



SLOVENSKI STANDARD
oSIST prEN 50736:2024

01-oktober-2024

Železniške naprave - Komunikacijski, signalni in procesni sistemi - Preskusne zahteve za signalizacijo in telekomunikacijsko opremo

Railway application - Communication, signalling and processing system - Test requirements for signalling and telecommunication equipment

Bahnanwendungen - Telekommunikationstechnik, Signaltechnik und Datenverarbeitungssysteme - Prüfanforderungen für Signal- und Telekommunikationsgeräte

Applications ferroviaires - Systèmes de signalisation, de télécommunication et de traitement - Exigences de test pour les équipements de signalisation et de télécommunication

<https://standards.iteh.ai>

<https://standards.iteh.ai> Ta slovenski standard je istoveten z: [oSIST prEN 50736:2024](https://standards.iteh.ai) [prEN 50736:2024](https://standards.iteh.ai) [992d74f85ea/osist-pren-50736-2024](https://standards.iteh.ai)

ICS:

45.060.01 Železniška vozila na splošno Railway rolling stock in general

oSIST prEN 50736:2024

en

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 50736

August 2024

ICS 45.060.01

English Version

Railway application - Communication, signalling and processing system - Test requirements for signalling and telecommunication equipment

Applications ferroviaires - Systèmes de signalisation, de télécommunication et de traitement - Exigences de test pour les équipements de signalisation et de télécommunication

Bahnanwendungen - Telekommunikationstechnik, Signaltechnik und Datenverarbeitungssysteme - Prüfanforderungen für Signal- und Telekommunikationsgeräte

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2024-10-25.

It has been drawn up by CLC/SC 9XA.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye 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.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

1	European foreword.....	5
2	Introduction.....	6
3	1 Scope.....	7
4	2 Normative references.....	7
5	3 Terms and definitions.....	8
6	3.1 Terms and definitions.....	8
7	3.2 Symbols and abbreviations.....	10
8	4 Relation between environmental conditions and test requirements.....	10
9	5 Test requirements for type test.....	12
10	5.1 General test requirements.....	12
11	5.1.1 Test levels.....	12
12	5.1.2 Standard atmospheric conditions.....	12
13	5.1.3 Performance criteria.....	12
14	5.1.4 Visual Inspection.....	12
15	5.1.5 Performance test.....	13
16	5.2 Insulation tests.....	13
17	5.2.1 General.....	13
18	5.2.2 Insulation resistance test.....	14
19	5.2.3 Impulse test.....	14
20	5.2.4 Voltage withstand test.....	15
21	5.3 Temperature tests.....	15
22	5.3.1 General.....	15
23	5.3.2 Dry heat test.....	16
24	5.3.3 Cold test.....	18
25	5.4 Humidity test.....	21
26	5.4.1 General.....	21
27	5.4.2 Damp heat test.....	21
28	5.5 Vibration and shock tests.....	26
29	5.5.1 General.....	26
30	5.5.2 Initial vibration response investigation.....	27
31	5.5.3 Fatigue vibration test.....	28
32	5.5.4 Shock test.....	29
33	5.5.5 Final vibration response investigation.....	30
34	5.6 Electromagnetic compatibility tests.....	30
35	5.7 Surge test.....	30
36	5.8 Test for protection against water ingress.....	31
37	5.8.1 General.....	31
38	5.8.2 Test requirements.....	31
39	5.8.3 Test setup.....	31
40	5.8.4 Test acceptance criteria.....	31
41	5.9 Solar radiation tests.....	31
42	5.9.1 General.....	31
43	5.9.2 Simulated solar radiation tests.....	32
44	5.9.3 Solar dry heat test.....	34
45	5.10 Test for protection against dust and sand ingress.....	35
46	5.10.1 General.....	35
47	5.10.2 Test requirements.....	35
48	5.10.3 Test setup.....	36
49	5.10.4 Test acceptance criteria.....	36
50	5.11 Test for protection against external mechanical impacts.....	36

