SLOVENSKI STANDARD
SIST EN 50289-1-16:2007

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Komunikacijski kabli – Specifikacije za preskušalne metode – 1-16. del: Elektromagnetne lastnosti – Sklopno slabljenje kabelskega pribora (v poljskih pogojih)

Communication cables - Specifications for test methods -- Part 1-16: Electromagnetic performance - Coupling attenuation of cable assemblies (Field conditions)

Kommunikationskabel - Spezifikationen für Prüfverfahren -- Teil 1-16: Elektromagnetisches Verhalten - Kopplungsdämpfung für konfektionierte Kabel unter Feldbedingungen

Câbles de communication - Spécifications des méthodes d'essai -- Partie 1-16: Performance électromagnétique - Affaiblissement de couplage des câbles équipés (Conditions de terrain)

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ICS:

33.120.10 Koaksialni kabli. Valovodi Coaxial cables. Waveguides

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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

This European Standard was prepared by the Technical Committee CENELEC TC 46X, Communication cables.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50289-1-16 on 2006-11-01.

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)	2007-11-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2009-11-01

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Table

1 Scope

This part of EN 50289-1 details the method of in field test to determine the coupling attenuation for installed links and channels used in analogue and digital communication systems. It is to be read in conjunction with EN 50289-1-6 and EN 50289-1-15.

This method is used to determine the attenuation of disturbing power to signal power in a cabling system, and vice versa. This determines the influence from cabling on the EMC performance of a system.

NOTE 1 The coupling attenuation of installed links and channels is dependant upon the performance of the cabling components (balance and screening if applicable), workmanship (especially termination of screens) and earthing and grounding. This procedure determines the overall effect of these parameters.

NOTE 2 This method cannot be used for verification of compliance with emission and immunity EMC standards for the complete system including active components

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.

EN 50290-1-2 Communication cables – Part 1-2: Definitions

EN 50289-1-6 Communication cables – Specifications for test methods – Part 1-6: Electrical test methods – Electromagnetic performance

EN 50289-1-15 Communication cables – Specifications for test methods – Part 1-15: Electromagnetic performance – Coupling attenuation of links and channels (Laboratory conditions)

3 Definitions

For the purposes of this document, the definitions of EN 50290-1-2 and EN 50289-1-6 apply.

4 Test method

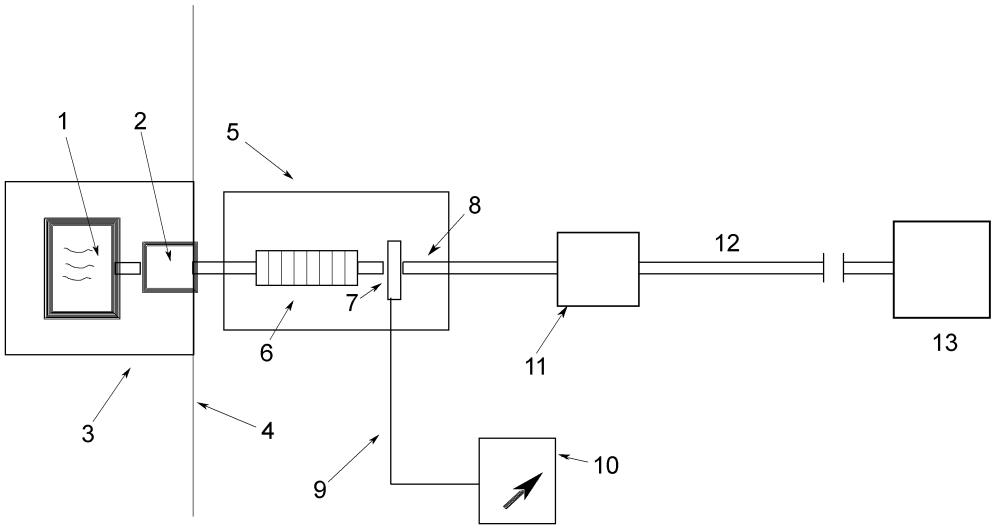
4.1 Equipment

4.1.1 General

The field test equipment [1)] shall be able to measure coupling attenuation according to the principle defined in EN 50289-1-6 (see also Subclause 5.3).

See EN 50289-1-6, Subclause 9.2.1.1, and Figure 1 below.

1) Instead of signal generator and measuring receiver or network analyser a spectrum analyser with tracking generator can be used, which is available as a field test equipment.



