

# 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: Emission et immunité des appareils de signalisation et de  
télécommunication**



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RAILWAY APPLICATIONS –  
ELECTROMAGNETIC COMPATIBILITY –****Part 4: Emission and immunity of the signalling  
and telecommunications apparatus**

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International Standard IEC 62236-4 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 50121-4:2006.

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

- requirements for the radiated immunity test of line 1.2 in Table 1;
- suppression of annex A.

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

FDIS	Report on voting
9/1188/FDIS	9/1216/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,
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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 the railway locations.

Test requirements are specified for each port considered.

Safety considerations are not covered by this standard.

In special situations, where the level of disturbances may exceed the levels considered in this standard, for example at a special location or where a hand-held transmitter is used in very close proximity to an apparatus, special mitigation measures may be necessary.

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## **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 which is installed in the railway environment. Signalling and telecommunication apparatus mounted in vehicles is covered by IEC 62236-3-2.

This standard specifies limits for emission and immunity and provides performance criteria for signalling and telecommunications (S&T) apparatus which may interfere with other apparatus in the railway environment, or increase the total emissions for the railway environment beyond the limits defined in the appropriate standard and so risk causing Electro-Magnetic 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.

If a port is intended to transmit or receive for the purpose of radio communication (intentional radiators, e.g. transponder systems), then the emission and immunity limits in this standard at the communication frequency do not apply.

The standard 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 d.c. 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 or IEC 61000-3-3, the requirements of those standards 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 standard 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 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 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  $\leq 16$  A per phase and not subject to conditional connection*

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

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

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

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

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

IEC 61000-4-8, *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, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments*

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

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

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

## 3 Terms and definitions

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

### 3.1

#### port

particular interface of the specified apparatus with the external environment, for example a.c. power port, d.c. power port, I/O (input/output) port, earth port

### 3.2

#### enclosure port

physical boundary of the apparatus through which electromagnetic fields may radiate or impinge (see Figure 1)

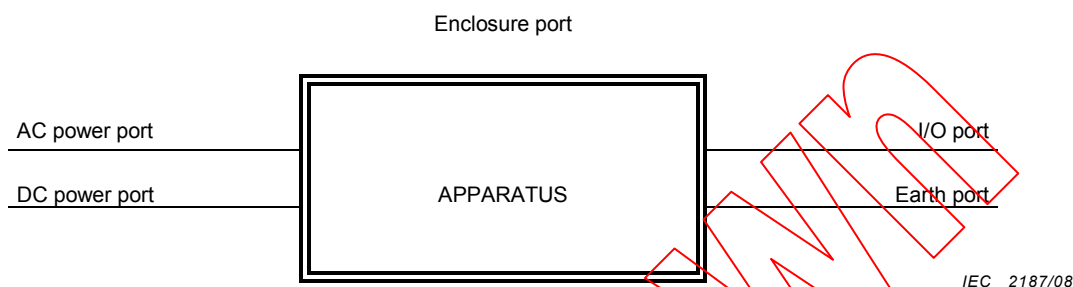


Figure 1 – Main categories of ports

## 4 Description of location

The railway environment is characterised as described in IEC 62236-1. Special consideration is given in this standard to apparatus intended to be installed within 3 m of the centreline of the nearest track and as defined in Note 1 of Table 1.

NOTE Tests covering compatibility with specific items of signalling equipment may be required.

## 5 Emission limits for apparatus

The maximum emissions permitted by IEC 61000-6-4 shall be complied with. The conducted emission limits shall apply to both a.c. and d.c. power ports. A measurement distance of 10 m may be used with the limits increased by 10 dB for the radiated emission of the enclosure port. Where the apparatus is intended to be used in an environment other than the railway environment, then the emission limits given in the appropriate standards shall apply.

If the field-strength measurement at 10 m or 30 m cannot be made because of high ambient noise levels, or for other reasons, measurements may be made at a closer distance, for example 3 m. An inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified EUTs at 3 m at frequencies near 30 MHz, due to the near field effects.

## 6 Immunity

### 6.1 Performance criteria

It is impossible to define precise criteria for the evaluation of the apparatus within the scope of this standard, but performance criteria are as specified in IEC 62236-1, unless otherwise stated.

### 6.2 Test requirements

The immunity requirements for apparatus covered by this standard are given on a port by port basis.

Tests shall be conducted in a well-defined and reproducible manner. The tests shall be carried out as single tests in sequence. The sequence of testing is optional. The description of the test, the test generator, the test methods and the test set-up are given in the basic standards referred to in Tables 1 to 5. If the apparatus has a large number of similar ports with many similar connections, then a sufficient number shall be selected to simulate actual operating conditions and to ensure that all the different types of termination are covered.

The contents of the basic standards are not repeated here; however, additional information needed for the practical application of the tests is given where appropriate.

Voltages induced by traction currents are not treated here. They have to be covered by the functional specification.

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**Table 1 – Immunity – Enclosure port**

Environmental phenomena	Test specification	Basic standard	Test set-up	Remarks	Performance criteria
1.1 <b>Radio-frequency electromagnetic field. Amplitude modulated</b>	80 MHz - 1 000 MHz 10 V/m (r.m.s) 80 % AM, 1 kHz	IEC 61000-4-3	IEC 61000-4-3	The test level specified is the r.m.s. value of the unmodulated carrier	<b>A</b>
	800 MHz - 1 000 MHz 20 V/m (r.m.s) 80 % AM, 1 kHz				
1.2 <b>Radio-frequency electromagnetic field, from digital mobile telephones</b>	1 400 MHz - 2 100 MHz	IEC 61000-4-3	IEC 61000-4-3	See Notes 1 and 3 The test level specified is the r.m.s. value of the unmodulated carrier	<b>A</b>
	10 V/m (r.m.s) 80 % AM, 1 kHz				
	Unmodulated carrier				
	Unmodulated carrier				
1.3 <b>Power - frequency magnetic field</b>	2 100 MHz - 2 500 MHz	IEC 61000-4-8	IEC 61000-4-8	See Notes 1 and 2 All frequencies have to be tested	<b>A</b>
	5 V/m (r.m.s) 80 % AM, 1 kHz				
	Unmodulated carrier				
	a.c. systems d.c. systems				
1.4 <b>Electrostatic discharge</b>	16,7 Hz, 50/60 Hz 100 A/m (r.m.s)	IEC 61000-4-2	IEC 61000-4-2	See Note 4	<b>B</b>
	0 Hz 300 A/m				
1.5 <b>Pulsed magnetic field</b>	± 6 kV ± 8 kV	IEC 61000-4-9	IEC 61000-4-9	See Note 1	<b>B</b>
	300 A/m				

NOTE 1 The tests given apply to apparatus inside 3 m – zone and vital equipment such as interlocking or command and control which are mounted in areas where a high risk of interference from mobile radio telephones has been identified. For other apparatus within the railway environment, requirements of IEC 61000-6-2 apply.

NOTE 2 Test only applies to apparatus containing devices sensitive to magnetic fields, for example Hall elements, electro-dynamic microphones, etc. Unshielded CRT displays can exhibit interference effects above 1 A/m (r.m.s.).