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INTERNATIONAL STANDARD

colour inside

Metallic ~~communication~~ cables and other passive components 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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METALLIC ~~COMMUNICATION~~ CABLES AND OTHER PASSIVE COMPONENTS 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

FOREWORD

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IEC 62153-4-7 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.

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– Annex F gives normative information about mixed mode parameters;
– Annex G contains normative information about accessories for measuring coupling attenuation;
– Annex H discusses the low frequency screening attenuation.

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FDIS	Report on voting
46/812/FDIS	46/820/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.

A list of all parts of the IEC 62153 series, under the general title *Metallic cables and other passive components test methods* 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

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- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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~~ CABLES AND OTHER PASSIVE COMPONENTS 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 part of IEC 62153 deals with the triaxial tube in tube method. 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 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 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, *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, triaxial 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 62153-4-15:2015, *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*

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*

EN 50117-9-2:2019, *Coaxial cables – Part 9-2: Sectional specification for coaxial cables for analogue and digital transmission – Indoor droop cables for systems operating at 5 MHz – 3 000 MHz*

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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 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, *Metallic communication cable test methods – Part 4-4: Electromagnetic compatibility (EMC) –Test method for measuring of the screening attenuation as up to and above 3 GHz, triaxial 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 62153-4-15:2015, *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*

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*

EN 50117-9-2:2019, *Coaxial cables – Part 9-2: Sectional specification for coaxial cables for analogue and digital transmission – Indoor droop cables for systems operating at 5 MHz – 3 000 MHz*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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MÉTHODES D'ESSAI DES CÂBLES MÉTALLIQUES ET AUTRES COMPOSANTS PASSIFS –

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 – Méthode triaxiale en tubes concentriques

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Cette troisième édition annule et remplace la deuxième édition parue en 2015, et son Amendement 1:2018. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

Le document a été révisé et mis à jour. Il inclut désormais l'IEC 62153-4-7:2015/COR1:2016 et l'IEC 62153-4-7:2015/AMD1:2018. En outre, les modifications relatives à la révision de l'IEC 62153-4-9:2018 sont incluses.

Les mesures de l'affaiblissement de couplage peuvent désormais être effectuées à l'aide d'un analyseur de réseau avec option de mode mixte (symétriseur virtuel). Les nouvelles annexes suivantes ont été ajoutées:

– l'Annexe E contient des informations relatives au mesurage direct de l'efficacité d'écrantage des connecteurs;
– l'Annexe F donne des informations normatives sur les paramètres du mode mixte;
– l'Annexe G contient des informations normatives concernant les accessoires permettant de mesurer l'affaiblissement de couplage;
– l'Annexe H traite de l'affaiblissement d'écrantage à basse fréquence.

Le texte de la présente Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
46/812/FDIS	46/820/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Le présent document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/standardsdev/publications.

Une liste de toutes les parties de la série IEC 62153, publiées sous le titre général *Méthodes d'essai des câbles métalliques et autres composants passifs*, peut être consultée sur le site web de l'IEC.

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INTRODUCTION

Le montage d'essai de l'affaiblissement d'écrantage blindé selon l'IEC 62153-4-3 et l'IEC 62153-4-4 a été étendu pour prendre en compte les particularités des éléments électriquement courts, comme les connecteurs et les cordons. En raison du tube concentrique externe du montage triaxial, les mesures sont indépendantes des irrégularités de la circonférence et des champs électromagnétiques externes.

Avec un tube résonnant supplémentaire (le tube interne des tubes concentriques), un système est créé, dans lequel l'efficacité d'écrantage d'un dispositif électriquement court est mesurée dans des conditions proches de la réalité et contrôlées. En outre, une fréquence de coupure inférieure pour la transition entre la faible longueur électrique (impédance de transfert, Z_T) et la grande longueur électrique (affaiblissement d'écrantage, a_S) peut être obtenue.

Une plage de fréquences large et dynamique peut être appliquée pour soumettre à essai même des cordons et des connecteurs fortement écrantés avec des instruments normaux, depuis les basses fréquences jusqu'à la limite des ondes transversales définies dans le circuit externe à environ 4 GHz.

MÉTHODES D'ESSAI DES CÂBLES MÉTALLIQUES ET AUTRES COMPOSANTS PASSIFS –

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 – Méthode triaxiale en tubes concentriques

1 Domaine d'application

La présente partie de l'IEC 62153 traite de la méthode triaxiale en tubes concentriques. Cette méthode triaxiale convient pour déterminer l'impédance surfacique de transfert et/ou l'affaiblissement d'écrantage et l'affaiblissement de couplage de connecteurs écrantés et accouplés (y compris la connexion entre le câble et le connecteur) et de cordons. Cette méthode pourrait également être étendue pour déterminer l'impédance de transfert, l'affaiblissement de couplage ou l'affaiblissement d'écrantage de connecteurs symétriques ou à plusieurs broches et de cordons multiconducteurs. Pour le mesurage de l'impédance de transfert et de l'affaiblissement d'écrantage ou l'affaiblissement de couplage, un seul montage d'essai est nécessaire.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

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

IEC 62153-4-3, *Metallic communication cable test methods – Part 4-3: Electromagnetic Compatibility (EMC) − Surface transfer impedance − Triaxial method* (disponible en anglais seulement)

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

IEC 62153-4-8, *Câbles métalliques et autres composants passifs – Méthodes d'essai – Partie 4-8: Compatibilité électromagnétique (CEM) – Admittance de couplage capacitif*

IEC 62153-4-9:2018, *Méthodes d'essais des câbles métalliques de communication – Partie 4-9: Compatibilité électromagnétique (CEM) – Affaiblissement de couplage des câbles symétriques écrantés, méthode triaxiale*

IEC 62153-4-10, *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*

IEC 62153-4-15:2015, *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* (disponible en anglais seulement)

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* (disponible en anglais seulement)

EN 50117-9-2:2019, *Coaxial cables – Part 9-2: Sectional specification for coaxial cables for analogue and digital transmission – Indoor droop cables for systems operating at 5 MHz – 3 000 MHz* (disponible en anglais seulement)