



SLOVENSKI STANDARD

SIST EN 50083-7:1999

01-april-1999

Cabled distribution systems for television and sound signals -- Part 7: System performance

Cable networks for television signals, sound signals and interactive services -- Part 7: System performance

Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste -- Teil 7: Systemanforderungen

Réseaux de distribution par câbles pour signaux de télévision, signaux de radiodiffusion sonore et services interactifs -- Partie 7: Caractéristiques des systèmes

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Descriptors: Telecasting, cable television, sound broadcasting, television broadcasting, coaxial cables, measurements, characteristics

English version

**Cabled distribution systems for television and sound signals
Part 7: System performance**

Systèmes de distribution par câble
destinés aux signaux de radiodiffusion
sonore et de télévision
Partie 7: Caractéristiques des systèmes

Kabelverteilsysteme für Fernseh- und
Tonsignale
Teil 7: Systemanforderungen

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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

FOREWORD

This European standard was prepared by CENELEC Technical Committee TC 209 "Cabled distribution systems for television and sound signals".

After having failed in the UAP, started in September 1993, a reworked draft was submitted to the formal vote and was approved by CENELEC as EN 50083-7 on 1995-11-28.

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) 1996-09-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-09-01

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1 Scope

This standard is applicable to any cabled distribution system (including individual receiving systems) having a coaxial cable output and primarily intended for television and sound signals operating between about 30 MHz and 1750 MHz.

This standard lays down the basic methods of measurement of the operational characteristics of cabled distribution systems having coaxial cable outputs in order to assess the performance of those systems and their performance limits.

All requirements refer to the performance limits which shall be obtained between the input(s) to the headend or headends and any system outlet when terminated in a resistance equal to the nominal load impedance of the system, unless otherwise specified. Where system outlets are not used, the above applies at the subscriber's end of the subscriber's feeder.

NOTE 1: Methods of measurement described in this standard are considered as basic. However, any equivalent method that ensures at least the same accuracy may be used.

NOTE 2: If the system operator wishes to subdivide the system into a number of parts, the accumulation of degradations should not exceed the figures given below.

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NOTE 3: An extension of the frequency range to that from 5 MHz to 2050 MHz (3000 MHz) will be considered for future work.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate 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 this European Standard only when incorporated in by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 50083		Cabled distribution systems for television and sound signals
EN 50083-2	1995	Part 2: Electromagnetic compatibility for equipment
EN 50083-3	1994	Part 3: Active coaxial wideband distribution equipment
EN 50083-4	1994	Part 4: Passive coaxial wideband distribution equipment
EN 50083-5	1994	Part 5: Headend equipment
EN 50083-6	1994	Part 6: Optical equipment

EN 60068/ HD 323 series		Environmental testing/ Basic environmental testing procedures
ETS 300-158	1992	Satellite Earth Stations (SES); Television Receive Only (TVRO) Satellite Earth Stations operating in the 11/12 GHz FSS bands
ETS 300-249	1993	Satellite Earth Stations (SES); Television Receive Only (TVRO) Satellite Earth Stations operating in the 12 GHz BSS band
IEC 50(60)	1970	International Electrotechnical Vocabulary, Chapter 60: Radiocommunications
IEC 728-1	1986	Cabled distribution systems; Part 1: Systems primarily intended for sound and television signals operating between 30 MHz and 1 GHz
CISPR 16-1	1993	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1: Radio disturbance and immunity measuring apparatus

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3 Terms, definitions and abbreviations

3.1 Terms and definitions

The terms defined here are those used later in the text and which are not defined in IEC 50 (60).

3.1.1 headend

Equipment which is connected between receiving antennas or other signal sources and the remainder of the cabled distribution system, to process the signals to be distributed.

NOTE: The headend may, for example, comprise antenna amplifiers, frequency converters, combiners, separators and generators.

3.1.2 local headend

A headend which is directly connected to the system trunk feeders or to a short haul "trunk feeder replacement" link.

3.1.3 hub headend

A headend used to feed the entire operating network in the service area.

3.1.4 remote headend

A headend from which signals are delivered to a local headend via a long-distance terrestrial link.

3.1.5 distribution point

A point where signals are taken from the trunk feeder to energize branch and/or spur feeders.

NOTE: In some cases a distribution point may be directly connected to the headend.

3.1.6 feeder

A transmission path forming part of a cabled distribution system. Such a path may consist of a metallic cable, optical fibre, waveguide, or any combination of them. By extension the term is also applied to paths containing one or more radio links.

3.1.7 supertrunk feeder

A feeder which connects only between headends or between a headend and the first distribution point.

3.1.8 trunk feeder

A feeder used for the transmission of signals between a headend and a distribution point or between distribution points.

3.1.9 branch feeder

A feeder used for connecting a distribution point to spur feeders.

3.1.10 spur feeder

A feeder to which splitters, subscriber taps, or looped system outlets are connected.

