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INTERNATIONAL STANDARD

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

IEC 61300-2-34:2024-05 CMV(en)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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~~

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This commented version (CMV) of the official standard IEC 61300-2-34:2024 edition 3.0 allows the user to identify the changes made to the previous IEC 61300-2-34:2009 edition 2.0. Furthermore, comments from IEC TC SC 86B experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

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IEC 61300-2-34 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.

This third edition cancels and replaces the second edition published in 2009. This edition constitutes a technical revision.

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

a) revision of the title;
b) classification of test procedure and applicable fluids, bringing the document in line with IEC 61753-1;
c) severities of test.

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

Draft	Report on voting
86B/4879/FDIS	86B/4924/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/publications.

A list of all the parts in the IEC 61300 series, under the general title *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures*, 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, or
- revised.

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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~~

1 Scope

The purpose of this part of IEC 61300 is for testing the resistance to solvents and contaminating fluids on fibre optic interconnecting devices, passive components and ~~closures~~ protective housings, and their functionality. ~~The object of this test is to define a standard test method to assess the effects of short term exposure to fluids and lubricants on fibre optic interconnecting components and closure.~~ 1

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

IEC 61300-2-38, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-38: Tests – Sealing for fibre optic sealed closures and hardened connectors using air* pressure

IEC 61300-3-1, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-1: Examinations and measurements – Visual examination*

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 61753 (all parts), *Fibre optic interconnecting devices and passive components – Performance standards*

IEC 62005 (all parts), *Fibre optic interconnecting devices and passive components – Reliability*

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

EN 590, *Automotive fuels – Diesel – Requirements and test methods*

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3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

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

4 General description

WARNING – Intended users of this procedure are cautioned that tests of this nature ~~may~~ can involve the use of certain hazardous material, operations and equipment. ~~In particular,~~ Some of the fluids that ~~may~~ can be used are flammable or ~~may~~ can constitute health hazards, or both. Test temperatures ~~should~~ shall be at least 10 °C below the flashpoint of any fluid being used. Open flame heat sources should not be used with any organic solvents. Test personnel ~~should~~ shall consult the relevant material's safety data sheet of each used fluid and wear the recommended personal protection clothing and equipment for handling highly toxic or flammable products when necessary.

This test method covers the effects ~~of contaminating fluids~~ on the properties of fibre optic interconnecting devices, passive components and ~~closures~~ protective housings when coming in contact with fluids in an intentional or unintentional way. Testing is performed to ensure resistance of a device under test (DUT) to liquids to which it could be exposed during storage, installation or operation, and is carried out by ~~immersing specimens in~~ exposing the DUT to a specified fluid or group of fluids for a specified period at a specified temperature. A separate ~~specimen~~ DUT shall be used with each test fluid. Properties are measured prior to and after exposure to the fluid.

This test method contains two procedures, procedure A and procedure B: **2**

- Procedure A

  DUT is immersed in a test fluid for 30 s, removed and then exposed to the test temperature for the test duration specified in Table 1.

- Procedure B

  DUT is immersed in a test fluid while being exposed for the test duration and to the test temperature specified in Table 1.

The selected procedure shall be based on the relevant IEC 61753 performance standard.

5 Apparatus

5.1 Containers

A container made of a material that will not interact with the testing fluid shall be used for each test fluid. Example materials for the test vessel are boro-silicate glass or stainless steel ~~vessel of suitable volume for each test fluid shall be used~~. Vessels shall be of sufficient size and capacity to permit the ~~specimen~~ DUT to be immersed until it is fully covered in the selected fluid without violating other physical constraints (e.g. minimum cable bend radius).

5.2 Fluids

Fluids used shall be in accordance with the relevant ~~specification for the fluid~~ IEC 61753 performance standard or IEC 62005 reliability document **3**. Table 1 give examples of fluids that may be used for this evaluation; other liquids can be used by specific request. **4**

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5.3 Heat source

A suitable heat source capable of achieving and maintaining the specified temperatures within ±2 °C of the required setting shall be used.

