

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Metallic cables and other passive components test methods –  
Part 4-15: Electromagnetic compatibility (EMC) – Test method for measuring  
transfer impedance and screening attenuation – or coupling attenuation with  
triaxial cell**

**Méthodes d'essais des câbles métalliques et autres composants passifs –  
Partie 4-15: Compatibilité électromagnétique (CEM) – Méthode d'essai pour  
le mesurage de l'impédance de transfert et de l'affaiblissement d'écran –  
ou de l'affaiblissement de couplage avec cellule triaxiale**





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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**METALLIC CABLES AND OTHER PASSIVE  
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measuring transfer impedance and screening attenuation –  
or coupling attenuation with triaxial cell****FOREWORD**

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International Standard IEC 62153-4-15 has been prepared by IEC technical committee 46: Cables, wires, waveguides, R.F. connectors, R.F. and microwave passive components and accessories.

This second edition cancels and replaces the first edition published in 2015. This edition constitutes a technical revision.

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

- a) measurement of coupling attenuation of balanced connectors, assemblies and components with balun and balunless added;
- b) application of a test adapter was added;
- c) application of a moveable shorting plane;

- d) application of the triaxial "absorber" cell;
- e) correction of test results in the case that the receiver input impedance  $R$  is higher than the characteristic impedance of the outer circuit  $Z_2$ .

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

FDIS	Report on voting
46/814/FDIS	46/822/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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

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

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## METALLIC CABLES AND OTHER PASSIVE COMPONENTS TEST METHODS –

### Part 4-15: Electromagnetic compatibility (EMC) – Test method for measuring transfer impedance and screening attenuation – or coupling attenuation with triaxial cell

#### 1 Scope

This part of IEC 62153 specifies the procedures for measuring with triaxial cell the transfer impedance, screening attenuation or the coupling attenuation of connectors, cable assemblies and components, for example accessories for analogue and digital transmission systems, and equipment for communication networks and cabling.

Measurements can be achieved by applying the device under test directly to the triaxial cell or with the tube-in-tube method in accordance with IEC 62153-4-7.

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

IEC TS 62153-4-1:2014, *Metallic communication cable test methods – Part 4-1: Electromagnetic Compatibility (EMC) – Introduction to electromagnetic screening measurements*

IEC 62153-4-3, *Metallic communication cable test methods – Part 4-3: Electromagnetic compatibility (EMC) – Surface transfer impedance – Triaxial method*

IEC 62153-4-4:2015, *Metallic communication cable test methods – Part 4-4: Electromagnetic compatibility (EMC) – Test method for measuring of the screening attenuation  $a_s$  up to and above 3 GHz, triaxial method*

IEC 62153-4-7, *Metallic communication cable test methods – Part 4-7: Electromagnetic compatibility (EMC) – Test method for measuring the transfer impedance  $Z_T$  and the screening attenuation  $a_s$  or coupling attenuation  $a_c$  of connectors and assemblies up to and above 3 GHz – Triaxial Tube in tube method*

IEC 62153-4-8, *Metallic cables and other passive components – Test methods – Part 4-8: Electromagnetic compatibility (EMC) – Capacitive coupling admittance*

IEC 62153-4-9:2018, *Metallic communication cable test methods – Part 4-9: Electromagnetic compatibility (EMC) – Coupling attenuation of screened balanced cables, triaxial method*

IEC 62153-4-10, *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*

IEC 62153-4-16, *Metallic communication cable test methods – Part 4-16: Electromagnetic compatibility (EMC) – Extension of the frequency range to higher frequencies for transfer impedance and to lower frequencies for screening attenuation measurements using the triaxial set-up*

### 3 Terms and definitions

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

#### 3.1

##### **triaxial cell**

rectangular housing in analogy to the principles of the triaxial test procedure, consisting of a non-ferromagnetic metallic material

Note 1 to entry: The triaxial test procedure is described in IEC 62153-4-3 and IEC 62153-4-4.

#### 3.2

##### **surface transfer impedance**

$Z_T$

for an electrically short screen, quotient of the longitudinal voltage  $U_1$  induced to the inner circuit by the current  $I_2$  fed into the outer circuit or vice versa [ $\Omega$ ] (see Figure 1)

Note 1 to entry: The value  $Z_T$  of an electrically short screen is expressed in ohms [ $\Omega$ ] or decibels in relation to 1  $\Omega$ .

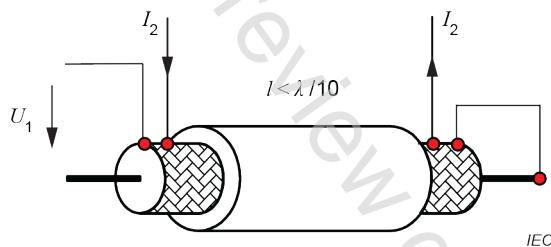


Figure 1 – Definition of  $Z_T$

$$Z_T = \frac{U_1}{I_2} \quad (1)$$

$$Z_T \text{ dB}(\Omega) = 20 \cdot \lg \left( \frac{|Z_T|}{1\Omega} \right) \quad (2)$$

#### 3.3

##### **effective transfer impedance**

$Z_{TE}$

impedance defined as:

$$Z_{TE} = \max |Z_F \pm Z_T| \quad (3)$$

where  $Z_F$  is the capacitive coupling impedance