
**Komunikacijski kabli – Specifikacije preskusnih metod – 1-15. del:
Elektromagnetne lastnosti - Sklopno slabljenje povezav in kanalov
(laboratorijski pogoji)**

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

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EUROPEAN STANDARD

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

Câbles de communication –
Spécifications des méthodes d'essai
Partie 1-15: Performance
électromagnétique –
Affaiblissement de couplage d'ensembles
de câbles (Conditions de laboratoire)

Kommunikationskabel –
Spezifikationen für Prüfverfahren –
Teil 1-15: Elektromagnetisches Verhalten -
Kopplungs-dämpfung für konfektionierte
Kabel unter Laborbedingungen

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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 the Technical Committee CENELEC TC 46X, Communication cables.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50289-1-15 on 2004-02-01.

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 - latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-02-01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

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

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

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

3 Definitions

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

4 Test method

4.1 Equipment

4.1.1 General

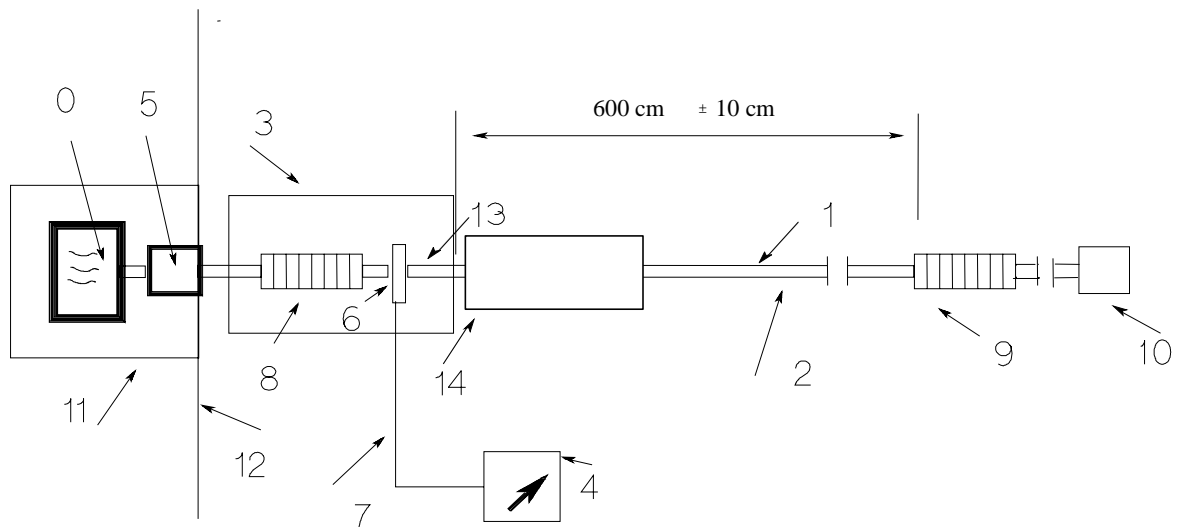
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See EN 50289-1-6, subclause 9.2.1.1 and Figure 1 below.

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¹⁾ Under consideration.



Key

- | | | | |
|---|--|----|---|
| 0 | signal generator, output impedance Z_0 | 8 | absorber (ferrite tube) of the clamp, insertion loss > 10 dB |
| 1 | link or channel under test, nominal characteristic impedance Z_1 | 9 | absorber (or second clamp), insertion loss > 10 dB |
| 2 | outer circuit of the link or channel under test, impedance Z_2 | 10 | termination of the far end extension cable connected to link or channel |
| 3 | absorbing clamp, impedance Z_3 | 11 | shield of signal generator and balun if needed for high dynamic range |
| 4 | measuring receiver | 12 | reflector plate |
| 5 | balun (if applicable) | 13 | extension cable connected through mating connector to link or channel under test, if applicable |
| 6 | current transformer | 14 | connecting hardware in measured end of link or channel |
| 7 | measuring receiver cable (use the same in measurement and calibration) | | |

Figure 1 - Measurement of surface wave at connecting hardware in one end of a link or channel

4.1.2 Balun requirements

For measurement of symmetrical cable assemblies, 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.

Table 1 - Balun performance characteristics

Parameter	Value
Impedance, primary ¹⁾	50 Ω (unbalanced)
Impedance, secondary ²⁾	100 Ω or 150 Ω (balanced)
Operational attenuation ⁴⁾ (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 ³⁾	≥ 50 dB from 30 MHz to 100 MHz ≥ 30 dB from 100 MHz to the highest measured frequency.
<p>1) Primary impedance may differ if necessary to accommodate analyzer outputs other than 50 Ω.</p> <p>2) 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.</p> <p>3) Measured per ITU-T Recommendations G.117 and O.9</p> <p>4) The operational attenuation of a balun shall be mathematically deduced from 3 operational attenuation measurements with 3 baluns back-to-back</p>	

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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.

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Unscreened extension cables shall be used for testing unscreened, balanced link or channels. Screened, balanced extension cables shall be used for testing screened, balanced cable assemblies. Unbalanced (coaxial) extension cables shall be used for testing unbalanced cable assemblies.

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 insertion loss and reflection loss of the set-up possible.

The extension cables shall have the same nominal characteristic impedance as the link or channel under test. Likewise the velocity of propagation of the extension cables shall correspond to the link or channel under test (same type of isolation e.g. foamed or solid). The insertion loss of a near end extension cable including mating connector, if applicable, shall be less than 2,0 dB up to the highest measurement frequency. The insertion loss of set-up validation cable shall be less than the insertion loss of any cable included in the link or channel under test.

The extension cables, any mating connectors and the connection between extension cables and the mating connectors, if applicable, shall have a balance or screening or balance and screening as good as possible. 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 4.4.2.1 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

4.2.0 General

The test sample consists of the link or channel under test, and, in each end where it ends in a connecting hardware component, also an extension cable equipped with or without a mating connector. In the near end any extension cable is used to connect the link or channel with the balun (if applied), network analyzer or signal generator. In the far end an extension cable may be used to apply end termination. The extension cable may also be used to adjust the entire length to 10 m including near end extension cable (for shorter links or channels). If the length of the link or channel under test is longer than 9 m a 1 m far end extension cable may be used for the termination.

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 extension cable with mating connector in the far end of the link or channel under test, if applicable,
- a number of connecting hardware contained in the link or channel under test,
- a number of cables contained in the link or channel under test

4.2.1 Length of extension cables

The min. length of extension cables with mating connectors, if applicable, is different for near end (reflector plate end) and far end (termination end).

A: Extension cable at reflector plate (near end)

The length of the near end extension cable, if applicable, shall be 100 cm \pm 10 cm.

B: Extension cable in termination end (far end)

The entire length of link or channel including any near and far end extension cables shall be 10 m \pm 0,5 m or 1 m \pm 0,5 m longer than link or channel including near end extension cable, whichever is the longest.

4.2.2 Tested length

The effective test length of each measurement is limited by the absorbing clamp and the ferrite tube, as shown in Figure 1. This length shall be 600 cm \pm 10 cm.

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 the cables of the measured parts of the link or channel under test.