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Railway applications – Electromagnetic compatibility – Part 4: Emission and immunity of the signalling and telecommunications apparatus

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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RAILWAY APPLICATIONS – ELECTROMAGNETIC COMPATIBILITY –

Part 4: Emission and immunity of the signalling and telecommunications apparatus

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62236-4 has been prepared by IEC technical committee TC 9: Electrical equipment and systems for railways.

This third edition cancels and replaces the second edition, issued in 2008. It constitutes a technical revision and has been developed on the basis of EN 50121-4:2015.

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

a) clarification of scope (Clause 1);
b) new definition (Clause 3);
c) emission requirement extended in the frequency range 1 GHz to 6 GHz following IEC 61000-6-4;
d) immunity requirement extended in the frequency range 5,1 GHz to 6 GHz.

This International Standard is to be read in conjunction with IEC 62236-1.

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

FDIS	Report on voting
9/2339/FDIS	9/2369/RVD

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62236 series, published under the general title *Railway applications – Electromagnetic compatibility*, 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 "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
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- replaced by a revised edition, or
- amended.

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INTRODUCTION

This part of IEC 62236 has been prepared in the form of a Product Standard.

It defines the immunity and emission test requirements for apparatus defined in the scope in relation to the electromagnetic disturbances likely to be experienced in the railway. In particular, the test requirements represent the essential electromagnetic immunity requirements and have been selected to ensure an adequate level of immunity for apparatus installed ~~in~~ on the railway locations.

Test requirements are specified for each port considered.

Safety considerations are not covered by this document.

In ~~special~~ specific situations, where the level of disturbances may exceed the levels considered in this document, e.g. at a special location or where a hand-held transmitter is used in very close proximity to an apparatus, special mitigation measures may have to be ~~necessary~~ employed.

RAILWAY APPLICATIONS – ELECTROMAGNETIC COMPATIBILITY –

Part 4: Emission and immunity of the signalling and telecommunications apparatus

1 Scope

This part of IEC 62236 applies to signalling and telecommunication apparatus that is installed inside the railway environment. Signalling and telecommunication apparatus mounted in vehicles is covered by IEC 62236-3-2:2018, signalling and telecommunication apparatus installed inside the substation and connected to substation equipment is covered by IEC 62236-5:2018.

This document specifies limits for emission and immunity and provides performance criteria for signalling and telecommunications (S&T) apparatus (including power supply systems belonging to S&T) which may interfere with other apparatus inside the railway environment, or increase the total emissions for the railway environment ~~beyond the limits defined in the appropriate standard~~ and so risk causing Electromagnetic Interference (EMI) to apparatus outside the railway system.

~~Apparatus which complies with the emission levels of IEC 61000-6-4 will meet the emission requirements of this standard provided that emissions from any d.c. power port are within the emissions limits specified for a.c. power ports. The immunity levels of IEC 61000-6-2 will also be adequate except for the special case of apparatus as defined in Note 1 of Table 1. This standard provides the immunity requirements for such apparatus.~~

~~The immunity levels given for the apparatus will in most cases allow the apparatus to perform as intended in the railway environment (see Note). The immunity level establishes a common reference for evaluating the performance of the apparatus when subject to interference resulting from direct exposure of the apparatus and associated cables to a radio frequency field, or by coupling of the interference from a remote source.~~

The requirements specified in this document apply for:

– vital equipment such as interlocking or command and control,
– apparatus inside the 3 m zone,
– ports of apparatus inside the 10 m zone with connection inside the 3 m zone,
– ports of apparatus inside the 10 m zone with cable length > 30 m.

Other apparatus not covered by at least one of these given cases is in compliance with IEC 61000-6-2.

If a port is intended to transmit or receive for the purpose of radio communication (intentional radiators, e.g. transponder systems), then the radiated emission ~~and immunity limits in this standard at the communication frequency do not apply~~ requirements in this document are not intended to be applicable to the intentional transmission from a radio-transmitter as defined by the ITU.

Immunity limits do not apply in the exclusion bands as defined in the corresponding EMC related standard for radio equipment.

This document does not specify basic personal safety requirements for apparatus such as protection against electric shock, unsafe operation, insulation co-ordination and related

dielectric tests. The requirements were developed for and are applicable to this set of apparatus when operating under normal conditions. Fault conditions of the apparatus have not been taken into account.

~~The requirements and test methods also apply to telecommunications and signalling data and power lines connected to the equipment under test (EUT).~~

The frequency range considered is from DC to 400 GHz. No measurements need to be performed at frequencies where no requirement is specified.

