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INTERNATIONAL STANDARD

colour inside

Fibre optic interconnecting devices and passive components – Connector optical interfaces –
Part 2-4: Connection parameters of non-dispersion shifted single-mode physically contacting fibres – Non-angled for reference connection applications

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International Standard IEC 61755-2-4 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

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

FDIS	Report on voting
86B/3845/FDIS	86B/3866/RVD

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

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

A list of all parts in the IEC 61755 series, published under the general title *Fibre optic interconnecting devices and passive components –Connector optical interfaces*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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

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- withdrawn,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

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – CONNECTOR OPTICAL INTERFACES –

Part 2-4: Connection parameters of non-dispersion shifted single-mode physically contacting fibres – Non-angled for reference connection applications

1 Scope

This part of IEC 61755 defines a set of prescribed conditions that should be maintained in order to satisfy the requirements of non-angled polished reference connections.

The prescribed conditions include dimensional limits and optical fibre requirements of the optical interface to meet specific requirements for reference connection (plugs and adaptors) used for attenuation measurements.

Two different grades for reference connections are defined in this standard. The use of each of these grades depends on the application and on the targeted attenuation measurement uncertainty. The model uses a Gaussian distribution of light intensity over the specified restricted mode field diameter (MFD) range.

This standard is intended to be used for shipping and acceptance inspections.

The reference connector plug is specified for B1.1, B1.3 and B6 fibres as specified in IEC 60793-2-50.

The use of the reference connector plug would not be recommended where classification of fibre is difficult, for example construction and maintenance of cable plant.

2 Normative references

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

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

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

IEC 61300-3-42, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-42: Examinations and measurements – Attenuation of single mode alignment sleeves and or adaptors with resilient alignment sleeves*

IEC 61755-2-1, *Fibre optic interconnecting devices and passive components –Connector optical interfaces – Part 2-1: Connection parameters of non-dispersion shifted single-mode physically contacting fibres – Non-angled*

IEC 61755-2-2, *Fibre optic interconnecting devices and passive components –Connector optical interfaces – Part 2-2: Connection parameters of non-dispersion shifted single-mode physically contacting fibres – Angled*

IEC 61755-3 (all parts), *Fibre optic interconnecting devices and passive components – Connector opticla interfaces – Part 3-x: Connector parameters of non-dispersion shifted single-mode physically contacting fibres*

IEC TR 62627-04, *Fibre optic interconnecting devices and passive components – Technical report – Part 04: Example of uncertainty calculation: Measurement of the attenuation of an optical connector*

3 Performance grades

Performance grades for PC polished reference connectors are given in Table 1. The specified attenuation for each grade is obtained when the reference plugs are connected to each other with the reference adaptor.

Table 1 – Single-mode attenuation grades at 1 310 nm

Reference grade [a]	**Attenuation** [a] dB	**Contribution to measurement uncertainty** [b] dB
R1	≤0,1	±0,1
R2	≤0,2	±0,2

[a] Under the assumption of worst case alignment with identical connector plug. Expected attenuation measured when connecting two plugs of the same grade may be higher due to significant measurement uncertainty.

[b] As described in Clause 8.

4 Description

Optical reference connector plugs are connector plugs manufactured with restricted tolerances for dimensions relevant to lateral and angular offset. These connector plugs are used for attenuation measurement purposes according to IEC 61300-3-4, and shall be considered as part of the measurement set-up since they strongly contribute to its measurement uncertainty (for example see IEC TR 62627-04). The attenuation measurement uncertainty contributions for both grades of reference connectors are listed in Table 3.

The principal performance of a reference connector plug is given by its contribution to measurement uncertainty (estimated based on the reproducibility of an attenuation measurement of the same device performed using multiple different reference connector plugs of the same grade) which is determined by the accuracy with which the core of the optical fibre is aligned to the optical datum target and determines the random attenuation performance of a reference connector population.

The main parameters influencing the performance of the reference connector plugs are fibre core location, fibre core axis angle and mode field diameter variability. Figure 1 represents the fibre alignment tolerances for the two different reference grades described in this standard, under the assumption of using selected reference fibre, described in Table 2.

The design curves given in Figure 1 each represent maximum allowable combinations of a given specific fibre core location and an associated fibre core axis angle to not exceed the specified attenuation of any single considered connection. The design curves shown represent the determination of the parameters under a worst case mismatch of the mode field diameter of the selected fibres as given in Table 3, i.e. 9,1/9,3 µm and a wavelength of 1 310 nm. These mode field diameter ranges are selected within the IEC 60793-2-50 family specification for single mode non-dispersion shifted fibres as given in Table 2.