IEC 61755-1

Edition 2.0 2022-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components – Connector optical interfaces for single-mode fibres – Part 1: Optical interfaces for dispersion unshifted fibres – General and guidance

Dispositifs d'interconnexion et composants passifs fibroniques – Interfaces optiques avec connecteurs pour fibres unimodales – Partie 1: Interfaces optiques pour fibres à dispersion non décalée – Généralités et recommandations

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – CONNECTOR OPTICAL INTERFACES FOR SINGLE-MODE FIBRES –

Part 1: Optical interfaces for dispersion unshifted fibres – General and guidance

FOREWORD

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IEC 61755-1 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics. It is an International Standard.

This second edition cancels and replaces the first edition published in 2005. This edition constitutes a technical revision.

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

a) deletion of Figure 2, Figure 3 and Table 4, and consideration of the whole parts of the text;
b) addition of the test method for random mating of the multifibre connectors;
c) introduction of a nomenclature for the specified core location variants;
d) replacement of the limited MFD range, which is now in line with the complete MFD range specified in IEC 60793-2-50;

e) replacement of the references to reliability standards to reliability technical reports;

f) new general title for the series.

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

Draft	Report on voting
86B/4642/FDIS	86B/4663/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/standardsdev/publications.

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

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

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

0 Introduction

0.1 Overview

A connector optical interface standard is a multi-part collection of the geometric, dimensional and material 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.

This series of optical interface standards for single-mode connectivity provides general information on optical connector interfaces for non-dispersion shifted single-mode fibres, according to IEC 60793-2-50, for class B with nominal mode field diameter range of 8,6 µm to 9,2 µm. It defines the location of the fibre core in relation to the datum target and the following key parameters: lateral and angular misalignment, fibre mode field diameter, end face separation, end face angle and end face high index layer condition. It also defines standardized test methods where appropriate.

The subsequent parts of the single-mode series contain those optical interfaces that have been standardized for international use. Each interface contains the essential information to ensure that products conforming to the standards of the IEC 61755 series will work together repeatedly to a known level of optical performance without the need for compatibility testing or cross checking.

It is important to emphasize that standard optical interfaces are intended to be used with IEC standards of various categories, which already include:

– mechanical connector interface standards;

– test and measurement methods;

– performance standards;

– reliability technical reports.

Interface standards, according to the IEC 61754 series, provide all the essential information about a given product type or family necessary to ensure that all products compliant with the interface standard will mate/de-mate.

Test and measurement methods, according to the IEC 61300-2 and IEC 61300-3 series, give a prescribed approach to the way in which key parameters that are assessed are evaluated.

Performance standards, according to the IEC 61753 series, use these test and measurement methods to define a set of conditions indicative to a known system location against which a product can be evaluated on a ‘once off’ basis to prove that its design and manufacture are capable of satisfying the necessary criteria.

Reliability technical reports are intended to provide the user and manufacturer with a set of guidelines for assessing the ability of the product to continue to meet the required criteria over time.

The two basic optical transmission performance parameters that characterize 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 dimensions 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 document has been designed to allow manufacturers to demonstrate compliance with the document while still permitting the maximum of manufacturing differentiation. The relationship between, and suitability of, materials specified in the IEC 61755-3 series for different performance categories as specified in IEC 61753-1, is defined, e.g. zirconia ferrule material can be applied in all environmental categories, while the thermoset epoxy polymer material specified for some rectangular ferrules can only be applicable for category C.

Optical interface standards define sets of required conditions, which should be maintained in order to satisfy the requirements for the attenuation and return loss performance in a randomly mated pair of fibres as specified in IEC 60793-2-50.

0.2 Hierarchical relationship

The hierarchical relationship between optical interface standards and interface standards is shown in Figure 1.

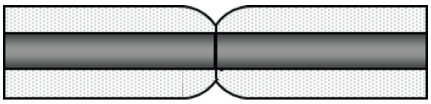
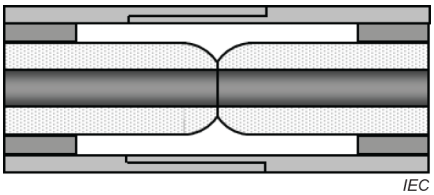
	IEC 61755-1 Optical interface – Part 1 : General and guidance
 IEC	IEC 61755-2 series Optical interface – Part 2 : Fibre to fibre, optical connection performance requirements, e.g. lateral and angular misalignment, mode field diameter mismatch excluding fibre support mechanisms
 IEC	IEC 61755-3 series Optical interface – Part 3 : Fibre support mechanisms, optical connector end face and material deformation properties e.g. in the case of ferrules, effects of dome offset, fibre undercut and fibre position necessary to meet the performance requirements of Part 2
 IEC	Mechanical connector interface IEC 61754 series. Connector mating dimensions, e.g. effects of spring force, etc.

Figure 1 – Relationship between optical interface standards and interface standards

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – CONNECTOR OPTICAL INTERFACES FOR SINGLE-MODE FIBRES –

Part 1: Optical interfaces for dispersion unshifted fibres – General and guidance

1 Scope

This document covers dispersion unshifted single-mode fibre optic connection interfaces. It includes references, document structure details, definitions, and standardised optical connection grades. The grades are based on random mated connections between two optical connector populations according to required characteristics including fibre mode field diameter (MFD) mismatch.

It also defines standardized test methods where appropriate.

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

IEC 61300-3-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-6: Examinations and measurements – Return loss*

IEC 61300-3-34, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-34: Examinations and measurements – Attenuation of random mated connectors*

IEC 61300-3-45, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-45: Examinations and measurements – Attenuation of random mated multi-fibre connectors*

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

3 Terms and definitions

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

ISO and IEC maintain terminological 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