For products in the scope of IEC 61000-3-2, IEC 61000-3-3, IEC 61000-3-11 or IEC 61000-3-12, the requirements of those standards also apply.

~~Testing methods are given in the basic standards listed in Clause 2.~~

These specific provisions are ~~to be~~ used in conjunction with the general provisions in IEC 62236-1.

~~NOTE~~ The immunity and emission levels do not of themselves guarantee that the integration of apparatus will necessarily be satisfactory. The document cannot cover all the possible configurations of the apparatus, but the test levels are sufficient to achieve satisfactory EMC in the majority of cases.

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 61000-3-2, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)*~~

~~IEC 61000-3-3, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*~~

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

~~IEC 61000-4-9, *Electromagnetic compatibility (EMC) – Part 4-9: Testing and measurement techniques – Pulse magnetic field immunity test*~~

IEC 61000-6-2:2016, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments*

IEC 61000-6-4:2006, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*
IEC 61000-6-4:2006/AMD1:2010

IEC 62236-1:2018, *Railway applications – Electromagnetic compatibility – Part 1: General*

~~IEC 62236-3-2, *Railway applications – Electromagnetic compatibility – Part 3-2: Rolling stock – Apparatus*~~

CISPR 16-2-1:2014, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements*

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Railway applications – Electromagnetic compatibility – Part 4: Emission and immunity of the signalling and telecommunications apparatus

Applications ferroviaires – Compatibilité électromagnétique – Partie 4: Émission et immunité des appareils de signalisation et de télécommunication

IEC 62236-4:2018-02(en-fr)

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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APPLICATIONS FERROVIAIRES – COMPATIBILITÉ ÉLECTROMAGNÉTIQUE –

Partie 4: Émission et immunité des appareils de signalisation et de télécommunication

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La Norme internationale IEC 62236-4 a été établie par le comité d'études 9 de l'IEC: Matériels et systèmes électriques ferroviaires.

Cette troisième édition annule et remplace la deuxième édition publiée en 2008. Elle constitue une révision technique et a été développée sur la base de EN 50121-4:2015.

Cette édition inclut les changements techniques significatifs suivants par rapport à l'édition précédente:

a) clarification du domaine d'application (Article 1);
b) nouvelles définitions (Article 3);

c) exigences d'émissions étendues dans la plage de fréquences 1 GHz à 6 GHz, suivant l'IEC 61000-6-4;

d) exigences d'immunité étendues dans la plage de fréquences 5,1 GHz à 6 GHz.

Cette Norme internationale doit être lue conjointement avec l'IEC 62236-1.

Le texte de cette Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
9/2339/FDIS	9/2369/RVD

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

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 62236, publiées sous le titre général *Applications ferroviaires – Compatibilité électromagnétique*, peut être consultée sur le site web de l'IEC.

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INTRODUCTION

La présente partie de l'IEC 62236 a été préparée sous la forme d’une Norme de Produits.

Elle définit les exigences d’essai d’immunité et d’émission pour les appareils définis dans le domaine d’application, en ce qui concerne les perturbations électromagnétiques susceptibles d’apparaître dans le domaine ferroviaire. Les exigences d’essai représentent en particulier les exigences d’immunité électromagnétique essentielles et ont été choisies pour assurer un niveau approprié d’immunité pour les appareils installés sur les systèmes ferroviaires.

Les exigences relatives aux essais sont spécifiées pour chaque accès considéré.

Les considérations de sécurité ne sont pas couvertes par le présent document.

Dans des situations particulières où le niveau de perturbation peut dépasser les niveaux de perturbation examinés dans le présent document, par exemple, à un emplacement spécial ou lorsqu’un émetteur portable est utilisé très près d’un appareil, des mesures spéciales de réduction peuvent devoir être prises.

APPLICATIONS FERROVIAIRES – COMPATIBILITÉ ÉLECTROMAGNÉTIQUE –

Partie 4: Émission et immunité des appareils de signalisation et de télécommunication

1 Domaine d'application

La présente partie de l'IEC 62236 s'applique aux appareils de signalisation et de télécommunication qui sont installés à l'intérieur de l'environnement ferroviaire. Les appareils de signalisation et de télécommunication montés dans les véhicules sont couverts par l'IEC 62236-3-2:2018, les appareils de signalisation et de télécommunication installés en sous-station et connectés aux appareils de sous-station sont couverts par l'IEC 62236-5:2018.

