a nominal operating wavelength λ_i, within which a passive component is designed to operate with the specified performance~~

~~Note 1 to entry: For a non-wavelength-selective branching device with more than one operating wavelength, the corresponding wavelength ranges are not necessarily equal.~~

~~**3.3.9**~~
~~**polarization dependent loss**~~
~~PDL~~
~~maximum variation of insertion loss due to a variation of the state of polarization (SOP) over all the SOPs~~

~~Note 1 to entry: This note applies to the French language only.~~

~~Note 2 to entry: This note applies to the French language only.~~

4 Requirement

4.1 Classification

4.1.1 General

Several technologies exist for the manufacturing of non-wavelength-selective branching devices. Typical technologies of non-wavelength selective branching devices are:

– Fused biconic taper;
– Planar lightwave circuit.

Some examples are given in Annex A.

Non-wavelength-selective branching devices shall be classified as follows:

– type;
– style~~;~~
~~– variant;~~
~~– performance standard grade;~~
~~– assessment level;~~
~~– normative reference extensions~~.

4.1.2 Types

The main characteristics of each type are as follows:

– transmissive ~~or~~;
– reflective~~;~~.
~~– bidirectional or unidirectional;~~
~~– tree or star;~~
~~– any combination of the above.~~

4.1.3 Style

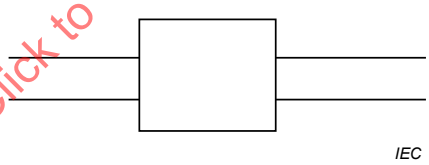
~~4.1.3.1 General~~

~~Non-wavelength-selective branching devices may be classified into styles based on the fibre type(s), the connector type(s), the cable type(s), the housing shape, and the configuration. The configuration of branching device ports are classified as follows:~~

~~4.1.3.2 Configuration A~~

~~Device containing integral fibre optic pigtails, without connectors (see Figure 1).~~

~~EXAMPLE~~

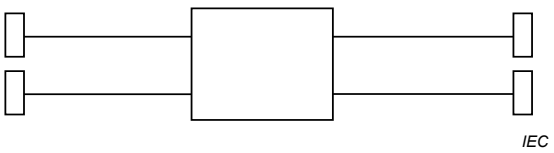


~~Figure 1 – Non-wavelength-selective branching device~~

~~4.1.3.3 Configuration B~~

~~Device containing integral fibre optic pigtails, with a connector on each pigtail (see Figure 2).~~

~~EXAMPLE~~

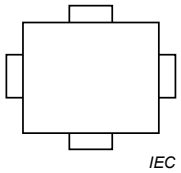


~~Figure 2 – Non-wavelength-selective branching device~~

~~4.1.3.4 Configuration C~~

~~Device containing fibre optic connectors as an integral part of the device housing (see Figure 3).~~

~~EXAMPLE~~

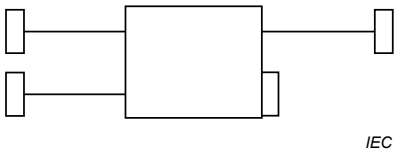


~~Figure 3 – Non-wavelength-selective branching device~~

~~4.1.3.5 Configuration D~~

~~Device containing some combination of the interfacing features of the preceding configurations (see Figure 4).~~

~~EXAMPLE~~



~~Figure 4 – Non-wavelength-selective branching device~~

~~4.1.4 Variant~~

~~The branching device variant identifies those common features which encompass structurally similar components.~~

~~Examples of features which define a variant include, but are not limited to the following:~~

~~– orientation of ports;~~

~~– means of mounting.~~

~~4.1.5 Normative reference extensions~~

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

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

~~Published reference documents produced by ITU, consistent with the scope of the relevant IEC specification series may be used as extension.~~

~~Some optical splice configurations require special qualification provisions which shall not be imposed universally. This accommodates individual component design configurations, specialized field tooling or specific application processes. In this case, requirements necessary to assure repeatable performance or adequate safety, and provide additional guidance for complete product specification. These extensions are mandatory whenever used to prepare, assemble or install an optical 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, in descending order, shall be generic over mandatory extension, over blank detail, over detail, over application specific extension.~~

Non-wavelength-selective branching devices may have fibre or cable type pigtails with or without optical connectors. If equipped with optical connectors, the optical connectors shall meet the requirements of IEC 61754 series.

4.2 Documentation

4.2.1 Symbols

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

~~4.2.2 Specification system~~

~~4.2.2.1 General~~

~~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 1. There are no sectional specifications for non-wavelength-selective branching devices.~~

~~Table 1 – Three-level IEC specification structure~~

~~Specification level~~	~~Examples of information to be included~~	~~Applicable to~~
~~Basic~~	~~Assessment system rules~~ ~~Inspection rules~~ ~~Optical measuring methods~~ ~~Environmental test methods~~ ~~Sampling plans~~ ~~Identification rule~~ ~~Marking standards~~ ~~Dimensional standards~~ ~~Terminology standards~~ ~~Symbol standards~~ ~~Preferred number series~~ ~~SI units~~	~~Two or more component families or sub-families~~
~~Generic~~	~~Specific terminology~~ ~~Specific symbols~~ ~~Specific units~~ ~~Preferred values~~ ~~Marking~~ ~~Quality assessment procedures~~ ~~Selection of tests~~ ~~Qualification approval and/or capability approval procedures~~	~~Component family~~
~~Blank detail~~	~~Quality conformance test schedule~~ ~~Inspection requirements~~ ~~Information common to a number of types~~	~~Groups of types having a common test schedule~~
~~Detail~~	~~Individual values~~ ~~Specific information~~ ~~Completed quality conformance test schedules~~	~~Individual type~~

~~4.2.2.2 Blank detail specifications~~

~~Blank detail specifications are not, by themselves, a specification level. They are associated with the generic specification.~~

~~Each blank detail specification shall be limited to one environmental category.~~

~~Each blank detail specification shall contain:~~

- ~~minimum mandatory test schedules and performance requirements;~~
- ~~one or more assessment levels;~~
- ~~the preferred format for stating the required information in the detail specification;~~
- ~~in case of hybrid components, including connectors, addition of appropriate entry fields to show the reference normative document, document title and issue date.~~

~~4.2.2.3 Detail specifications~~

~~A specific non-wavelength-selective branching device is described by a corresponding detail specification, which is prepared by filling in the blanks of the blank detail specification. Within the constraints imposed by this generic specification, the blank detail specification may be filled in by any national committee of the IEC, thereby defining a particular non-wavelength-selective branching device design as an IEC standard.~~

~~Detail specifications shall specify the following, as applicable:~~

- ~~type (see 4.1.2);~~
- ~~style (see 4.1.3);~~
- ~~variant(s) (see 4.1.4);~~
- ~~part identification number for each variant (see 4.7.2);~~
- ~~drawings, dimensions required (see 4.2.3);~~
- ~~performance requirements (see 4.6).~~

4.2.2 Drawings

4.2.2.1 General

The drawings and dimensions given in detail specifications shall not restrict themselves to details of construction, nor shall they be used as manufacturing drawings.

4.2.2.2 Projection system

Either first angle or third angle projection shall be used for the drawings in documents covered by this specification. All drawings within a document shall use the same projection system and the drawings shall state which system is used.

4.2.2.3 Dimensional system

All dimensions shall be given in accordance with ISO 129-1, ISO 286-1 and ISO 1101.

