

INTERNATIONAL STANDARD

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Optical fibres – **iTeh STANDARD PREVIEW**
Part 1-53: Measurement methods and test procedures – Water immersion tests
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Fibres optiques –
Partie 1-53: Méthodes de mesure et procédures d'essai – Essais d'immersion
dans l'eau

IEC 60793-1-53:2014
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRES –

**Part 1-53: Measurement methods and test procedures –
Water immersion tests**

FOREWORD

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International Standard IEC 60793-1-53 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition, published in 2001, and constitutes a technical revision.

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

- harmonizing the content with sectional specifications of relevant fibre types;
- extending the applicability of the standard to Class C single-mode fibres.

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

CDV	Report on voting
86A/1529CDV	86A/1575/RVC

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 parts in the IEC 60793 series, published under the general title *Optical fibres*, 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- withdrawn,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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OPTICAL FIBRES –

Part 1-53: Measurement methods and test procedures – Water immersion tests

1 Scope

This part of IEC 60793 provides a practical method for evaluating fibre performance in a defined environment.

The purpose of this standard is to define a test that determines the suitability of sub-category A1a to A1d multimode fibres and class B and C single-mode fibres to withstand the environmental condition of immersion in distilled or demineralized water which may occur in actual use, storage and/or transport. The test is primarily intended to permit the observation of effects of immersion in water over a given period. This procedure is conducted in accordance with IEC 60068-2-18, Test R.

NOTE The applicability of this test to other fibre categories is under study.

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.

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- [IEC 60793-1-53:2014](#)
bb57a1ffa032/iec-60793-1-53-2014
- IEC 60068-2-18, *Environmental testing – Part 2-18: Tests – Test R and guidance: Water immersion tests*
- IEC 60793-1-32, *Optical fibres – Part 1-32: Measurement and test procedures – Coating strippability*
- IEC 60793-1-40:2001, *Optical fibres – Part 1-40: Attenuation measurement methods*
- IEC 60793-2-10, *Optical fibres – Part 2-10: Product specifications – Sectional specification for category A1 multimode fibres*
- IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single mode fibres*
- IEC 60793-2-60, *Optical fibres – Part 2-60: Product specifications – Sectional specification for class C single-mode intraconnection fibres*

3 Apparatus

3.1 Water tank

The apparatus consists of a water tank filled with water. Use distilled, demineralized or de-ionized water which has a pH of between 5,0 and 8,0.

3.2 Other apparatus

Additional apparatus may be necessary to perform the examinations and measurements (or as specified in the detail specification).

4 Sampling and specimens

To ensure the required repeatability on optical measurements, the length of the specimen shall be at least 1 000 m for fibre sub-categories A1a to A1d, and at least 2 000 m for fibre class B and C. The amount of the specimen outside of the tank shall be minimized and, if it exceeds 10 % of the overall specimen length, this should be reported.

The preparation of the specimen shall have no detrimental effect on the fibre whilst under test conditions. Unless otherwise specified, the fibre sample should be loosely coiled and that the fibre ends are kept out of the water. The specimen may be coiled horizontally or vertically, with a minimum bend diameter of 150 mm to avoid any macrobend effects.

A length of the control specimen shall be removed prior to the test to enable the completion of required mechanical measurements for comparison to measurements made after the test.

5 Procedure

5.1 General

The specimen is placed in a tank which is filled with water held at $23\text{ °C} \pm 5\text{ °C}$, and held there for 30 days. The attenuation and coating strip force of the specimen are then monitored. Conduct the procedure in accordance with IEC 60068-2-18, Test R, with the “head of water” being not applicable (the head of water is used to test for “water tightness” of electrotechnical products, but it is not required in this application).

5.2 Measurements

5.2.1 Optical measurements

Attenuation measurement shall be carried out at the wavelength specified in the relevant specification using either IEC 60793-1-40:2001, Annex B (insertion loss) or IEC 60793-1-40:2001, Annex C (backscattering) before, during (once the specimen has stabilized at the specified temperature) and after the test. Attenuation changes shall be recorded.

Other optical measurements may be required if specified in the relevant product specification.

5.2.2 Mechanical measurements

The fibre coating strip force shall be measured before and after the test, using the method described in IEC 60793-1-32. The control specimen (see Clause 4) is used to evaluate the change in strippability.

5.3 Preconditioning

If specified, precondition the specimen as required by the detail specification.

5.4 Conditioning

Not applicable.

5.5 Recovery

Unless otherwise required by the relevant specification, the specimen shall remain under standard atmospheric condition for recovery for a period greater than 12 h but not more than 48 h. The detail specification may call for measurements during recovery. If required, the detail specification shall specify the measurements to be taken and when to take them.

6 Pass/fail criteria

The applicable specification limits can be found in the relevant sectional specification of IEC 60793-2-10 for A1 fibres, IEC 60793-2-50 for B fibres and IEC 60793-2-60 for C fibres.

7 Results

7.1 Information to be provided with each test

- date and title of test;
- identification of specimen;
- length of specimen;
- nominal wavelength(s) at which the test was performed;
- attenuation change;
- coating strip force;
- initial pH of the water.

7.2 Information to be available upon request

- description of all key equipment.

8 Specification information

The detail specification shall specify the following information:

- pass/fail criteria;
- information to be reported; [IEC 60793-1-53:2014](https://standards.iteh.ai/catalog/standards/sist/ee44af7-ec0e-4963-9e12-6657a11a092/iec-60793-1-53-2014)
- any deviations to the procedure that apply. <https://standards.iteh.ai/catalog/standards/sist/ee44af7-ec0e-4963-9e12-6657a11a092/iec-60793-1-53-2014>

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