Le présent document spécifie les limites d'émission et d'immunité et donne les critères d'aptitude à la fonction pour les appareils de signalisation et de télécommunication (S&T) (y compris les systèmes d'alimentation appartenant à S&T) qui peuvent perturber d'autres appareils dans l'environnement ferroviaire ou augmenter les émissions totales pour l'environnement ferroviaire et qui risquent ainsi d'être la cause d'un brouillage électromagnétique (EMI) pour des appareils à l'extérieur du système ferroviaire.

Les exigences spécifiées dans le présent document s'appliquent aux:

– équipements vitaux tels que les équipements d'interlocking ou de contrôle/commande,
– appareils situés dans la zone de 3 m,
– accès des appareils situés dans la zone de 10 m avec connexion dans la zone de 3 m,
– accès des appareils situés dans la zone de 10 m avec longueur de câble > 30 m.

Les autres appareils non couverts par au moins un des cas donnés ci-dessus sont conformes à l'IEC 61000-6-2.

Si un accès est destiné à émettre ou recevoir des communications radio (émetteurs intentionnels de rayonnement, par exemple, systèmes de balise), alors les exigences relatives aux émissions rayonnées du présent document ne s'appliquent pas à la transmission intentionnelle à partir d'un émetteur radio tel que défini par l'UIT.

Les limites d'immunité ne s'appliquent pas dans les bandes d'exclusion telles que définies dans la norme CEM correspondante pour les équipements radio.

Le présent document ne spécifie pas d'exigences fondamentales de sécurité du personnel pour les appareils telles que la protection contre les chocs électriques, le fonctionnement non sûr, la coordination de l'isolement et les essais diélectriques correspondants. Ces exigences ont été développées pour cet ensemble d'appareils et elles lui sont applicables dans des conditions normales de fonctionnement. Les conditions de défaut des appareils n'ont pas été prises en compte.

La plage de fréquences concernée va du courant continu à 400 GHz. Aucune mesure n'est nécessaire aux fréquences pour lesquelles aucune exigence n'est spécifiée.

Pour les produits du domaine d'application des normes IEC 61000-3-2, IEC 61000-3-3, IEC 61000-3-11 ou IEC 61000-3-12, les exigences de ces normes s'appliquent également.

Ces dispositions spécifiques sont utilisées avec les dispositions générales données dans l'IEC 62236-1.

L'immunité et les niveaux d'émission ne garantissent pas à eux seuls que l'intégration des appareils sera nécessairement satisfaisante. Le document ne peut pas couvrir toutes les configurations possibles des appareils, mais les niveaux d'essai sont suffisants pour obtenir une CEM satisfaisante dans la majorité des cas.

2 Références normatives

Les documents suivants cités dans le texte 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 61000-4-2:2008, *Compatibilité électromagnétique (CEM) – Partie 4-2: Techniques d'essai et de mesure – Essai d'immunité aux décharges électrostatiques*

IEC 61000-4-3:2006, *Compatibilité électromagnétique (CEM) – Partie 4-3: Techniques d'essai et de mesure – Essai d'immunité aux champs électromagnétiques rayonnés aux fréquences radioélectriques*

IEC 61000-4-4:2012, *Compatibilité électromagnétique (CEM) – Partie 4-4: Techniques d'essai et de mesure – Essai d'immunité aux transitoires électriques rapides en salves*

IEC 61000-4-5:2014, *Compatibilité électromagnétique (CEM) – Partie 4-5: Techniques d'essai et de mesure – Essai d'immunité aux ondes de choc*

IEC 61000-4-6:2013, *Compatibilité électromagnétique (CEM) – Partie 4-6: Techniques d'essai et de mesure – Immunité aux perturbations conduites, induites par les champs radioélectriques*

IEC 61000-4-8:2009, *Compatibilité électromagnétique (CEM) – Partie 4-8: Techniques d'essai et de mesure – Essai d'immunité au champ magnétique à la fréquence du réseau*

IEC 61000-6-2:2016, *Compatibilité électromagnétique (CEM) – Partie 6-2: Normes génériques – Norme d'immunité pour les environnements industriels*

IEC 61000-6-4:2006, *Compatibilité électromagnétique (CEM) – Partie 6-4: Normes génériques – Norme sur l'émission pour les environnements industriels*
IEC 61000-6-4:2006/AMD1:2010

IEC 62236-1:2018, *Applications ferroviaires – Compatibilité électromagnétique – Partie 1: Généralités*

CISPR 16-2-1:2014, *Spécifications des méthodes et des appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques – Partie 2-1: Méthodes de mesure des perturbations et de l'immunité – Mesures des perturbations conduites*