



SLOVENSKI STANDARD
SIST EN 60512-23-3:2002

01-september-2002

Electromechanical components for electronic equipment - Basic testing procedure and measuring methods - Part 23-3: Test 23c: Shielding effectiveness of connectors and accessories (IEC 60512-23-3:2000)

Electromechanical components for electronic equipment - Basic testing procedures and measuring methods -- Part 23-3: Test 23c: Shielding effectiveness of connectors and accessories

iTeh STANDARD PREVIEW

Elektrisch-mechanische Bauelemente für elektronische Einrichtungen - Meß- und Prüfverfahren -- Teil 23-3: Prüfung 23c: Schirmwirkung von Steckverbindern und Zubehör

[SIST EN 60512-23-3:2002](https://standards.iteh.ai/catalog/standards/sist/4edbe9c5-3c2a-455d-a860-)

<https://standards.iteh.ai/catalog/standards/sist/4edbe9c5-3c2a-455d-a860->

Composants électromécaniques pour équipements électroniques - Procédures d'essai de base et méthodes de mesure -- Partie 23-3: Essai 23c: Efficacité de blindage des connecteurs et des accessoires

Ta slovenski standard je istoveten z: EN 60512-23-3:2001

ICS:

31.220.10 Xā ā Ą ċ } & Æ [] ^ ħ ĩ ð Plug-and-socket devices.
Connectors

SIST EN 60512-23-3:2002 en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 60512-23-3:2002

<https://standards.iteh.ai/catalog/standards/sist/4edbe9c5-3c2a-455d-a860-be156f8f8a7f/sist-en-60512-23-3-2002>

EUROPEAN STANDARD

EN 60512-23-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2001

ICS 31.220.01

English version

**Electromechanical components for electronic equipment -
Basic testing procedures and measuring methods
Part 23-3: Test 23c: Shielding effectiveness of
connectors and accessories
(IEC 60512-23-3:2000)**

Composants électromécaniques pour
équipements électroniques -
Procédures d'essai de base et méthodes
de mesure
Partie 23-3: Essai 23c: Efficacité de
blindage des connecteurs et des
accessoires
(CEI 60512-23-3:2000)

Elektrisch-mechanische Bauelemente
für elektronische Einrichtungen -
Meß- und Prüfverfahren
Teil 23-3: Prüfung 23c: Schirmwirkung
von Steckverbindern und Zubehör
(IEC 60512-23-3:2000)

(standards.iteh.ai)

SIST EN 60512-23-3:2002

<https://standards.iteh.ai/catalog/standards/sist/4edbe9c5-3c2a-455d-a860-be156f8f8a7f/sist-en-60512-23-3-2002>

This European Standard was approved by CENELEC on 2001-01-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

The text of document 48B/941/FDIS, future edition 1 of IEC 60512-23-3, prepared by SC 48B, Connectors, of IEC TC 48, Electromechanical components and mechanical structures for electronic equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60512-23-3 on 2001-01-01.

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) 2001-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2004-01-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA is normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60512-23-3:2000 was approved by CENELEC as a European Standard without any modification.

[SIST EN 60512-23-3:2002](https://standards.iteh.ai/catalog/standards/sist/4edbe9c5-3c2a-455d-a860-be156f8f8a7f/sist-en-60512-23-3-2002)
<https://standards.iteh.ai/catalog/standards/sist/4edbe9c5-3c2a-455d-a860-be156f8f8a7f/sist-en-60512-23-3-2002>

CONTENTS

Clause	Page
1 Scope and object.....	4
2 Normative references.....	5
3 Test method.....	5
3.1 Test requirements.....	5
3.2 Test screen diameter.....	5
3.3 Applicable frequency range.....	6
4 Test equipment.....	6
5 Preparation of the test sample under test.....	7
5.1 Circular connectors.....	7
5.2 Rectangular connectors.....	8
5.3 Connectors for printed boards.....	9
5.4 Impedance matching of primary and secondary circuit.....	9
5.5 Preparation of the secondary circuit.....	9
5.6 Adaptation of the primary circuit.....	9
5.7 Calibration of test set-up.....	10
6 Measurement of shielding effectiveness.....	11
6.1 Measurement.....	11
6.2 Method of calculating attenuation.....	11
7 Requirements.....	12
8 Details to be specified.....	12
Figure 1 – Principle of line injection method.....	4
Figure 2 – Installation of test set-up.....	7
Figure 3 – Example of test set-up for circular connectors.....	8
Figure 4 – Example of test set-up for shielded rectangular connectors.....	8
Figure 5 – Example of test set-up for shielded printed board connectors.....	9
Figure 6 – Calibration set-up.....	10
Figure 7 – Example of a shielding attenuation plot.....	12
Table 1 – Requirements for transfer impedance.....	6
Annex ZA (normative) Normative references to international publications with their corresponding European publications.....	13

