



SLOVENSKI STANDARD

oSIST prEN 50121-3-2:2014

01-januar-2014

Nadomešča:

SIST EN 50121-3-2:2007

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

<https://standards.iteh.ai/catalog/standards/sist/99015ccc-ee7c-48e9-85db-405992e619f2/sist-en-50121-3-2-2015>

Ta slovenski standard je istoveten z: prEN 50121-3-2:2013

ICS:

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

oSIST prEN 50121-3-2:2014

en

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 50121-3-2

September 2013

ICS

Will supersede EN 50121-3-2:2006

English version

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

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

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

This draft European Standard is submitted to CENELEC members for CENELEC enquiry.
Deadline for CENELEC: 2014-02-28.

It has been drawn up by CLC/TC 9X.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

CENELEC

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels

© 2013 CENELEC - All rights of exploitation in any form and by any means reserved worldwide for CENELEC members.

Project: 23683

Ref. No. prEN 50121-3-2:2013 E

1	Contents	Page
2	Foreword	4
3	1 Scope	5
4	2 Normative references	6
5	3 Terms, definitions and abbreviations	7
6	3.1 Terms and definitions	7
7	3.2 Abbreviations	7
8	4 Performance criteria	8
9	5 Conditions during testing	8
10	6 Applicability	8
11	7 Emission tests and limits	9
12	8 Immunity tests and limits	13
13	Annex A (informative) Examples of apparatus and ports	17
14	Annex B (informative) Conducted disturbances generated by power converters	22
15	Annex ZZ (informative) Coverage of Essential Requirements of EU Directives	23
16	Bibliography	24
17		
18	Figure 1 – Main categories of ports	7
19	Figure A.1 – AC fed loco with AC traction drive and psophometric filter on the line side	19
20	Figure A.2 – AC/AC system with power factor correction filter on the converter side and with DC or three-	
21	phase auxiliary and train power supply	19
22	Figure A.3 – Conventional system with AC input and DC traction motors fed by phase control converter	20
23	Figure A.4 – DC fed system with AC traction drive	20
24	Figure A.5 – Additional ports of converter and control electronics	21
25	Figure B.1 – Test set-up	22

26		
27	Table 1 – Emission – Auxiliary AC or DC power ports (input and output)	10
28	Table 2 – Emission – Battery power supply (Input and output)	10
29	Table 3 – Emission – Enclosure port	11
30	Table 4 – Immunity – Battery referenced ports (except at the output of energy sources), auxiliary AC	
31	power input ports (rated voltage ≤ 400 Vrms)	14
32	Table 5 – Immunity – Signal & communication, process measurement & control ports	15
33	Table 6 – Immunity – Enclosure ports	16
34	Table A.1 – Typical examples of apparatus	17
35	Table A.2 – Typical port descriptions	18
36	Table B.1 – Emission requirements for AC and DC power ports	22
37		
38		

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 50121-3-2:2015

<https://standards.iteh.ai/catalog/standards/sist/99015cec-ee7c-48e9-85db-405992e619f2/sist-en-50121-3-2-2015>

prEN 50121-3-2:2013 (E)

39 **Foreword**

40 This document [prEN 50121-3-2:2013] has been prepared by CLC/TC 9X " Electrical and electronic
41 applications for railways".

42 This document is currently submitted to the Enquiry.

43 This document will supersede EN 50121-3-2:2006.

44 prEN 50121-3-2:2013 includes the following significant technical changes with respect to EN 50121-3-2:2006:

- 45 — clarification of scope (Clause 1);
- 46 — set dated normative references (Clause 2);
- 47 — new definition of ports and clarification in Tables 1 – 6;
- 48 — emission requirement extended in the frequency range 1 GHz – 6 GHz following EN 61000-6-4;
- 49 — immunity requirement extended in the frequency range 5,1 GHz – 6 GHz;
- 50 — revision of Annex B.

51 EN 50121 "*Railway applications – Electromagnetic compatibility*" consists of the following parts:

- 52 • *Part 1: General;*
- 53 • *Part 2: Emission of the whole railway system to the outside world;*
- 54 • *Part 3-1: Rolling stock – Train and complete vehicle;*
- 55 • *Part 3-2: Rolling stock – Apparatus;*
- 56 • *Part 4: Emission and immunity of the signalling and telecommunications apparatus;*
- 57 • *Part 5: Emission and immunity of fixed power supply installations and apparatus.*

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

59 This document has been prepared under a mandate given to CENELEC by the European Commission and the
60 European Free Trade Association, and supports essential requirements of EU Directive(s).

61 For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

62 1 Scope

63 This European Standard applies to emission and immunity aspects of EMC for electrical and electronic
64 apparatus intended for use on railway rolling stock. EN 50121-3-2 applies for the integration of apparatus on
65 rolling stock.

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

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

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

73 If a port is intended to transmit or receive for the purpose of radio communication (intentional radiators, e.g.
74 transponder systems), then the radiated emission requirement in this European Standard are not intended to
75 be applicable to the intentional transmission from a radio transmitter as defined by the ITU.

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

78 This European Standard does not apply to transient emissions when starting or stopping the apparatus.

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

81 These limits and tests represent essential electromagnetic compatibility requirements.

82 Emission requirements have been selected so as to ensure that disturbances generated by the apparatus
83 operated normally on railway rolling stock do not exceed a level which could prevent other apparatus from
84 operating as intended. The emission limits given in this European Standard take precedence over emission
85 requirements for individual apparatus onboard the rolling stock given in other standards.

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

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

90 Test requirements are specified for each port considered.

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

prEN 50121-3-2:2013 (E)

92 **2 Normative references**

93 The following documents, in whole or in part, are normatively referenced in this document and are
 94 indispensable for its application. For dated references, only the edition cited applies. For undated references,
 95 the latest edition of the referenced document (including any amendments) applies.

