SLOVENSKI STANDARD
SIST EN 50083-6:1999

01-julij-1999

Nadomešča:
SIST EN 50083-6:1995

Cable networks for television signals, sound signals and interactive services - Part 6: Optical equipment

Cable networks for television signals, sound signals and interactive services -- Part 6: Optical equipment

Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste -- Teil 6: Optische Geräte

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Réseaux de distribution par câbles pour signaux de télévision, signaux de radiodiffusion sonore et services interactifs -- Partie 6: Matériels optiques

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Ta slovenski standard je istoveten z: **EN 50083-6:1997**

ICS:

33.060.40	Kabelski razdelilni sistemi	Cabled distribution systems

SIST EN 50083-6:1999 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50083-6

December 1997

ICS 33.060.40

Supersedes EN 50083-6:1994

Descriptors: Telecasting, cable television, sound broadcasting, television broadcasting, optical fibres, components, measurements, characteristics

English version

Cable networks for television signals, sound signals and interactive services Part 6: Optical equipment

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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

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FOREWORD

This second edition of the European Standard was prepared by CENELEC Technical Committee CENELEC TC 209, "Cable networks for television signals, sound signals and interactive services" on the basis of EN 50083-6:1994 and the first amendment to EN 50083-6.

The text of this first amendment was approved by CENELEC on 1997-03-11 with the request to prepare a second edition of EN 50083-6, by incorporating this amendment into the European standard EN 50083-6:1994.

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) 1998-07-01

- latest date by which national standards conflicting with the EN have to be withdrawn (dow) 1998-07-01

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For products which have complied with EN 50083-6:1994 before 1998-07-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2003-07-01.

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1 Scope

1.1 General

Standards of EN 50083 series deal with cable networks for television signals, sound signals and interactive services including equipment, systems and installation

- for headend-reception, processing and distribution of television and sound signals and their associated data signals and
- for processing, interfacing and transmitting all kinds of interactive services

using all applicable transmission media.

All kinds of networks like

- CATV-networks
- MATV-networks and SMATV-networks
- individual receiving networks

and all kinds of equipment, systems and installations installed in such networks, are within this scope.

The extent of this standardization work is from the antennas, special signal source inputs to the headend or other interface points to the network up to the system outlet or the terminal input, where no system outlet exists.

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The standardization of any user terminals (i.e. tuners, receivers, decoders, multimedia terminals etc.) as well as of any coaxial and optical cables and accessories therefor is excluded.

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1.2 Specific scope of this part 6

This standard

- applies to all optical transmitters, receivers, amplifiers, splitters, directional couplers, isolators, multiplexers, connectors and splices used in cable networks;
- covers the frequency range 5 MHz to 3000 MHz;

  NOTE: The upper limit is an example, but not a strict value. The frequency range or ranges, over which the equipment is specified, shall be published.
- identifies guaranteed performance requirements for certain parameters;
- lays down data publication requirements with guaranteed performance;
- describes methods of measurement for compliance testing.

All requirements and published data relate to minimum performance levels within the specified frequency range and in well matched conditions as might be applicable to cable networks for television signals, sound signals and interactive services.

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2 Normative references

This European standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the 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 EN 50083-6 only when incorporated in by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 50083		Cable networks for television signals, sound signals and interactive services
EN 50083-1 + A1	1994 1997	Part 1: Safety requirements
EN 50083-2 + A1	1995 1997	Part 2 : Electromagnetic compatibility for equipment and systems
EN 50083-3	1994	Part 3: Active coaxial wideband distribution equipment
EN 50083-5	1994	Part 5: Headend equipment
EN 50083-7	1996	Part 7: System performance
EN 60068/HD 323	series	Environmental testing / Basic environmental testing procedures (IEC 68 series)
EN 60529	1991	Degrees of protection provided by enclosures (IP Code) (IEC 529:1989)
EN 60617-13	1993	Graphical symbols for diagrams Part 13: Analogue elements (IEC 617-13:1993)
EN 60825-1 + A11	1994 1996	Safety of laser products - Part 1: Equipment, classification, requirements and user´s guide (IEC 825-1: 1993)
EN 60825-2	1994	Safety of laser products - Part 2: Safety of optical fibre communication systems (IEC 825-2: 1993)
EN 181000	1994	Fibre Optic Branching Devices
HD 243 S12	1995	Graphical symbols for use on equipment - Index, survey and compilation of the single sheets (IEC 417:1973 + supplements A:1974 to M:1994)
HD 571 S1	1990	General principles for the creation of graphical symbols for use on equipment (IEC 416:1988)
IEC 617-1 to -12	1983	Graphical symbols for diagrams

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3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this part of EN 50083, the following terms and definitions apply.

