SLOVENSKI STANDARD
SIST EN IEC 62153-4-5:2021

01-december-2021

Preskusne metode za kovinske komunikacijske kable - 4-5. del: Elektromagnetna združljivost (EMC) - Zaslonsko slabljenje ali sklopno slabljenje - Metoda absorpcijske objemke (IEC 62153-4-5:2021)

Metallic communication cable test methods - Part 4-5: Electromagnetic compatibility (EMC) - Screening or coupling attenuation - Absorbing clamp method (IEC 62153-4-5:2021)

Prüfverfahren für metallische Kommunikationskabel - Teil 4-5: Elektromagnetische Verträglichkeit (EMV) - Kopplungsdämpfung oder Schirmdämpfung - Verfahren mit Absorberzangen (IEC 62153-4-5:2021)

Méthodes d'essai des câbles métalliques et autres composants passifs - Partie 4-5: Compatibilité électromagnétique (CEM) - Affaiblissement d'écran ou de couplage - Méthode de la pince absorbante (IEC 62153-4-5:2021)

Ta slovenski standard je istoveten z: **EN IEC 62153-4-5:2021**

ICS:

33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general
33.120.10	Koaksialni kabli. Valovodi	Coaxial cables. Waveguides

SIST EN IEC 62153-4-5:2021 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62153-4-5

October 2021

ICS 33.120.10; 33.100.10

English Version

Metallic communication cable test methods - Part 4-5: Electromagnetic compatibility (EMC) - Screening or coupling attenuation - Absorbing clamp method (IEC 62153-4-5:2021)

Méthodes d'essai des câbles métalliques de communication - Partie 4-5: Compatibilité électromagnétique (CEM) - Affaiblissement d'écran ou de couplage - Méthode de la pince absorbante (IEC 62153-4-5:2021)

Prüfverfahren für metallische Kommunikationskabel - Teil 4-5: Elektromagnetische Verträglichkeit (EMV) - Kopplungsdämpfung oder Schirmdämpfung - Verfahren mit Absorberzangen (IEC 62153-4-5:2021)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 46/819/FDIS, future edition 2 of IEC 62153-4-5, prepared by IEC/TC 46 “Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories” was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62153-4-5:2021.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2022–06–30
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2024–09–30

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The text of the International Standard IEC 62153-4-5:2021 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 62153-4-3 NOTE Harmonized as EN 62153-4-3[1]

[1] To be published. Stage at the time of publication: prEN 62153-4-3:2021.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60050-726	-	International Electrotechnical Vocabulary- (IEV) – Part 726: Transmission lines and waveguides		-
IEC/TS 62153-4-1	-	Metallic communication cable test methods- - Part 4–1: Electromagnetic compatibility (EMC) - Introduction to electromagnetic screening measurements		-
CISPR 16-1-3	2004	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1–3: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Disturbance power	EN 55016-1-3	2006
ITU-T G.117	1996	Transmission aspects of unbalance about- earth		-
ITU-T O.9	1999	Measuring arrangements to assess the- degree of unbalance about earth		-

IEC 62153-4-5

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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METALLIC COMMUNICATION CABLE TEST METHODS –

Part 4-5: Electromagnetic compatibility (EMC) – Screening or coupling attenuation – Absorbing clamp method

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC 62153-4-5 has been prepared by IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories. It is an International Standard.

This second edition cancels and replaces the first edition published in 2006. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) reorganisation of clauses and annexes;
b) extension of frequency range to 2,4 GHz;
c) application of a virtual balun respectively balunless test procedure with multiport VNA.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
46/819/FDIS	46/829/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

This standard is intended to be read in conjunction with IEC TS 62153-4-1:2014, which describes the theoretical background.

A list of all parts in the IEC 62153-4-n series, under the general title: *Metallic communication cable test methods − Electromagnetic Compatibility (EMC)* can be found on the IEC website.

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

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

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METALLIC COMMUNICATION CABLE TEST METHODS –

Part 4-5: Electromagnetic compatibility (EMC) – Screening or coupling attenuation – Absorbing clamp method

1 Scope

The absorbing clamp method is suitable to determine the screening- or the coupling-attenuation of metallic communication cables in the frequency range of 30 MHz to 1 000 MHz (2 400 MHz), depending on the performance of the clamp. It is an alternative method to the triaxial method of IEC 62153-4-4 or IEC 62153-4-9. Due to the undefined outer circuit of this absorbing clamp method, the test results obtained at different places and laboratories could vary by at least ± 6 dB.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 (IEV) – Part 726: Transmission lines and waveguides*

IEC TS 62153-4-1, *Metallic communication cable test methods – Part 4-1: Electromagnetic compatibility (EMC) – Introduction to electromagnetic screening measurements*

CISPR 16-1-3:2004, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-3: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Disturbance power*

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

ITU-T 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 TS 62153-4-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
quasi-coaxial cable
cable construction with two or more inner conductors enclosed by cable screens acting as an outer conductor, connected together on both ends

Note 1 to entry: Screened balanced or multiconductor cables become a quasi-coaxial system by short circuiting the inner conductive elements.

4 Principles of the test method

The cable (for unbalanced respectively coaxial cables) or one cable pair (for balanced cables) is fed with the power P_1. Due to the electromagnetic coupling between the cable or pair and the environment, surface waves are exited which propagate in both directions along the screen surface (or the cable surface where there is not a screen). A surface current transformer is used for picking up the power of the surface waves in combination with an absorber (usually a ferrite tube) to suppress unwanted common mode currents. These kinds of combinations are known as absorbing clamps.

On the basis of the peak values of the measured surface currents, it is possible to calculate the maximum peak power, P_{2max}, in the secondary system formed by the screen of the cable (or the cable itself) and the environment.

The logarithmic ratio of the powers P_1 and P_{2max} is termed screening or coupling attenuation, expressed in dB.

In case of balunless measurement, coupling attenuation is termed by the logarithmic ratio of the powers P_{diff} and $P_{com,max}$.

For unbalanced (coaxial) or quasicoaxial cables, the measurement result is the screening attenuation. For balanced (symmetrical) cables, we have to consider two cases:

a) disturbing power fed in differential mode: the measurement result is the coupling attenuation, which is the combined result of both unbalance attenuation and screening attenuation;

b) disturbing power fed in common mode: the measurement result is the screening attenuation.

To measure coupling attenuation, a balanced signal is required to feed the balanced pair under test. This can be achieved by using a two port VNA and a balun to transform unbalanced (usually 50 Ω) generator signal into the balanced (usually 100 Ω) signal of the balanced cable.

Another option is the “balun-less” test method by using a 4 port vector network analyser or similar test equipment. The preferred method is the balunless (virtual balun) method.

The surface current is measured on a swept-frequency basis with a stationary clamp.

Taking into account the maximum effect of either near or far end surface waves, the coupling attenuation a_c (or the screening attenuation a_S) is defined by:

$$a_c = 10 \log_{10}\left(\frac{P_1}{\max\left[P_{2n};P_{2f}\right]}\right) \qquad (1)$$

where

P_1 is the input power of inner circuit of the sample;

P_{2n} is the maximum near end coupling peak power;

P_{2f} is the maximum far end coupling peak power.

A detailed description of the physical background of screening attenuation and coupling attenuation measurement is given in IEC TS 62153-4-1.