IEC 61753-022-2

Edition 2.0 2012-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components – Performance standard –
Part 022-2: Fibre optic connectors terminated on multimode fibre for category C – Controlled environment

Dispositifs d'interconnexion et composants passifs à fibres optiques – Norme de performance –
Partie 022-2: Connecteurs à fibres optiques raccordés à une fibre multimodale pour la catégorie C – Environnement contrôlé

IEC 61753-022-2:2012

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE
CODE PRIX N

ICS 33.180.20

ISBN 978-2-83220-468-9

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

Part 022-2: Fibre optic connectors terminated on multimode fibre for category C – Controlled environment

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International Standard IEC 61753-022-2 has been prepared by sub-committee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition, published in 2003. This edition constitutes a technical revision.

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

– reconsideration of test requirements and details.

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

FDIS	Report on voting
86B/3493/FDIS	86B/3537/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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

A list of all the parts in the IEC 61753 series, published under the general title, *Fibre optic interconnecting and passive components – Perfomance standard* can be found on the IEC website.

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

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

Part 022-2: Fibre optic connectors terminated on multimode fibre for category C – Controlled environment

1 Scope

This part of IEC 61753 contains the minimum requirements and severities which a fibre optic connector terminated on multimode fibre must satisfy in order to be categorized as meeting the IEC standard category C – Controlled Environment, as defined in Annex A of IEC 61753-1:2007.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60793-2-10, *Optical fibres – Part 2-10: Product specifications – Sectional specification for category A1 multimode fibres*

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

IEC 61300-2-12, *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 61300-2-22, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-22: Tests – Change of temperature*

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 61300-3-3, *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 in 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*

3 Test

All test methods are in accordance with the IEC 61300 series.

The connector shall be terminated onto multimode fibre as per IEC 60793-2-10, fibre type A1a or A1b, in either secondary coated or reinforced cable format.

Each test defines the number of samples to be evaluated.

The samples used for each test are intended to be previously unstressed new samples, but may be selected from previously used samples if so desired.

All optical testing shall be carried out at one central wavelength only, this shall be either 850 nm ± 30 nm.

Source characteristics shall be S2, S3 and detector D1, as specified in IEC 61300-3-4.

Launch conditions shall be in accordance with IEC 61300-1.

The full set of tests shall be carried out for all fibre types for which compliance to this standard is claimed.

For different cable structures only requalification to tests 4, 6, 9, 10, 11, 12, 13 and 14 is requested.

Change in attenuation, for the purpose of the test, is defined as the peak-to-peak variation and shall be measured using IEC 61300-3-3. For monitoring intermittent discontinuities during a test, IEC 61300-3-28 shall be used.

4 Test report

Fully documented test reports and supporting evidence shall be prepared and be available for inspection as evidence that the tests have been carried out and complied with.

5 Performance requirements

5.1 Dimensions

Dimensions shall comply with the appropriate IEC interface standard.

5.2 Sample size

For the purposes of this standard, a sample is a connector set, defined as the complete set of connector components required to provide demountable coupling between one or more pairs of optical fibres, i.e. “cable-plug-adapter-plug-cable” or “cable-socket-plug-cable”. The length of cable (or fibre) inside the chamber on each side of the connector set should be 1,5 m minimum.

The sample sizes to be used for the tests shall be as defined in Annex A. Samples may either be a new product or sourced from a previous test.

5.3 Test details and requirements

Table 1 gives test details and requirements.

NOTE Class Bm requires physical contact between fibre cores; Class Cm relates to non physical contact.

Table 1 – Test details and requirements *(1 of 6)*

No.	Test	Requirements	Details
1	End face geometry	All end face geometry parameters	Relevant Part 3 of IEC 61755: Optical interface
2	Attenuation (random mate)	Class Bm: Mean ≤ 0,35 dB Maximum 0,60 dB for 97 % of mating combinations Class Cm: Mean ≤ 0,50 dB Maximum 1,00 dB for 97 % of mating combinations	IEC 61300-3-34 METHOD 1 Source stability ± 0,05 dB over the measuring period or at least 1 h Source characteristics: (IEC 61300-3-4) for 850 nm: S2 type, LED Power meter: D1 Attenuation measurements shall be made on randomly selected specimens. Preconditioning procedure: Clean the mechanical and optical alignment parts of the specimen according to the manufacturer's instructions.
3	Return loss (random mate)	Class 2m: RL > 20 dB Class 3m: RL > 8 dB	IEC 61300-3-6 METHOD A (Branching device method) Source: Stability: ± 0,20 dB over the measuring period or at least 1 h Spectral width: > 50 nm Detector: Sensitivity: < 30 dB under source injected power Linearity: ≤ 0,5 dB Branching device: Directivity: > 35 dB without modal dispersion Other methods specified in IEC 61300-3-6 may be used as long as modal condition as specified in IEC 61300-1 is maintained at the point of measurement. Preconditioning procedure: Clean the mechanical and optical alignment parts of the specimen according to the manufacturer's instructions
4	Vibration (sinusoidal)	Attenuation shall be measured before, during and after the test. Class Bm: Maximum change during test ≤ 0,20 dB Maximum change before and after test ≤ 0,20 dB Return loss: Before and after test > 20 dB Class Cm: Maximum change during test ≤ 0,50 dB Maximum change before and after test ≤ 0,40 dB Return loss: Before and after test > 8 dB	IEC 61300-2-1 Frequency range: 10 Hz to 55 Hz Endurance duration per axis: 0,5 h Number of axes: Three orthogonal Number of sweeps: 15 Vibration amplitude: 0,75 mm Sampling rate: Maximum sampling interval shall be 2 ms by means of transient loss IEC 61300-3-28 Method of mounting: An adapter shall be mounted rigidly to the mounting fixture Specimen shall be optically functioning Preconditioning procedure: Clean the mechanical and optical alignment parts of the specimen according to the manufacturer's instructions