3.1.1 Equipment

3.1.1.1 optical transmitter
A device for converting electrical signals into optical signals. It consists of a light source (e.g. laser) and its associated components as well as all components between the coaxial input and optical output connectors.

3.1.1.2 optical receiver
A device for converting optical signals into electrical signals. It consists of a detector (e.g. PIN-diode) and its associated components as well as all the components between the optical input and coaxial output connectors.

3.1.1.3 optical amplifier
A device for amplifying optical signals directly. It consists of an active medium, and its associated components, which amplifies the optical signal without demodulation or regeneration.

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3.1.1.4 optical isolator
A device which transports optical power in one direction only.

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3.1.1.5 optical fibre splice
A permanent joint of two fibre ends.

3.1.1.6 splitters, directional couplers, and multiplexers
Splitters, directional couplers and multiplexers are fibre optic branching devices as defined in EN 181000.

3.1.2 Performance characteristics

3.1.2.1 extinction ratio
The ratio of the high-level ϕ_h optical power to the low-level ϕ_l optical power of a modulated optical transmitter.

$$e = \frac{\phi_h}{\phi_l} \qquad (1)$$

This term is mainly used for digital systems.

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3.1.2.2 optical modulation index
The optical modulation index is defined as:

$$m = \frac{\phi_h - \phi_l}{\phi_h + \phi_l} \quad (2)$$

where ϕ_h is the highest and ϕ_l is the lowest instantaneous optical power of the intensity modulated optical signal. This term is mainly used for analogue systems.

3.1.2.3 noise figure/factor
Figures of merit describing the internally generated noise of an active device. The noise factor NF is the ratio of the carrier to noise ratio at the input, to the carrier to noise ratio at the output of an active device, assuming the incoming carrier is noise free.

$$NF = \frac{C_1 / N_1}{C_2 / N_2} \quad (3)$$

where: C_1 = signal power at the input
C_2 = signal power at the output
N_1 = noise power at the input
(ideal thermal noise for electrical devices;
quantum noise for optical devices)
N_2 = noise power at the output

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in other words, the noise factor is the ratio of noise power at the output of an active device to the noise power at the same point if the device had been ideal and added no noise.

$$NF = \frac{N_{2,actual}}{N_{2,ideal}} \quad (4)$$

The noise factor is dimensionless and is often expressed as noise figure F in dB.

$$F = 10 \lg NF \quad (5)$$

3.1.2.4 relative intensity noise (*RIN*)
The ratio of the mean square of the intensity fluctuations in the optical power of a light source to the square of the mean of the optical output power.

NOTE: The value for the *RIN* can be calculated from the results of a carrier to noise measurement for the system (see 4.19).

3.1.2.5 noise equivalent power (*NEP*)
The notional optical power which, when applied to the input of a noiseless optical receiver, would give raise to an electrical output noise power density equal to that observed at the output of an actual receiver under consideration.

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NOTE: The *NEP* can be calculated from the carrier to noise ratio *C/N* (see 4.19) of a receiver using:

$$NEP = \frac{mP}{\sqrt{2B}} 10^{-\frac{1}{20}C/N} \quad (6)$$

In this equation, *m* is the optical modulation index, *P* is the received optical power and *B* is the bandwidth. The *NEP* shall be expressed in units of W/√Hz.

3.1.2.6 equivalent input noise current density

The notional input noise current density which, when applied to the input of an ideal noiseless device, would produce an output noise current density equal in value to that observed at the output of the actual device under consideration.