51	5.11.1	General	36
52	5.11.2	Test requirements	37
53	5.11.3	Test setup.....	37
54	5.11.4	Test acceptance criteria	37
55	6	Documentation	38
56	6.1	General	38
57	6.2	Type test specification.....	38
58	6.3	Type test report	39
59	6.4	Type test compliance summary sheet	39
60	Annex A (informative)	Analysis of the environmental conditions	40
61	A.1	General	40
62	A.2	Pressure	40
63	A.2.1	Altitude	40
64	A.2.2	Pulse pressure.....	42
65	A.3	Temperature.....	42
66	A.4	Humidity	42
67	A.5	Wind.....	44
68	A.6	Rain.....	44
69	A.7	Snow and hail	44
70	A.7.1	Snow.....	44
71	A.7.2	Hail	45
72	A.8	Ice.....	45
73	A.9	Solar radiation	46
74	A.10	Lightning	46
75	A.11	Pollution	47
76	A.11.1	General	47
77	A.11.2	Chemically and biologically active substances	47
78	A.11.3	Mechanically active substances	47
79	A.12	Fire protection	48
80	A.13	Vibrations and shocks	48
81	A.14	Electromagnetic compatibility	49
82	A.15	Power supply	49
83	Annex B (informative)	Type test specification	50
84	B.1	General	50
85	B.2	Type test specification clauses	50
86	B.2.1	Introduction.....	50
87	B.2.2	Terms, definition and abbreviation.....	50
88	B.2.3	Reference documents.....	50
89	B.2.4	General description.....	50
90	B.2.5	Equipment under test.....	51
91	B.2.6	Installation environment.....	51
92	B.2.7	Ports identification	52
93	B.2.8	Performance test	55
94	B.2.9	Visual inspection	56
95	B.2.10	Correlation between performance test and the performance criteria.....	56
96	B.2.11	Summary of all type tests to be performed on the EUT	57
97	B.2.12	Insulation tests	59
98	B.2.13	EMC tests	59
99	B.2.14	Climatic tests	60

prEN 50736:2024 (E)

100	B.2.15	Vibration and shock tests	60
101	B.2.16	Tests for protection against external agents	60
102	B.2.17	Tests for protection against external mechanical impacts	61
103	B.2.18	Power supply tests	61
104	B.2.19	Additional tests	61
105	Annex C (informative)	Additional and not mandatory tests	62
106	C.1	General	62
107	C.2	Storage and transport temperature tests	62
108	C.2.1	General	62
109	C.2.2	Test setup	62
110	C.2.3	Test requirements	62
111	C.2.4	Test acceptance criteria	64
112	C.3	Shock tests for transversal and longitudinal axis	65
113	C.4	Impulse test for equipment without earth connection	65
114	Annex D (informative)	Tests selection guideline	66
115	D.1	General	66
116	D.2	Definition of equipment installation conditions	66
117	D.3	Equipment for installation in locations protected from the weather	67
118	D.4	Equipment for installation in locations not protected from the weather	68
119	Annex E (informative)	Examples for type test compliance summary sheet	70
120	E.1	General	70
121	E.2	Example 1	70
122	E.3	Example 2	71
123	Bibliography		74

[oSIST prEN 50736:2024](https://standards.iteh.ai/catalog/standards/sist/fla53655-e796-4818-bf1f-4992d74f85ea/osist-pren-50736-2024)

<https://standards.iteh.ai/catalog/standards/sist/fla53655-e796-4818-bf1f-4992d74f85ea/osist-pren-50736-2024>

124 **European foreword**

125 This document (prEN 50736:2024) has been prepared by CLC/SC 9XA "Communication, signalling and
126 processing systems" of CLC/TC 9X "Electrical and electronic applications for railways".

