

Fibre optic interconnecting devices and passive components performance standard —

Part 1: General and guidance for performance standards

The European Standard EN 61753-1:2007 has the status of a
British Standard

ICS 33.180.20

National foreword

This British Standard is the UK implementation of EN 61753-1:2007. It is identical to IEC 61753-1:2007. It supersedes BS EN 61753-1-1:2001 which is withdrawn.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.

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2007

© BSI 2007

ISBN 978 0 580 53367 9

Amendments issued since publication

Amd. No.	Date	Comments

**Fibre optic interconnecting devices and passive components
performance standard -**

**Part 1: General and guidance for performance standards
(IEC 61753-1:2007)**

Norme de qualité de fonctionnement
des dispositifs d'interconnexion
et composants passifs à fibres optiques -
Partie 1: Généralités et lignes directrices
relatives aux normes
de qualité de fonctionnement
(CEI 61753-1:2007)

Lichtwellenleiter -
Verbindungselemente
und passive Bauteile -
Betriebsverhalten -
Teil 1: Allgemeines und Leitfaden
für Betriebsverhaltensnormen
(IEC 61753-1:2007)

This European Standard was approved by CENELEC on 2007-10-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 86B/2452/FDIS, future edition 1 of IEC 61753-1, 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 was approved by CENELEC as EN 61753-1 on 2007-10-01.

This European Standard supersedes EN 61753-1-1:2001.

Specific technical changes vis-à-vis EN 61753-1-1:2001 include that EN 61753-1:2007 covers all passive fibre optic products, including connectors, passive optical components, fibre management systems and closures.

The following dates were fixed:

- | | | |
|--|-------|------------|
| – latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2008-07-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2010-10-01 |

Annex ZA has been added by CENELEC.

Notice

This document contains material that is Copyright © 2006, Telcordia Technologies, Inc. ("Telcordia"). All rights reserved.

The reader is advised that this IEC document and Telcordia source(s) may differ, and the context and use of said material in this IEC document may differ from that of Telcordia. Telcordia makes no representation or warranty, express or implied, with respect to the sufficiency, accuracy, or utility of any information or opinion contained herein. Any use of or reliance upon said information or opinion is at the risk of the user. Telcordia shall not be liable for any damage or injury incurred by any person arising out of the sufficiency, accuracy, or utility of any information or opinion contained herein.

Endorsement notice

The text of the International Standard IEC 61753-1:2007 was approved by CENELEC as a European Standard without any modification.

CONTENTS

INTRODUCTION.....	5
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions	8
4 Preparation of a performance standard	9
4.1 Performance standard title.....	9
4.2 Tests.....	9
4.3 Details.....	10
4.4 Requirements	10
4.5 Sample size	10
4.6 Sample definition	10
4.7 Groupings/sequences	10
4.8 Pass/fail criteria.....	10
4.9 Reference product definition	10
4.10 Performance standard test report.....	10
4.11 Environmental aspects.....	11
Annex A (normative) Tests and severities for performance standards	12
Annex B (informative) Test sequencing for category O.....	33
Annex C (informative) Mixing of products with different performance category	36
Annex D (informative) Performance standard numbering	37
Annex E (informative) Minimum temperature value in Finland	38
Annex ZA (normative Normative references to international publications with their corresponding European publications	40
Bibliography	39
Table A.1 – General operating service environments and performance categories	13
Table A.2 – Connectors and passive components – Category C – Controlled environment.....	14
Table A.3 – Connectors and passive components – Category U – Uncontrolled environment.....	15
Table A.4a – Passive components – Category O – Uncontrolled environment	17
Table A.4b – Connectors – Category O – Uncontrolled environment.....	18
Table A.5 – Connectors and passive components – Category E – Extreme environment	20
Table A.6 – Fibre management systems – Category C – Controlled environment	22
Table A.7 – Fibre management systems – Category U – Uncontrolled environment.....	23
Table A.8 – Closures – Category C – Controlled environment	24
Table A.9 – Closures – Category A – Aerial environment	25
Table A.10 – Closures – Category G – Ground environment	27
Table A.11 – Closures – Category S – Subterranean environment	29
Table A.12 – Connectors	

Table A.13 – Passive optical components	31
Table A.14 – Fibre management systems	32
Table A.15 – Closures	32
Table B.1 – Test sequence for passive optical components category O	33
Table B.2 – Test sequence connectors category O	34

INTRODUCTION

Performance standards define the requirements for standard optical performance under a set of specified conditions. Each standard contains a series or a set of tests and measurements with clearly stated conditions, severities and pass/fail criteria. The series of tests, commonly referred to as an operating service environment or performance category, is intended to be run on a 'one-off' basis to prove the product's ability to satisfy the requirements of a specific application, market sector or user group.

The subsequent parts of this document define those sets of tests which form each operating service environment or performance category and which have been standardised for international use. A product that has been shown to meet all the requirements of a performance standard may be declared as complying with that performance standard.