NOTE: It can be calculated from the carrier to noise ratio C/N (see 4.19) of a device or system using:

$$I_r = \sqrt{\frac{C}{Z\ 10^{\frac{1}{10}C/N}}} \quad (7)$$

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In this equation, *C* is the amplitude of the carrier at the input of the device or system and *Z* is its input impedance. The equivalent input noise current density shall be expressed in units of A/√Hz.

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3.1.2.7 bit error rate (*BER*)

The number of erroneous bits at the output of a system divided by the total number of received bits. This term is used in digital transmission systems.

3.1.2.8 responsivity

The ratio of the output current of a photodiode to the incident optical power.

$$r_s = \frac{I}{P} \quad \text{(static responsivity)} \quad (8)$$

$$r_d = \frac{dI}{dP} \quad \text{(dynamic responsivity)} \quad (9)$$

For practical purposes static and dynamic responsivities can be assumed to be equal.

3.1.2.9 voltage responsivity of an optical receiver

The ratio of the change of output voltage to the change of the incident optical power.

$$r_V = \frac{dU}{dP} \quad (10)$$

3.1.2.10 chromatic dispersion

The velocity at which an optical pulse travels on a fibre depends on its wavelength. Chromatic dispersion is defined as minus the change of group travel time per unit length of fibre per change of wavelength.

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3.1.2.11 wavelength
The wavelength λ of light in vacuum is given by:

$$\lambda = \frac{c}{f} \qquad (11)$$

where: c = 2,99793 x 10^8 m/s (speed of light in vacuum)
f = optical frequency.

Although the wavelength in dielectric material such as fibres is shorter than in vacuum, only the wavelength of light in vacuum is used.

3.1.2.12 chirp
The incidental frequency modulation caused by intensity modulation of a laser diode.

NOTE: Chirping effectively broadens the laser spectral bandwidth. Due to the chromatic dispersion of the fibre, parts of the spectrum travel at different speeds resulting in harmonic distortion of the transferred signal.

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3.1.2.13 polarization
The projection of the electric vector on a plane perpendicular to the direction of transmission of the polarized light wave.

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3.1.2.14 linewidth
The spectral bandwidth of an individual mode of a laser. It is defined as the difference between those optical frequencies at which the amplitude reaches or first falls to half of the maximum amplitude.

3.1.2.15 coherence time and coherence length
The coherence time is the time which light needs to travel the coherence length. The coherence time is the reciprocal of 2π times the linewidth. Both values are used to describe the phase stability of a light source.

3.1.2.16 well cleaved
A well cleaved end of fibre has a clean plane front perpendicular to the axis of the fibre.

3.1.2.17 amplified spontaneous emission (*ASE*)
Part of an optical amplifier's output power caused by photons emitted from excited ions whose lifetime was over before their energy was used for amplification.

3.1.2.18 directivity
The attenuation between the output port and interface port minus the attenuation between input and interface port, of any equipment or system.

3.1.2.19 central wavelength
The average of those wavelengths at which the amplitude of a light source reaches or last falls to half of the maximum amplitude.

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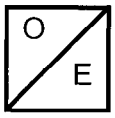
3.1.2.20 spectral width
The difference of those wavelengths at which the amplitude of a light source reaches or last falls to half of the maximum amplitude.

3.2 Symbols

According to EN 60617-13 and IEC 617 the following graphical symbols are used in the figures of this standard:

optical transmitter



optical receiver

optical amplifier

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optical fibre

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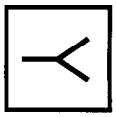
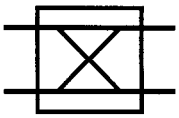
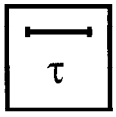
isolator



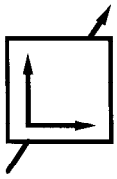
coupler



directional coupler



delay line



polarisation control device

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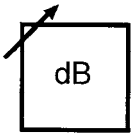
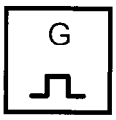
low-pass filter

bandpass filter



variable attenuator



pulse generator

sine-wave generator

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voltmeter

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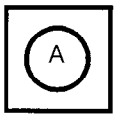
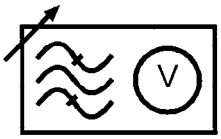


current meter

power meter

bit error detector

oscilloscope



selective voltmeter