BS EN 61314-1:2012

BSI Standards Publication

# Fibre optic interconnecting devices and passive components — Fibre optic fan-outs

Part 1: Generic specification

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## National foreword

This British Standard is the UK implementation of EN 61314-1:2012. It is identical to IEC 61314-1:2011. It supersedes BS EN 61314-1:2009 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee GEL/86, Fibre optics, to Subcommittee GEL/86/2, Fibre optic interconnecting devices and passive components.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.



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**Compliance with a British Standard cannot confer immunity from legal obligations.**

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## Amendments issued since publication

| Amd. No. | Date | Text affected |
|---|---|---|

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 61314-1

March 2012

ICS 33.180.20

Supersedes EN 61314-1:2009

English version

# Fibre optic interconnecting devices and passive components - Fibre optic fan-outs - Part 1: Generic specification

(IEC 61314-1:2011)

Dispositifs d'interconnexion et composants passifs à fibres optiques - Systèmes d'éclatement pour fibres optiques - Partie 1: Spécification générique (CEI 61314-1:2011)

Lichtwellenleiter - Verbindungselemente und passive Bauteile - Lichtwellenleiteraufteiler - Teil 1: Fachgrundspezifikation (IEC 61314-1:2011)



CENELEC

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

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Ref. No. EN 61314-1:2012 E

## Foreword

The text of document 86B/3270/FDIS, future edition 4 of IEC 61314-1, prepared by SC 86B, "Fibre optic interconnecting devices and passive components", of IEC TC 86, "Fibre optics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61314-1:2012.

The following dates are fixed:

| | | |
|---|---|---|
| • latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2012-09-29 |
| • latest date by which the national standards conflicting with the document have to be withdrawn | (dow) | 2012-12-29 |

This document supersedes EN 61314-1:2009.

The specific technical changes from EN 61314-1:2009 are to reconsider a drawing showing the relationship between EN 60874, EN 61753, EN 61754 series of standards, and updating the normative references.

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

## Endorsement notice

The text of the International Standard IEC 61314-1:2011 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

| | | |
|---|---|---|
| IEC 60793-1 series | NOTE | Harmonized in EN 60793-1 series. |
| IEC 60869-1 | NOTE | Harmonized as EN 60869-1. |

# Annex ZA
(normative)

## Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60027 | Series | Letter symbols to be used in electrical technology | - | - |
| IEC 60050-731 | - | International Electrotechnical Vocabulary (IEV) - Chapter 731: Optical fibre communication | - | - |
| IEC 60617 | Data-base | 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 | EN 60695-11-5 | - |
| IEC 60793-1-1 | - | Optical fibres - Part 1-1: Measurement methods and test procedures - General and guidance | EN 60793-1-1 | - |
| IEC 60794-1-1 | - | Optical fibre cables - Part 1-1: Generic specification - General | EN 60794-1-1 | - |
| IEC 60825-1 | - | Safety of laser products - Part 1: Equipment classification and requirements | EN 60825-1 | - |
| IEC 60869-1 | - | Fibre optic attenuators - Part 1: Generic specification | EN 60869-1 | - |
| IEC 60874-1 | - | Fibre optic interconnecting devices and passive components - Connectors for optical fibres and cables - Part 1: Generic specification | EN 60874-1 | - |
| IEC 61073-1 | - | Fibre optic interconnecting devices and passive components - Mechanical splices and fusion splice protectors for optical fibres and cables - Part 1: Generic specification | EN 61073-1 | - |
| IEC 61300 | Series | Fibre optic interconnecting devices and passive components - Basic test and measurement procedures | EN 61300 | Series |
| IEC 61753 | Series | Fibre optic interconnecting devices and passive components performance standard | EN 61753 | Series |
| IEC/TR 61930 | - | Fibre optic graphical symbology | - | - |
| IEC/TR 61931 | - | Fibre optic - Terminology | - | - |

