

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Dispositifs d'interconnexion et composants passifs à fibres optiques –
Méthodes fondamentales d'essais et de mesures –
Partie 2-19: Essais – Chaleur humide (état continu)**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIBRE OPTIC INTERCONNECTING DEVICES
AND PASSIVE COMPONENTS –
BASIC TEST AND MEASUREMENT PROCEDURES –****Part 2-19: Tests – Damp heat (steady state)**

FOREWORD

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International Standard IEC 61300-2-19 has been prepared by subcommittee SC86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This third edition cancels and replaces the second edition published in 2005. It constitutes a technical revision. The changes with respect to the previous edition are to reconsider the severities and details to be specified.

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

FDIS	Report on voting
86B/3492/FDIS	86B/3536/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.

The list of all parts of IEC 61300 series, published under the general title, *Fibre optic interconnecting and passive components – Basic test and measurement procedures*, can be found on the IEC website.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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The contents of the corrigendum of March 2020 have been included in this copy.

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – BASIC TEST AND MEASUREMENT PROCEDURES –

Part 2-19: Tests – Damp heat (steady state)

1 Scope

This part of IEC 61300 details a procedure for determining the suitability of a fibre optic device to withstand the environmental condition of high humidity and high temperature which may occur in actual use, storage and/or transport. The test is primarily intended to permit the observation of effects of high humidity at constant temperature over a given period. Absorption of moisture may result in swelling that would destroy functional utility, cause loss of physical strength, and cause changes in other important mechanical properties. Degradation of optical properties may also occur. Although not necessarily intended as a simulated tropical test, this test can, nevertheless, be useful in determining moisture absorption of insulating or covering materials.

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.

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IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

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 61300-3-3, *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*

3 General description

This procedure is conducted in accordance with IEC 60068-2-78, Test Cab. The specimen is placed in a chamber and subjected to a damp-heat environment which is maintained at a given temperature and relative humidity for a specified duration, as specified in the relevant specification.

4 Apparatus

4.1 Chamber

The apparatus consists of an environmental chamber in accordance with IEC 60068-2-78, test Cab. The chamber shall be capable of housing the specimen and shall be so constructed that:

- a) it can produce the temperature and relative humidity given in Table 1;
- b) it is capable of providing controlled conditions of temperature, relative humidity during testing, and the ramp-up to, and ramp-down from, specified test conditions;
- c) the temperature and humidity of the chamber can be monitored by means of sensing devices located in the working space, and/or other areas giving the same results (e.g. a steam generator);
- d) the enclosed atmosphere can be expelled from the chamber by the water-vapour prior to the commencement of testing;
- e) condensed water is not allowed to fall on the specimen;
- f) the materials used in the construction shall not cause any corrosion of the specimen, or degradation of the quality of the humidifying water.

The temperature tolerance of ± 2 °C is intended to take account of absolute errors in the measurement, fluctuations of the chamber temperature at any point, and variations between all points within the working space.

However, in order to maintain the relative humidity within the specified tolerance of ± 5 %, it is necessary to keep the difference between any two points in the working space (at any instant) within narrower limits.

The specified humidity tolerance will be exceeded if such temperature differences exceed 1,5 °C. It is also necessary to restrict the short-term temperature fluctuations due to cycling of the chamber heater to a similar value.

The specimen should not significantly impede the vapour flow.

Condensation shall not be allowed to form on the specimen at any time during the test.

4.2 Steam

Use steam or distilled, demineralized or deionized water to obtain the specified humidity. No rust or corrosion contaminants shall be imposed on the specimen by the test facility. Before the water is placed in the humidifier, all internal parts of the chamber shall be cleaned.

The water shall have a resistivity of not less than 50 M Ω m at 23 °C.

4.3 Optical measurements

Unless otherwise specified, measuring equipment specified in IEC 61300-3-3 shall be connected to the specimen for monitoring optical performance during the test. Where active monitoring is specified, the optical source and detector used to measure changes in attenuation shall comply with those specified in IEC 61300-3-4.

4.4 Positioning and mounting of the specimen

The specimen shall not be subjected to radiant heat from the heaters or the chamber wall.

A specific mounting structure for mounting the DUT shall be used. The heat conductivity and the thermal capacity of the mounting fixtures shall be low so that for all practical purposes the specimen is thermally isolated.

