SLOVENSKI STANDARD

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Fibre optic communication subsystem basic test procedures - Part 2-1: Test procedures for digital systems - Receiver sensitivity and overload measurement (IEC 61280-2-1:1998)

Fibre optic communication subsystem basic test procedures -- Part 2-1: Test procedures for digital systems - Receiver sensitivity and overload measurement

Lichtwellenleiter-Kommunikationsuntersysteme - Grundlegende Prüfverfahren -- Teil 2-1: Prüfverfahren für digitale Systeme - Messung der Empfindlichkeitsschwelle und der maximalen Eingangsleistung von Empfängern

Procédures d'essai de base des sous-systèmes de télécommunication à fibres optiques -- Partie 2-1: Procédures d'essai des systèmes numériques - Mesure de la sensibilité et de la surcharge d'un récepteur

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(IEC 61280-2-1:1998)

This European Standard was approved by CENELEC on 1999-04-01. 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.

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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/224/FDIS, future edition 1 of IEC 61280-2-1, 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 61280-2-1 on 1999-04-01.

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) 2000-01-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2002-01-01

Endorsement notice

The text of the International Standard IEC 61280-2-1:1999 was approved by CENELEC as a European Standard without any modification.

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Procédures d'essai de base des sous-systèmes de télécommunication à fibres optiques –

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Fibre optic communication subsystem basic test procedures –

Part 2-1:
Test procedures for digital systems – Receiver sensitivity and overload measurement

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIBRE OPTIC COMMUNICATION SUBSYSTEM BASIC TEST PROCEDURES –

Part 2-1: Test procedures for digital systems – Receiver sensitivity and overload measurement

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.

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5) 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.

6) 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 61280-2-1 has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

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

FDIS	Report on voting
86C/224/FDIS	86C/232/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.

Annex A is for information only.

FIBRE OPTIC COMMUNICATION SUBSYSTEM BASIC TEST PROCEDURES –

Part 2-1: Test procedures for digital systems – Receiver sensitivity and overload measurement

1 Scope and object

This standard specifies a test procedure applicable to digital fibre optic communication systems.

One object of this test procedure is to measure the minimum and maximum optical powers required and allowed at the input of a single-mode fibre optic system receiver connector to operate at specified BERs. Another object is to verify that the guaranteed error performance is obtained at the minimum and the maximum optical input powers specified by the terminal equipment manufacturer.

2 Apparatus

2.1 BER test set

This test set shall be capable of providing a pseudo-random data input to the system consistent with the signal format (pulse shape, amplitude, etc.) required at the system input interface. The receiver portion of the test set shall be able to interface with the system output for computing the BER performance.

2.2 Optical power meter

The optical power meter used shall have a resolution of at least 0,1 dB, and shall have been calibrated for the wavelength and dynamic range of operation for the equipment to be tested.

2.3 Variable optical attenuator

This attenuator shall be capable of attenuation in steps less than, or equal to, 0,25 dB, and should be able to provide total attenuation 5 dB to 10 dB more than the system gain. Care should be taken to avoid back reflection into the transmitter.

2.4 Optical splitter

Optical splitter (coupler) should have one input port and two output ports, equipped with appropriate connectors. The splitting ratio for the output ports should be approximately 50 % (unless otherwise specified).

2.5 Jumper cable

Single-mode fibre jumper cables with the appropriate connectors shall be used.

2.6 Test transmitter

The test transmitter shall have electrical, optical, and mechanical characteristics similar to those of transmitters that are used in the specified fibre optic terminal devices. Measurement of receiver sensitivity is dependent upon the associated transmitter and its characteristics. (A measurement of the worst-case receiver sensitivity may require a test transmitter meeting its worst-case criteria.)

3 Test sample

The test sample shall be a single-mode fibre optic receiver, including all signal conditioning and multiplexing equipment used in the system under normal operating conditions. The system inputs and outputs shall be those normally seen by the user of the system. The test transmitter shall be installed in the fibre optic transmission system under test.

4 Procedure

The procedures of 4.1 to 4.9 are to measure received power levels required to achieve different BER performance levels. The procedures of clause 5 are to determine that the receiver BER performance is obtained at the manufacturer's specified minimum and maximum receive power levels.

4.1 Unless otherwise specified, standard operating conditions apply. The ambient or reference point temperature and humidity shall be specified.

4.2 Apply appropriate terminal input voltage to the system under test. Apply standard (or extended) operating conditions. Allow sufficient time (30 min unless otherwise specified by the manufacturer) for the terminal under test to reach a steady-state temperature and performance condition.

4.3 Turn the optical power meter on and allow the recommended warm-up and settling time to achieve the rated measurement performance level.

4.4 Apply the optical output of the transmitter to the receiver through the optical attenuator and optical splitter, as shown in figure 1.

4.5 As part of standard operating conditions, all the terminal inputs are fully loaded with pseudo-random data (maximum possible word length: typically $2^{+23} - 1$). Select a channel to be monitored. Connect the terminal output of the selected channel to the receiver portion of the BER test set.

4.6 Using the following procedures, determine the calibration factor to be applied to the power meter reading, so as to determine the received power at the input of the optical receiver.

4.6.1 Connect a fibre optic jumper cable between port number 1 and the optical head of the power meter. Adjust the attenuator so that the power meter reads the manufacturer's specified minimum received power necessary to achieve the specified BER. Disconnect the connector from the optical power meter input and connect it to the receiver optical input connector.

4.6.2 Connect another fibre optic jumper cable from the port number 2 of the optical splitter to the input of optical power meter. Adjust or calculate the calibration factor for the optical power meter so that the optical meter reads the manufacturer's specified minimum received power necessary to achieve the specified BER.