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IEC 62153-4-11

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INTERNATIONAL
STANDARD

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inside

**Metallic communication cable test methods –
Part 4-11: Electromagnetic compatibility (EMC) – Coupling attenuation or
screening attenuation of patch cords, coaxial cable assemblies,
pre-connectorized cables – Absorbing clamp method**

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METALLIC COMMUNICATION CABLE TEST METHODS –

Part 4-11: Electromagnetic compatibility (EMC) – Coupling attenuation or screening attenuation of patch cords, coaxial cable assemblies, pre-connectorized cables – Absorbing clamp method

FOREWORD

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International Standard IEC 62153-4-11 has been prepared by IEC technical committee 46: Cables, wires, waveguides, R.F. connectors, R.F. and microwave passive components and accessories.

The text of this standard is based on the following documents:

CDV	Report on voting
46/311/CDV	46/327/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication is to be read in conjunction with IEC 62153-4-5 (2006).

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 62153 series, under the general title: *Metallic communication cable test methods*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version may be issued at a later date.

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METALLIC COMMUNICATION CABLE TEST METHODS –

Part 4-11: Electromagnetic compatibility (EMC) –
Coupling attenuation or screening attenuation of patch cords,
coaxial cable assemblies, pre-connectorized cables –
Absorbing clamp method

1 Scope

This part of IEC 62153 details the method of test to determine the coupling attenuation and screening attenuation for patch cords, coaxial cable assemblies and pre-connectorized cables used in analogue and digital communication systems.

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.

IEC 60050-726, *International Electrotechnical Vocabulary – Chapter 726: Transmission lines and waveguides*

IEC 61196-1, *Coaxial communication cables – Part 1: Generic specification – General, definitions and requirements*

IEC 62153-4-5:2006, *Metallic communication cables test methods – Part 4-5: Electromagnetic compatibility (EMC) – Coupling or screening attenuation – Absorbing clamp method*

ITU-T Recommendation G.117:1996, *Transmission aspects of unbalance about earth*

ITU-T Recommendation O.9:1999, *Measuring arrangements to assess the degree of unbalance about earth*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-726 and IEC 61196-1 apply.

In this document, the cords under test (patch cords, coaxial cable assemblies, pre-connectorized cables) are denoted 'patch cords'.
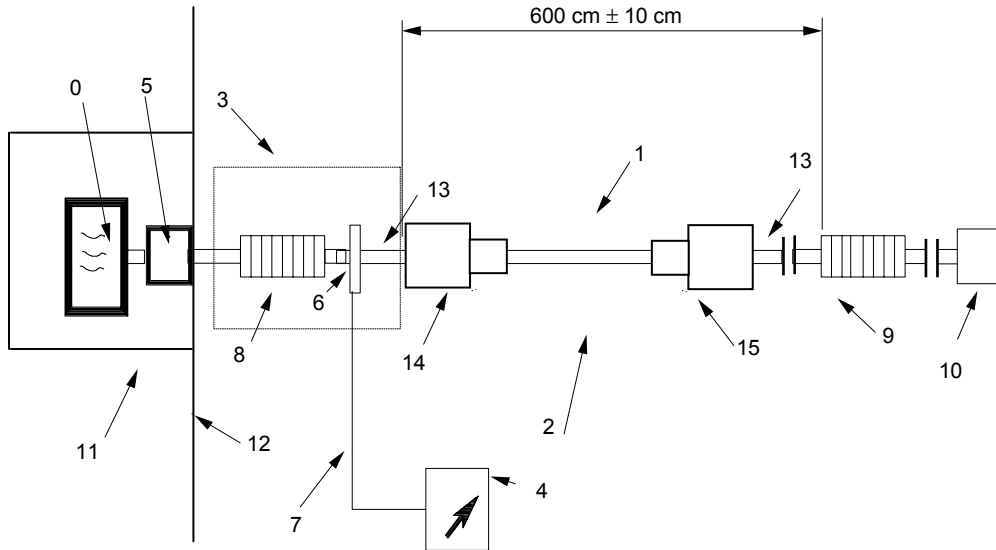
4 Test method

4.1 Equipment

4.1.1 General

See 5.1.1 of IEC 62153-4-5, and Figure 1 below.

For patch cord testing, two test head connecting hardware modules and extension cables are needed for measurement of a patch cord (see 4.1.3). The two test heads are denoted as near end test head and far end test head.

IEC   1468/09

Key

iTeh STANDARD PREVIEW
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0   signal generator, output impedance Z_0

1   patch cord under test, nominal characteristic impedance Z_1

2   outer circuit of patch cords 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 connected to patch cord under test

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

12 reflector plate

13 extension cable connected through test head to patch cord under test

14 test head for termination of patch cord at near end

15 test head for termination of patch cord at far end

Figure 1 – Measurement of surface wave at near end of patch cord

4.1.2   Balun requirements

For measurement of balanced patch cords, 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 [a]	50 Ω (unbalanced)
Impedance, secondary [b]	100 Ω or 150 Ω (balanced)
Operational attenuation [c] (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 [d]	≥ 50 dB from 30 MHz to 100 MHz ≥ 30 dB from 100 MHz to 1 GHz

[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 balanced patch cord / cable pair. 100 Ω shall be used for termination of 120 Ω cabling.

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

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

4.1.3 Test head and extension cable requirements

Unscreened balanced test heads and extension cables shall be used for testing unscreened, balanced patch cords. Screened, balanced test heads and extension cables shall be used for testing screened, balanced patch cords. Unbalanced (coaxial) test heads and extension cables shall be used for testing unbalanced patch cords.

The electrical transmission performance including electromagnetic screening and unbalance attenuation of the test head connecting hardware and the extension cable shall be better or equal to the performance of the patch cord under test. The choice of the test head extension cable shall 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 patch cables under test. Likewise, the velocity of propagation of the extension cables shall correspond to the patch cable under test (same type of isolation, for example foamed or solid). The operational attenuation of the near end terminating cable including test heads and set up validation cord shall be less than 1 dB up to 100 MHz.

The test head connecting hardware, the extension cables, the connection between the test head and the extension cable cables shall have a balance (when measuring balanced patch cords) and shall have a screen (when measuring screened patch cords) as good as possible. To further enhance the measurement sensitivity, the connection between the test head connecting hardware 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 from the plug of the patch cord under test to the test heads used. The measurement sensitivity shall be 6 dB better than the specified requirement limit for the patch cord under test. See 4.4.2.1 for determination of the measurement sensitivity.

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

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