The metric system shall be used in all specifications.

Dimensions shall not contain more than five significant digits.

When units are converted, a note shall be added in each relevant specification and the conversion between systems of units shall use a factor of 25,4 mm to 1 inch.

4.2.3 Measurements

4.2.3.1 Measurement method

The measurement method for optical, mechanical, climatic, and environmental characteristics of branching devices to be used ~~shall~~ should be defined and selected preferentially from the IEC 61300 series.

The size measurement method to be used shall be specified in the detail specification for any dimensions which are specified within a total tolerance zone of ≤0,01 mm.

4.2.3.2 Reference components

Reference components for measurement purposes, if required, shall be specified in the relevant IEC standards or industrial specifications.

~~**4.2.4.3 Gauges**~~

~~Gauges, if required, shall be specified in the relevant specification.~~

4.2.4 Test data sheets

Test data sheets shall be prepared for each test conducted as required by a relevant IEC standard or industrial specification. The data sheets shall be included in the qualification report and in the periodic inspection report.

Data sheets shall contain the following information as a minimum:

– title of test and date;
– specimen description including the type of fibre ~~and the variant identification number (see 4.7.2)~~;
– test equipment used and date of latest calibration;
– all applicable test details;
– all measurement values and observations;
– sufficiently detailed documentation to provide traceable information for failure analysis.

4.2.5 Instructions for use

Instructions for use, when required, shall be given by the manufacturer and shall include:

– assembly and connection instructions;
– cleaning method;
– safety aspects;
– additional information as necessary.

4.3 Standardization system of performance standards

~~**4.3.1 Interface standards**~~

~~The interface standards provide both manufacturer and user with all the information they require to make or use a product conforming to the physical features of that standard interface. Interface standards fully define and provide dimensions for the features essential for the mating and unmating of optical connectors and other components. They also serve to position the optical datum target, where defined, relative to other reference datum.~~

~~Interface standards ensure that connectors and adaptors that comply with the standard will fit together. The standards may also contain tolerance grades for ferrules and alignment devices. Tolerance grades are used to provide different levels of alignment precision.~~

~~The interface dimensions may also be used to design other components that will mate with the connectors. For example, an active device mount can be designed using the adapter interface dimensions. The use of these dimensions combined with those of a standard plug, provides the designer with assurance that the standard plugs will fit into the optical device mount. They also provide the location of the plug's optical datum target.~~

~~Standard interface dimensions do not, by themselves, guarantee optical performance. They guarantee connector mating at a specified fit. Optical performance is currently guaranteed via the manufacturing specification. Products from the same or different manufacturing specifications using the same standard interface will always fit together. Guaranteed performance can be given by any single manufacturer only for products delivered to the same manufacturing specification. However, it can be reasonably expected that some level of performance will be obtained from products having different manufacturing specifications, although the level of performance cannot be expected to be any better than that of the lowest specified performance.~~

~~4.3.2 Performance standards~~

Performance standards contain a series of tests and measurements (which ~~may or may not~~ can be grouped into a specified schedule depending on the requirements of that standard) with clearly defined conditions, severities and pass/fail criteria. The tests are intended to be run on a "once-off" basis to prove any product's ability to satisfy the "performance standards" requirements of a market sector, user group or system location. A product that has been shown to meet all the requirements of a performance standard can be declared as complying with a performance standard but should then be controlled by a quality assurance~~/~~ or quality conformance programme.

A key point of the test and measurement standards for their application (particularly with regard to attenuation (insertion loss) and return loss) in conjunction with the interface standards of interproduct compatibility can be defined. Conformity of each individual product to this document will be ensured.

~~4.3.3 Reliability standards~~

~~Reliability standards are intended to ensure that a component can meet performance specifications under stated conditions for a stated time period.~~

~~For each type of component, the following shall be identified (and shall appear in the standard):~~

~~– failure modes (observable, general mechanical or optical effects of failure);~~

~~– failure mechanisms (general causes of failure common to several components);~~

~~– failure effects (detailed cause of failure, specific to component).~~

~~These are all related to environmental and material aspects.~~

~~Initially, just after component manufacture, there is an "infant mortality phase" during which many components would fail if deployed in the field. To avoid early field failure, all components can be subjected to a screening process in the factory, involving environmental stress that may be mechanical, thermal or humidity related. This is to induce known failure mechanisms in a controlled environmental situation to occur earlier than would normally be seen in an unscreened population. For those components that survive (and are then sold), there is a reduced failure rate since these mechanisms have been eliminated.~~

~~Screening is an optional part of the manufacturing process rather than a test method. It does not affect the "useful life" of a component, defined as the period during which it performs according to specifications. Eventually, other failure mechanisms appear and the failure rate increases beyond the defined threshold. At this point, the useful life ends and the "wear-out period" begins and the component must be replaced.~~

~~At the beginning of useful life, performance testing on a sampled population of components may be applied by the supplier, by the manufacturer or by a third party. This is to ensure that the component meets performance specifications over the range of intended environments at this initial time. Reliability testing, on the other hand, is applied to ensure that the component meets performance specifications for at least a specified minimum useful lifetime or for a specified maximum failure rate. These tests are usually carried out by utilizing the performance testing but increasing duration and severity in order to accelerate the failure mechanism.~~

~~A reliability theory relates component reliability testing to component parameters and to lifetime or failure rate under testing. The theory then extrapolates these to life or failure rate under less stressful service conditions. The reliability specifications include values of the component parameters needed to ensure the specified minimum lifetime or maximum failure rate in service.~~

~~4.3.4 Interlinking~~

~~Standards currently under preparation are given in Figure 5. A large number of the test and measurement standards exist already and the quality assurance qualification approval standards have existed for many years.~~

~~When interface, performance and reliability standards are in place, the matrix given in Table 2 demonstrates some of the options available for product standardization.~~

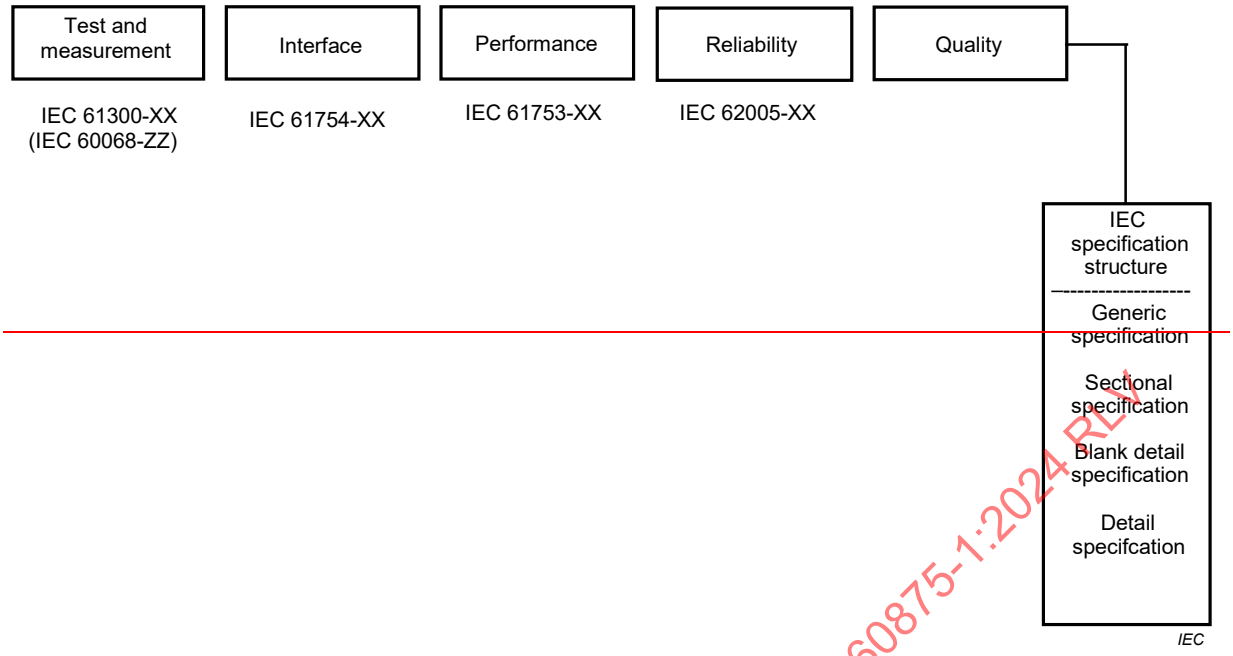
~~Product A is a product that is fully IEC standardized, having a standard interface and meeting defined performance standards and reliability standards.~~