Table 1 (*2 of 6*)

No.	Test	Requirements	Details
5	Mating durability	Attenuation shall be measured before, after each mating during the test. In the event that the change in attenuation increases above the allowable limit, the connector may be cleaned as necessary, but not more than 25 times during the course of the test. (The measurement at which the cleaning takes place shall be discounted from the test results.) Class Bm: Maximum change during test ≤ 0,20 dB Maximum change before and after test ≤ 0,20 dB Return loss: Before and after test > 20 dB Class Cm: Maximum change during test ≤ 0,50 dB Maximum change before and after test ≤ 0,40 dB Return loss: Before and after test > 8 dB	IEC 61300-2-2 Coupling mechanism to be cycled: plug-adapter Cycling rate: Not less than 3 s between each engagement and separation Number of cycles: 500 Specimen shall be optically functioning Preconditioning and recovery procedure: Clean the mechanical and optical alignment parts of the specimen according to the manufacturer's instructions
6	Fibre cable retention	Attenuation shall be measured before, during and after the test. Class Bm: Maximum change during test ≤ 0,20 dB Maximum change before and after test ≤ 0,20 dB Return loss: Before and after test > 20 dB Class Cm: Maximum change during test ≤ 0,50 dB Maximum change before and after test ≤ 0,40 dB Return loss: Before and after test > 8 dB	IEC 61300-2-4 Magnitude and rate of application of the tensile load: 50 N ± 2 N at a speed of 5 N/s for reinforced cables 5 N ± 0,5 N at a speed of 0,5 N/s for coated fibres Point of application of tensile load: 0,3 m from the end face of the connector. Duration of the test (maintaining the load): 60 s Sampling rate: Attenuation shall be measured at least once after the load has reached its maximum level and been maintained for a minimum period of 30 s. Method of mounting: The connector shall be rigidly mounted such that the load is applied to the fibre/cable retention mechanism not the connector coupling mechanism. Specimen shall be optically functioning. Preconditioning procedure: Clean the mechanical and optical alignment parts of the specimen according to the manufacturer's instructions

Table 1 (*3 of 6*)

No.	Test	Requirements	Details
7	Strength of coupling mechanism	Attenuation shall be measured before, during and after the test. Class Bm: Maximum change during test ≤ 0,20 dB Maximum change before and after test ≤ 0,20 dB Return loss: Before and after test > 20 dB Class Cm: Maximum change during test ≤ 0,50 dB Maximum change before and after test ≤ 0,40 dB Return loss: Before and after test > 8 dB	IEC 61300-2-6 Magnitude of the tensile load: 40 N ± 1 N Rate of application of the load: 2 N/s Duration of the test: 60 s Sampling rate: Attenuation shall be measured at least once after the load has reached its maximum level and been maintained for a minimum period of 30 s. Method of mounting: An adapter shall be mounted rigidly to the mounting fixture. Specimen shall be optically functioning. Preconditioning procedure: Clean the mechanical and optical alignment parts of the specimen according to the manufacturer instructions
8	Impact	Attenuation shall be measured before, and after each drop. Class Bm: Maximum change before and after test ≤ 0,20 dB Return loss:Before and after test > 20 dB Class Cm: Maximum change before and after test ≤ 0,40 dB Return loss: Before and after test > 8 dB	IEC 61300-2-12 (Method A) Number of drops: 5 Drop height: 1,5 m Sampling rate: After each drop Specimen shall be unmated during drops, and remated for measurements after each drop. Specimen shall be non-functioning. Preconditioning procedure: Clean the mechanical and optical alignment parts of the specimen according to the manufacturer's instructions. Recovery procedure after each drop: Clean the mechanical and optical alignment parts of the specimen according to the manufacturer's instructions
9	Flexing of the strain relief of fibre optic device	Class Bm: Maximum change during test ≤ 0,20 dB Maximum change before and after test ≤ 0,20 dB Return loss: Before and after test > 20 dB Class Cm: Maximum change during test ≤ 0,50 dB Maximum change before and after test ≤ 0,40 dB Return loss: Before and after test > 8 dB	IEC 61300-2-44 Load: 2 N for reinforced cable assemblies Point of application of the load: 0,5 m from rear of plug Method of mounting: An adapter shall be mounted rigidly to the mounting fixture. Number of flex cycles: 50 Direction of flex: X and Y direction Specimen optically functioning: Yes Measurements required: Before, during (continuous) and after the test. Sampling rate: Maximum sampling interval shall be 2 ms by means of transient loss IEC 61300-3-28. Pre-conditioning procedure: Clean plug and adapter according to manufacturer's instructions.