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Železniške naprave – Elektromagnetna združljivost – 3-2. del: Vozna sredstva – Naprave

Railway applications - Electromagnetic compatibility -- Part 3-2: Rolling stock - Apparatus

Bahnanwendungen - Elektromagnetische Verträglichkeit -- Teil 3-2: Bahnfahrzeuge - Geräte

Applications ferroviaires - Compatibilité électromagnétique -- Partie 3-2: Matériel roulant - Appareils

Ta slovenski standard je istoveten z: **EN 50121-3-2:2000**

ICS:

33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general
45.060.01	Železniška vozila na splošno	Railway rolling stock in general

SIST EN 50121-3-2:2001 **en**

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English version

Railway applications - Electromagnetic compatibility Part 3-2: Rolling stock - Apparatus

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This European Standard was approved by CENELEC on 2000-04-01. 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.

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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

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Foreword

This European standard was prepared by SC 9XB, Electromechanical material on board of rolling stock, of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways, in accordance with the decisions taken by TC 9X.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50121-3-2 on 2000-04-01.

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)	2001-04-01
- latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2003-04-01

This European Standard is to be read in conjunction with EN 50121-1:2000.

This standard forms part 3-2 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

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given only for information.
In this standard, annexes A and B are informative.

Contents

1 Scope

This European Standard applies to emission and immunity aspects of EMC for electrical and electronic apparatus intended for use on railway rolling stock.

The frequency range considered is from d.c. to 400 GHz. At present, testing is not defined for frequencies above 1 GHz.

The application of tests shall depend on the particular apparatus, its configuration, its ports, its technology and its operating conditions.

This standard takes into account the internal environment of the railway rolling stock and the external environment of the railway, and interference to the apparatus from equipment such as hand-held radio transmitters.

If a port is intended to transmit or receive for the purpose of radio communication then the emission and immunity limits in this standard at the communication frequency do not apply.

This standard does not apply to transient emissions when starting or stopping the apparatus.

The objective of this standard is to define limits and test methods for electromagnetic emissions and immunity test requirements in relation to conducted and radiated disturbances.

These limits and tests represent essential electromagnetic compatibility requirements.

Emission requirements have been selected so as to ensure that disturbances generated by the apparatus operated normally on railway rolling stock do not exceed a level which could prevent other apparatus from operating as intended.

Likewise, the immunity requirements have been selected so as to ensure an adequate level of immunity for rolling stock apparatus.

The levels do not however cover extreme cases which may occur with an extremely low probability of occurrence in any location. Specific requirements which deviate from this standard shall be specified.

Test requirements are specified for each port considered.

These specific provisions are additional to the general provisions in EN 50121-1.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 50121-1	Railway applications - Electromagnetic compatibility Part 1: General
EN 50121-3-1	Part 3-1: Rolling stock - Train and complete vehicle
EN 50155	Railway applications - Electronic equipment used on rolling stock
EN 55011	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment (CISPR 11, modified)
EN 55022	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement (CISPR 22, modified)

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	Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3, modified)
EN 61000-4-4	Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test (IEC 61000-4-4)
EN 61000-4-6	Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6)
CISPR 16-1	Specification for radio disturbance and immunity measuring apparatus and methods -- Part 1: Radio disturbance and immunity measuring apparatus

3 Definitions

For the purpose of this Part 3-2 of the European Standard, the following definitions apply:

3.1
rolling stock apparatus
a finished product with an intrinsic function intended for implementation into the rolling stock installation which may be placed on the market as a single commercial unit

3.2
port
the 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

3.3
enclosure port
the physical boundary of the apparatus through which electromagnetic fields may radiate or impinge

The main categories of ports for rolling stock apparatus are presented in Figure 1.

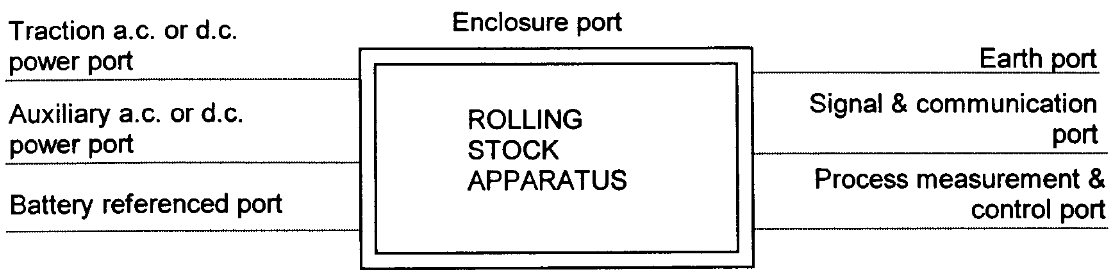

Figure 1: Main categories of ports

Typical examples of rolling stock apparatus with their ports are listed in annex A.

4 Performance criteria

The variety and the diversity of the apparatus within the scope of this standard makes it difficult to define precise criteria for the evaluation of the immunity test results.

Apparatus shall not become dangerous or unsafe as a result of the application of the tests defined in this standard .

