IEC 63267-1

Edition 1.0 2023-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components – fibre optic connector optical interfaces – Part 1: Enhanced macro bend loss multimode 50 µm core diameter fibres – General and guidance

Dispositifs d'interconnexion et composants passifs fibroniques – Interfaces optiques de connecteurs fibroniques Partie 1: Fibres multimodales de diamètre de cœur de 50 µm à performances améliorées en matière de pertes par macrocourbures – Généralités et recommandations

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, …). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 300 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 19 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

IEC 63267-1

Edition 1.0 2023-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components – fibre optic connector optical interfaces –
Part 1: Enhanced macro bend loss multimode 50 µm core diameter fibres – General and guidance

Dispositifs d'interconnexion et composants passifs fibroniques – Interfaces optiques de connecteurs fibroniques –
Partie 1: Fibres multimodales de diamètre de cœur de 50 µm à performances améliorées en matière de pertes par macrocourbures – Généralités et recommandations

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 33.180.10

ISBN 978-2-8322-6016-6

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

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

Part 1: Enhanced macro bend loss multimode 50 µm core diameter fibres – General and guidance

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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 63267-1 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.

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

Draft	Report on voting
86B/4657/FDIS	86B/4676/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 63267 series, under the general title *Fibre optic interconnecting devices and passive components – Fibre optic connector optical interfaces*, 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,
- replaced by a revised edition, or
- amended.

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.

The IEC 63267 series is composed of optical interface standards for multimode connectivity which provide general information on optical connector interfaces for IEC 60793-2-10, subcategory A1-OM2b to A1-OM5b multimode fibre, at 850 nm band only.

The IEC 63267 series defines the location of the fibre core in relation to the datum target and the following key parameters: lateral and angular misalignment, core diameter, numerical aperture, end face separation, end face high index layer condition. It also defines standardized test methods where appropriate.

The subsequent parts of the multimode 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 standard 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, and

– 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 series and the IEC 61300-3 series, give a prescribed approach to the way in which key parameters that need to be 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.

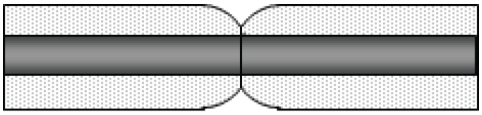
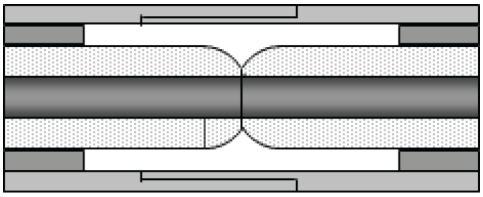
The two basic optical transmission performance parameters that characterize the optical interface are attenuation and return loss. Each parameter places different physical constraints on the optical interface. Environmental conditions also affect the performance of the optical interface and it may require definition of physical and mechanical 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, this document has been designed to allow manufacturers to demonstrate compliance with this document while still permitting the maximum of manufacturing differentiation. The relationship between, and suitability of, materials specified in the IEC 63267-3 series standards for different performance categories as specified in IEC 61753-1 will be defined, for example zirconia ferrule material can be applied in all environmental categories, while the thermoset polymer material specified for some rectangular ferrules may only be applicable for category C.

Optical interface standards define sets of prescribed 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 of the same type.

0.2 Hierarchical relationship

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

	Optical interface: IEC 62367-1 – General and guidance
 IEC	Optical interface: IEC 62367-2 – Fibre to fibre, optical connection performance requirements, e.g. lateral and angular misalignment, mode field diameter mismatch excluding fibre support mechanisms
 IEC	Optical interface: IEC 62367-3 – 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 IEC 62367-2
 IEC	Connector mechanical interface – IEC 61754 (all parts) Connector mating dimensions, e.g. effects of spring force, etc.

IEC 2531/05

Figure 1 – Relationship between optical interface standards and interface standards

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

Part 1: Enhanced macro bend loss multimode 50 µm core diameter fibres – General and guidance

1 Scope

This part of IEC 63267 covers enhanced macrobend loss 50 µm core diameter multimode 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 prescribed characteristics, including the core diameter and numerical aperture mismatches.

This document describes the rules under which an optical interface is created. It also defines standardised 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 61280-1-4, *Fibre optic communication subsystem test procedures – Part 1-4: General communication subsystems – Light source encircled flux measurement method*

IEC 61300 (all parts), *Fibre optic interconnecting 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 connectors multi-fibre connectors*

IEC 63267 (all parts), *Fibre optic interconnecting devices and passive components – Fibre optic connector multimode optical 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:

- ISO Online browsing platform: available at https://www.iso.org/obp
- IEC Electropedia: available at http://www.electropedia.org/

3.1
encircled flux
EF
fraction of cumulative near-field power to the total output power as a function of radial distance from the optical centre of the core, defined by Formula (1):