~~Product B is a product with a proprietary interface, but which meets a defined IEC performance standard and reliability standard.~~

~~Product C is a product which complies with an IEC standard interface but does not meet the requirement of either an IEC performance standard or reliability standard.~~

~~Product D is a product which complies with an IEC interface standard and with a performance standard, but does not meet a reliability requirement.~~

~~Obviously, the matrix is more complex than shown since there will be a number of interface, performance and reliability standards that can be cross-related. In addition, all the products may be subject to a recognized quality assurance programme or even a national or company quality assurance system. Table 3 shows options of qualification approval, capability approval and technology approval within a quality assurance programme.~~



~~**Figure 5 – Standards**~~

~~**Table 2 – Standards interlink matrix**~~

	~~Interface standard~~	~~Performance standard~~	~~Reliability standard~~
~~Product A~~	~~Yes~~	~~Yes~~	~~Yes~~
~~Product B~~	~~No~~	~~Yes~~	~~Yes~~
~~Product C~~	~~Yes~~	~~No~~	~~No~~
~~Product D~~	~~Yes~~	~~Yes~~	~~No~~

~~**Table 3 – Quality assurance options**~~

	~~Company A~~			~~Company B~~			~~Company C~~		
	~~QA[a]~~	~~CA[b]~~	~~TA[c]~~	~~QA[a]~~	~~CA[b]~~	~~TA[c]~~	~~QA[a]~~	~~CA[b]~~	~~TA[c]~~
~~Product A~~	~~x~~			~~x~~					~~x~~
~~Product B~~	~~x~~				~~x~~				~~x~~
~~Product C~~	~~x~~				~~x~~				~~x~~
~~Product D~~	~~x~~					~~x~~			~~x~~

~~[a] Qualification approval~~

~~[b] Capability approval~~

~~[c] Technology approval~~

4.4 Design and construction

4.4.1 Materials

4.4.1.1 Corrosion resistance

All materials used in the construction shall be corrosion resistant or suitably finished to meet the requirements of the relevant IEC standard or industrial specification.

4.4.1.2 Non-flammable materials

When non-flammable materials are required, the requirement shall be specified ~~in the specification and reference shall be made to IEC 60695-11-5~~. IEC 60695-11-5 should be used as the reference, unless otherwise specified.

4.4.2 Workmanship

Components and associated hardware shall be manufactured to a uniform quality and shall be free of sharp edges, burrs or other defects that will affect service life, serviceability, or appearance. Particular attention shall be given to neatness and thoroughness of marking, plating, soldering, bonding, etc.

4.5 Quality

The reliability qualification documents for non-wavelength-selective branching devices ~~shall be controlled by the quality assessment procedures~~ are standardized in IEC 62005-9-1. The measurement and test procedures from the IEC 61300 series shall be used, as applicable.

4.6 Performance requirements

Branching devices shall meet the performance requirements specified in the relevant IEC ~~performance~~ standard or industrial specification.

4.7 Identification and marking

4.7.1 General

Components, associated hardware, and packages shall be permanently and legibly identified and marked when this is required by the ~~detail~~ relevant IEC standard or industrial specification.

~~4.7.2 Variant identification number~~

~~Each variant in a detail specification shall be assigned a variant identification number. The number shall consist of the number assigned to the detail specification followed by a four-digit number preceded by a dash and a letter designating the assessment level. The first digit of the four-digit number shall be sequentially assigned to each component type covered by the detail specification. The last three digits shall be sequentially assigned to each variant of the component.~~

~~Example:~~ ~~QC810001/US0001 -1~~ ~~001~~ ~~A~~

~~Detail specification number~~

~~Component type~~

~~Variant number~~

~~Assessment level~~

4.7.2 Component marking

Component marking, if required, shall be specified in the ~~detail~~ relevant IEC standard or industrial specification. The preferred order of marking is as follows:

a) port identification;

b) manufacturer's part or serial number ~~(including serial number, if applicable)~~;

c) manufacturer's identification mark or logo~~;~~

~~d) manufacturing date;~~

~~e) variant identification number;~~

~~f) any additional marking required by the detail specification~~.

If space does not allow for all the required marking on the component, each unit shall be individually packaged with a data sheet containing all the required information which is not marked.

4.7.3 Package marking

Several non-wavelength-selective branching devices may be packed together for shipment.

Package marking, if required, shall be specified in the ~~detail~~ relevant IEC standard or industrial specification. The preferred order of marking is as follows:

a) manufacturer's identification mark or logo;

b) manufacturer's part number;

c) manufacturing date code (year/week, see ISO 8601);

~~d) variant identification number(s) (see 4.7.2);~~

~~e) type designation (see 4.1.2);~~

~~f) any additional marking required by the detail specification.~~

When applicable, individual unit packages (within the sealed package) shall be marked with the reference number of the certified record of released lots, the manufacturer's factory identity code, and the component identification.

4.8 Safety

Non-wavelength-selective branching devices, when used on either an optical transmission system ~~and/~~or equipment, or both, may emit potentially hazardous radiation from an uncapped or unterminated output port or end.

The non-wavelength-selective branching device manufacturers shall make available sufficient information to alert system designers and users about the potential hazard and shall indicate the required precautions and working practices.

In addition, each ~~detail~~ relevant IEC standard or industrial specification shall include the following:

WARNING NOTE

Care should be taken when handling small diameter fibre optics to prevent puncturing the skin, especially near the eyes. Direct viewing of the end of an optical fibre or an optical connector when it is propagating energy is not recommended unless prior assurance has been obtained as to the safety of the energy output level.

Reference shall be made to the IEC 60825 series, the relevant standard on safety.

Annex A
(informative)

Examples technologies of non-wavelength-selective fibre optic branching devices

Non-wavelength selective branching devices are typically based on the following two optical technologies. One is the fused biconic taper (FBT) technology (Figure A.1), which is mainly used for 1(2) × 2, 1(3) × 3 and 1(4) × 4 couplers (splitters). FBT-type optical branching device is manufactured by coming close between two or more optical fibres and fused using burner or heater system. It functions by evanescent effects. Fused fibres are typically fixed on a glass half-tube by adhesive. And a half-tube is packed by a hard pipe.

