

# FINAL VERSION

## VERSION FINALE



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

**Méthodes d'essai des câbles métalliques de communication –  
Partie 4-7: Compatibilité électromagnétique (CEM) – Méthode d'essai pour  
mesurer l'impédance de transfert  $Z_T$  et l'affaiblissement d'écrantage  $a_s$  ou  
l'affaiblissement de couplage  $a_c$  des connecteurs et des cordons jusqu'à 3 GHz  
et au-dessus – Méthode triaxiale en tubes concentriques**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### METALLIC COMMUNICATION CABLE TEST METHODS –

#### **Part 4-7: Electromagnetic compatibility (EMC) – Test method for measuring of transfer impedance $Z_T$ and screening attenuation $a_s$ or coupling attenuation $a_C$ of connectors and assemblies up to and above 3 GHz – Triaxial tube in tube method**

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**This Consolidated version of IEC 62153-4-7 bears the edition number 2.1. It consists of the second edition (2015-12) [documents 46/572/FDIS and 46/585/RVD], its corrigendum 1 (2016-04) and its amendment 1 (2018-05) [documents 46/679/FDIS and 46/682/RVD]. The technical content is identical to the base edition and its amendment.**

**This Final version does not show where the technical content is modified by amendment 1. A separate Redline version with all changes highlighted is available in this publication.**

International Standard IEC 62153-4-7 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 constitutes a technical revision.

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

The document is revised and updated. The changes of the revised IEC 62153-4-3:2013, and IEC 62153-4-4:2015, are included.

Measurements can be achieved now with mismatch at the generator site, impedance matching devices are not necessary.

This bilingual version (2016-03) corresponds to the monolingual English version, published in 2015-12.

The French version of this standard has not been voted upon.

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 the present publication and its amendment will remain unchanged until the stability 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.

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## INTRODUCTION

The shielded screening attenuation test set-up according to IEC 62153-4-3 and IEC 62153-4-4 have been extended to take into account the particularities of electrically short elements like connectors and cable assemblies. Due to the concentric outer tube of the triaxial set-up, measurements are independent of irregularities on the circumference and outer electromagnetic fields.

With the use of an additional resonator tube (inner tube respectively tube in tube), a system is created where the screening effectiveness of an electrically short device is measured in realistic and controlled conditions. Also a lower cut off frequency for the transition between electrically short (transfer impedance  $Z_T$ ) and electrically long (screening attenuation  $a_S$ ) can be achieved.

A wide dynamic and frequency range can be applied to test even super screened connectors and assemblies with normal instrumentation from low frequencies up to the limit of defined transversal waves in the outer circuit at approximately 4 GHz.

## METALLIC COMMUNICATION CABLE TEST METHODS –

### Part 4-7: Electromagnetic compatibility (EMC) – Test method for measuring of transfer impedance $Z_T$ and screening attenuation $a_s$ or coupling attenuation $a_c$ of connectors and assemblies up to and above 3 GHz – Triaxial tube in tube method

#### 1 Scope

This triaxial method is suitable to determine the surface transfer impedance and/or screening attenuation and coupling attenuation of mated screened connectors (including the connection between cable and connector) and cable assemblies. This method could also be extended to determine the transfer impedance, coupling or screening attenuation of balanced or multipin connectors and multicore cable assemblies. For the measurement of transfer impedance and screening- or coupling attenuation, only one test set-up is needed.

#### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC TS 62153-4-1, *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, *Metallic communication cable test methods – Part 4-4: Electromagnetic compatibility (EMC) – Shielded screening attenuation, test method for measuring of the screening attenuation as up to and above 3 GHz*

IEC 62153-4-15, *Metallic communication cable test methods – Part 4-15: Electromagnetic compatibility (EMC) – Test method for measuring transfer impedance and screening attenuation – or coupling attenuation with Triaxial Cell*

#### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

##### 3.1 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, see figure 1

Note 1 to entry: The surface transfer impedance is expressed in ohms.

Note 2 to entry: The value  $Z_T$  of an electrically short screen is expressed in ohms [ $\Omega$ ] or decibels in relation to 1  $\Omega$ .

Note 3 to entry: See Figure 1.