EESTI STANDARD EVS-EN IEC 60793-1-31:2019

Optical fibres - Part 1-31: Measurement methods and test procedures - Tensile strength

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA / NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 60793-1-31:2019 sisaldab Euroopa standardi EN IEC 60793-1-31:2019 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 60793-1-31:2019 consists of the English text of the European standard EN IEC 60793-1-31:2019.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 05.04.2019.	Date of Availability of the European standard is 05.04.2019.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 33.180.10

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60793-1-31

April 2019

ICS 33.180.10

Supersedes EN 60793-1-31:2010

English Version

Optical fibres - Part 1-31: Measurement methods and test procedures - Tensile strength (IEC 60793-1-31:2019)

Fibres optiques - Partie 1-31: Méthodes de mesure et procédures d'essai - Résistance à la traction (IEC 60793-1-31:2019)

Lichtwellenleiter - Teil 1-31: Messmethoden und Prüfverfahren - Zugfestigkeit (IEC 60793-1-31:2019)

This European Standard was approved by CENELEC on 2019-03-13. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 60793-1-31:2019 E

European foreword

The text of document 86A/1908/FDIS, future edition 3 of IEC 60793-1-31, prepared by SC 86A "Fibres and cables" of IEC/TC 86 "Fibre optics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60793-1-31:2019.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2019-12-13
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2022-03-13

This document supersedes EN 60793-1-31:2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 60793-1-31:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60793-1-21:2001	NOTE	Harmonized as EN 60793-1-21:2002 (not modified)
IEC 60793-2-10:2017	NOTE	Harmonized as EN 60793-2-10:2017 (not modified)
IEC 60793-2-20:2015	NOTE	Harmonized as EN 60793-2-20:2016 (not modified)
IEC 60793-2-30:2015	NOTE	Harmonized as EN 60793-2-30:2015 (not modified)
IEC 60793-2-40:2015	NOTE	Harmonized as EN 60793-2-40:2016 (not modified)
IEC 60793-2-50:2015	NOTE	Harmonized as EN 60793-2-50:2016 (not modified)
IEC 61649:2008	NOTE	Harmonized as EN 61649:2008 (not modified)

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60793-1-20	-	Optical fibres - Part 1-20: Measurement methods and test procedures - Fibre geometry	EN 60793-1-20	-

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

____

OPTICAL FIBRES –

Part 1-31: Measurement methods and test procedures – Tensile strength

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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 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 IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60793-1-31 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This third edition cancels and replaces the second edition published in 2010. This edition constitutes a technical revision.

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

a) correction of Formulae (3b) and (4b) and renumbering of formulae.

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

FDIS	Report on voting
86A/1908/FDIS	86A/1926/RVD

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

This document 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 document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

INTRODUCTION

Failure stress distributions can be used to predict fibre reliability in different conditions. IEC TR 62048 shows mathematically how this can be done. To complete a given reliability projection, the tests used to characterize a distribution are controlled for the following:

- population of fibre, for example coating, manufacturing period, diameter;
- gauge length, i.e. length of section that is tested;
- stress or strain rates;
- testing environment;
- preconditioning or aging treatments;
- sample size.

This method measures the strength of optical fibre at a specified constant strain rate. It is a destructive test, and is not a substitute for proof-testing.

This method is used for those typical optical fibres for which the median fracture stress is greater than 3,1 GPa (450 kpsi[1]) in 0,5 m gauge lengths at the highest specified strain rate of 25 %/min. For fibres with lower median fracture stress, the conditions herein have not demonstrated sufficient precision.

Typical testing is conducted on "short lengths", up to 1 m, or on "long lengths", from 10 m to 20 m with sample size ranging from 15 to 30.

The test environment and any preconditioning or aging are critical to the outcome of this test. There is no agreed upon model for extrapolating the results for one environment to another environment. For failure stress at a given stress or strain rate, however, as the relative humidity increases, failure stress decreases. Both increases and decreases in the measured strength distribution parameters have been observed as the result of preconditioning at elevated temperature and humidity for even a day or two.

This test is based on the theory of fracture mechanics of brittle materials and on the power-law description of flaw growth (see IEC TR 62048). Although other theories have been described elsewhere, the fracture mechanics based on power-law theory is the most generally accepted.

A typical population consists of fibre that has not been deliberately damaged or environmentally aged. A typical fibre has a nominal diameter of 125 mm, with a 250 mm or less diameter acrylate coating. Default conditions are given for such typical populations. Non-typical populations might include alternative coatings, environmentally aged fibre, or deliberately damaged or abraded fibre. Guidance for non-typical populations is also provided.

1 kpsi = kilopounds per square inch.