3.1.11 subscriber feeder

A feeder connecting a subscriber tap to a system outlet or, where the latter is not used, directly to the subscriber's equipment.

NOTE: A subscriber feeder may include filters and balun transformers.

3.1.12 antenna amplifier

An amplifier (often a low noise type) associated with an antenna.

3.1.13 trunk amplifier

An amplifier to compensate for the attenuation in a trunk feeder.

3.1.14 bridger amplifier

3.1.14.1 An amplifier for connection in a trunk feeder to energize a distribution point.

3.1.14.2 An amplifier for connection in a branch feeder, to energize one or more branch or spur feeders.

3.1.15 trunk-bridger amplifier

An amplifier to compensate for the attenuation in a trunk feeder and also to energize a distribution point.

3.1.16 distribution amplifier

An amplifier designed to feed one or more branch or spur feeders.

NOTE: This is a general term embracing branch amplifier and spur amplifier.

3.1.17 branch amplifier

An amplifier to compensate for the attenuation in a branch feeder.

3.1.18 spur amplifier (line extender)

An amplifier to compensate for the attenuation in a spur feeder.

3.1.19 automatic level controlled amplifier

An amplifier which includes means to control automatically the level of the signal(s) at its output.

NOTE: This may be achieved by controlling the variation of gain or slope or both, by means of:

- one or more pilot carriers;
- a temperature sensing device;
- remote control.

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3.1.20 frequency converter

A device for changing the carrier frequency of one or more signals.

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3.1.21 combiner

A device in which signals arriving at two or more input ports are fed to a single output port.

NOTE: Some forms of this device may be used in the reverse direction as splitters.

3.1.22 separator

A device in which the signal energy, covering a frequency band, at one input port is divided between two or more output ports each of which covers a part of that frequency band.

NOTE 1: For example, a diplexer is a two-output separator.

NOTE 2: Some forms of this device may be used in the reverse direction for combining.

3.1.23 splitter (spur unit)

A device in which the signal power at the (input) port is divided equally or unequally between two or more (output) ports.

NOTE: Some forms of this device may be used in the reverse direction for combining signal energy.

3.1.24 directional coupler

A splitter in which the attenuation between any two output ports exceeds the sum of the attenuations between the input port and each of those output ports.

3.1.25 equalizer

A device designed to compensate, over a certain frequency range, for the amplitude/frequency distortion or the phase/frequency distortion introduced by feeders or equipment.

NOTE: This device is for the compensation of linear distortions only.

3.1.26 subscriber tap

A device for connecting a subscriber feeder to a spur feeder.

3.1.27 system outlet

A device for interconnecting a subscriber feeder and a receiver lead.

3.1.28 looped system outlet

A device through which the spur feeder passes and to which is connected a receiver lead, without the use of a subscriber feeder.

3.1.29 receiver lead

A lead which connects the system outlet to the subscriber's equipment.

NOTE: A receiver lead may include filters and balun transformers in addition to the cable.

3.1.30 signal adaptor

A device which modifies the input signal to achieve conformity with the appropriate CCIR system, without changing the baseband characteristics, for use in a cabled distribution system which distributes television signals not conforming to any CCIR system (only in respect of RF structure).

3.1.31 decibel ratio

Ten times the logarithm to the base 10 of the ratio of two quantities of power P_1 and P_2 i.e.,

$$10 \lg \frac{P_1}{P_2} \quad (\text{dB})$$

NOTE: May also be expressed in terms of voltages

$$20 \lg \frac{V_1}{V_2} \quad (\text{dB})$$

3.1.32 standard reference power P_0

In cabled systems the standard reference power P_0 is 1/75 pW.

NOTE: This is the power dissipated in a 75 Ω resistor with a voltage drop of 1 μV_{RMS} across it.

3.1.33 level

The level of any power P_1 is the decibel ratio of that power to the standard reference power P_0 , i.e.

$$10 \lg \frac{P_1}{P_0} \quad (\text{dB})$$

The level of any voltage V_1 is the decibel ratio of that voltage to the standard reference voltage V_0 , i.e.

$$20 \lg \frac{V_1}{V_0} \quad (\text{dB})$$

This may be expressed in decibels (relative to 1 μV in 75 Ω) or more simply in dB(μV) if there is no risk of ambiguity.

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3.1.34 attenuation

The ratio of the input power to the output power of an equipment or system, usually expressed in decibel.

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3.1.35 gain

The ratio of the output power to the input power of any equipment or system, usually expressed in decibel.

3.1.36 automatic gain control (AGC)

The automatic control of a device to maintain constant the level of the signal at its output, using the signal to be controlled as the control stimulus.

3.1.37 frequency amplitude response

The gain or loss of an equipment or system plotted against frequency.

3.1.38 slope

The difference in gain or attenuation at two specified frequencies between any two points in a system, .

