IEC 62153-4-10

Edition 2.0 2020-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
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Metallic communication cable test methods – Part 4-10: Electromagnetic compatibility (EMC) – Transfer impedance and screening attenuation of feed-throughs and electromagnetic gaskets – Double coaxial test method

Méthodes d'essai des câbles métalliques de communication – Partie 4-10: Compatibilité électromagnétique (CEM) – Impédance de transfert et affaiblissement d'écran des traversées et des joints d'étanchéité électromagnétiques – Méthode d'essai coaxiale double

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IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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FOREWORD

This amendment has been prepared by IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories.

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

CDV	Report on voting
46/736/CDV	46/769/RVC

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

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website 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- withdrawn,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.

Add, after Annex C, the following new Annex D (informative):

Annexe D
(informative)

Measurement of the transfer impedance of conductive gaskets with controlled contact pressure

D.1 General

A well-known effect in contact physics is the dependence of the contact resistance to the force F that is applied to the contact system. A typical progression of the contact resistance follows $\sim F^{-2/3}$ meaning that if the contact force is increased, the contact resistance is decreasing based on an increasing number of microscopic contact points. Conductive gaskets act in a similar manner. When the pressure acting on the gasket is increased, the resistance of the transition through the arrangement contact surface 1 – gasket – contact surface 2 is decreasing.

This annex gives the normative details whenever pressure controlled measurements of the transfer impedance of conductive gaskets are required.

D.2 Measuring equipment and auxiliary measuring devices

Typical measuring equipment and auxiliary measuring devices consist of:

- RF-generator and test receiver (test method A) or a network analyser (NWA) (test method B,
- test fixture for the relevant specimen size,
- terminating resistor (test method A: RF-generator and test receiver).

D.3 Test setup

The test set-up is shown in Figure D.1.

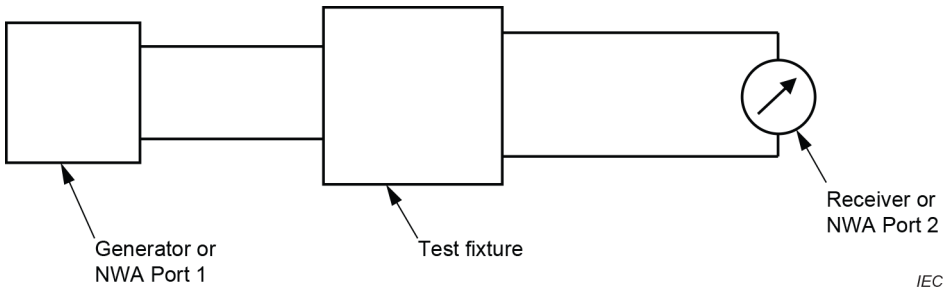
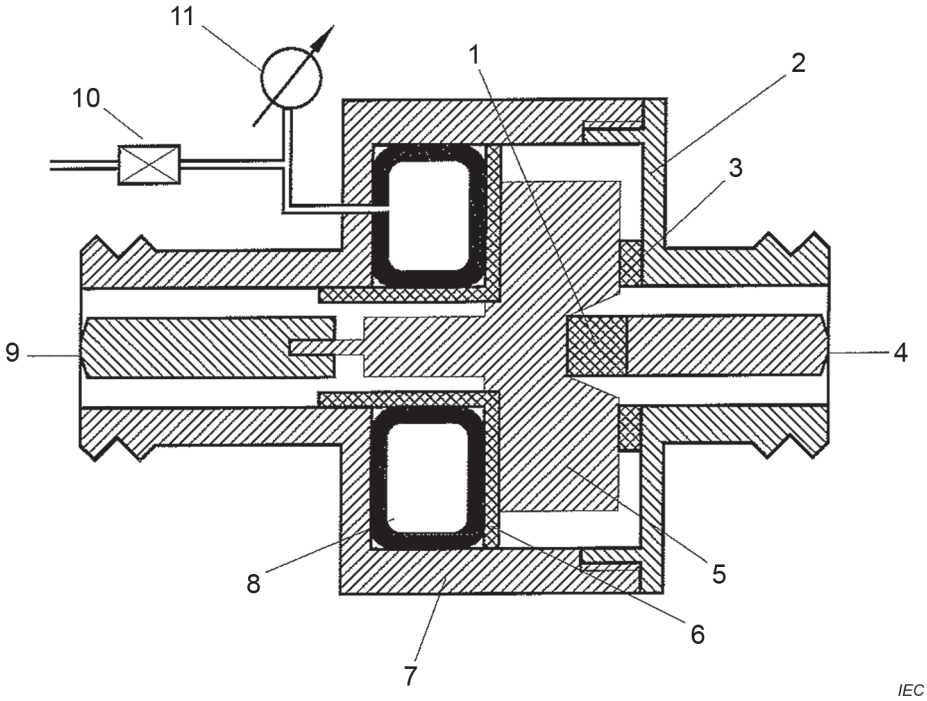


Figure D.1 – Test set-up

Figure D.2 shows the details of an example for a suitable test fixture enabling the determination of certain contact pressures during the measurement.