127 This document is currently submitted to the Enquiry

128 The following dates are proposed:

- latest date by which the existence of this document has to be announced at national level (doa) dor + 6 months
- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) dor + 12 months
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) dor + 36 months (to be confirmed or modified when voting)

129 This document has been prepared according to Decision 57/5 taken during the SC 9XA meeting.

iTeh Standards (<https://standards.iteh.ai>) Document Preview

[oSIST prEN 50736:2024](https://standards.iteh.ai/catalog/standards/sist/fla53655-e796-4818-bf1f-4992d74f85ea/osist-pren-50736-2024)

<https://standards.iteh.ai/catalog/standards/sist/fla53655-e796-4818-bf1f-4992d74f85ea/osist-pren-50736-2024>

prEN 50736:2024 (E)**130 Introduction**

131 The environmental conditions for signalling and telecommunication equipment are specified by
132 EN 50125-3:2003, without defining test requirements and their related performance/acceptance criteria.

133 This document contains test requirements and performance/acceptance criteria for most of the mentioned
134 environmental conditions likely to be experienced in the railway applications and published in EN 50125-3:2003.
135 Furthermore, it clearly indicates for which environmental conditions no test methods are known and therefore
136 no meaningful test requirements can be defined.

137 Test requirements for the type test defined in this document consider the severity of the environmental
138 parameters provided for by EN 50125-3:2003, but those test requirements remain applicable even if the severity
139 levels requested by the customer differ.

140 This document has been prepared in the form of a Product Standard.

141 Where possible direct references are given to other existing standards to obtain a high degree of acceptance
142 and to reduce additional effort for testing.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[oSIST prEN 50736:2024](https://standards.iteh.ai/catalog/standards/sist/fla53655-e796-4818-bf1f-4992d74f85ea/osist-pren-50736-2024)

<https://standards.iteh.ai/catalog/standards/sist/fla53655-e796-4818-bf1f-4992d74f85ea/osist-pren-50736-2024>

143 **1 Scope**

144 This document applies to railway signalling and telecommunication trackside equipment.

145 This document does not cover signalling and telecommunication equipment mounted in vehicles; these are
146 covered by EN 50155:2021.

147 This document covers the type testing phases of the equipment for signal and telecommunication (S&T) system
148 (including power supply systems belonging to S&T), in order to ensure compliance with specified requirements
149 already defined in the customer specifications or by the involved parties.

150 In particular this document intends to define test requirements with related performance / acceptance criteria,
151 considering only the environmental conditions stated by the EN 50125-3:2003, and considering the severities
152 of the environmental parameters herein defined.

153 Safety considerations are not covered by this document.

154 **2 Normative references**

155 The following documents are referred to in the text in such a way that some or all of their content constitutes
156 requirements of this document. For dated references, only the edition cited applies. For undated references, the
157 latest edition of the referenced document (including any amendments) applies.

158 EN 50121-4:2016,¹ *Railway applications - Electromagnetic compatibility - Part 4: Emission and immunity of the*
159 *signalling and telecommunications apparatus*

160 EN 50124-1:2017, *Railway applications - Insulation coordination - Part 1: Basic requirements - Clearances and*
161 *creepage distances for all electrical and electronic equipment*

162 EN 50125-3:2003,² *Railway applications - Environmental conditions for equipment - Part 3: Equipment for*
163 *signalling and telecommunications*

164 EN 60068-1:2014, *Environmental testing - Part 1: General and guidance*

165 EN 60068-2-1:2007, *Environmental testing - Part 2-1: Tests - Test A: Cold*

166 EN 60068-2-2:2007, *Environmental testing - Part 2-2: Tests - Test B: Dry heat*

167 EN 60068-2-27:2009, *Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock*

168 EN 60068-2-30:2005, *Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

169 EN 60068-2-47:2005, *Environmental testing - Part 2-47: Tests - Mounting of specimens for vibration, impact*
170 *and similar dynamic tests*

171 EN IEC 60068-2-5:2018, *Environmental testing - Part 2-5: Tests - Test S: Simulated solar radiation at ground*
172 *level and guidance for solar radiation testing and weathering*

173 EN 60068-2-64:2008,³ *Environmental testing - Part 2: Tests - Test Fh: Vibration, broadband random and*
174 *guidance*

175 EN 60068-2-75:2014, *Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests*

¹ As impacted by EN 50121-4:2016/A1:2019.