The other is the planar lightwave circuit (PLC) technology shown in Figure A.2, which is mainly used for 1(2) × N (N = 4 to 128) couplers (splitters). A PLC-type fibre optic branching device consists of a PLC chip and optical fibres which are connected to the facets of the PLC chip by adhesive as shown in Figure A.2. The typical fabrication methods of PLC chips are shown in Annex B.

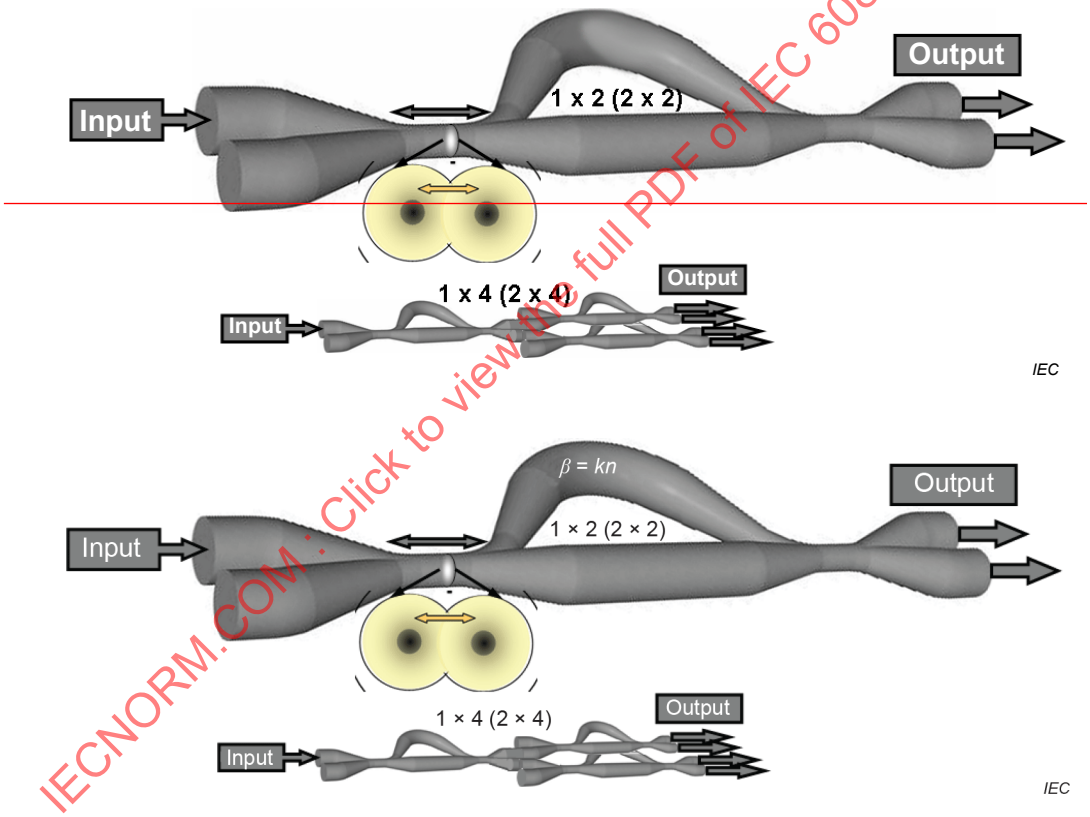


Figure A.1 – FBT-type optical branching device technology

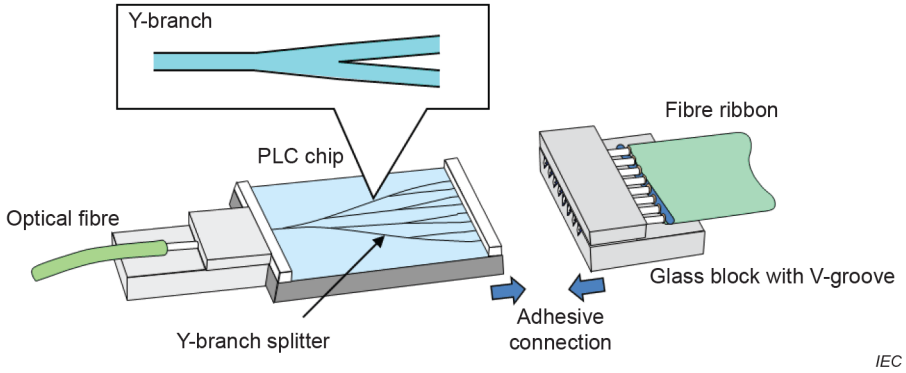


Figure A.2 – PLC-type optical branching device technology

Annex B
(informative)

Examples of fabrication technology of PLC chips

~~The typical fabrication methods of PLCs are shown in Annex B.~~ In the flame hydrolysis deposition (FHD) method, PLC is manufactured by depositing those particles of SiO_2 and GeO_2 on a substrate by reacting reactant gas in oxyhydrogen flame and light waveguide is molded by etching (Figure B.1). In the chemical vapour deposition (CVD) method, light waveguide is molded by etching the cores fabricated by reacting reactant gas (Figure B.2). In Ion-exchange method, light waveguide is molded by enhancing the refractive index of the place where Na^+ ion in glass is exchanged for Ag^+ in molten salt by soaking glass including Na^+ in molten salt including Ag^+ (Figure B.3).