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC Guide 102 | - | Electronic components - Specification structures for quality assessment (Qualification approval and capability approval) | - | - |
| IECQ QC 001002-3 | - | IEC Quality Assessment System for Electronic Components (IECQ) - Rules of Procedure - Part 3: Approval procedures | - | - |
| ISO 129 | - | Technical drawings - Dimensioning - General principles, definitions, methods of execution and special indications | - | - |
| ISO 286-1 | - | ISO system of limits and fits - Part 1: Bases of tolerances, deviations and fits | EN ISO 286-1 | - |
| ISO 1101 | - | Geometrical Product Specifications (GPS) - Geometrical tolerancing - Tolerances of form, orientation, location and run-out | EN ISO 1101 | - |
| ISO 8601 | - | Data elements and interchange formats - Information interchange - Representation of dates and times | - | - |

CONTENTS

# FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – FIBRE OPTIC FAN-OUTS –

## Part 1: Generic specification

## 1 Scope

This part of IEC 61314 specifies requirements for fan-outs used in the fibre optics field to provide a safe transition from multifibre cable units to individual fibres or cables.

This standard corresponds to QC880000 of IEC Quality Assessment System.

This standard does not cover test and measurement procedures, which are described in IEC 61300 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.

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, *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 60793-1-1, *Optical fibres – Part 1-1: Measurement methods and test procedures – General and guidance*

IEC 60794-1-1, *Optical fibre cables – Part 1-1: Generic specification – General*

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

IEC 60869-1, *Fibre optic attenuators – Part 1: Generic specification*

IEC 60874-1, *Connectors for optical fibres and cables – Part 1: Generic specificati*on

IEC 61073-1, *Fibre optic interconnecting devices and passive components – Mechanical splices and fusion splice protectors for optical fibres and cables – Part 1: Generic specification*

IEC 61300 (all parts), *Fibre optic interconnecting devices and passive components*

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

IEC/TR 61930, *Fibre optic graphical symbology*

IEC/TR 61931, *Fibre optic – Terminology*

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

IECQ QC 001002-3, *IEC Quality Assessment System for Electronic Components (IECQ System) – Rules of procedure – Part 2: Documentation*

ISO 129, *Technical drawings – Indication of dimensions and tolerances*

ISO 286-1, *Geometrical product specifications (GPS) – ISO code system for tolerances on linear sizes – 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 given in IEC 60050-731, IEC 60874-1 and IEC/TR 61931 as well as the following apply.

**3.1**
**fibre optic fan-out**
passive component providing a transition from multifibre cable unit to individual fibres or cables having at least one fibre or cable end connectorised

**3.2**
**transition box**
part of the fan-out where a multifibre cable is separated into individual fibre or cables. It may contain splices

**3.3**
**cable anchoring element**
part of the fan-out where the cable strength members are secured

## 4 Requirements

### 4.1 General

The requirements for fan-outs covered by this specification are specified in this clause and in the relevant specification.

### 4.2 Classification

#### 4.2.1 General

Fibre optic fan-outs are classified by the following categories:

– style;
– arrangement;
– variant;

– assessment level.

#### 4.2.2 Style

Fan-out style shall be classified by the following categories:

– connector / splice type names (e.g. MT/FC, Bare Ribbon/SC);
– fan-out configuration (e.g. diagrams shown in Figures 1, 2 and 3).

Key applies to Figures 1 and 2.