Products having the same classification from one manufacturer that satisfy a performance standard will operate within the boundaries set by the performance standard. Interchangeability or interchangeability of products from different suppliers (having the same classification and conforming to the same performance standard) can only be guaranteed when these products are also meeting the interface standards. Only in this condition an equivalent level of performance will be provided when they are used together (for example, in the case of optical connectors).

Conformance to a performance standard is not a guarantee of lifetime assured performance or reliability. Reliability testing must be the subject of a separate test schedule, where the tests and severities selected are truly representative of the requirements of this reliability test programme. Consistency of manufacture should be maintained using a recognised Quality Assurance programme whilst the reliability of product should be evaluated using the procedures recommended in IEC 62005.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS PERFORMANCE STANDARD –

Part 1: General and guidance for performance standards

1 Scope

This part of IEC 61753 deals with performance standards for all passive fibre optic products, including connectors, passive optical components, fibre management systems and closures. The IEC 61753 series is published in multiple parts. This Part 1 covers general information on performance standards. It defines those tests and severities which form the performance categories or general operating service environments and identifies those tests which are considered to be product specific. Test and severity details are given in Annex A. Part 1 also includes references, definitions and rules for creating a performance standard, together with informative annexes, such as a description of test sequencing given in Annex B, and other pertinent information.

Subsequent parts which form IEC 61753 are known as performance standards and are numbered according to the classification defined in Annex C. These standards contain the minimum test and measurement severities which a specific product must satisfy, in order to be categorized as meeting the requirements for use in a particular service environment. A product performance standard will contain a combination of those tests and measurements which are common to all passive fibre optic products, for a particular service environment or performance category, and those which are considered specific to that particular product in that environment.

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 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60590, *Determination of the aromatic hydrocarbon content of new mineral insulating oils*

IEC 61300-2-1, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-1: Tests – Vibration (sinusoidal)*

IEC 61300-2-2, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-2: Tests – Mating durability*

IEC 61300-2-4, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-4: Tests – Fibre/cable retention*

IEC 61300-2-5, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-5: Tests – Torsion/Twist*

IEC 61300-2-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-6: Tests – Tensile strength of coupling mechanism*

IEC 61300-2-7:1995, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-7: Tests – Bending moment*

IEC 61300-2-9, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-9: Tests – Shock*

IEC 61300-2-10:1995, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-10: Tests – Crush resistance*

IEC 61300-2-11:1995, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-11: Tests – Axial compression*

IEC 61300-2-12, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-12: Tests – Impact*

IEC 61300-2-17, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-17: Tests – Cold*

IEC 61300-2-18, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-18: Tests – Dry heat – High temperature endurance*

IEC 61300-2-19, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-19: Tests – Damp heat (steady state)*

IEC 61300-2-21, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-21: Tests – Composite temperature-humidity cyclic test*

IEC 61300-2-22, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-22: Tests – Change of temperature*

IEC 61300-2-23, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-23: Tests – Sealing for non-pressurized closures of fibre optic devices*

IEC 61300-2-26, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-26: Tests – Salt mist*

IEC 61300-2-27, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-27: Tests – Dust – Laminar flow*

IEC 61300-2-28, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-28: Tests – Industrial atmosphere (sulphur dioxide)*

IEC 61300-2-33, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-33: Tests – Assembly and disassembly of closures*

IEC 61300-2-34, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-34: Tests – Resistance to solvents and contaminating fluids*

IEC 61300-2-37, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-37: Tests – Cable bending for closures*

IEC 61300-2-38, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-38: Tests – Sealing for pressurized closures of fibre optic devices*

IEC 61300-2-42, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-42: Tests – Static side load for connectors*

IEC 61300-2-44, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-44: Tests – Flexing of the strain relief of fibre optic devices*

IEC 61300-2-45, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-45: Tests – Durability test by water immersion*

IEC 61300-2-46, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-46: Tests – Damp heat cyclic*

IEC 61300-2-48, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-48: Tests – Temperature-humidity cycling*

IEC 61300-2-49, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-49: Tests – Connector Installation test*¹

IEC 61300-2-50, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-50: Tests – Fibre optic connector proof test – singlemode and multimode*²

IEC 61300-2-51 *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-51: Tests – Fibre optic connector test for transmission with applied tensile load – singlemode and multimode*³

IEC 61300-3-3 *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-3: Examinations and measurements – Active monitoring of changes in attenuation and return loss*

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

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

IEC 61300-3-28 *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-28: Examinations and measurements – Transient 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 Guide 109, *Environmental aspects – Inclusion in electrotechnical product standards*

ISO 1998 (all parts), *Petroleum industry – Terminology*

3 Terms and definitions

For the purposes of this document the following definitions apply .

NOTE Definitions for various components can be found in the relevant IEC standard or generic specification.

¹ To be published.

² To be published.

³ To be published.