ELECTROMECHANICAL COMPONENTS FOR ELECTRONIC EQUIPMENT – BASIC TESTING PROCEDURES AND MEASURING METHODS –

Part 23-3: Test 23c: Shielding effectiveness of connectors and accessories

1 Scope and object

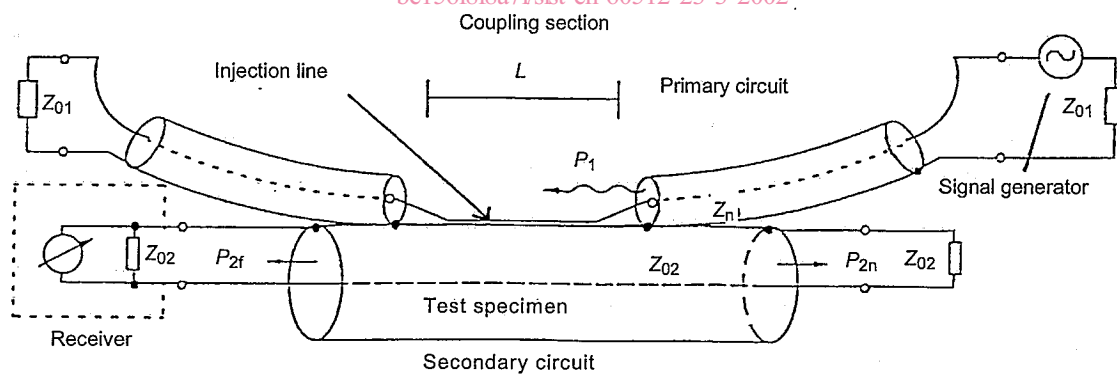
This part of IEC 60512 defines a standard test method for measuring the shielding effectiveness of a connector, or a connector fitted with an accessory and terminated with a cable. The complete assembly has a continuous 360° shielding capability throughout its length.

This test method utilizes the principle that the intrinsic shielding property of the connector/accessory/cable assembly is its surface transfer impedance which can be expressed as the longitudinal voltage inside the shield, relative to the current flow on the outside shell.

The test method is based on two impedance matched circuits. See figure 1 for the measurement principle. The connector under test is integrated into the secondary circuit O2. The impedance matched injection line of the primary circuit O1, which activates the electromagnetic field, runs parallel to the surface of the test sample under test.

This test is suitable for measuring the shielding effectiveness of a connector fitted with triaxial contacts terminated with shielded, twisted pair cables as used in data bus systems.

NOTE This standard has been adopted by AECMA as EN 2591-212 and, as such, should not be amended without direct consultation and liaison with the AECMA organization.



IEC 2578/2000

Key

- Z_{01} characteristic impedance, primary circuit
- Z_{02} characteristic impedance, secondary circuit
- L length of coupling section
- P_1 power, primary circuit
- P_{2f} power, far end, secondary circuit
- P_{2n} power, near end, secondary circuit

Figure 1 – Principle of line injection method

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60512. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60512 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60096-4-1:1990, *Radio-frequency cables – Part 4: Specification for superscreened cables – Section 1: General requirements and test methods*

3 Test method

3.1 Test requirements

This method is based on IEC 60096-4-1 and the sample under test shall be tested with the cables installed. However, reference to 12.1.6.1 and 12.1.6.3 shall be made to ensure that an electrical short length is maintained and that a minimum of four points around the circumference of the specimen under test are measured.

This test method can be applied to connectors and accessories with outer shielding capability. The following different connector designs can be tested:

- circular connectors;
- rectangular connectors;
- connectors for printed boards;
- connector accessories.

The line injection method provides a means of obtaining two balanced and matched transmission lines. This is achieved by selecting an inner pick-up line through the sample under test to provide an impedance match as close as possible to 50 Ω relative to the sample under test. The second outer transmission line is achieved by laying an injection wire along the length of the sample under test, this also being adjusted to provide an impedance match as close as possible to 50 Ω relative to the sample under test. It is important to ensure there is no earth loop between the signal source and the measuring equipment.

