
**Optična vlakna – 1-33. del: Metode merjenja in preskusni postopki –
Dovzetnost na napetostno korozijo (IEC 60793-1-33:2001)***

Optical fibres - Part 1-33: Measurement methods and test procedures - Stress
corrosion susceptibility (IEC 60793-1-33:2001)

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Optical fibres
Part 1-33: Measurement methods and test procedures -
Stress corrosion susceptibility
(IEC 60793-1-33:2001)

Fibres optiques
Partie 1-33: Méthodes de mesure
et procédures d'essai -
Résistance à la corrosion sous contrainte
(CEI 60793-1-33:2001)

Lichtwellenleiter
Teil 1-33: Messmethoden
und Prüfverfahren -
Spannungskorrosionsempfindlichkeit
(IEC 60793-1-33:2001)

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This European Standard was approved by CENELEC on 2002-03-05. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 86A/688/FDIS, future edition 1 of IEC 60793-1-33, prepared by SC 86A, Fibres and cables, of IEC TC 86, Fibre optics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60793-1-33 on 2002-03-05.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2002-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2005-03-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annexes A, B, C, D, E and ZA are normative and annexes F, G and H are informative.

Annex ZA has been added by CENELEC.

Compared to IEC 60793-1:1989 and IEC 60793-2:1992, IEC/SC 86A has adopted a revised structure of the new IEC 60793 series: The individual measurement methods and test procedures for optical fibres are published as "Part 1-XX"; the product standards are published as "Part 2-XX".

The general relationship between the new series of EN 60793 and the superseded European Standards of the EN 188000 series is as follows:

EN	Title	supersedes
EN 60793-1-XX	Optical fibres -- Part 1-XX: Measurement methods and test procedures	Individual subclauses of EN 188000:1992
EN 60793-2-XX	Optical fibres -- Part 2-XX: Product specifications	EN 188100:1995 EN 188101:1995 EN 188102:1995 EN 188200:1995 EN 188201:1995 EN 188202:1995

EN 60793-1-3X consists of the following parts, under the general title: Optical fibres:

- Part 1-30: Measurement methods and test procedures – Fibre proof test
- Part 1-31: Measurement methods and test procedures – Tensile strength
- Part 1-32: Measurement methods and test procedures – Coating strippability
- Part 1-33: Measurement methods and test procedures – Stress corrosion susceptibility
- Part 1-34: Measurement methods and test procedures – Fibre curl

Endorsement notice

The text of the International Standard IEC 60793-1-33:2001 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC/TR 62048	- ¹⁾	The law theory of optical fibre reliability	-	-

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¹⁾ To be published.

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Fibres optiques –

Partie 1-33:

**Méthodes de mesures et procédures d'essai –
Résistance à la corrosion sous contrainte**

iTeh STANDARD PREVIEW

Optical fibres –

Part 1-33: IEC 60793-1-33:2004

**Measurement methods and test procedures –
Stress corrosion susceptibility**

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International Electrotechnical Commission
Telefax: +41 22 919 0300

e-mail: inmail@iec.ch

3, rue de Varembe Geneva, Switzerland
IEC web site <http://www.iec.ch>



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRES –

**Part 1-33: Measurement methods and test procedures –
Stress corrosion susceptibility**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 4) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 5) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60793-1-33 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This standard, together with the other standards in the IEC 60793-1-3X series, cancels and replaces the second edition of IEC 60793-1-3, of which it constitutes a technical revision.

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

FDIS	Report on voting
86A/688/FDIS	86A/727/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.

Annexes A, B, C, D, E form an integral part of this standard.

Annexes F, G, H are for information only.

IEC 60793-1-3X consists of the following parts, under the general title *Optical fibres*:

- Part 1-30: Measurement methods and test procedures: Fibre proof test
- Part 1-31: Measurement methods and test procedures: Tensile strength
- Part 1-32: Measurement methods and test procedures: Coating strippability
- Part 1-33: Measurement methods and test procedures: Stress corrosion susceptibility
- Part 1-34: Measurement methods and test procedures: Fibre curl

The committee has decided that the contents of this publication will remain unchanged until 2003. At this date, the publication will be

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

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INTRODUCTION

Publications in the IEC 60793-1 series concern measurement methods and test procedures as they apply to optical fibres.