Care shall be exercised in the choice of mounting structure and mounting fixture materials to minimize the effects of contamination and to minimize degradation due to corrosion and other mechanisms.

5 Procedure

5.1 General

Unless otherwise specified in the relevant specification, the following applies:

- a) conduct the procedure in accordance with IEC 60068-2-78, test Cab;
- b) if the component construction includes optical leads, include 1,5 m of cable in the climatic chamber for each port monitored during the test;
- c) if optical measurements are requested during the test, these measurements shall be performed at a maximum interval of 1 h.

5.2 Preconditioning

Maintain the specimen under standard atmospheric condition (room temperature condition) for 2 h as the minimum.

Clean the specimen according to the manufacturer's instructions.

5.3 Initial examinations and measurements

Complete initial examinations and measurements as required by the relevant specification.

5.4 Conditioning

- a) Stabilize the chamber and the specimen to standard atmospheric conditions. Place the specimen in the chamber in its normal operating position including hook-ups to peripheral equipment (when required).
- b) Adjust the chamber temperature and humidity to the specified severity. The rate of change of temperature shall not exceed 1°K/min, averaged over a maximum period of 5 min. During this period, the enclosed atmosphere is expelled from the chamber by the water vapour and the temperature and the relative humidity shall not exceed the specified range. Condensed water is not allowed on the specimen at any time during the test. Allow the specimen to reach temperature stability and maintain the temperature and humidity for the specified duration. Stabilization of temperature and humidity shall take place within 1,5 h. However, if stabilization takes longer than 1,5 h, the test requirements will be met if stabilization is achieved in not more than 3 h and the specified test duration is greater than 48 h.
- c) The temperature and relative humidity shall be maintained within the prescribed limits for duration as specified in the relevant specification. The test duration shall commence as soon as the conditions have stabilized.
- d) At the completion of the test, allow the specimen to remain in the chamber while the temperature is gradually reduced to standard atmospheric conditions. Furthermore, the chamber pressure, temperature and relative humidity shall be restored to standard atmospheric conditions for measurement and tests in not less than 1 h and not more than 4 h. During this period, the temperature and the relative humidity shall not exceed the specified value. The conditions may be achieved by means of natural cooling. If the pressure is reduced by release from the chamber, care shall be taken that the specimen is not subject to rapid depressurization. The pressure inside the test chamber shall remain the same as the pressure in the laboratory.
- e) On completion of the cooling period, the specimen shall be subjected to the recovery procedure.
- f) Where optical measurements are required during the test, measurements shall be made at a maximum interval of 1 h. Measurements shall be made in accordance with IEC 61300-3-3. The relevant specification shall define the measurements and period(s) during testing after which they shall be carried out. The measurements shall not cause any change to the test conditions. Measurements preceded by recovery which would require the removal of the specimen from the chamber are not permissible during testing.

5.5 Recovery

Dry the specimen if necessary and allow it to remain under standard atmospheric conditions for 2 h as the minimum.

5.6 Final examinations and measurements

On completion of the test, remove all fixtures. Clean the mechanical and optical alignment parts of the specimen according to the manufacturer's instructions. Take final measurements as required by the relevant specification. If specified, visually examine the specimen in accordance with IEC 61300-3-1 and take any measurements specified to ensure that there is no permanent damage.

6 Severity

The severity consists of the combination of the temperature, humidity and exposure time. The severity shall be specified in the relevant specification.

The severities according to Table 1 shall be specified for this procedure.

Table 1 – Severities

Relative humidity %	Temperature °C	Minimum duration of exposure h
85 ⁺² ₋₃	+40 ± 2	96
93 ⁺² ₋₃	+40 ± 2	96
93 ⁺² ₋₃	+85 ± 2	336
93 ⁺² ₋₃	+85 ± 2	2 000
90 ± 5	+75 ± 2	168

7 Details to be specified

The following details, as applicable, shall be specified in the relevant specification:

- a) temperature;
- b) humidity;
- c) duration of exposure;
- d) specific mounting structures;
- e) specimen optically functioning;
- f) specimen mated (for connectors);
- g) initial examinations and measurements and performance requirements;
- h) examinations and measurements during test and performance requirements;
- i) final examinations and measurements and performance requirements;
- j) deviations from test procedure;
- k) additional pass/fail criteria.

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