3.1

operating / service environment

defines the typical service environment or operating location simulated by a performance category

3.2

performance category

series of tests and measurements (which may or may not be grouped into a specific sequence) with clearly stated conditions and severities, which are chosen to simulate a particular operating service environment

3.3

performance standard

standard which is designed to verify a product is capable of meeting the requirements of a particular service environment. It contains a combination of those tests, together with their severities and pass-fail criteria, which shall be applied to all passive fibre optic products for a particular performance category, together with those which are considered specific to that particular product in that environment

3.4

product specific tests

those tests which are considered to be specific to a particular product category or type, e.g. connectors, attenuators, enclosures for aerial applications. Where there is a specific IP requirement for a product, this shall be the subject of a separate test and shall be included in the relevant product performance standard

3.5

performance standard test report

report to be produced on completion of testing to a performance standard

4 Preparation of a performance standard

In the preparation of a performance standard, the following items shall be considered and defined, together with any relevant instructions pertaining to them.

4.1 Performance standard title

The performance standard title shall be clear. This information shall include:

- the product description
- the appropriate performance category
- any other variant or differentiation information to distinguish it from other performance standards

4.2 Tests

The tests to be carried out on the product in order for it to meet the performance standard shall be clearly defined, including those which are product specific. No ambiguity or options shall be allowed.

The tests selected combined with the severities/durations, groupings/sequencing, method used and pass/fail criteria shall be indicative of a defined operating service environment.

The test method to be used shall be clearly defined for each test. Wherever possible the test method shall be selected from IEC 61300, where this is not possible other test methods may be defined. If an undefined test method is used, the test method and details to be specified shall be included in the appropriate annex of the performance standard.

Performance standards may call up additional tests that may be needed to fully characterise a particular connector or component.

Impact on the environment shall be carefully considered when specifying the test methods on the products, covered by this standard.

4.3 Details

The details to be considered, severities and durations, shall be given for all tests and measurements defined in a performance standard. They shall be directly related to the performance requirements defined by the operating service environment. No ambiguity or options shall be allowed.

4.4 Requirements

The performance requirements that must be satisfied in order for the product to comply with the performance standard shall be specified for each test and/or measurement. No ambiguities shall be allowed.

4.5 Sample size

The sample size for each test shall be defined in the appropriate annex of the performance standard. No deviations shall be allowed.

4.6 Sample definition

The sample to be tested shall be defined in the relevant performance standard.

4.7 Groupings/sequences

Test groups and test sequences shall be defined in the appropriate annex of the performance standard as required by the user, user group or manufacturer.

4.8 Pass/fail criteria

Where required by the performance category, the pass/fail criteria shall be unambiguously stated for each test within the performance standard. No deviation or exceptions shall be allowed.

4.9 Reference product definition

Where a performance standard requires the use of a reference product or component, the reference product shall be clearly defined in the appropriate annex of the performance standard.

4.10 Performance standard test report

Conformance to a performance standard shall be supported by a test report. The test report shall clearly demonstrate that the tests were carried out in accordance with the requirements of the performance standard and provide full details of the tests together with a pass/fail declaration. All test and measurement requirements shall be satisfied before a component may be declared to be in compliance with the performance standard.

The failure of any product to comply with a particular test or sequence of tests shall be reported in the performance standard test report. An analysis of the cause of the failure shall be undertaken and any corrective actions taken shall be described.

If no design changes are made to the product, the test or test sequence where the failure occurred shall be rerun with the results of both tests reported.

If design changes are made, another complete performance standard test programme shall be undertaken. Any tests previously completed successfully shall be repeated with new samples.

4.11 Environmental aspects

The requirements concerning the reduction of adverse environmental impacts over the whole life cycle of products are not subject to this specification. The environmental aspects as appropriate shall be implemented according to the guidelines given in IEC Guide 109.

Annex A (normative)

Tests and severities for performance standards

A.1 Introduction

This annex defines the performance categories, tests and recommended severities, which simulate each of the operating service environments applicable to passive fibre optic products. A list of these is given in Table A.1.

The choice of tests and associated severities in each performance category is based upon a harmonized set of requirements determined to be appropriate for that category. The set of tests that form a particular performance category, given in Tables A.2 to A.11, are a combination of common tests, which are applicable to all fibre optic product types, and product specific tests.

Those tests which constitute a performance category form a minimum set of testing requirements. It is recognised that additional tests may often be necessary to fully characterize a particular component or connector.

All of the performance categories contained in this annex are applicable to single-mode and multi-mode fibre optic transmission. The minimum performance requirements for connectors, passive optical components, fibre management systems and closures are given in Tables A.12 to A.15. The choice of which values to include in the performance standard test schedules will depend on the system type and the required performance level.

Category O is a sequential series of tests. The tests in Tables A.4a and A.4b are shown in the order in which the tests shall be run. An explanation of the test sequencing for category O is given in Annex B.

For all other categories there is no defined sequence in which the tests shall be run.