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IEC 61753-1

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CONSOLIDATED VERSION

# INTERNATIONAL STANDARD



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**Fibre optic interconnecting devices and passive components – Performance standard –  
Part 1: General and guidance**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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**Fibre optic interconnecting devices and passive components – Performance standard –  
Part 1: General and guidance**



## CONTENTS

FOREWORD .....	4
INTRODUCTION .....	7
1 Scope .....	8
2 Normative references .....	8
3 Terms and definitions .....	10
4 Abbreviations .....	14
5 Preparation of a performance standard .....	14
5.1 Performance standard title .....	14
5.2 Tests .....	14
5.3 Details .....	14
5.4 Requirements .....	14
5.5 Sample size .....	14
5.6 Sample definition .....	14
5.7 Groupings/sequences .....	15
5.8 Pass/fail criteria .....	15
5.9 Reference product definition .....	15
5.10 Performance standard test report .....	15
6 Environmental aspects .....	15
Annex A (normative) Tests, severities and criteria for performance standards .....	16
A.1 General .....	16
A.2 How to find the performance tests for the desired category? .....	20
A.3 Performance criteria .....	45
Annex B (normative) Performance standard numbering .....	58
Bibliography .....	59
Figure 1 – Relationship between various protective housing types .....	13
Figure A.1 – Flow chart to identify the relevant category for the operating service environment .....	21
Table A.1 – Operating service environments and performance categories .....	18
Table A.2 – Operating service environments and performance categories for components in locations with additional heat dissipation by active electronics .....	20
Table A.3 – Connectors, passive components, mechanical splices, fusion splice protectors and fibre management systems – Category C – Indoor controlled environment .....	22
Table A.4 – Connectors, field mountable connectors, passive components, mechanical splices, fusion splice protectors and fibre management systems – Category C <sup>HD</sup> – Indoor controlled environment with additional heat dissipation .....	24
Table A.5 – Connectors, field mountable connectors, passive components, mechanical splices, fusion splice protectors and fibre management systems – Category OP – Outdoor protected environment .....	25
Table A.6 – Connectors, field mountable connectors, passive components, mechanical splices, fusion splice protectors and fibre management systems – Category OP <sup>HD</sup> – Outdoor protected environment with additional heat dissipation .....	27

Table A.7 – Connectors, field mountable connectors, passive components, mechanical splices, fusion splice protectors and fibre management systems – Category OP+ – Extended outdoor protected environment.....	28
Table A.8 – Connectors, field mountable connectors, passive components, mechanical splices, fusion splice protectors and fibre management systems – Category OP+ <sup>HD</sup> – Extended outdoor protected environment with additional heat dissipation .....	28
Table A.9 – Connectors, passive optical components – Category I – Industrial environment.....	29
Table A.10 – Connectors, passive optical components – Category I <sup>HD</sup> – Industrial environment with additional heat dissipation .....	31
Table A.11 – Connectors and passive optical components – Category E – Extreme environment.....	32
Table A.12 – Wall outlets, boxes, optical distribution frame modules and closures – Category C – Indoor controlled environment .....	34
Table A.13 – Hardened optical connectors, street cabinets, boxes and closures Category A – Outdoor aerial environment .....	36
Table A.14 – Hardened optical connectors and closures – Category G – Outdoor ground environment .....	39
Table A.15 – Hardened optical connectors and closures – Category S – Outdoor subterranean environment .....	42
Table A.16 – Single mode connectors .....	45
Table A.17 – Single mode field mountable connectors .....	46
Table A.18 – Multi mode connectors .....	47
Table A.19 – Single mode mechanical splices.....	48
Table A.20 – Multi mode mechanical splices .....	49
Table A.21 – Single mode fusion splice protectors .....	49
Table A.22 – Passive optical components .....	50
Table A.23 – Fibre management systems .....	51
Table A.24 – Category C – Wall outlets and boxes.....	52
Table A.25 – Category C – Optical distribution frame modules (OFDM) .....	53
Table A.26 – Category A, single mode boxes, street cabinets and free breathing closures .....	54
Table A.27 – Category C, A, G and S single mode sealed closures.....	55
Table A.28 – Category A, G and S single mode hardened fibre optic connectors .....	56

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

# FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

## Part 1: 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.
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This second edition constitutes a technical revision.

