



National Standards Authority of Ireland

IRISH STANDARD

I.S. EN 60793-1-40:2004

ICS 33.180.10

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OPTICAL FIBRES

PART 1-40: MEASUREMENT METHODS AND

TEST PROCEDURES - ATTENUATION

(IEC 60793-1-40:2001, MODIFIED)

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EUROPEAN STANDARD

EN 60793-1-40

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2003

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Partly supersedes EN 188000:1992

English version

Optical fibres
Part 1-40: Measurement methods and test procedures –
Attenuation
(IEC 60793-1-40:2001, modified)

Fibres optiques
Partie 1-40: Méthodes de mesure
et procédures d'essai –
Affaiblissement
(CEI 60793-1-40:2001, modifiée)

Lichtwellenleiter
Teil 1-40: Messmethoden und
Prüfverfahren –
Dämpfung
(IEC 60793-1-40:2001, modifiziert)

This European Standard was approved by CENELEC on 2003-11-01. 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, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, 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/669/FDIS, future edition 1 of IEC 60793-1-40, 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 60793-1-40 on 2001-10-01.

A draft amendment, prepared by the Technical Committee CENELEC TC 86A, Optical fibres and optical fibre cables, was submitted to the Unique Acceptance Procedure and was approved by CENELEC for inclusion into EN 60793-1-40 on 2003-11-01.

This European Standard supersedes subclause 4.5 (test method 301), subclause 4.6 (test method 302) and subclause 4.7 (test method 303) of EN 188000:1992.

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) 2004-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-11-01

Annexes designated "normative" are part of the body of the standard. In this standard, Annexes A, B, C, D and ZA are normative. 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 60793-1-4X consists of the following parts, under the general title: Optical fibres:

- Part 1-40: Measurement methods and test procedures – Attenuation
- Part 1-41: Measurement methods and test procedures – Bandwidth
- Part 1-42: Measurement methods and test procedures – Chromatic dispersion
- Part 1-43: Measurement methods and test procedures – Numerical aperture
- Part 1-44: Measurement methods and test procedures – Cut-off wavelength
- Part 1-45: Measurement methods and test procedures – Mode field diameter
- Part 1-46: Measurement methods and test procedures – Monitoring of changes in optical transmittance
- Part 1-47: Measurement methods and test procedures – Macrobending loss
- Part 1-48: Measurement methods and test procedures – Polarization mode dispersion
- Part 1-49: Measurement methods and test procedures – Differential mode delay

Endorsement notice

The text of the International Standard IEC 60793-1-40:2001 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS

Annex C

C.3 Procedure

C.3.6.2 Add at the end of the third sentence (...of the fibre or cable attenuation):

"... (C.3) or the measurement of the fibre longitudinal attenuation uniformity (C.4)".

Insert the following new title and text for C.4 and **renumber** the existing clauses C.4 and C.5 to become C.5 Calculations and C.6 Results.

C.4 Measurement of fibre longitudinal attenuation uniformity using an OTDR

This procedure describes the use of an OTDR to measure the longitudinal attenuation uniformity of single-mode fibres in a bi-directional way. The use for multimode fibres is still under consideration.

Longitudinal attenuation uniformity is the deviation in attenuation coefficient of segments of the fibre under test, compared with its average attenuation coefficient determined over the entire fibre length.

In case an OTDR instrument is not able to calculate the longitudinal attenuation uniformity, an additional computer is needed to analyze the measured OTDR traces.

C.4.1 The fibre under test should be measured in both directions using an OTDR at the relevant wavelength (See C.3 for start-up details).

C.4.2 For both bi-directional measurements the OTDR traces are fitted using a least-squares fit over the entire length of the fibre (excluding the dead-zone and reflecting pulse areas). The attenuation coefficient of the entire fibre length is calculated as the mean of the slopes of both bi-directional traces (comparable to C.3.5.2 and C.5.5).

C.4.3 Divide both bi-directional traces in segments with a length of about 2 km. These segments should have the same orientation for the measurements in both directions. Each segment may have an overlap with adjacent segments: the length of this overlap (e.g. 1 km) is to be determined between the customer and the manufacturer.

C.4.4 For each segment, the slopes of the corresponding traces in both directions are determined, using a least-squares fit.

C.4.4 The attenuation coefficient of each fibre segment is calculated as the mean of the slopes of both bi-directional traces for the corresponding segment

C.4.6 The longitudinal attenuation (non-) uniformity parameter X (in dB/km) is the maximum difference between the segment attenuation coefficient (result of C.4.5) and the attenuation coefficient determined for the entire fibre length (result of C.4.2).

NOTE 1 The use of this longitudinal attenuation (non-)uniformity parameter is a matter of common agreement between the customer and the manufacturer.

NOTE 2 The minimum fibre length for this test should be 4 km.

NOTE 3 The use of this longitudinal attenuation (non-) uniformity parameter should be treated with great care, because the determination of the segment attenuation coefficients may be less accurate compared with the attenuation coefficient of the entire fibre length.

C.5 Calculations (renumbered from C.4)

C.5.3 Replace "in 6.4.2" by "in 6.5.2".

C.5.4 Replace "in C.4.1 to .4.2" by "in C.5.1 to 6.5.2".

C.5.5 Replace "in C.4.2" by "in C.5.2".

C.5.6 Replace "C.4.1 through C.4.5" by "C.5.1 through C.5.5".

C.6 Results (renumbered from C.5)

C.6.1 Add at the end:

Report the following information when measuring fibre longitudinal uniformity:

- the longitudinal attenuation non-uniformity parameter X (in dB/km) at the specified wavelength.

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