A functional description and a definition of performance criteria, during or as a consequence of the EMC testing, shall be provided by the manufacturer and noted in the test report, based on the criteria A, B, C defined in EN 50121-1.

NOTE The minimum performance criteria might be a subject to agreement between manufacturer and user.

5 Conditions during testing

It is not always possible to test every function of the apparatus. The tests shall be made at typical operating mode considered by the manufacturer to produce the largest emission or maximum susceptibility to noise as appropriate in the frequency band being investigated consistent with normal applications. The manufacturer shall define the conditions during testing in a test plan.

If the apparatus is part of a system, or can be connected to auxiliary apparatus, then the apparatus shall be tested while connected to the minimum configuration of auxiliary apparatus necessary to exercise the ports in accordance with EN 55022.

The configuration and mode of operation shall be specified in the test plan and the actual conditions, during the tests, shall be precisely noted in the test report.

If the apparatus has a large number of similar ports or 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 (e.g. 20% of the ports or at least four ports).

The tests shall be carried out within the specified operating range for the apparatus and at its rated supply voltage, unless otherwise indicated in the basic standard.

6 Applicability

The measurements in this standard shall be made on the relevant ports of the apparatus.

It may be determined from consideration of the electrical characteristics, the connection and the usage of a particular apparatus that some of the tests are not applicable (e.g. radiated immunity of induction motors, transformers, ...). In such case the decision not to test has to be recorded in the test plan or test report.

If not otherwise specified the EMC tests shall be type tests.

7 Emission tests and limits

The emission tests and limits for apparatus covered by this standard are given on a port by port basis.

The emission limits for individual equipment within a vehicle are only mandatory for items which are supplied as self contained units and are taken into service or placed upon the market separately from the supply or re-engineering of vehicles.

At the discretion of the system integrator these emission limits may be applied to items of equipment which are not supplied as separate items.

Measurements shall be performed in well-defined and reproducible conditions for each type of disturbance.

The description of the test, the test methods and the test set-up are given in Basic Standards which are referred to in Tables 1 to 6.

The contents of these Basic Standards are not repeated here, however modifications or additional information needed for the practical application of the tests are given in this standard.

NOTE The reference to „Basic Standard" is intended to be limited to those parts of the standard that give the description of the test, the test methods and the test set-up.

Table 1: Emission - Traction a.c. power ports

Ports	Basic standard	Frequency range	Limits	Remarks
High voltage connection, input side before filter (port 3 on Figures A.1, A.2, A.3)		Signalling and telecommunication frequencies	see EN 50121-3-1	
		9 kHz - 30 MHz	No limits See note 1	See note 2

NOTE 1 No conducted radio frequency limits are applied. The apparatus when installed with other surrounding equipment shall satisfy the radiated emission limits of EN 50121-3-1 for trains.

NOTE 2 It is desirable but not possible to apply conducted radio frequency limits. No practical test method exists and the relationship between conducted emissions and radiated emissions is not possible to define.

Table 2: Emission - Traction d.c. power ports

Ports	Basic standard	Frequency range	Limits	Remarks
High voltage connection, input side before filter (port 3 on Figure A.4)		Signalling and telecommunication frequencies	see EN 50121-3-1	
		9 kHz - 30 MHz	See notes	See notes

NOTE 1 At present there is no agreed method or limits for conducted emissions on the traction supply from 9 kHz to 30 MHz. Limiting conducted emissions from an apparatus connected to the traction supply will prevent excessive radiated emissions from the supply system. A method for measuring conducted emissions is proposed in annex B. Experience in this technique and the relationship between conducted and radiated emissions is necessary in order to progress this standard in the future.

NOTE 2 No conducted radio frequency limits are applied. The apparatus when installed with other surrounding equipment shall satisfy the radiated emission limits of EN 50121-3-1 for trains.

Table 3: Emission - Auxiliary a.c. or d.c. power ports

Ports	Basic standard	Frequency range	Limits	Remarks
Auxiliary supply sinusoidal a.c. or d.c. (port 9 on Figures A.1, A.2 and A.4.	EN 55011	9 kHz - 150 kHz	No limits	See note 1
		150 kHz - 500 kHz	99 dBµV quasi-peak	See notes 2, 3, 4
		500 kHz - 30 MHz	93 dBµV quasi-peak	See notes 2, 3, 4

NOTE 1 At present there are no limits for conducted emissions from 9 kHz to 150 kHz. Limiting conducted emissions from an apparatus will prevent excessive radiated emissions. Experience in this technique and the relationship between conducted and radiated emissions is necessary in order to progress this standard in the future.

NOTE 2 Wherever applicable the method defined by EN 55011 is to be used. At present the existing method of measuring conducted emissions (EN 55011) has limitations in terms of voltage and current rating of coupling networks. In addition the method of measuring voltage has safety implications for testing high power systems. Limiting conducted emissions from apparatus connected to external cable systems will prevent excessive radiated emissions.

NOTE 3 This requirement refers to the industrial limit values but considering they have been defined to protect radio and TV sets and as the objective is not the same here, the applicable limit for railway applications have been relaxed by 20 dB to be more representative of potential problems.

NOTE 4 This requirement is not applicable to power ports which are connected to other dedicated, compatible ports.