

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Railway applications – Electromagnetic compatibility –
Part 1: General**

**Applications ferroviaires – Compatibilité électromagnétique –
Partie 1: Généralités**



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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Email: csc@iec.ch

Tél.: +41 22 919 02 11

Fax: +41 22 919 03 00



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RAILWAY APPLICATIONS –
ELECTROMAGNETIC COMPATIBILITY –****Part 1: General****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 62236-1 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

This second edition cancels and replaces the first edition published in 2003. It constitutes a technical revision and is based on EN 50121-1:2006.

The main changes with respect to the previous edition are listed below:

- rewording of the introduction;
- suppression of Annex B.

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

FDIS	Report on voting
9/1184/FDIS	9/1212/RVD

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

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

A list of all parts of 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 publication will remain unchanged until the maintenance result 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.

INTRODUCTION

The railway EMC set of product-specific International Standards consists of five parts described at the end of this introduction.

The set of standards provides both a framework for managing the EMC for railways and also specifies the limits for the electromagnetic (EM) emission of the railway as a whole to the outside world and for the EM emission and immunity for equipment operating within the railway. The latter must be compatible with the emission limits set for the railway as a whole and also provides for establishing confidence in equipment being Fit For Purpose in the Railway environment. There are different stationary emission limits set for trams/trolleybuses and for metro/mainline railways. The frequency covered by the standards is in the range from d.c. to 400 GHz. No measurements need to be performed at frequencies where no requirement is specified. The limits for EMC phenomena are set so that the railway as a whole achieves electromagnetic compatibility with the outside world, and between the various parts of the railway. Throughout the set of standards, the immunity levels are chosen to ensure a reasonable level of EMC with other apparatus within the local railway environment and with emissions which enter the railway from the outside world. Limits are also placed on EM emission by railways into the outside world.

The compatibility between railway emissions and their external environment is based upon emission limits from the railways being set by considering results from measurements. Given that the general compatibility between railways and their environment was satisfactory at the time these measurements were made and subsequent experience of applying the limits has confirmed their acceptability, compliance with this part of IEC 62236 has been judged to give satisfactory compatibility. The immunity and emission levels do not of themselves guarantee that the railway will have satisfactory compliance with its neighbours. In exceptional circumstances, for instance near a “special location” which has unusually high levels of EM interference, the railway system may require additional measures to be taken to ensure proper compatibility. Particular care should be taken when in proximity to equipment such as radio transmission equipment, military or medical installations. In particular, attention is drawn to any magnetic imaging equipment in hospitals that may be near to urban transport. In all these cases, compatibility must be achieved with consultation and co-operation between the interested parties.

The immunity and emission levels do not of themselves guarantee that integration of the apparatus within the railway will necessarily be satisfactory. The standard cannot cover all the possible configurations of apparatus, but the test levels are sufficient to achieve satisfactory EMC in the majority of cases. In exceptional circumstances, for instance near a “special location” which has unusually high levels of EM interference, the system may require additional measures to be taken to ensure proper operation. The resolution of this is a matter for discussion between the equipment supplier and the project manager, infrastructure controller or equivalent.

The railway apparatus is assembled into large systems and installations, such as trains and signalling control centres. Details are given in annex A. It is not, therefore, possible to establish immunity tests and limits for these large assemblies. The immunity levels for the apparatus will normally ensure reliable operation, but it is necessary to prepare an EMC management plan to deal with complex situations or to deal with specific circumstances. For example the passage of the railway line close to a high power radio transmitter which produces abnormally high field strengths. Special conditions may have to be applied for railway equipment which has to work near such a transmitter and these will be accepted as National Conditions for the specification.

The series of standards IEC 62236, *Railway applications – Electromagnetic compatibility*, contains the following parts:

Part 1: General

This part gives a description of the electromagnetic behaviour of a railway; it specifies the performance criteria for the whole set. A management process to achieve EMC at the interface between the railway infrastructure and trains is referenced.

Part 2: Emission of the whole railway system to the outside world

This part sets the emission limits from the railway to the outside world at radio frequencies. It defines the applied test methods and gives information on typical field strength values at traction and radio frequency (cartography).

Part 3-1: Rolling stock – Train and complete vehicle

This part specifies the emission and immunity requirements for all types of rolling stock. It covers traction stock and trainsets, as well as independent hauled stock.

The scope of this part of the standard ends at the interface of the stock with its respective energy inputs and outputs.

Part 3-2: Rolling stock – Apparatus

This part applies to emission and immunity aspects of EMC for electrical and electronic apparatus intended for use on railway rolling stock. It is also used as a means of dealing with the impracticality of immunity testing a complete vehicle.

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

This part specifies limits for electromagnetic emission and immunity for signalling and telecommunications apparatus installed within a railway.

Part 5: Emission and immunity of fixed power supply installations and apparatus

This part applies to emission and immunity aspects of EMC for electrical and electronic apparatus and components intended for use in railway fixed installations associated with power supply.

RAILWAY APPLICATIONS – ELECTROMAGNETIC COMPATIBILITY –

Part 1: General

1 Scope

1.1 This part of IEC 62236 outlines the structure and the content of the whole series.

Annex A describes the characteristics of the railway system which affect electromagnetic compatibility (EMC) behaviour.

Phenomena excluded from this series are nuclear EM pulse, abnormal operating conditions and the induction effects of direct lightning strike.

Emission limits at the railway boundary do not apply to intentional transmitters within the railway boundaries.

Safety considerations are not covered by this series of standards.

The biological effects of non-ionising radiation as well as apparatus for medical assistance, such as pacemakers, are not considered in this series.

1.2 This part of IEC 62236 is supplemented by the following specific standards:

- IEC 62236-2 *Railway applications – Electromagnetic compatibility – Part 2: Emission of the whole railway system to the outside world*
- IEC 62236-3-1 *Railway applications – Electromagnetic compatibility – Part 3-1: Rolling stock – Train and complete vehicle*
- IEC 62236-3-2 *Railway applications – Electromagnetic compatibility – Part 3-2: Rolling stock – Apparatus*
- IEC 62236-4 *Railway applications – Electromagnetic compatibility – Part 4: Emission and immunity of the signalling and telecommunications apparatus*
- IEC 62236-5 *Railway applications – Electromagnetic compatibility – Part 5: Emission and immunity of fixed power supply installations and apparatus*

2 Normative references

The following referenced documents are indispensable for the application 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 60050-161, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility (EMC)*

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

IEC 62427, *Railway applications – Compatibility between rolling stock and train detection systems*