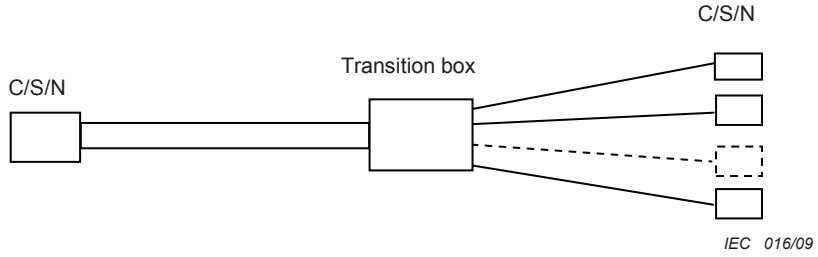



**Figure 1 – Pigtail/patchcord fan-out**

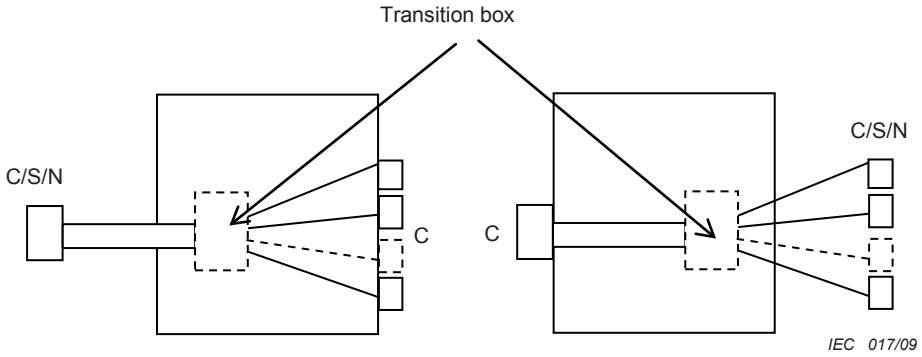
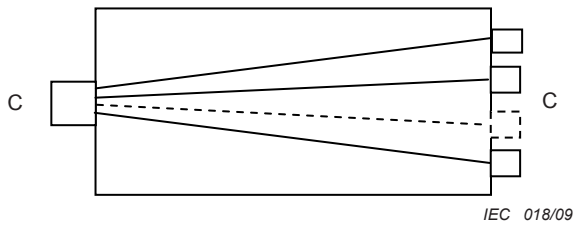



**Figure 2 – Semi-compact fan-out**




**Key**

C connector
S splice hardware (mechanical)
N not terminated

**Figure 3 – Compact fan-out**

– category of fibres/cables in accordance with IEC 60793-1-1 and IEC 60794-1-1;
– length of fibres/cables.

#### 4.2.3 Arrangement

The fan-out arrangement shall define the delivered fan-out form.

Examples of fan-out arrangements:

– kit arrangement;
– pigtail (one side connectorised) arrangement;
– patchcord (both sides connectorised) arrangement.

#### 4.2.4 Variant

The fan-out variants define the variety of structurally similar components. Examples of feature variables which create variants include:

– number of fibres or channels;
– fibre or cable sizes;
– transition box dimensions
– mounting/fixing schemes.

#### 4.2.5 Normative reference extensions

Normative reference extensions are used to identify integrated independent standards, specifications or other reference documents in other relevant 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 integrated functional application requirements that are dependent on technical expertise other than fibre optics.

Published reference documents produced by the ITU, consistent with the scope statements of the relevant IEC specification series, may be used as extensions. Published documents produced by other regional standardisation bodies such as ANSI, CENELEC, JIS, DIN etc., may be referenced in a bibliography, attached to the generic specification.

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

Examples of optical connector extensions are given as follows:

- using IEC 61754-4 and IEC 61754-20 to partially define a future IEC 60874 specification for a duplex type “SC”/”LC” hybrid connector adapter;
- using IEC 61754-13 and IEC 60869-1 to partially define a future IEC 60874 specification for an integrated type ”FC” attenuated optical connector;
- using IEC 61754-20 and IEC 61073-1 to partially define a future IEC 60874 specification for a duplex “LC” receptacle incorporating integral mechanical splices.

Other examples of requirements for normative extensions are:

a) 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.

b) Specialised field tooling may require an extension to implement specific ocular safety, electrical shock, burn hazard avoidance requirements, or require isolation procedures to prevent potential ignition of combustible gases.

### 4.3 Documentation

#### 4.3.1 Symbols

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

#### 4.3.2 Specification system

##### 4.3.2.1 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 fan-outs.

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

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

#### 4.3.2.2 Blank detail specification

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

Each blank detail specification shall contain:

– the 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.

#### 4.3.2.3 Detail specification

A specific fan-out 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 fan-out design as an official IEC standard.

Detail specifications shall specify the following, as applicable:

– style (see 4.2.2);
– arrangement (see 4.2.3)
– variant(s) (see 4.2.4);
– part identification number for each variant (see 4.8.1)
– drawings, dimensions required (see 4.3.3);
– performance requirements (see 4.7).

### 4.3.3 Drawings

#### 4.3.3.1 General

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

#### 4.3.3.2 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.

#### 4.3.3.3 Dimensional system

All dimensions shall be given in accordance with ISO 129, 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.

#### 4.3.3.4 Performance

The performance requirements for fibre optic fan-outs are defined in the performance standard series of documents IEC 61753.

