

PUBLICLY AVAILABLE SPECIFICATION

PRE-STANDARD

**Fibre optic interconnecting devices and passive components performance standard –
Part 1-3: General and guidance for performance standards – Single-mode fibre
optic connector performance for harsh industrial operating conditions**

[IEC PAS 61753-1-3:2009](https://standards.iteh.ai/standards/sst/61753-1-3-2009)

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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references	5
3 Terms and definitions	7
4 Industrial environment	7
4.1 General.....	7
4.2 Cross reference with MICE.....	7
5 Tests.....	8
5.1 General.....	8
5.2 Sample size.....	8
6 Test report.....	8
7 Reference component.....	8
8 Performance requirements.....	9
8.1 General.....	9
8.2 Dimensions	9
8.3 Sample definition and size.....	9
8.4 Test preparation and accomplishment.....	9
8.5 Performance criteria.....	9
9 Performance tests	10
Annex A (informative) Scheme of a test matrix for a duplex connector	21
Figure 1 – Example of a duplex sample (mated), DUT.....	9
Table 1 – Single mode attenuation grades at 1310 nm and 1550 nm (dB)	10
Table 2 – Test description.....	11
Table 3 – Sample size and product sourcing requirements.....	20
Table A.1 – Scheme of measurements for random-random test for duplex DUT	21

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS PERFORMANCE STANDARD –

Part 1-3: General and guidance for performance standards – Single-mode fibre optic connector performance for harsh industrial operating conditions

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IEC-PAS 61753-1-3 has been processed by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

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

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

Draft PAS	Report on voting
86B/2895/PAS	86B/2931/RVD

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned may transform it into an International Standard.

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS PERFORMANCE STANDARD –

Part 1-3: General and guidance for performance standards – Single-mode fibre optic connector performance for harsh industrial operating conditions

1 Scope

This Publicly Available Specification (PAS) defines the minimum initial performance, test and measurement requirements and severities which a single-mode connector or cable assembly must satisfy in order to be categorized as meeting IEC Category I (industrial environment). Category I is an addition to environmental categories C, U, O, E described in IEC 61753-1 and the MICE methodology described in ISO/IEC 24702.

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 60068-2-60, *Environmental testing – Part 2: Tests – Test Ke: Flowing mixed gas corrosion test*

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

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

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

IEC 61300-1, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 1: General and guidance*

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*

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, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-7: Tests – Bending moment*¹

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

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

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

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

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 of interconnecting components and closures*

61300-2-35, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-35: Tests – Cable nutation*³

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

IEC 61300-3-3, *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 61300-3-35, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-35: Examinations and measurements – Fibre optic connector endface visual and automated inspection*⁴

1 Publication withdrawn and not replaced.

2 Publication withdrawn and not replaced.

3 Publication withdrawn and not replaced.

4 To be published.

IEC 61753-1: 2007, *Fibre optic interconnecting devices and passive components performance standard – Part 1: General and guidance for performance standards*

IEC 61754 (all parts), *Fibre optic connector interfaces*

IEC 61755 (all parts), *Fibre optic connector optical interfaces*

IEC 61755-1, *Fibre optic connector optical interfaces – Part 1: Optical interfaces for single mode non-dispersion shifted fibres – General and guidance*

IEC 61755-3 (all parts 3), *Fibre optic connector optical interfaces*

ISO/IEC 24702, *Information technology – Generic cabling – Industrial premises*

ISO/IEC TR 29106, *Information technology – Generic cabling – Introduction to the MICE environmental classification*

3 Terms and definitions

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

3.1

change in attenuation

peak-to-peak variation (see Table A-12, IEC 61753-1)

3.2

sample

a complete set of passive connector components consisting of a free plug and a socket. The socket may be mounted in an enclosure. This allow demountable coupling between pairs of optical fibres

3.3

patch cord assembly

two connector plugs mated consisting of a free plug and a socket with each socket mechanically mounted in an enclosure. Each of the non terminated leads from the socket should be at least 3 m long so that the splices may be located outside of the environmental test chamber (see also Figure 1)

4 Industrial environment

4.1 General

Fibre optic components are frequently used in industrial environments, like control stations, power rooms or inside switch cabinets. The special environmental conditions such as temperature, dust, moisture, vibration, chemicals, etc. in industrial deployment require more rugged components than found in standard environments.

