

Fibre-optic communication subsystem test procedures —

Part 4-1: Cable plant and links — Multimode fibre-optic cable plant attenuation measurement

The European Standard EN 61280-4-1:2004 has the status of a British Standard

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National foreword

This British Standard is the official English language version of EN 61280-4-1:2004. It is identical with IEC 61280-4-1:2003.

The UK participation in its preparation was entrusted by Technical Committee GEL/86, Fibre optics, to Subcommittee GEL/86/3, Fibre optics systems and active devices, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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**Fibre-optic communication subsystem test procedures
Part 4-1: Cable plant and links –
Multimode fibre-optic cable plant attenuation measurement
(IEC 61280-4-1:2003)**

Procédures d'essai des sous-systèmes
de télécommunication à fibres optiques
Partie 4-1: Installation de câbles et liens -
Mesure de l'affaiblissement
des installations de câbles
à fibres optiques multimodales
(CEI 61280-4-1:2003)

Prüfverfahren für Lichtwellenleiter-
Kommunikationsuntersysteme
Teil 4-1: Lichtwellenleiter-Kabelanlagen -
Dämpfungsmessung in Mehrmoden-LWL-
Kabelanlagen
(IEC 61280-4-1:2003)

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CENELEC

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

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Foreword

The text of document 86C/550/FDIS, future edition 1 of IEC 61280-4-1, prepared by SC 86C, Fibre optic systems and active devices, of IEC TC 86, Fibre optics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61280-4-1 on 2004-05-01.

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) 2005-02-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2007-05-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61280-4-1:2003 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 61280-4-2	NOTE	Harmonized as EN 61280-4-2:1999 (not modified).
IEC 61300-3-31	NOTE	Harmonized as EN 61300-3-31:2003 (not modified).
IEC 61315	NOTE	Harmonized as EN 61315:1997 (not modified).

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FIBRE-OPTIC COMMUNICATION SUBSYSTEM TEST PROCEDURES –

Part 4-1: Cable plant and links – Multimode fibre-optic cable plant attenuation measurement

1 Scope

This part of IEC 61280 establishes preferred measurement principles and practices to assure that meaningful data describing the optical loss performance of installed cable plants can be obtained. It is not intended for component testing, nor does it define those elements of an installation that need to be measured. Establishment of requirements for installation, maintenance, repair or conformance testing is left to the specifier of this test method.

This procedure is a specific test associated with IEC 61281-1.

This procedure can be used to measure the optical loss between any two passively connected points, including end terminations, of a multimode optical fibre cable plant. The optical fibre cable plant, as the term is used here, may consist of optical fibre cables, connectors, mounting panels, jumper cables, and other passive components, but may not include active components. An example of a cable plant could be a portion of a LED (light emitting diode)-based local area network. This could include optical switches or couplers, but would exclude gain elements in the connected path.

The accuracy of this test method depends upon proper selection of the test methods contained herein and other factors. Refer to Annex B for additional information.

This test method utilizes test jumpers to facilitate a field measurement that includes all loss elements within the cable plant. It may, therefore depending on the method chosen, include connection losses that do not appear in method B of IEC 60793-1-40 – insertion loss technique (for fibres). For guidance in selecting a method, refer to Annex B.

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 60793-1-40:2001, *Optical fibres – Part 1-40: Measurement methods and test procedures – Attenuation*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification, requirements and user's guide*

IEC 61281-1, *Fibre optic communication subsystems – Part 1: Generic specification*

IEC 61300-3-4, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-4: Examination and measurements – Attenuation*

3 Apparatus

3.1 Light sources

The light sources shall conform to the spectral characteristics of Table 1 and modal launch conditions that follow, unless otherwise specified in the detail specification or other reference document.

Table 1 – Light source characteristics

Centre wavelength nm	Spectral width nm, FWHM
850 ± 30	30 – 60
1 300 ± 20	100 – 140

The light sources may contain internal lenses, pigtails and mode conditioners, provided they meet the following modal launch conditions.

The modal launch conditions from the light source shall be characterized as one of categories 1 through 5 following the procedure in Annex A. If not otherwise specified in a reference document, light sources from category 1 shall be used and noted in the test report (see 7.1). Category 1 sources result in the highest measured cable plant loss.

NOTE Characterization of the modal launch conditions by category is not required if the test set transmitter has the same characteristics as the system source.

This test method does not specify precision or accuracy requirements for the test equipment. However, the stability of the light source directly contributes to measurement variability. Use a light source that is sufficiently stable to meet the desired measurement precision.

3.2 Safety

All tests performed on optical fibre communication systems, or that use a laser or LED in a test set, shall be carried out with safety precautions in accordance with IEC 60825-1.

3.3 Optical power measurement equipment

Use equipment capable of measuring relative or absolute optical power (such as an optical power meter) which is designed in such a way as to make power measurements independent of the modal distribution. This test method does not specify precision or accuracy requirements for this equipment; therefore, the user is responsible for determining whether the equipment temperature stability and optical power linearity are consistent with the accuracy and precision that is desired.

NOTE Non-linearity between the measured and incident optical power will introduce measurement error. Also, equipment with internal waveguides may exhibit measurement variability with varying modal conditions.

3.4 Test jumpers

Unless otherwise specified by a network standard, the test jumper fibres (optical fibres within the test patchcords) shall have the core diameter and numerical aperture nominally equal to those of the cable plant or link under test being measured. The jumpers shall be 1 m to 5 m long, and shall contain fibres with coatings, or contain appropriate mechanisms, that remove cladding light. Terminations shall be compatible with the light source and cable plant.