#### 4.3.4 Tests and measurements

##### 4.3.4.1 Test and measurement procedures

The test and measurement procedures for optical, mechanical, climatic, and environmental characteristics of fan-outs to be used shall be defined and selected preferentially from the IEC 61300 series.

The size measurement method to be used shall be specified in the relevant specification for dimensions which are specified within a total tolerance zone of 0,1 mm or less.

##### 4.3.4.2 Reference components

Reference components, if required, shall be specified in the relevant specification.

##### 4.3.4.3 Gauges

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

#### 4.3.5 Test reports

Test reports shall be prepared for each test conducted as required by the relevant specification. The reports shall be included in the qualification report and in the periodic inspection report.

Test reports shall contain the following information:

– title of test and date;
– specimen description including the type of fibre, connector or other coupling device. The description shall also include the variant identification number (see 4.8.1);
– 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.

#### 4.3.6 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.

### 4.4 Standardisation system

#### 4.4.1 Interface standards

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

Interface standards ensure that connectors and adapters 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 by mating products from different manufacturing specifications, although the level of performance cannot be expected to be any better than that of the lowest specified performance.

#### 4.4.2 Performance standards

Performance standards contain a series of tests and measurements (which may or may not 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 "one-off" basis to prove any product's ability to satisfy the "performance standards" requirement. Each performance standard has a different set of tests, and/or severities (and/or groupings) and represents the 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/quality conformance programme.

A key point of the test and measurements standards is their application (particularly with regard to attenuation and return loss) in conjunction with the interface standards of inter-product compatibility. Certainly conformance on each individual product to this standard will be ensured.

#### 4.4.3 Optical interface standards

An optical interface standard is a multi-part collection of the physical and mechanical requirements necessary in order to comply with the optical functionality specifications for a defined interface between two optical fibres. It consists of those essential features that are functionally critical to the optical attenuation and return loss performance of an optical interface in the mated condition. The standard defines, the location of the fibre core in relation to the datum target and the following key parameters: lateral offset, end face separation, end face angle, end face high index layer condition. It also defines standardised test methods where appropriate.

Each interface contains the essential information to ensure that product conforming to the standard will work together repeatedly to a known level of optical performance without the need for compatibility testing or cross checking.

The two basic performance parameters that characterise the optical interface are attenuation and return loss. Each parameter places different physical constraints on the optical interface. Environmental conditions also affect the performance of the optical interface and it may require definition of physical and mechanical requirements to ensure that the performance specified is maintained over the environmental extremes defined in a particular performance standard.

Manufacturing materials and processes also affect the optical interface and therefore the standard has been designed to allow manufacturers to demonstrate compliance with the

standard while still permitting the maximum of manufacturing differentiation. The relationship between and suitability of materials specified in Part 3 documents for different performance categories as specified in IEC 61753-1 shall be defined e.g. zirconia ferrule material can be applied in all environmental categories, while the polymer material specified for some rectangular ferrules may only be applicable for category C.

Optical interface standards define sets of prescribed conditions, which shall be maintained in order to satisfy the requirements for the attenuation and return loss performance in a randomly mated pair of fibres of the same type.

#### 4.4.4 Reliability documentation

Reliability documentation is 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 appear in the reliability documentation):

- failure modes (observable general mechanical or optical effects of failure);
- failure mechanisms (general causes of failure, common to several components);
- failure effects (detailed causes 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 they were to be deployed in the field. To avoid early field failure, all components may be subjected to a screening process in the factory involving environmental stresses 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 the 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 will 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, the "wear-out region" begins and the component must be replaced.

At the beginning of useful life, performance testing on a sample 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 as foreseen at the start. 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 specified maximum failure rate. These tests are usually done by utilising the performance testing, but increasing duration and severity in order to accelerate the failure mechanisms.

A reliability theory relates component reliability testing to component parameters and to lifetime or failure rate under testing. The theory then extrapolates these to lifetime 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.

#### 4.4.5 Interlinking

The standards relevant to fibre optic connectors are given in Figure 4. A large number of test and measurements standards are already in place. The quality assurance/qualification approval standards produced under the banner of the IECQ have already been in place for many years.

With regard to interface, performance optical interface and reliability documentation, the matrix given in Figure 5 demonstrates some of the options available for product standardization once all these three standards are in place.

Product A is fully IEC standardized, having a standard interface and meeting defined optical interface performance and reliability documentation.