Key

1 termination (only required for test method A: RF-Generator and test receiver)
2 housing lid
3 test specimen
4 connection to generator port (method A) or NWA Port 1 (method B)
5 contact element
6 insulator
7 housing
8 pressure element
9 connection to test receiver port (method A) or NWA Port 2 (method B)
10 connection to pneumatic or hydraulic
11 manometer

Figure D.2 – Details of the test fixture

D.4 Test specimen

Specimens of size A are dimensioned for measurements up to 3 GHz, size B for measurements up to 750 MHz (see Table D.1 and Figure D.3).

Table D.1 – Specimen size

Specimen size	D1 mm	D2 mm
A	40	min. 20
B	160	min. 80

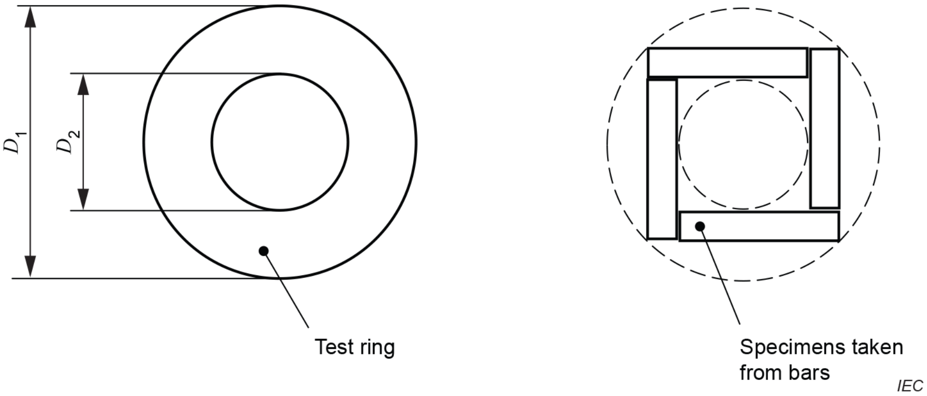


Figure D.3 – Specimen size and shape

The shape of the specimen results typically from the delivery shape of the gaskets under test; test rings shall be prepared e.g. from gasket foils or sheets, test bars shall be prepared e.g. from gasket section or strips.

D.5 Measurement procedure

D.5.1 Test method A: matched RF-generator and test receiver

The test set-up is assembled according to Figure D.1 and Figure D.2.

The terminating resistor value Z_{Res} shall be in accordance with the source impedance of the RF-generator Z_G. The impedance of the test receiver Z_R shall be in accordance with the source impedance of the RF-generator Z_G. The impedance of the test cables Z_0 shall be in accordance with the source impedance of the RF-generator, so that $Z_G = Z_{Res} = Z_R = Z_0$.

D.5.2 Test method B: un-matched NWA measurement

The test set-up is assembled according to Figure D.1 and Figure D.2.

The terminating resistor is not used with method B.

The NWA shall be calibrated according to the manufacturer's specifications.

D.5.3 Both methods

The operational attenuation $A_{B21}(Z_T = \infty)$ of the test fixture with an open circuited DUT ($Z_T = \infty$) shall be measured and recorded vs. frequency.

The operational attenuation A'_{B21} with the feed-through connector mounted to the plate or the gasket inserted is measured and recorded vs. frequency.

The operational attenuation of the gasket is then

$$A_{B21} = A'_{B21} - A_{B21}(Z_T = \infty)$$

Depending on the application, measurements of the transfer impedance can be taken at different frequencies and compression forces or different thicknesses and varying shapes in the course of compression, respectively.

The compression force and frequency are to be selected in accordance with manufacturer's specification or customers option.

D.6 Expression of results

D.6.1 Method A: matched RF-generator and test receiver measurement

The transfer impedance of the test specimen shall be calculated as follows:

$$|Z_T| = |Z_0| \times 10^{-\frac{A_{B21}}{20}}$$

where

A_{B21} is the operational attenuation in dB;

Z_0 is the nominal characteristic impedance of the test setup, equal to the impedance of the generator and receiver and the terminating resistor.

D.6.2 Method B: un-matched NWA measurement

The transfer impedance of the test specimen shall be calculated as follows:

$$|Z_T| = \frac{|Z_0|}{2} \times 10^{-\frac{A_{B21}}{20}}$$

where

A_{B21} is the operational attenuation in dB;

Z_0 is the nominal characteristic impedance of the test setup, equal to the impedance of the network analyser.

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