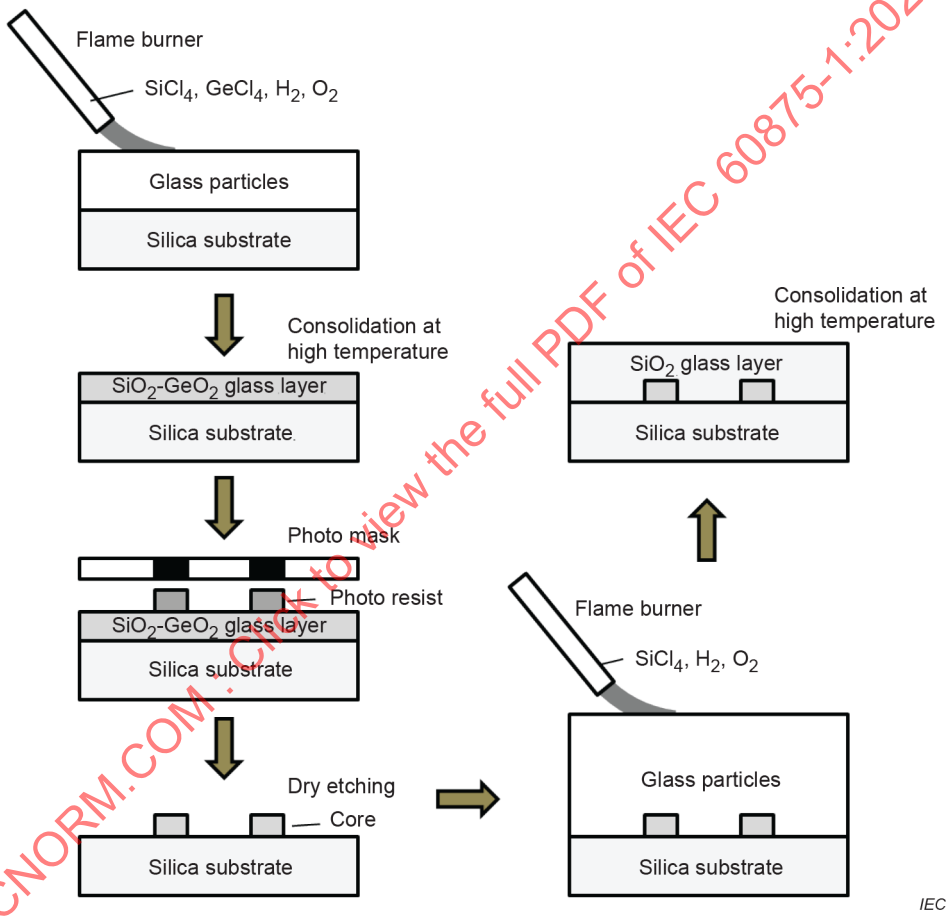


Figure B.1 – Fabrication by FHD method

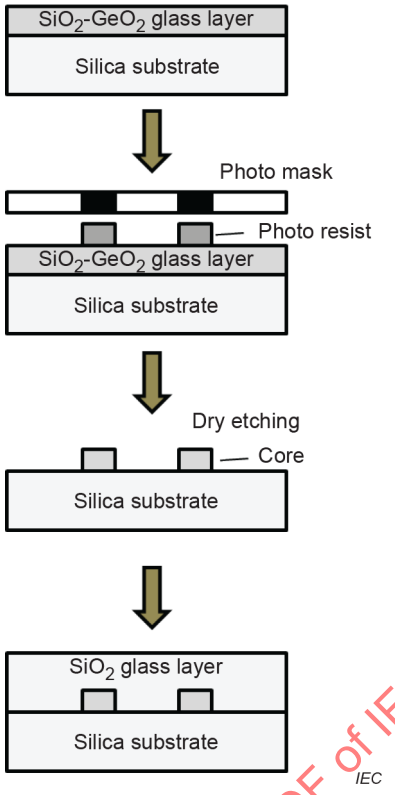


Figure B.2 – Fabrication by CVD method

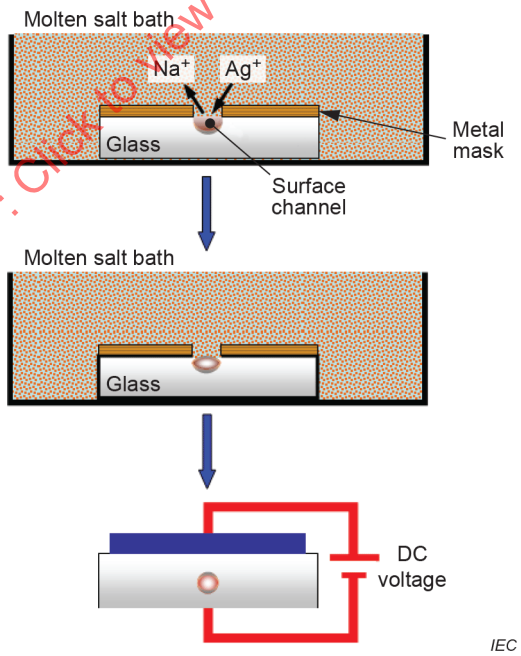


Figure B.3 – Fabrication by ion-exchange method

Bibliography

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

IEC 60068 (all parts), *Environmental testing*

IEC 60410, *Sampling plans and procedures for inspection by attributes*

IEC 60974 (all parts), *Arc welding equipment*

~~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 61753 (all parts), *Fibre optic interconnecting devices and passive components – Performance standard*

~~IEC 61754 (all parts), *Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces*~~

~~IEC TR 61931, *Fibre optic – Terminology*~~

~~IEC 62005 (all parts), *Reliability of fibre optic interconnecting devices and passive optical components*~~

IEC 62005-9-1, *Fibre optic interconnecting devices and passive components – Reliability – Part 9-1: Qualification of passive optical components*

IEC TR 61931, *Fibre optic – Terminology*

IEC Guide 104, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ITU-T Recommendation G.671, *Transmission characteristics of optical components and subsystems*

IEC 60875-1

Edition 7.0 2024-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Fibre optic interconnecting devices and passive components – Non-wavelength-selective fibre optic branching devices – Part 1: Generic specification

Dispositifs d'interconnexion et composants passifs fibroniques – Dispositifs de couplage fibroniques ne dépendant pas de la longueur d'onde – Partie 1: Spécification générique

IEC 60875-1:2024-04(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – NON-WAVELENGTH-SELECTIVE FIBRE OPTIC BRANCHING DEVICES –

Part 1: Generic specification

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC 60875-1 has been prepared by IEC technical committee 86B: Fibre optic interconnecting devices and passive components. It is an International Standard.

This seventh edition cancels and replaces the sixth edition published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) removal of variant and reference extensions in clause classification
b) removal of specification system in clause documentation

c) removal of interface standards, reliability standards and interlinking in clause standardization system

The text of this International Standard is based on the following documents:

Draft	Report on voting
86B/4868/FDIS	86B/4903/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60875 series, published under the general title *Fibre optic interconnecting and passive components – Non-wavelength-selective fibre optic branching devices*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – NON-WAVELENGTH-SELECTIVE FIBRE OPTIC BRANCHING DEVICES –

Part 1: Generic specification

1 Scope

This part of IEC 60875 applies to non-wavelength-selective fibre optic branching devices, all exhibiting the following features:

– they are passive, in that they contain no optoelectronic or other transducing elements;

– they have three or more ports for either the entry or exit, or both, of optical power, and share optical power among these ports in a predetermined fashion;

– the ports are optical fibres, or optical fibre connectors.

This document establishes uniform requirements for the optical, mechanical and environmental properties.

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.

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 60825 (all parts), *Safety of laser products*

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

IEC 61754 (all parts), *Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces*

IEC TR 61930, *Fibre optic graphic symbology*

IEC TS 62627-09, *Fibre optic interconnecting devices and passive components – Vocabulary for passive optical devices*

ISO 129-1, *Technical product documentation (TPD) – Presentation of dimensions and tolerances – Part 1: General principles*

ISO 286-1, *Geometrical product specifications (GPS) – ISO code system for tolerances on linear sizes – Part 1: Basis 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 given in IEC 60050-731 and IEC TS 62627-09 and the following apply.

ISO and IEC maintain terminology 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 Basic terms and definitions

3.1.1
optical pigtail
fibre or cable terminated with or without a connector at the end forming an optical port for an optical component

3.2 Component definitions

3.2.1
non-wavelength-selective branching device
<optical> coupler
<optical> splitter
bidirectional passive component possessing three or more ports which operates non-selectively over a specified range of wavelengths, divides or combines optical power coming into one or more input port(s) among its one or more output port(s) in a predetermined fashion, without any amplification, switching, or other active modulation

3.2.2
bidirectional non-wavelength-selective branching device
device whose transfer matrix element of t_{ij} is equal to t_{ji} for all i and j

3.2.3
non-bidirectional non-wavelength-selective branching device
device which at least one transfer matrix element of t_{ij} is not equal to t_{ji}

3.2.4
balanced coupler
non-wavelength-selective branching device designed to ensure that the power at each output port from the same input port is equal

3.2.5
unbalanced coupler
non-wavelength-selective branching device designed to ensure that the power at each output port from the same input port is not equal

3.2.6
tap-coupler
unbalanced coupler

Note 1 to entry: Typically the coupling ratio is from 1 % to 20 %.