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

Product C is a product with a proprietary interface, which meets defined IEC optical interface and performance standards but does not comply with reliability documentation.

Product D is a product which complies with an IEC standard interface which complies with the IEC optical interface standard but does not meet the requirements of either an IEC performance standard or reliability document.

Product E is a product which complies with both an IEC standard interface and a performance standard, but does not meet the optical interface or reliability requirements.

Obviously the matrix is more complex than that shown in Figure 5, since a number of interface, performance and reliability documentation will be able to be cross-related. In addition, the products may all be subject to a quality assurance programme that could be conducted under IEC Approval, or even under a national or company quality assurance system.

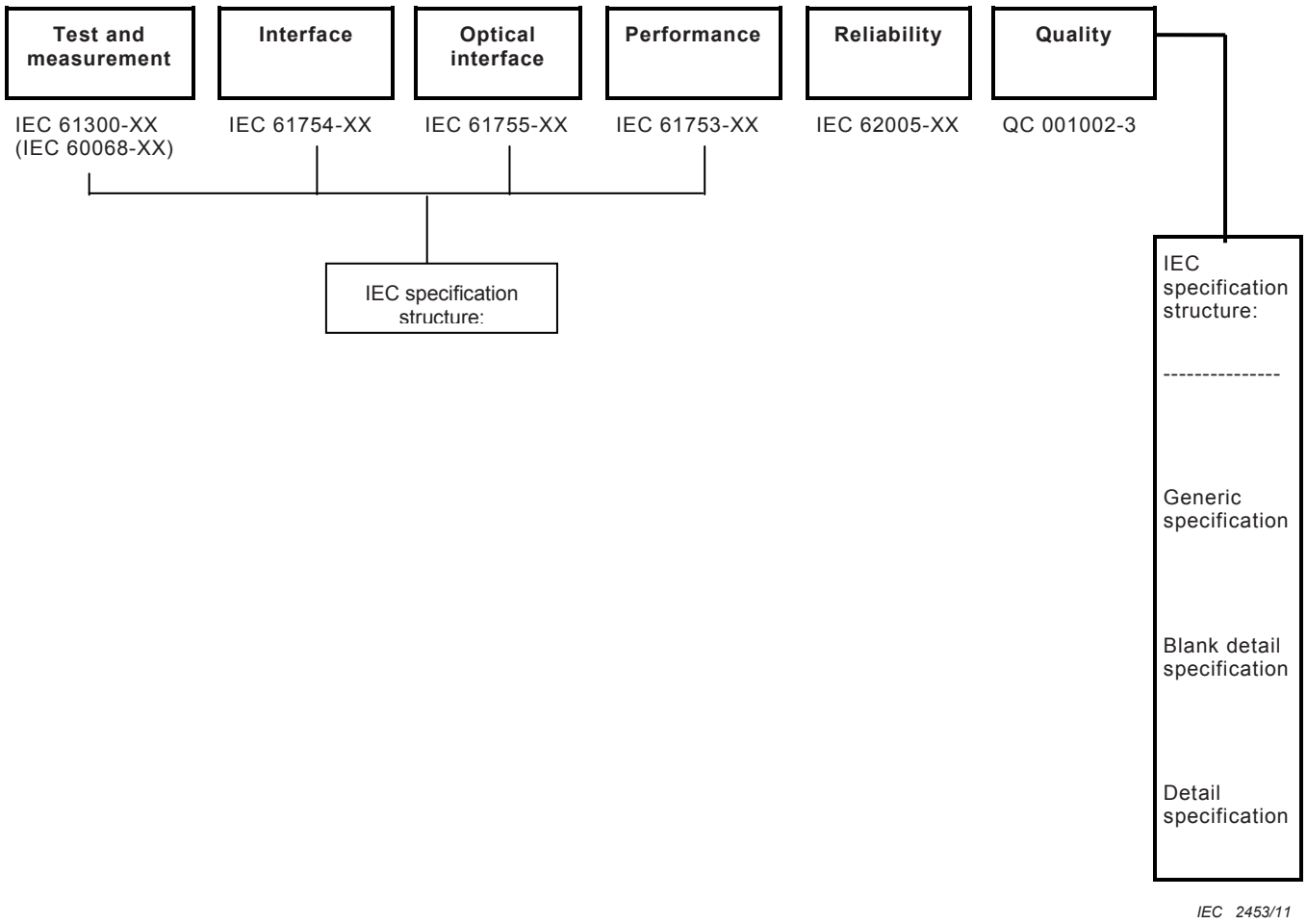



**Figure 4 – Standards**

| | Interface standard | Optical Interface Standard | Performance standard | Reliability documentation |
|---|---|---|---|---|
| Product A | YES | YES | YES | YES |
| Product B | NO | YES | YES | YES |
| Product C | NO | YES | YES | NO |
| Product D | YES | YES | NO | NO |
| Product E | YES | NO | YES | NO |

*IEC 2454/11*

**Figure 5 – Standards interlink matrix**

### 4.5 Design and construction

#### 4.5.1 Materials

##### 4.5.1.1 Corrosion resistance

All materials used in the construction of fan-out sets shall be corrosion resistant or suitably finished to meet the requirements of the relevant specification.

##### 4.5.1.2 Non-flammable materials

When non-flammable materials are required, the requirement shall be specified in the specification and IEC 60695-11-5 shall be referenced.

#### 4.5.2 Workmanship

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

### 4.6 Quality

Connector set components shall be controlled by an appropriate quality assessment procedure. The measurement and test procedures of the IEC 61300 standards shall be used, as applicable, for quality assessment.

### 4.7 Performance

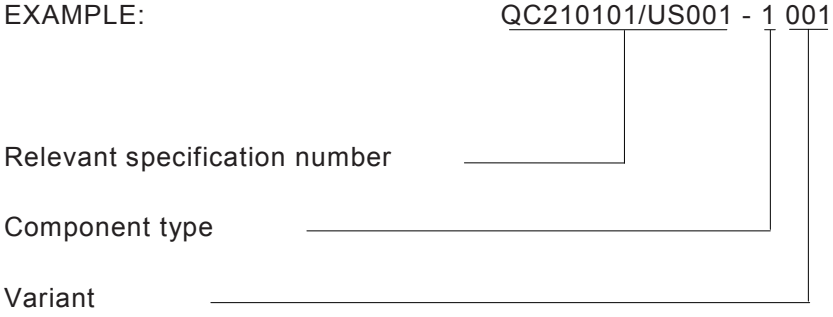
Fan-outs shall meet the performance requirements specified in the relevant specification.