3.1.39 signal tilt

The difference in level deliberately established between specified signals at any point in a system. If groups of signals are established at differing levels, this is referred to as block tilt.

3.1.40 crossview

The effect on a wanted television signal of the undesired transfer of one or more television signal(s) from other circuit(s).

3.1.41 crossmodulation

The undesired modulation of the carrier of a desired signal by the modulation of another signal as a result of equipment or system non-linearities.

3.1.42 intermodulation

The process whereby non-linearity of equipment in a system produces output signals (called intermodulation products) at frequencies which are linear combinations of those of the input signals.

3.1.43 carrier to intermodulation ratio

The difference in decibel between the carrier level at a specified point in an equipment or a system and the level of a specified intermodulation product or combination of products.

3.1.44 carrier to noise ratio

The difference in decibel between the vision or sound carrier level at a given point in an equipment or a system and the noise level at that point (measured within a bandwidth appropriate to the television or radio system in use).

3.1.45 mutual isolation

The attenuation between two specified system outlets at any frequency within the range of the system under investigation. It is always specified, for any particular installation, as the minimum value obtained within specified frequency limits.

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3.1.46 echo rating E for PAL and SECAM

The result of a system test with a $2T$ sine-squared pulse (as determined in CCIR Recommendations 473 [1] and 567 [2]) using the boundary line on a specified graticule (e.g. figure 25) within which all parts of the received pulse fall.

NOTE: The object of the graticule design is to ensure that the subjective effect of an echo of rating $E\%$ is the same as that of a single echo, with displacement greater than $12T$, of $(E/2)\%$ relative to the peak amplitude of the test pulse.

3.1.47 frequency designations

The frequency designations and abbreviations of IEC Publication 50(60) "International Electrotechnical Vocabulary (IEV), Chapter 60: Radio-communications (60-02-020)" shall be used in relation to cabled systems (e.g. a VHF system includes frequencies between 30 MHz and 300 MHz).

3.1.48 well-matched

The matching condition when the return loss of the equipment complies with the requirements of table 1 of EN 50083-3.

3.1.49 Definitions for Digital Radio:

Under consideration.

3.1.50 Definitions for return paths:

Under consideration.

3.1.51 Definitions for satellite broadcasting:

See ETS 300 158 and ETS 300 249 respectively under consideration.

3.1.52 Definitions for scrambled signals:

Under consideration.

3.1.53 Definitions for teletext:

Under consideration.

3.2 Abbreviations

AC	Alternating Current
AGC	Automatic Gain Control
ALC	Automatic Level Control
AM	Amplitude Modulation
CCIR	Comité Consultatif International Radiodiffusion
CENELEC	Comité Européen de Normalisation Electrotechnique
CW	Continous Wave
DAB	Digital Audio Broadcasting
DC	Direct Current
DSR	Digital Satellite Radio
EN	European Norm
ETS	European Telecommunication Standard
FDM	Frequency Division Multiplex
FM	Frequency Modulation
IF	Intermediate Frequency
NICAM	Near-Instantaneously Companded Audio Multiplex
PAL	Phase Alternation Line
RF	Radio Frequency
RMS	Root Mean Square
SECAM	Séquentiel Couleur A Mémoire
TV	Television
TVRO	Television Receive Only
VSB	Vestigial Side Band

4 Methods of measurement

4.1 Mutual isolation between system outlets

General

Although the method described applies also to the far ends of subscribers' feeders when no system outlets are used, isolation will usually be measured between:

- a) system outlets connected to adjacent subscribers' taps;
- b) system outlets connected to the same multiple subscribers' tap;
- c) adjacent looped system outlets.

4.1.1 Equipment required

The test set-up shall be well-matched.

NOTE 1: "Wideband" is understood to mean of sufficient bandwidth to cover the full frequency range of the system under investigation.

NOTE 2: Some sweep frequency generators may include a terminating wideband detector.

4.1.1.1 A sweep frequency generator with frequency range or ranges to suit the system to be examined, equipped with a frequency-marking system.

4.1.1.2 A terminating wideband detector.

4.1.1.3 A variable attenuator, adjustable in steps of not more than 1 dB up to a value greater than the maximum mutual isolation to be measured.

4.1.1.4 A wideband amplifier with sufficient gain to raise the signal level at the system outlet to a level suitable to drive the detector.

4.1.1.5 An oscilloscope or other display unit suitable for operation with the sweep frequency generator.

4.1.1.6 A suitable coaxial cable of sufficient length to reach from one system outlet to an adjacent one in the cabled distribution system.

4.1.2 Connection of the equipment

The equipment shall be connected as in figure 1.

4.1.3 Measurement procedure

4.1.3.1 With the equipment connected as shown in figure 1a, set the variable attenuator to a value just greater than the maximum value of mutual isolation expected to be measured. Note this value a_1 .