

**Raudteealased rakendused.  
Elektromagnetiline ühilduvus. Osa 4:  
Signalisatsiooni- ja  
telekommunikatsiooniseadiste kiirgus  
ja häirekindlus**

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

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 50121-4:2006 sisaldab Euroopa standardi EN 50121-4:2006 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 22.09.2006 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 50121-4:2006 consists of the English text of the European standard EN 50121-4:2006.</p> <p>This document is endorsed on 22.09.2006 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
--	---

<p><b>Käsitlusala:</b></p> <p>This European Standard applies to signalling and telecommunication apparatus which is installed in the railway environment. Signalling and telecommunication apparatus mounted in vehicles is covered by EN 50121-3-2.</p>	<p><b>Scope:</b></p> <p>This European Standard applies to signalling and telecommunication apparatus which is installed in the railway environment. Signalling and telecommunication apparatus mounted in vehicles is covered by EN 50121-3-2.</p>
--	--

**ICS** 29.020, 29.280, 45.020

**Võtmesõnad:** electromagnetic, emc, interference rejections, interfering emissions, limits (mathematics), mathematics, performance in service, railway applications, railways, signal devices, signalling, telecommunication systems, telecommunications, testing requirements, tests

English version

**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

Bahnanwendungen -  
Elektromagnetische Verträglichkeit  
Teil 4: Störaussendungen und  
Störfestigkeit von Signal- und  
Telekommunikationseinrichtungen

This European Standard was approved by CENELEC on 2006-07-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

This European Standard was prepared by Technical Committee TC 9X: Electrical and electronic applications for railways. The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50121-4 on 2006-07-01.

This European Standard supersedes EN 50121-4:2000.

This European Standard is to be read in conjunction with EN 50121-1.

This standard forms Part 4 of the European Standard series EN 50121, published under the general title "Railway applications - Electromagnetic compatibility". The series consists of:

- Part 1 : General
- Part 2 : Emission of the whole railway system to the outside world
- Part 3-1 : Rolling stock - Train and complete vehicle
- Part 3-2 : Rolling stock - Apparatus
- Part 4 : Emission and immunity of the signalling and telecommunications apparatus
- Part 5 : Emission and immunity of fixed power supply installations and apparatus

The following dates were fixed:

- latest date by which the EN has to be implemented  
at national level by publication of an identical  
national standard or by endorsement (dop) 2007-07-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2009-07-01

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive 89/336/EEC. See Annex ZZ.

---

## Contents

Introduction .....	4
1 Scope .....	4
2 Normative references .....	5
3 Definitions .....	6
4 Description of location .....	6
5 Emission limits for apparatus .....	6
6 Immunity .....	7
6.1 Performance criteria .....	7
6.2 Test requirements .....	7
Annex ZZ (informative) Coverage of Essential Requirements of EC Directives .....	12

### Figure

Figure 1 – Main categories of ports .....	6
---	---

### Tables

Table 1 – Immunity – Enclosure port .....	8
Table 2 – Immunity – I/O port .....	9
Table 3 – Immunity – D.C. power ports .....	10
Table 4 – Immunity – A.C. power ports .....	11
Table 5 – Immunity – Earth port .....	11

## Introduction

This European Standard 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, 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 employed.

## 1 Scope

This European Standard applies to signalling and telecommunication apparatus which is installed in the railway environment. Signalling and telecommunication apparatus mounted in vehicles is covered by EN 50121-3-2.

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 EN 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 EN 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 EN 61000-3-2 or EN 61000-3-3, the requirements of those standards apply.

Testing methods are given in the basic standards listed in Clause 2, Normative references.

These specific provisions are to be used in conjunction with the general provisions in EN 50121-1.

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.

EN 50121-1	Railway applications – Electromagnetic compatibility Part 1: General
EN 50121-3-2	Railway applications – Electromagnetic compatibility Part 3-2: Rolling stock – Apparatus
EN 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 61000-3-2)
EN 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 61000-3-3)
EN 61000-4-1	Electromagnetic compatibility (EMC) – Part 4-1: Testing and measurement techniques – Overview of IEC 61000-4 series (IEC 61000-4-1)
EN 61000-4-2	Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test (IEC 61000-4-2)
EN 61000-4-3	Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3)
EN 61000-4-4	Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test (IEC 61000-4-4)
EN 61000-4-5	Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test (IEC 61000-4-5)
EN 61000-4-6	Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6)
EN 61000-4-8	Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test (IEC 61000-4-8)
EN 61000-4-9	Electromagnetic compatibility (EMC) – Part 4-9: Testing and measurement techniques – Pulse magnetic field immunity test (IEC 61000-4-9)
EN 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments (IEC 61000-6-2)

EN 61000-6-4

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

### 3 Definitions

For the purpose of this Part 4 of the European Standard, the following definitions apply.

#### 3.1

##### **port**

particular interface of the specified apparatus with the external environment e.g. 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

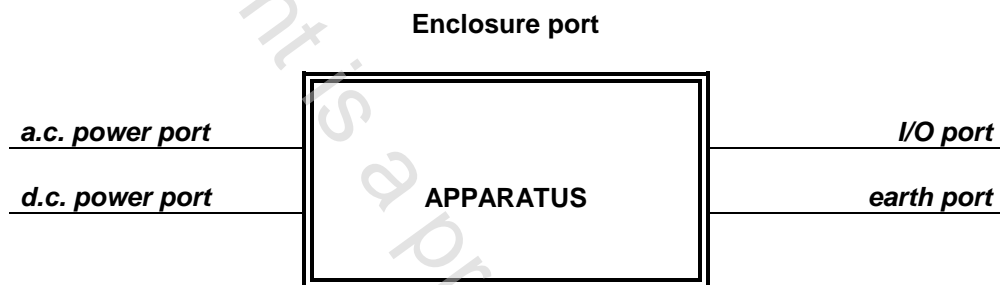


Figure 1 – Main categories of ports

### 4 Description of location

The railway environment is characterised as described in EN 50121-1. 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 EN 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 distance for determining compliance. Care should be taken in the measurement of large EUTs at 3 m at frequencies near 30 MHz, due to the near field effects.