### 4.8 Identification and marking

#### 4.8.1 Variant identification number

Each variant in a relevant specification shall be assigned a variant identification number. The number shall consist of the number assigned to the relevant specification followed by a four digit dash number. The first digit of the dash number shall be sequentially assigned to each component type covered by the relevant specification. The last three digits shall be sequentially assigned to each variant of the component.

EXAMPLE: QC210101/US001 - 1 001




#### 4.8.2 Component marking

Components, associated hardware, and packages shall be permanently and legibly identified and marked when required by the relevant specification. The preferred order of marking is as follows:

a) port identification;
b) manufacturer's part number;
c) manufacturer's identification mark or logo;
d) manufacturing date;
e) variant identification number;
f) any additional marking required by the relevant specification.

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

#### 4.8.3 Package marking

Package marking, if required, shall be specified in the relevant 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 4.8.1);
e) style designations (see 4.2.2);
f) any additional marking required by the relevant 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.

### 4.9 Packaging

Packages shall include instructions for use when required by the specification (see 4.3.6).

### 4.10 Storage conditions

The manufacturer shall mark the package with any requirements or precautions concerning safety hazards or environmental conditions for storage.

### 4.11 Safety

Optical fan-outs, when used on an optical fibre transmission system and/or equipment, may emit potentially hazardous radiation from an uncapped or exterminated output port or fibre end.

The optical fan-out 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 specification shall include the following:

**WARNING NOTE**

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

Reference shall be made to IEC 60825-1, the relevant standard on safety.

# Bibliography

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

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

IEC 60869-1, *Fibre optic attenuators – Part 1: Generic specification*

IECQ QC 01, *IEC Quality Assessment System for Electronic Components (IECQ System) – Basic Rules*

IECQ QC 001002 (all parts), *IEC Quality Assessment System for Electronic Components (IECQ System) – Rules of procedure*

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