EN 50121-1	date	Railway applications – Electromagnetic compatibility Part 1: General
EN 50121-3-1	Date	Railway applications – Electromagnetic compatibility Part 3-1: Rolling stock – Train and complete vehicle
EN 50155	07.2007	Railway applications – Electronic equipment used on rolling stock
EN 55016-1-4	2010	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test sites for radiated disturbance Measurements (IEC/CISPR 16-1-4:2010 + Cor.:2010)
EN 55016-2-1	03.2009	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements (CISPR 16-2-1:2008)
EN 55016-2-3 +A1	06.2010 10.2010	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements (IEC/CISPR 16-2-3:2010 + A1:2010)
EN 55022	12.2010	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement (CISPR 22, mod.)
EN 61000-4-2	03.2009	Electromagnetic compatibility (EMC) Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test (IEC 61000-4-2)
EN 61000-4-3	05.2006	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	12.2004	Electromagnetic compatibility (EMC) Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test (IEC 61000-4-4)
EN 61000-4-5	11.2006	Electromagnetic compatibility (EMC) Part 4-5: Testing and measurement techniques – Surge immunity test (IEC 61000-4-5)
EN 61000-4-6	03.2009	Electromagnetic compatibility (EMC) Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6)
EN 61000-4-30	01.2009	Electromagnetic compatibility (EMC) - Part 4-30: Testing and measurement techniques - Power quality measurement methods (IEC 61000-4-30:2008)
EN 61000-6-4	01.2007 02.2011	Electromagnetic Compatibility (EMC) – Part 6-4 Generic standards – Emission standard for industrial environments (IEC 61000-6-4: 2006 + A1: 2010)

96 3 Terms, definitions and abbreviations

97 3.1 Terms and definitions

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

99 3.1.1

100 **rolling stock apparatus**

101 finished product with an intrinsic function intended for implementation into the rolling stock installation

102 3.1.2

103 **port**

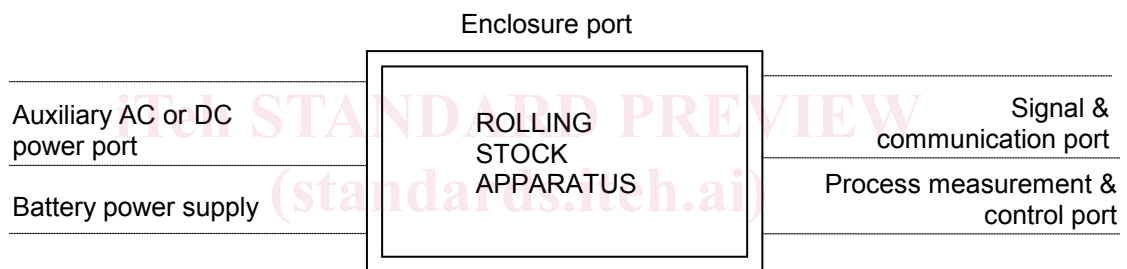
104 particular interface of the specified apparatus with the external environment e.g. auxiliary AC or DC power port,
105 I/O (input/output) port

106 3.1.3

107 **enclosure port**

108 physical boundary of the apparatus through which electromagnetic fields may radiate or impinge

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



110

SIST EN 50121-3-2:2015

111

<https://standards.iteh.ai/catalog/standards/sist/99015cec-ee7c-48e9-85db-405992123000>

Figure 1 – Main categories of ports

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

113 Traction power ports are not covered in EN 50121-3-2, see Annex B.

114 3.2 Abbreviations

115 For the purposes of this document, the following abbreviations apply.

116	AC	Alternating current
117	AM	Amplitude modulation
118	CISPR	Comité international spécial des perturbations radioélectriques
119	DC	Direct current
120	EMC	Electromagnetic compatibility
121	EUT	Equipment under test
122	I/O	Input / Output
123	OATS	Open area test site

prEN 50121-3-2:2013 (E)

124	PC	Personal computer
125	SAC	Semi anechoic chamber
126	THD	Total harmonic distortion
127	TV	Television

128 4 Performance criteria

129 The variety and the diversity of the apparatus within the scope of this European Standard make it difficult to
130 define precise criteria for the evaluation of the immunity test results.

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

134 5 Conditions during testing

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

139 If the apparatus is part of a system, or can be connected to auxiliary apparatus, then the apparatus shall be
140 tested while connected to the minimum configuration of auxiliary apparatus necessary to exercise the ports in
141 accordance e.g. with EN 55022 (Clause 8).

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

144 If the apparatus has a large number of similar ports or ports with many similar connections, then a sufficient
145 number shall be selected to simulate actual operating conditions and to ensure that all the different types of
146 termination are covered (e.g. 20 % of the ports or at least four ports).

147 The tests shall be carried out within the specified operating range for the apparatus and at its nominal supply
148 voltage, unless otherwise indicated.

149 6 Applicability

150 The measurements in this European Standard shall be made on the relevant ports of the apparatus.

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

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

155 **7 Emission tests and limits**

156 The emission tests and limits for apparatus covered by this European Standard are given on a port by port
157 basis.

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

159 The description of the test, the test methods and the test set-up are given in Basic Standards which are
160 referred to in Tables 1 to 3.

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

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 50121-3-2:2015](https://standards.iteh.ai/catalog/standards/sist/99015cec-ee7c-48e9-85db-405992e619f2/sist-en-50121-3-2-2015)

<https://standards.iteh.ai/catalog/standards/sist/99015cec-ee7c-48e9-85db-405992e619f2/sist-en-50121-3-2-2015>