5.4 ~~Oven~~ Temperature controlled equipment

~~A suitable oven to dry the specimen shall be used.~~

If the specified period for liquid exposure is longer than 1 h, or to dry the DUT after exposure, a temperature-controlled oven or an environmental test chamber shall be used in order to keep the test temperature stable. See 6.4 and 6.5.

6 Procedure

6.1 ~~General~~ DUT preparation

The preparation of the ~~specimen~~ DUT shall be in accordance with the relevant ~~specification~~ IEC 61753 performance standard or IEC 62005 reliability document **5**. If cables are fitted, they shall be long enough to exit the test medium. Where no cables are fitted, blanking plugs shall be inserted.

6.2 Preconditioning

Clean the mechanical and optical alignment parts of the ~~specimen~~ DUT according to the manufacturer's instructions.

Unless otherwise stated, maintain the ~~specimen~~ DUT under standard atmospheric condition according to IEC 61300-1 for a minimum of 2 h.

6.3 Initial examinations and measurements

~~If specified,~~ Perform initial examinations according to IEC 61300-3-1 and measurements as required by the relevant ~~specification~~ IEC 61753 performance standard or IEC 62005 reliability document.

For optical properties measurement, the equipment and measurement methods shall be according to IEC 61300-3-4 for attenuation and IEC 61300-3-6 for return loss measurement. The optical performance measurement shall be performed at the wavelength(s) specified in the relevant IEC 61753 performance standard or IEC 62005 reliability document. When sealing performance is requested to be evaluated, for devices such as sealed closures and hardened connectors, the equipment and measurement method shall be according to IEC 61300-2-38 **6**. For free breathing protective housings (that are not able to hold a permanent overpressure or underpressure), the test shall be carried out on material slabs.

6.4 Conditioning

~~For each specified fluid, prepare a vessel with sufficient fluid such that the specimen can be adequately immersed.~~

~~Immerse the specimen for the specified period while maintaining the fluid temperature.~~

~~NOTE In the case of volatile fluids, it may be necessary to add additional amounts of fluid (heated to the test temperature) during the test in order to keep the specimen immersed.~~

6.4.1 Procedure A **7**

For each specified fluid, prepare a vessel with sufficient fluid such that the DUT can be fully immersed. Immerse the DUT for 30 s in the fluid, then remove the DUT from the fluid and dry it.

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DUTs or high viscosity fluids such as jellies, that are not practical to be immersed, brush the test fluid homogeneously over the DUT external area. Drain-off the excess test fluid for 2 mins and immediately after this step, set the DUT inside the temperature-controlled equipment to be exposed to the test temperature and the period specified in Table 1.

DUTs of the same type and material, although exposed to different test fluids, can be placed inside the same temperature-controlled equipment.

6.4.2 Procedure B 8

For each specified fluid, prepare a vessel with sufficient fluid such that the DUT can be fully immersed.

Immerse the DUT while maintaining the fluid temperature during the period specified in Table 1. This may require putting the vessel with the DUT immersed in temperature-controlled equipment.

In the case of volatile fluids, it is sometimes necessary to add fluid (heated to the test temperature) during the test in order to keep the DUT immersed.

6.5 Recovery

~~At the end of the immersion period, remove the specimen and wipe off surplus fluid.~~

~~Where applicable as defined in the relevant specification, dry components in an oven at an appropriate temperature for a defined period.~~

6.5.1 Procedure A

After the exposure period at the designated test temperature, remove the DUT from the temperature-controlled equipment and maintain it under standard atmospheric conditions according to IEC 61300-1 for a minimum of 1 h.

6.5.2 Procedure B

At the end of the immersion period, remove the DUT and wipe off surplus fluid.

Dry the DUT in a temperature-controlled equipment at the temperature and period as defined in Table 1. Remove the DUT from the temperature-controlled equipment and maintain it under standard atmospheric conditions according to IEC 61300-1.