3.3 Performance parameter definitions

3.3.1
uniformity
U
difference between the maximum and minimum attenuation measured for all output ports for one input port

Note 1 to entry: For each input port, it is the maximum value over the operating wavelength range or ranges. The uniformity for a device with more than one input port is defined as the maximum value of uniformities of all input ports.

Note 2 to entry: Uniformity is expressed as difference of maximum and minimum value of each attenuation (insertion loss) from a common input port. It is expressed in decibels.

Note 3 to entry: Generally, uniformity for a passive device is defined as maximum value of uniformities of all ports.

3.3.2
coupling ratio
splitting ratio
CR
for a given input port i, the ratio of light at a given output port k to the total light from all output ports where j represents the operational output ports

Note 1 to entry: Coupling ratio is calculated by

$$CR_{ik} = t_{ik} \Big/ \sum_{j} t_{ij}$$

where t_{ij} is a transmission element from port i to port j.

4 Requirement

4.1 Classification

4.1.1 General

Several technologies exist for the manufacturing of non-wavelength-selective branching devices. Typical technologies of non-wavelength selective branching devices are:

– Fused biconic taper;
– Planar lightwave circuit.

Some examples are given in Annex A.

Non-wavelength-selective branching devices shall be classified as follows:

– type;
– style.

4.1.2 Types

The main characteristics of each type are as follows:

– transmissive;
– reflective.

4.1.3 Style

Non-wavelength-selective branching devices may have fibre or cable type pigtails with or without optical connectors. If equipped with optical connectors, the optical connectors shall meet the requirements of IEC 61754 series.

4.2 Documentation

4.2.1 Symbols

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

4.2.2 Drawings

4.2.2.1 General

The drawings and dimensions given in detail specifications shall not restrict themselves to details of construction, nor shall they be used as manufacturing drawings.

4.2.2.2 Projection system

Either first angle or third angle projection shall be used for the drawings in documents covered by this specification. All drawings within a document shall use the same projection system and the drawings shall state which system is used.

4.2.2.3 Dimensional system

All dimensions shall be given in accordance with ISO 129-1, ISO 286-1 and ISO 1101.

The metric system shall be used in all specifications.

Dimensions shall not contain more than five significant digits.

When units are converted, a note shall be added in each relevant specification and the conversion between systems of units shall use a factor of 25,4 mm to 1 inch.

4.2.3 Measurements

4.2.3.1 Measurement method

The measurement method for optical, mechanical, climatic, and environmental characteristics of branching devices to be used should be defined and selected preferentially from the IEC 61300 series.

The size measurement method to be used shall be specified in the detail specification for any dimensions which are specified within a total tolerance zone of ≤0,01 mm.

4.2.3.2 Reference components

Reference components for measurement purposes, if required, shall be specified in the relevant IEC standards or industrial specifications.

4.2.4 Test data sheets

Test data sheets shall be prepared for each test conducted as required by a relevant IEC standard or industrial specification. The data sheets shall be included in the qualification report and in the periodic inspection report.

Data sheets shall contain the following information as a minimum:

– title of test and date;
– specimen description including the type of fibre;
– test equipment used and date of latest calibration;
– all applicable test details;
– all measurement values and observations;
– sufficiently detailed documentation to provide traceable information for failure analysis.

4.2.5 Instructions for use

Instructions for use, when required, shall be given by the manufacturer and shall include:

– assembly and connection instructions;
– cleaning method;
– safety aspects;
– additional information as necessary.

4.3 Standardization system of performance standards

Performance standards contain a series of tests and measurements (which can be grouped into a specified schedule depending on the requirements of that standard) with clearly defined conditions, severities and pass/fail criteria. The tests are intended to be run on a "once-off" basis to prove any product's ability to satisfy the "performance standards" requirements of a market sector, user group or system location. A product that has been shown to meet all the requirements of a performance standard can be declared as complying with a performance standard but should then be controlled by a quality assurance or quality conformance programme.

A key point of the test and measurement standards for their application (particularly with regard to attenuation (insertion loss) and return loss) in conjunction with the interface standards of interproduct compatibility can be defined. Conformity of each individual product to this document will be ensured.

4.4 Design and construction

4.4.1 Materials

4.4.1.1 Corrosion resistance

All materials used in the construction shall be corrosion resistant or suitably finished to meet the requirements of the relevant IEC standard or industrial specification.

4.4.1.2 Non-flammable materials

When non-flammable materials are required, the requirement shall be specified. IEC 60695-11-5 should be used as the reference, unless otherwise specified..

4.4.2 Workmanship

Components and associated hardware shall be manufactured to a uniform quality and shall be free of sharp edges, burrs or other defects that will affect service life, serviceability, or appearance. Particular attention shall be given to neatness and thoroughness of marking, plating, soldering, bonding, etc.

4.5 Quality

The reliability qualification documents for non-wavelength-selective branching devices are standardized in IEC 62005-9-1. The measurement and test procedures from the IEC 61300 series shall be used, as applicable.

4.6 Performance requirements

Branching devices shall meet the performance requirements specified in the relevant IEC standard or industrial specification.

4.7 Identification and marking

4.7.1 General

Components, associated hardware, and packages shall be permanently and legibly identified and marked when this is required by the relevant IEC standard or industrial specification.

4.7.2 Component marking

Component marking, if required, shall be specified in the relevant IEC standard or industrial specification. The preferred order of marking is as follows:

a) port identification;

b) manufacturer's part or serial number;

c) manufacturer's identification mark or logo.

If space does not allow for all the required marking on the component, each unit shall be individually packaged with a data sheet containing all the required information which is not marked.

4.7.3 Package marking

Several non-wavelength-selective branching devices may be packed together for shipment.

Package marking, if required, shall be specified in the relevant IEC standard or industrial specification. The preferred order of marking is as follows:

a) manufacturer's identification mark or logo;

b) manufacturer's part number;

c) manufacturing date code (year/week, see ISO 8601);

When applicable, individual unit packages (within the sealed package) shall be marked with the reference number of the certified record of released lots, the manufacturer's factory identity code, and the component identification.

4.8 Safety

Non-wavelength-selective branching devices, when used on either an optical transmission system or equipment, or both, may emit potentially hazardous radiation from an uncapped or unterminated output port or end.

The non-wavelength-selective branching device manufacturers shall make available sufficient information to alert system designers and users about the potential hazard and shall indicate the required precautions and working practices.

In addition, each relevant IEC standard or industrial specification shall include the following:

WARNING NOTE

Care should be taken when handling small diameter fibre optics to prevent puncturing the skin, especially near the eyes. Direct viewing of the end of an optical fibre or an optical connector when it is propagating energy is not recommended unless prior assurance has been obtained as to the safety of the energy output level.

Reference shall be made to the IEC 60825 series, the relevant standard on safety.

Annex A
(informative)

Examples technologies of non-wavelength-selective fibre optic branching devices

Non-wavelength selective branching devices are typically based on the following two optical technologies. One is the fused biconic taper (FBT) technology (Figure A.1), which is mainly used for 1(2) × 2, 1(3) × 3 and 1(4) × 4 couplers (splitters). FBT-type optical branching device is manufactured by coming close between two or more optical fibres and fused using burner or heater system. It functions by evanescent effects. Fused fibres are typically fixed on a glass half-tube by adhesive. And a half-tube is packed by a hard pipe.

The other is the planar lightwave circuit (PLC) technology shown in Figure A.2, which is mainly used for 1(2) × N (N = 4 to 128) couplers (splitters). A PLC-type fibre optic branching device consists of a PLC chip and optical fibres which are connected to the facets of the PLC chip by adhesive as shown in Figure A.2. The typical fabrication methods of PLC chips are shown in Annex B.