4.2 Cross-reference with MICE

The MICE methodology from ISO/IEC/TR 29106 classifies the environment local to a cabling system in terms of mechanical, ingress, climatic and chemical and electromagnetic characteristics. The tests and severities in Clause 9 of this PAS are intended to reflect the M₃ and I₃ environment. The climatic conditions and chemical substances used are selected from the C₃ environment. The defined tests and severities are according to IEC 60068-2-60

NOTE Not all chemical substances are used.

5 Tests

5.1 General

The defined performance test procedures should:

- evaluate the product for two basic acceptance criteria: mechanical integrity and optical transmission requirements;
- simulate the effects of exposure to the environment in which it will be installed;
- simulate installation and intervention conditions;
- evaluate all specified features of the product.

The defined performance test procedures should simulate the situation in a mated condition under use in a harsh industrial environment. It is not the intention to simulate the situation:

- when being mated or demated;
- during the assembling of the connector;
- during transportation and storage of the connector.

All test methods are in accordance with IEC 61300 series as defined in Table 3.

Each test defines the number of samples to be evaluated as described in Annex A. The samples used for each test should be composed of randomly selected and previously unstressed new samples but may also be selected from previously used samples if desired.

The connectors under test shall be terminated onto single-mode fibre per IEC 60793-2-50, type B1.1 or B1.3. The connector interface standard shall meet the dimensions of IEC 61754 series and the connector optical interface standard shall meet the relevant requirements of IEC 61755 series.

Unless otherwise specified, tests should be carried out under standard atmospheric conditions according to IEC 61300-1. The optical criteria for each test shall be as defined in Clause 9, (see also notes to Table 1).

5.2 Sample size

As a minimum requirement and if not otherwise mentioned, the tests can be run individually on five samples per test only. It is intended that new samples should be used for each test however samples may be reused at the manufacturer's own risk. In the event that this reuse causes a failure, the test may be rerun with new samples.

Samples for the attenuation test are to be randomly selected and randomly mated as new product, starting with 10 DUT, see Figure 1 (e.g. as duplex version, see also Annex A).

6 Test report

Fully documented test reports and supporting evidence shall be prepared and available for inspection to show that the tests have been carried out and the results are satisfactory; the requested performances (see Table 1 for the grades) should be defined before starting the tests.

7 Reference component

No reference components are required to perform the tests in this standard.

8 Performance requirements

8.1 General

The protection level of the connector according to IEC 60529 shall be defined before performing the tests. The minimum protection level shall be IP x5 and IP x7 for immersion and IP 6x for dust, so the resulting level will be IP65 and IP67.

8.2 Dimensions

Dimensions shall comply with the appropriate IEC interface standard as defined in IEC 61754 series.

8.3 Sample definition and size

Default sample sizes for the tests are defined in 5.1.

Reliability tests for life time expectations are not covered by this standard.

For the purposes of this standard, a sample (DUT) is a mated connector set. Products under test shall be mounted and cleaned according to the manufacturer's instructions.

Where the connector arrangement is a plug and a bulkhead flange, Figure 1 shows a proposed sample.

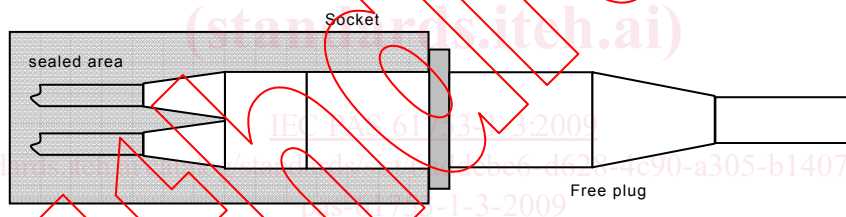


Figure 1 – Example of a duplex sample (mated), DUT

8.4 Test preparation and accomplishment

Before the tests are made, the sample shall be preconditioned under standard atmospheric conditions for testing as specified in IEC 61300-1 for a period of 24 h unless otherwise specified by the manufacturer.

When mounting is required in a test, unless otherwise specified, the adaptors shall be rigidly mounted on a specified accessory, whichever is applicable, using the specified connection methods, fixing devices and panel cut-outs.

When un-mating is required in a test, the end faces of the sample shall be cleaned according to the manufacturer's instructions. A particular combination of connectors shall be maintained during the complete test sequence, normally without un-mating the sample.

8.5 Performance criteria

Compliance with the following requirements shall be confirmed on all samples before the test has been started and after the test have been completed.

- All performed tests according to the chosen performance category and performance requirements shall be passed with all tested samples.