6.6 Final examinations and measurements

Upon completion of the test, the ~~specimen~~ DUT(s) shall be visually examined in accordance with IEC 61300-3-1 and all necessary observations recorded as specified in the relevant ~~specification~~ IEC 61753 performance standard or IEC 62005 reliability document. ~~Careful attention shall be given to~~ Ensure no swelling and shrinkage of materials, loss of adhesive bonding between bonded surfaces, corrosion of ~~materials~~ metallic parts, softening of materials, cracks in material, degradation of optical characteristics, etc, have occurred.

The functional measurements ~~shall~~ should be ~~accomplished~~ taken at the standard ~~test~~ atmospheric conditions as defined in IEC 61300-1~~, unless otherwise specified in the relevant specification~~. When optical measurements are required, the equipment and measurement methods shall be according to IEC 61300-3-4 for attenuation and 61300-3-6 for return loss measurement. When sealing performance is evaluated, the equipment and measurement method shall be according to IEC 61300-2-38.

In the case of contamination, the disposal of contaminated water can be subject to local regulations. Follow the recommendations and warnings indicated in IEC 61300-2-38.

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7 Severity

7.1 General

The severity consists of ~~the combination~~ a selection of the test fluid, exposure duration and the fluid exposure temperature. ~~The severity shall be specified in the relevant specification.~~

Table 1 shows the specified test severities in relation to the performance categories. It is recommended to verify the test severities with the relevant IEC 61753 performance standards or IEC 62005 reliability documents for the normative values. 9

Table 1 – Recommended test severities

Category [a,b]	Fluid	Test duration	Test temperature [c]	Drying duration [d]
C, C^{HD}, OP OPHD, OP+, OP+HD, E	Not required			
I I^{HD}	NaCl 0,3 × 10^{-6}	24 h	30 °C	None
	Mineral Oil 0,5 × 10^{-6}	24 h	70 °C	None
	Soap 50 000 × 10^{-6}	24 h	30 °C	None
A	HCl at pH 2	5 days	+23 °C ± 5 °C	None
	NaOH at pH 12			
	petroleum jelly, ISO 1998-1:1998, (1.60.132)			
	90 % Isopropyl alcohol (IPA)	24 h		
G S	HCl at pH 2	5 days	+23 °C ± 5 °C	None
	NaOH at pH 12			
	Cable compound (petroleum jelly), ISO 1998-1:1998, 1.60.132			
	90 % Isopropyl alcohol (IPA)	24 h		
	Automotive diesel oil ISO 1998-1:1998, 1.20.131, and EN 590	1 h		24 h
	10 % Nonyl Phenol Ethoxylate solution (Igepal) [e]	5 days	50 °C ± 2 °C	None

[a] Categories are defined in IEC 61753-1.

[b] When the tests are performed for category I^{HD}, the product will be automatically qualified for category I.

[c] For specified test temperature of 23 °C, the standard atmospheric conditions according IEC 61300-1 can be applied

[d] When drying duration is none, sample should be checked immediately at the end of the test.

[e] Nonylphenol ethoxylate (Igepal®) is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of this product. An alternative to this fluid is 10 % sorbitan monostearate solution.

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~~The following preferred severities are non-mandatory severities which may be specified for this procedure.~~

~~6.2 Exposure and drying duration~~

~~Specimen shall be exposed to the test for the following preferred duration:~~

~~Table 1 – Preferred test durations~~

~~1 h~~
~~24 h~~
~~5 days~~
~~7 days~~
~~1 month~~

~~After exposure specimen shall be recovered by drying applied according to the temperatures given in the relevant specification and durations mentioned below.~~

~~Table 2 – Preferred drying durations~~

~~1 h~~
~~2 h~~
~~24 h~~

~~The dry out temperature should be at maximum temperature of the service environment.~~

~~6.3 Fuels, lubricants, hydraulic fluids, cleaning agents and moisture repellents and anti-freeze agents~~

~~Table 3 provides a non-exhaustive list of recommended fluids.~~

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