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

- a) definitions updated with new products: wall outlets, wall or pole mounted boxes, splices, ODF modules, street cabinets, hardened connectors and field mountable connectors;
- b) categories U and O are replaced by categories OP and OP+. No mandatory sequence in category OP+. Category OP+ contains the tests from category OP with the addition of only 4 other tests;
- c) addition of Category I (Industrial);
- d) temperature ranges added (with the HD suffix to the categories C, OP, OP+ and I) in case passive optical components are placed in a housing together with active electronics (HD stands for “heat dissipation”);
- e) the height of category A changed from 3 m to ground level (0 m);
- f) the lower level height of category G environment changed from ground level (0 m) to –1 m below ground level. Upper level remains at 3 m above ground level;
- g) addition of performance tests, test severities and performance criteria for new products: Wall outlet, wall or pole mounted boxes, mechanical splices, fusion splice protectors, ODF modules, street cabinets, field mountable connectors and hardened optical connectors;
- h) test severity of "Mating durability" test for connectors in categories C, OP, OP+ and I is reduced to 200 cycles for connectors with cylindrical ferrules and 50 cycles for connectors with rectangular ferrules;
- i) test severity of "Change of temperature" test for connectors and passive optical components in category I is reduced from 20 cycles to 12 cycles (harmonized with connectors and components from other categories);
- j) test severity of "Flexing of strain relief" test for connectors in categories C, OP and OP+ is reduced to 50 cycles;
- k) test severities of "Assembly and disassembly of fibre optic mechanical splices, fibre management systems and closures" test for all enclosures is reduced to 5 cycles;
- l) test severities of "Change of temperature" test for all protective housings in categories C, A, G and S is reduced from 20 cycles to 12 cycles (harmonized with connectors and components);
- m) test severities of "Resistance to solvents and contaminating fluids" test for closures in categories G and S changed – kerosene is removed, diesel oil exposure reduced to 1 h immersion and 24 h drying at room temperature;
- n) sealing performance criteria of sealed closures for categories G and A are reduced to 20 kPa overpressure.
- o) the change in attenuation criterion for connectors has changed from peak-to-peak into a +/- deviation from the original value of the transmitted power at the start of the test (harmonized with the change in attenuation criterion for components, splices and protective housings).

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

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## INTRODUCTION

The IEC 61753 series is dealing with performance standards for all passive fibre optic products, including connectors, passive optical components, fibre management systems and various protective housings. The standard is published in multiple parts. This part, Part 1, covers general information on performance standards. Subsequent parts are known as performance standards and are numbered according to the classification defined in Annex B. These standards contain the minimum test and measurement severities which are common to all passive fibre optic products, for a particular service environment or performance category, and the test and measurement severities which are considered specific to that particular product in that environment.

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.

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 can 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. Intermateability 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 also meet the interface standards. Only in this condition will an equivalent level of performance 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 is 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 will be maintained using a recognised quality assurance programme whilst the reliability of product will be evaluated using the procedures recommended in IEC 62005 (all parts).

Tests and measurements are selected from IEC 61300 (all parts). Where this is not possible, the required test method is attached as an annex to the performance standard.

# FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

## Part 1: General and guidance

### 1 Scope

This part of IEC 61753 provides guidance for the drafting of performance standards for all passive fibre optic products.

This document defines the 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.

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

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

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*

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*

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

IEC 61753-1:2018+AMD1:2020 CSV – 9 –  
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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 – Corrosive 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 fibre optic mechanical splices, fibre management systems and 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 of interconnecting components and closures*

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

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

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

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

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

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 61300-3-7, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-7: Examinations and measurements – Wavelength dependence of attenuation and return loss of single mode components*

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 61300-3-29, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-29: Examinations and measurements – Spectral transfer characteristics of DWDM devices*

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 Guide 109, *Environmental aspects – Inclusion in electrotechnical product standards*

ISO 1998-1:1998, *Petroleum industry – Terminology – Part 1: Raw materials and products*

# FINAL VERSION



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**Fibre optic interconnecting devices and passive components – Performance standard –  
Part 1: General and guidance**