Key

1 signal generator, output impedance Z_0
2 balun (if applicable).
3 screen of signal generator and balun if needed for high dynamic range
4 reflector plate, minimum size 0,2 m x 0,2 m
5 absorbing clamp
6 absorber (ferrite tube) of the clamp, insertion loss > 10 dB 2)
7 current transformer of the clamp
8 extension cable for connection to link under test. Length 2 m
9 measuring receiver cable (use the same in measurement and calibration)
10 measuring receiver
11 connecting hardware in measured end of link or channel
12 link or channel under test
13 load termination of far end of link or channel under test

Figure 1 – Measurement of surface wave in one end of a link or channel

4.1.2 Balun requirements

For measurement of symmetrical links or channels, a means for generating symmetrical signals shall be provided. If the generator is unbalanced, this may be performed by the use of a balun or 180° power splitter.

The minimum requirements for this device are specified in Table 1.

The attenuation of the balun shall be kept as low as possible because it will limit the dynamic range of the coupling attenuation or screening attenuation measurements.

2) There is no requirement for an absorber in the far end.

Table 1 – Balun performance characteristics

Parameter	Value
Impedance, primary [a]	50 Ω (unbalanced)
Impedance, secondary [b]	100 Ω or 150 Ω (balanced)
Operational attenuation [d] (including matching pads if used)	≤ 10 dB
Return loss, bi-directional	≥ 6 dB
Power rating	To accommodate the power of the generator and amplifier (if applicable)
Output signal balance [c]	≥ 50 dB from 30 MHz to 100 MHz ≥ 30 dB from 100 MHz to the highest measured frequency.

[a] Primary impedance may differ if necessary to accommodate analyzer outputs other than 50 Ω.

[b] Balanced outputs of the test baluns shall be matched to the nominal impedance of the symmetrical patch cord / cable pair. 100 Ω shall be used for termination of 120 Ω cabling.

[c] Measured per ITU-T Recommendations G.117 and O.9.

[d] The operational attenuation of a balun shall be mathematically deduced from 3 operational attenuation measurements with 3 baluns back-to-back.

4.1.3 Extension cable requirements

An extension cable is only required if the channel or link under test does not include a cable, which can be connected to the test set-up.

The length of the extension cable shall be 2 m ± 0,1 m.

Unscreened extension cables shall be used for testing unscreened, balanced link or channels. Screened, balanced extension cables shall be used for testing screened, balanced links or channels. Coaxial extension cables shall be used for testing coaxial links or channels.

The electrical transmission performance including electromagnetic screening and unbalance attenuation of the extension cables shall be better or equal to the performance of the link or channel under test. The choice of the extension cable should assure the minimum possible insertion loss and reflection loss of the set-up.

The extension cables shall have the same nominal characteristic impedance as the link or channel under test. Likewise the same type of insulation (i.e. foamed or solid) shall be used. The insertion loss of an extension cable including mating connector, if applicable, shall be less than 2,0 dB up to the highest measurement frequency.

The extension cables, any mating connectors and the connection between extension cables and the mating connectors, if applicable, should have a balance or screening or balance and screening as good as possible, because its quality may have an impact on the test results. To further enhance the measurement sensitivity the connection between the mating connector and the extension cable may be improved since it does not form part of the device under test. It is not allowed to improve any contact between the connecting hardware of the link or channel under test and the mating connector of the extension cable, if applicable. The measurement sensitivity shall be 6 dB better than the specified requirement limit for the link or channel under test. See 5.4.2.1 for determination of the measurement sensitivity.

In case of doubt regarding the interoperability between any mating connector and the connecting hardware of the link or channel under test, it is recommended to use the mating connector specified or advised by the supplier of the connecting hardware of the link or channel under test.

4.2 Test sample

4.2.1 General

The test sample consists of the link or channel under test, an extension cable (if applicable), and a far end termination. In the near end an extension cable is used to connect the link or channel with the balun (if applicable), network analyzer or signal generator. In the far end a suitable connecting hardware with build in resistor terminations is used for termination of the link or channel under test.

The sample therefore consists of

- one extension cable with mating connector in the near end of the link or channel under test, if applicable,
- one connecting hardware with build in resistor terminations.

  If the link or channel under test is unscreened, the connecting hardware shall be unscreened. The termination resistors shall be mounted as close to the connecting hardware as possible and mounted in order to maintain good balance properties. If the link or channel under test is screened, the connecting hardware shall be screened. The resistor terminations shall be mounted in a screen, which is integrated with the connector screen,
- an installed link or channel under test.

4.2.2 Tested length

The effective test length of each measurement is determined by the length of the link or channel under test.

4.2.3 Preparation of test sample

The diameter of any extension cables must be selected to allow insertion in the bore of the absorbing clamp.

When a special type of socket interface is specified for termination of the link or channel such interface shall be used in the mating connector in question.

The bore of the absorbing clamp shall be larger than the diameter of the cables of the measured parts of the link or channel under test.

4.2.3.1 Balanced links or channels

Differential and common mode terminations are required for each unmeasured pair at the near end of the link or channel or any applied extension cable, see Figure 2.

Differential and common mode terminations are required for each pair at the far end of the link or channel, see Figure 2.