Within the same series several different areas are grouped, as follows:

- parts 1-10 to 1-19: General
- parts 1-20 to 1-29: Measurement methods and test procedures for dimensions
- parts 1-30 to 1-39: Measurement methods and test procedures for mechanical characteristics
- parts 1-40 to 1-49: Measurement methods and test procedures for transmission and optical characteristics
- parts 1-50 to 1-59: Measurement methods and test procedures for environmental characteristics.

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OPTICAL FIBRES –

Part 1-33: Measurement methods and test procedures – Stress corrosion susceptibility

1 Scope and object

This part of IEC 60793 contains descriptions of the five main test methods concerning the determination of stress corrosion susceptibility parameters.

The object of this standard is to establish uniform requirements for the mechanical characteristic stress corrosion susceptibility. Dynamic fatigue and static fatigue tests are used in practice to determine stress corrosion susceptibility parameters, dynamic n -value and static n -value.

Any fibre mechanical test should determine fracture stress and fatigue properties under conditions that model the practical application as close as possible. Some appropriate test methods are available:

- A: Dynamic n value by axial tension (see annex A);
- B: Dynamic n value by two-point bending (see annex B);
- C: Static n value by axial tension (see annex C);
- D: Static n value by two-point bending (see annex D);
- E: Static n value by uniform bending (see annex E).

These methods are appropriate for types A1, A2 and A3 multimode and type B1 single-mode fibres.

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Static and dynamic fatigue test methods show comparable results if both tests are performed in the same effective measuring time. For dynamic fatigue tests this means a measuring time which is $(n + 1)$ times larger than the measuring time of static fatigue tests.

When using static fatigue test methods, it has been observed that for longer measuring times and consequently lower applied stress levels, the n -value increases. The range of measuring times of the static fatigue tests, given in this standard, approaches the practical situation better than that of the dynamic fatigue tests, which in general are performed in relatively short time-frames.

These tests provide values of the stress corrosion parameter, n , that can be used for reliability calculations according to IEC 62048.

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.

IEC 62048, *The law theory of optical fibre reliability* ¹

¹ To be published.

3 Apparatus

See annexes A, B, C, D, and E for each of the layout drawings and other equipment requirements for each of the methods respectively.

4 Sampling and specimens

These measurements are statistical in nature. A number of specimens or samples from a common population are tested, each under several conditions.

Failure stress or time statistics for various sampling groups are used to calculate the stress corrosion susceptibility parameters.

4.1 Specimen length

Specimen length is contingent on the test procedure used. See the respective annexes A, B, C, D and E for the length required for the test method. For tensile tests, the length ranges from 0,5 m to at most 5 m. For two-point bending tests, the actual length tested is less than 1 cm and for uniform bending tests about 1 m.

4.2 Specimen preparation and conditioning

All of the test methods shall be performed under constant environmental conditions. Unless otherwise specified in the detail specification, the nominal temperature shall be in the range of 20 °C to 23 °C with a tolerance of ± 2 °C for the duration of the test. Unless otherwise specified in the detail specification, the nominal relative humidity (RH) shall be in the range of 40 % to 60 % with a tolerance of ± 5 % for the duration of the test.

Unless otherwise specified, all specimens shall be pre-conditioned in the test environment for a minimum period of 12 h.

The use of stress corrosion susceptibility (and proof stress) parameters for reliability estimates is still under consideration. A method for extrapolating such parameters to service environments different from the default environment specified above has not been developed.

It has been observed that the value of n produced by these tests can change after even brief exposure of the fibre to elevated temperature and humidity. A guide for the use of these methods is documented in IEC 62048.

The observed value of stress corrosion susceptibility parameter, n , may differ between fatigue test methods. Influences on the results have been observed concerning the measuring time and the applied stress level. Care should be taken in the choice of test method. This should be agreed between the user and manufacturer.

5 Reference test method

Method A is the reference test method and shall be used to resolve disputes because it yields minimal values compared to the others and may be completed in a duration practical for dispute resolution.