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Communication cables - Specifications for test methods - Part 1-14. del: Electrical test methods - Coupling attenuation or screening attenuation of connecting hardware

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EUROPEAN STANDARD **EN 50289-1-14**

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Communication cables – Specifications for test methods Part 1-14: Electrical test methods – Coupling attenuation or screening attenuation of connecting hardware

Câbles de communication – Spécifications des méthodes d'essai Partie 1-14: Méthodes d'essais électriques – Affaiblissement de couplage ou affaiblissement de blindage du matériel de connexion

Kommunikationskabel – Spezifikationen für Prüfverfahren Teil 1-14: Elektrische Prüfverfahren - Kopplungsdämpfung oder Schirmdämpfung für Verbindungstechnik

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CENELEC
European Committee for Electrotechnical Standardization
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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 Unique Acceptance Procedure and was approved by CENELEC as EN 50289-1-14 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– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2007-02-01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 1-14 of EN 50289 details the method of test to determine the coupling attenuation or screening attenuation for connecting hardware used in analogue and digital communication systems. The test method details means to test one part of a connecting hardware (e. g. wall outlet or plug alone) as well as testing a mated pair of connecting hardware. 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.

In this document connecting hardware is defined as a complete connecting device including compensating or matching networks (if any), connectors and cable terminations.

4 Test method

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4.1 Equipment

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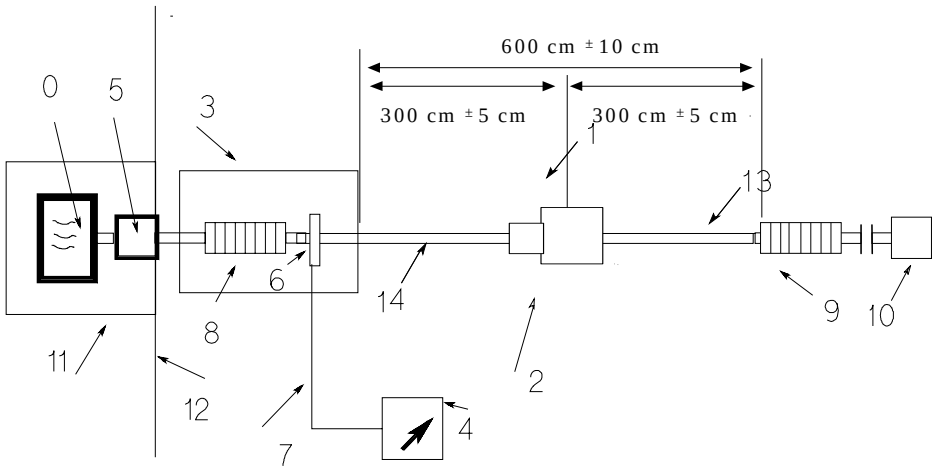
4.1.1 General

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

The connecting hardware under test shall be terminated using the termination method and a cable type for which it is constructed. If only one part of the connecting hardware is under test, a test head shall be used to mate the part under test.

[1)] Under consideration.



Key

0 signal generator, output impedance Z_0

1 connecting hardware under test, nominal characteristic impedance Z_1

2 outer circuit of connecting hardware under test, impedance Z_2

3 absorbing clamp, impedance Z_3

4 measuring receiver

5 balun (if applicable)

6 current transformer of the clamp

7 measuring receiver cable (use the same in measurement and calibration)

8 absorber (ferrite tube) of the clamp, operational attenuation > 10 dB

9 absorber (or second clamp), operational attenuation > 10 dB

10 termination of the far end extension cable terminating the connecting hardware

11 shield of signal generator and balun if needed for high dynamic range

12 reflector plate

13 extension cable terminating the connecting hardware at far end

14 extension cable terminating the test head or connecting hardware at near end

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Figure 1 - Measurement of surface wave at near end of connecting hardware

4.1.2 Balun requirements

For measurement of balanced connecting hardware, a means for generating balanced 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 (30 MHz to 1 GHz)

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 1 GHz

1) Primary impedance may differ, if necessary, to accommodate analyzer outputs other than 50 Ω.

2) Balanced outputs of the test baluns shall be matched to the nominal impedance of the balanced terminating cable pair. 100 Ω shall be used for termination of 120 Ω cabling.

3) Measured per ITU-T Recommendations G.117 and O.9

4) The operational attenuation of a balun shall be mathematically deduced from 3 operational attenuation measurements with 3 baluns back-to-back

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4.1.3 Test head and extension cable requirements

4.1.3.1 General requirements

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Unscreened balanced test heads (if applicable) and extension cables shall be used for testing unscreened, balanced connecting hardware. Screened balanced test heads (if applicable) and extension cables shall be used for testing screened, balanced connecting hardware. Unbalanced (coaxial) test heads (if applicable) and extension cables shall be used for testing unbalanced connecting hardware.

The electrical transmission performance including electromagnetic screening and unbalance attenuation of the test head (if applicable) and the extension cable shall be better or equal to the performance of the connecting hardware under test. The choice of the extension cable should assure the minimum operational attenuation and reflection loss of the set-up possible.

The extension cables shall have the same nominal characteristic impedance as the connecting hardware under test. The velocity of propagation for the two extension cables, terminating the connecting hardware, shall be similar (same type of insulation e. g. foamed or solid). The operational attenuation of the near end terminating cable including test head (if applicable) shall be less than 1 dB up to 100 MHz.

The extension cables shall have a balance (when measuring balanced patch cords) and shall have a screen (when measuring screened patch cords) as good as possible.

4.1.3.2 Testing one part of connecting hardware

Testing one part of connecting hardware requires a test head which mates the connecting hardware under test.

The test head, the extension cable and the connection between test head and the extension cable shall have a balance or screening or balance and screening as good as can be obtained. To further enhance the measurement sensitivity the connection between the test head and the extension cable may be improved since it does not form part of the device under test. It is not allowed to improve the contact between the test head and the connecting hardware under test. In addition it is not allowed to improve the connection between the connecting hardware under test and the extension cable, as this termination is part of the test. The measurement sensitivity shall be 6 dB better than the specified requirement limit for the connecting hardware under test. See 4.4.2.1 for determination of the measurement sensitivity.

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

4.1.3.3 Testing of a mated pair of connecting hardware

Testing of a mated pair of connecting hardware is performed by terminating the connecting hardware with extension cables as defined in 4.1.1.

No improvement of the terminations in excess of those specified by the manufacturer are allowed as these terminations are parts of the test.

For screened cables the far end termination could already be included into the test head. In that way the quality of the extension cable is not critical with respect to the test results.

4.1.4 Impedance matching

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When measuring connecting hardware with another characteristic impedance than the impedance of the test system, impedance matching is only required when the return loss is less than 10 dB. The error that is introduced by the mismatch is max. ± 0,5 dB and thus negligible compared to the typical accuracy of the absorbing clamp test method.

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4.2 Test sample

4.2.1 Length of the extension cables

The extension cable at the near end of the set-up (close to the reflector plate) shall be 4 m ± 0,1 m. The extension cable at the far end of the test set-up shall be 10 m ± 0,1 m.

4.2.2 Tested length

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

4.2.3 Preparation of extension cable and test head

The diameter of the 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 connecting hardware such interface shall be used in the test head in question.