3.2 Test screen diameter

The surface transfer impedance of the screen installed for the test shall comply with the requirements of table 1 and shall have an outside diameter of not less than 90 % of the inside diameter of the cable accessory outlet.

Table 1 – Requirements for transfer impedance

Test screen diameter mm	Maximum surface transfer impedance of screen mΩ/m at 30 MHz
2 – 4,9	70
5 – 9,9	45
10 – 17,9	35
18 – 23,9	20
24 – 29,9	10
30 – 40+	5

NOTE These values have been chosen in order that the leakage of the shield is not dominant in the overall result.

3.3 Applicable frequency range

The applicable frequency range is 10 kHz up to 1 GHz. The maximum applicable frequency is dependent on the test set-up and the dimensions of the sample under test.

The upper frequency limit can be calculated as

$$f = \frac{c}{\pi} \times L \times \left| \sqrt{\epsilon_{r2}} - \sqrt{\epsilon_{r1}} \right|$$

iTeH STANDARD PREVIEW
(standards.iteh.ai)

$c = 3 \times 10^8$ m/s

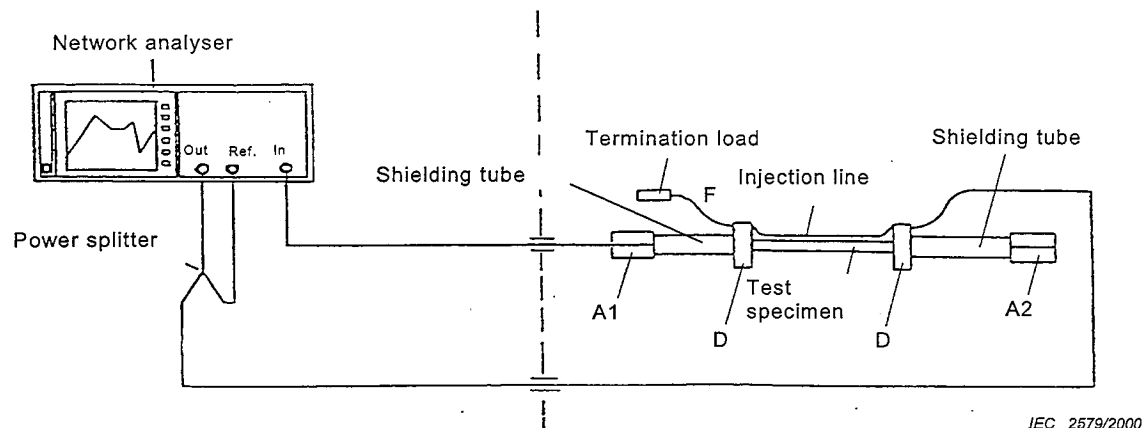
L is the length of the sample under test

ϵ_{r1} is the dielectric constant of the primary circuit

ϵ_{r2} is the dielectric constant of the secondary circuit

4 Test equipment

- Network analyser or signal generator and receiver
- Power splitter (as required)
- Attenuators (as required)
- Termination loads
- Test adapter
- Time domain reflectometer (TDR)
- Insulated copper foil or multi-conductor ribbon cable for the injection line construction.

**Key**

- A1 Coupling box
- A2 Termination box
- D Launchers for injection line
- F Feeding cables for primary circuit

Figure 2 – Installation of test set-up

5 Preparation of the test sample under test

iTeh STANDARD PREVIEW
(standards.iteh.ai)

In all applications when testing accessories, the shielding tube is substituted with the accessory to be tested.

[SIST EN 60512-23-3:2002](https://standards.iteh.ai/catalog/standards/sist/4edbe9c5-3c2a-455d-a860-be156f8f8a7f/sist-en-60512-23-3-2002)

5.1 Circular connectors

<https://standards.iteh.ai/catalog/standards/sist/4edbe9c5-3c2a-455d-a860-be156f8f8a7f/sist-en-60512-23-3-2002>

The connector shells are mounted on the r.f. proof-shielding tubes.

The total length of the sample under test acts as the coupling section.

Figure 3 shows an example of a test set-up for circular connectors. The coupling of the injection line is carried out by semi-rigid coaxial cables with appropriate termination load for the feeding cable of the signal generator. The outer conductor of the semi-rigid cable and the shielding tube are connected by soldering.

The injection line shall be isolated from the conductive surfaces of the connector shells. Therefore, for impedance matching, a suitable dielectric has to be chosen.