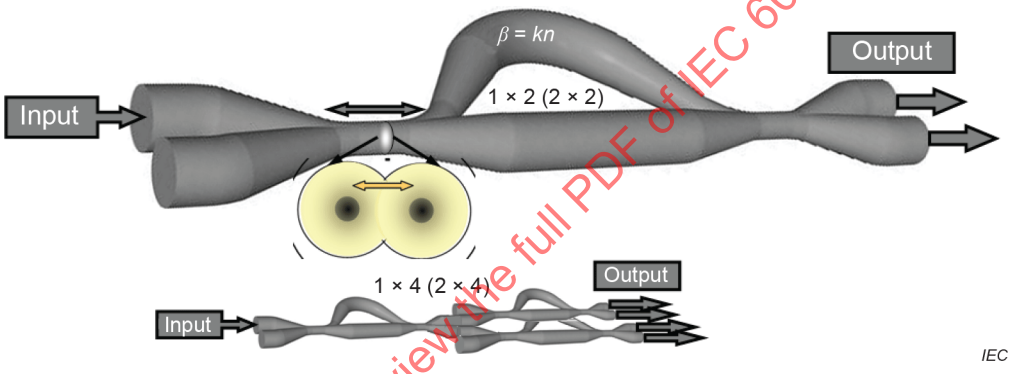

Figure A.1 – FBT-type optical branching device technology

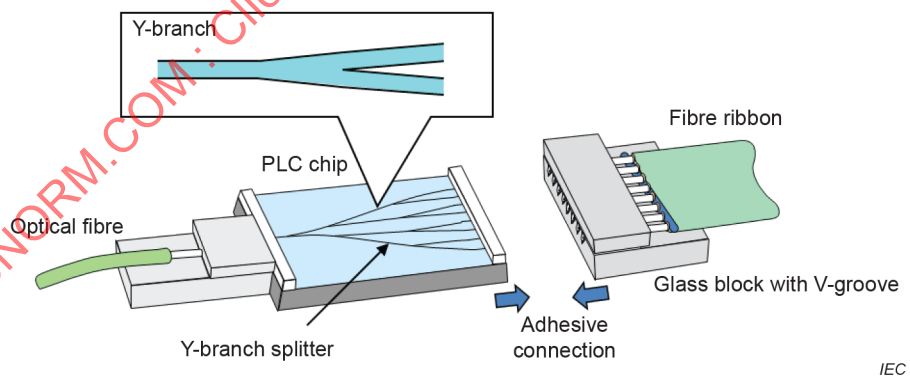

Figure A.2 – PLC-type optical branching device technology

Annex B
(informative)

Examples of fabrication technology of PLC chips

In the flame hydrolysis deposition (FHD) method, PLC is manufactured by depositing those particles of SiO_2 and GeO_2 on a substrate by reacting reactant gas in oxyhydrogen flame and light waveguide is molded by etching (Figure B.1). In the chemical vapour deposition (CVD) method, light waveguide is molded by etching the cores fabricated by reacting reactant gas (Figure B.2). In Ion-exchange method, light waveguide is molded by enhancing the refractive index of the place where Na^+ ion in glass is exchanged for Ag^+ in molten salt by soaking glass including Na^+ in molten salt including Ag^+ (Figure B.3).