## CONTENTS

FOREWORD .....	4
INTRODUCTION .....	7
1 Scope .....	8
2 Normative references .....	8
3 Terms and definitions .....	10
4 Abbreviations .....	14
5 Preparation of a performance standard .....	14
5.1 Performance standard title .....	14
5.2 Tests .....	14
5.3 Details .....	14
5.4 Requirements .....	14
5.5 Sample size .....	14
5.6 Sample definition .....	14
5.7 Groupings/sequences .....	15
5.8 Pass/fail criteria .....	15
5.9 Reference product definition .....	15
5.10 Performance standard test report .....	15
6 Environmental aspects .....	15
Annex A (normative) Tests, severities and criteria for performance standards .....	16
A.1 General .....	16
A.2 How to find the performance tests for the desired category? .....	20
A.3 Performance criteria .....	45
Annex B (normative) Performance standard numbering .....	58
Bibliography .....	59
Figure 1 – Relationship between various protective housing types .....	13
Figure A.1 – Flow chart to identify the relevant category for the operating service environment .....	21
Table A.1 – Operating service environments and performance categories .....	18
Table A.2 – Operating service environments and performance categories for components in locations with additional heat dissipation by active electronics .....	20
Table A.3 – Connectors, passive components, mechanical splices, fusion splice protectors and fibre management systems – Category C – Indoor controlled environment .....	22
Table A.4 – Connectors, field mountable connectors, passive components, mechanical splices, fusion splice protectors and fibre management systems – Category C <sup>HD</sup> – Indoor controlled environment with additional heat dissipation .....	24
Table A.5 – Connectors, field mountable connectors, passive components, mechanical splices, fusion splice protectors and fibre management systems – Category OP – Outdoor protected environment .....	25
Table A.6 – Connectors, field mountable connectors, passive components, mechanical splices, fusion splice protectors and fibre management systems – Category OP <sup>HD</sup> – Outdoor protected environment with additional heat dissipation .....	27

Table A.7 – Connectors, field mountable connectors, passive components, mechanical splices, fusion splice protectors and fibre management systems – Category OP+ – Extended outdoor protected environment.....	28
Table A.8 – Connectors, field mountable connectors, passive components, mechanical splices, fusion splice protectors and fibre management systems – Category OP+ <sup>HD</sup> – Extended outdoor protected environment with additional heat dissipation .....	28
Table A.9 – Connectors, passive optical components – Category I – Industrial environment.....	29
Table A.10 – Connectors, passive optical components – Category I <sup>HD</sup> – Industrial environment with additional heat dissipation .....	31
Table A.11 – Connectors and passive optical components – Category E – Extreme environment.....	32
Table A.12 – Wall outlets, boxes, optical distribution frame modules and closures – Category C – Indoor controlled environment .....	34
Table A.13 – Hardened optical connectors, street cabinets, boxes and closures Category A – Outdoor aerial environment .....	36
Table A.14 – Hardened optical connectors and closures – Category G – Outdoor ground environment .....	39
Table A.15 – Hardened optical connectors and closures – Category S – Outdoor subterranean environment .....	42
Table A.16 – Single mode connectors .....	45
Table A.17 – Single mode field mountable connectors .....	46
Table A.18 – Multi mode connectors .....	47
Table A.19 – Single mode mechanical splices.....	48
Table A.20 – Multi mode mechanical splices .....	49
Table A.21 – Single mode fusion splice protectors .....	49
Table A.22 – Passive optical components .....	50
Table A.23 – Fibre management systems .....	51
Table A.24 – Category C – Wall outlets and boxes.....	52
Table A.25 – Category C – Optical distribution frame modules (OFDM) .....	53
Table A.26 – Category A, single mode boxes, street cabinets and free breathing closures .....	54
Table A.27 – Category C, A, G and S single mode sealed closures.....	55
Table A.28 – Category A, G and S single mode hardened fibre optic connectors .....	56

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## Part 1: General and guidance

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**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## INTRODUCTION

The IEC 61753 series is dealing with performance standards for all passive fibre optic products, including connectors, passive optical components, fibre management systems and various protective housings. The standard is published in multiple parts. This part, Part 1, covers general information on performance standards. Subsequent parts are known as performance standards and are numbered according to the classification defined in Annex B. These standards contain the minimum test and measurement severities which are common to all passive fibre optic products, for a particular service environment or performance category, and the test and measurement severities which are considered specific to that particular product in that environment.

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.

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 can 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. Intermateability 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 also meet the interface standards. Only in this condition will an equivalent level of performance 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 is 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 will be maintained using a recognised quality assurance programme whilst the reliability of product will be evaluated using the procedures recommended in IEC 62005 (all parts).

Tests and measurements are selected from IEC 61300 (all parts). Where this is not possible, the required test method is attached as an annex to the performance standard.

# FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

## Part 1: General and guidance

### 1 Scope

This part of IEC 61753 provides guidance for the drafting of performance standards for all passive fibre optic products.

This document defines the 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.

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

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

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*

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*

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

IEC 61753-1:2018+AMD1:2020 CSV – 9 –  
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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 – Corrosive 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 fibre optic mechanical splices, fibre management systems and 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 of interconnecting components and closures*

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

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

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

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

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

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 61300-3-7, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-7: Examinations and measurements – Wavelength dependence of attenuation and return loss of single mode components*

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 61300-3-29, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-29: Examinations and measurements – Spectral transfer characteristics of DWDM devices*

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 Guide 109, *Environmental aspects – Inclusion in electrotechnical product standards*

ISO 1998-1:1998, *Petroleum industry – Terminology – Part 1: Raw materials and products*