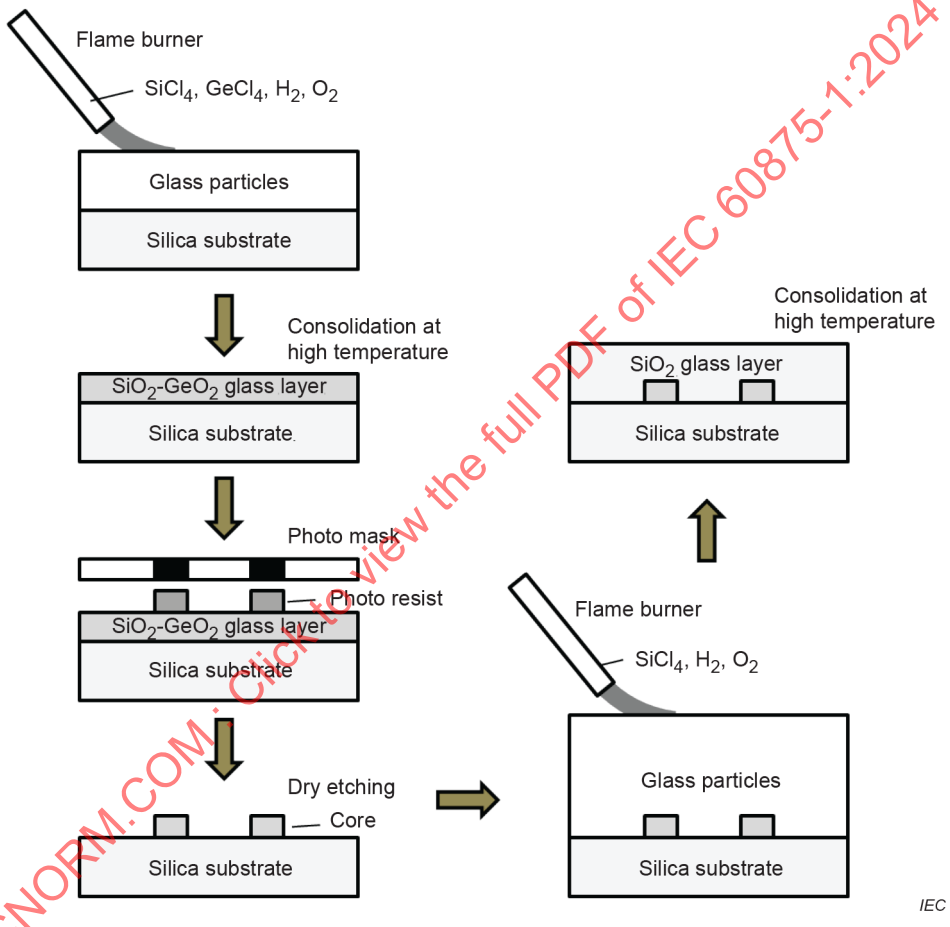

Figure B.1 – Fabrication by FHD method

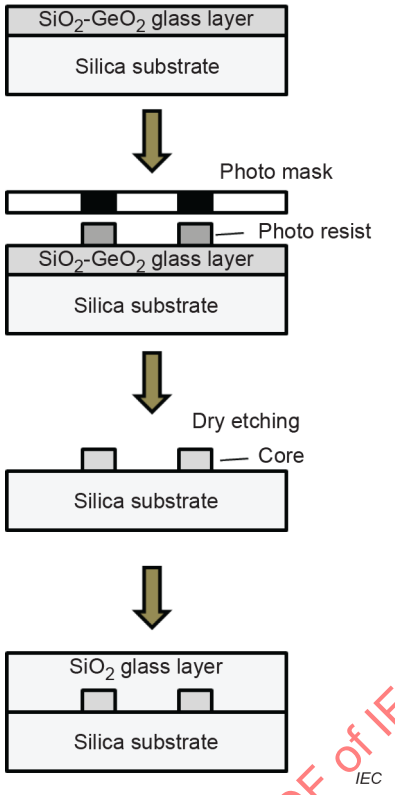

Figure B.2 – Fabrication by CVD method

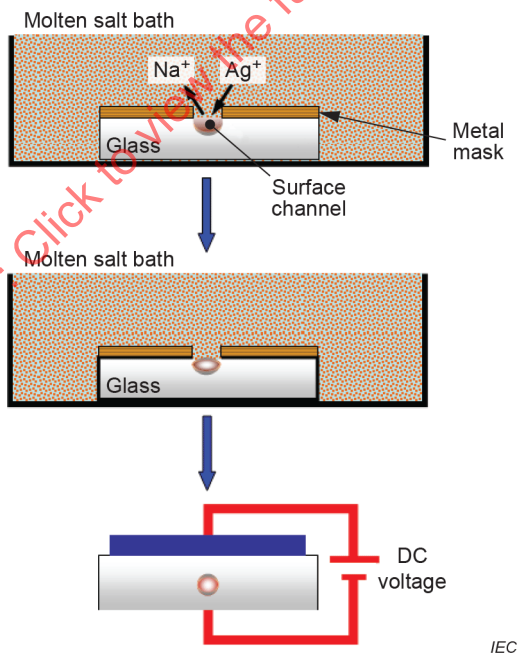

Figure B.3 – Fabrication by ion-exchange method

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IEC 60068 (all parts), *Environmental testing*

IEC 60410, *Sampling plans and procedures for inspection by attributes*

IEC 60974 (all parts), *Arc welding equipment*

IEC 61753 (all parts), *Fibre optic interconnecting devices and passive components – Performance standard*

IEC 62005-9-1, *Fibre optic interconnecting devices and passive components – Reliability – Part 9-1: Qualification of passive optical components*

IEC TR 61931, *Fibre optic – Terminology*

IEC Guide 104, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ITU-T Recommendation G.671, *Transmission characteristics of optical components and subsystems*

SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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DISPOSITIFS D'INTERCONNEXION ET COMPOSANTS PASSIFS FIBRONIQUES – DISPOSITIFS DE COUPLAGE FIBRONIQUES NE DÉPENDANT PAS DE LA LONGUEUR D'ONDE –

Partie 1: Spécification générique

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L'IEC 60875-1 a été établie par le comité d'études 86B de l'IEC: Dispositifs d'interconnexion et composants passifs à fibres optiques. Il s'agit d'une Norme internationale.

Cette septième édition annule et remplace la sixième édition parue en 2015. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) suppression des variantes et des extensions de référence dans la classification des articles;

b) suppression de la structure des spécifications dans la documentation des articles;

c) suppression des normes d'interface, des normes de fiabilité et des correspondances croisées dans le système de normalisation des articles.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
86B/4868/FDIS	86B/4903/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

Une liste de toutes les parties de la série IEC 60875, publiées sous le titre général *Dispositifs d'interconnexion et composants passifs fibroniques – Dispositifs de couplage fibroniques ne dépendant pas de la longueur d'onde*, peut être consultée sur le site web de l'IEC.

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DISPOSITIFS D'INTERCONNEXION ET COMPOSANTS PASSIFS FIBRONIQUES – DISPOSITIFS DE COUPLAGE FIBRONIQUES NE DÉPENDANT PAS DE LA LONGUEUR D'ONDE –

Partie 1: Spécification générique

1 Domaine d'application

La présente partie de l'IEC 60875 s'applique aux dispositifs de couplage fibroniques qui ne dépendent pas de la longueur d'onde. Tous présentent les caractéristiques suivantes:

– ils sont passifs, au sens où ils ne contiennent aucun élément optoélectronique ou transducteur;

– ils ont trois ports ou plus pour l'entrée ou la sortie de la puissance optique, ou pour les deux, et ils partagent la puissance optique parmi ces ports, selon une modalité prédéterminée;

– les ports sont des fibres optiques ou des connecteurs à fibres optiques.

Le présent document établit des exigences uniformes relatives aux propriétés optiques, mécaniques et environnementales.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60027 (toutes les parties), *Symboles littéraux à utiliser en électrotechnique*

IEC 60050-731, *Vocabulaire Électrotechnique International – Chapitre 731: Télécommunications par fibres optiques*

IEC 60617 (toutes les parties), *Symboles graphiques pour schémas*

IEC 60695-11-5, *Essais relatifs aux risques du feu – Partie 11-5: Flammes d'essai – Méthode d'essai au brûleur-aiguille – Appareillage, dispositif d'essai de vérification et lignes directrices*

IEC 60825 (toutes les parties), *Sécurité des appareils à laser*

IEC 61300 (toutes les parties), *Dispositifs d'interconnexion et composants passifs fibroniques – Procédures fondamentales d'essais et de mesures*

IEC 61754 (toutes les parties), *Dispositifs d'interconnexion et composants passifs fibroniques – Interfaces de connecteurs fibroniques*

IEC TR 61930, *Symbologie des graphiques de fibres optiques*

IEC TS 62627-09, *Fibre optic interconnecting devices and passive components – Vocabulary for passive optical devices* (disponible en anglais seulement)

ISO 129-1, *Documentation technique de produits – Représentation des dimensions et tolérances – Partie 1: Principes généraux*

ISO 286-1, *Spécification géométrique des produits (GPS) – Système de codification ISO pour les tolérances sur les tailles linéaires – Partie 1: Base des tolérances, écarts et ajustements*

ISO 1101, *Spécification géométrique des produits (GPS) – Tolérancement géométrique – Tolérancement de forme, orientation, position et battement*

ISO 8601, *Éléments de données et formats d'échange – Échange d'information – Représentation de la date et de l'heure*

3 Termes et définitions

Pour les besoins du présent document, les termes et définitions de l'IEC 60050-731 et de l'IEC TS 62627-09, ainsi que les suivants s'appliquent.

L'ISO et l'IEC tiennent à jour des bases de données terminologiques destinées à être utilisées en normalisation, consultables aux adresses suivantes:

- IEC Electropedia: disponible à l'adresse https://www.electropedia.org/
- ISO Online browsing platform: disponible à l'adresse https://www.iso.org/obp

3.1 Termes et définitions fondamentaux

3.1.1
fibre optique amorce
fibre ou câble se terminant à son extrémité avec ou sans connecteur, formant un port optique pour un composant à fibre optique

3.2 Définitions des composants

3.2.1
dispositif de couplage ne dépendant pas de la longueur d'onde
coupleur <optique>
répartiteur <optique>
composant passif bidirectionnel ayant trois ports ou plus, qui fonctionne de manière non sélective sur une plage spécifiée de longueurs d'onde, répartit ou combine la puissance optique arrivant dans un ou plusieurs ports d'entrée, à son ou ses ports de sortie d'une manière prédéterminée, sans amplification, commutation ou autre modulation active

3.2.2
dispositif de couplage bidirectionnel ne dépendant pas de la longueur d'onde
dispositif dont chaque élément t_{ij} de la matrice de transfert est égal à t_{ji} pour tous les i et j

3.2.3
dispositif de couplage non bidirectionnel ne dépendant pas de la longueur d'onde
dispositif pour lequel au moins un élément t_{ij} de la matrice de transfert n'est pas égal à t_{ji}

3.2.4
coupleur optique équilibré
dispositif de couplage ne dépendant pas de la longueur d'onde, conçu pour s'assurer que la puissance au niveau de chaque port de sortie est égale à la puissance au niveau du port d'entrée correspondant