² As impacted by EN 50125-3:2003/corrigendum May 2010.

³ As impacted by EN 60068-2-64:2008/A1:2019.

prEN 50736:2024 (E)

176 EN 60529:1991,⁴ *Degrees of protection provided by enclosures (IP Code)*

177 EN 61180:2016, *High-voltage test techniques for low-voltage equipment - Definitions, test and procedure*
178 *requirements, test equipment*

179 EN 62262:2002,⁵ *Degrees of protection provided by enclosures for electrical equipment against external*
180 *mechanical impacts (IK code)*

181 **3 Terms and definitions**

182 **3.1 Terms and definitions**

183 For the purposes of this document, the terms and definitions given in EN 50124-1:2017, EN 60068-2-64:2008
184 and the following apply.

185 ISO and IEC maintain terminology databases for use in standardization at the following addresses:

186 — ISO Online browsing platform: available at <https://www.iso.org/obp/>

187 — IEC Electropedia: available at <https://www.electropedia.org/>

188 **3.1.1**

189 **enclosure**

190 case, housing, or other part to protect the equipment against certain external influences

191 Note 1 to entry: The enclosure can offer protection to personnel, e.g. from electric shock.

192 Note 2 to entry: In this document insulating compound (e.g. potting, encapsulation and vacuum impregnation) used to protect
193 the equipment against external influences is considered as enclosure.

194 **3.1.2**

195 **environmental condition**

196 physical, chemical or biological condition, external to a product, to which it is subjected at a certain time

197 [SOURCE: EN 60721-1:1995, 3.1]

198 **3.1.3**

199 **environmental factor**

200 physical, chemical or biological influence which, either singly or in combination with other influences, produces
201 an environmental condition (e.g. heat, vibration)

202 [SOURCE: EN 60721-1:1995, 3.2]

203 **3.1.4**

204 **environmental parameter**

205 one or more physical, chemical or biological properties characterizing an environmental factor (e.g. temperature,
206 acceleration)

207 Note 1 to entry: For example, the environmental factor vibration is characterized by the parameters: type of vibration
208 (sinusoidal, random), acceleration and frequency.

209 [SOURCE: EN 60721-1:1995, 3.3, modified – The second part of the definition was moved to Note 1 to entry]

⁴ As impacted by EN 60529:1991/corrigendum May 1993, EN 60529:1991/A1:2000, EN 60529:1991/A2:2013, EN 60529:1991/AC:2016-12 and EN 60529:1991/A2:2013/AC:2019-02.

⁵ As impacted by EN 62262:2002/A1:2021.

210 **3.1.5**
 211 **equipment**
 212 single apparatus or set of devices or apparatuses, or the set of main devices of an installation, or all devices
 213 necessary to perform a specific task.

214 EXAMPLES a power transformer, the equipment of a substation, measuring equipment

215 [SOURCE: IEC 60050-151:2001, 151-11-25]

216 **3.1.6**
 217 **operating temperature**
 218 <of equipment> temperature range in which the equipment is operating as specified.

219 Note 1 to entry: Outside of the operating temperature range there can be temporary or permanent degradation of the
 220 equipment performances.

221 **3.1.7**
 222 **performance**
 223 characteristics defining the ability of an equipment to achieve the intended functions

224 [SOURCE: IEC 60050-311:2001, 311-06-11, modified – The terminological entry “measuring instrument” has
 225 been replaced by “equipment”]

226 **3.1.8**
 227 **port**
 228 <for signalling and telecommunications apparatus> particular interface of the specified apparatus with the
 229 external environment

230 EXAMPLES AC power port, DC power port, I/O (input/output) port, earth port.

231 [SOURCE: IEC 60050-821:2017, 821-11-37]

232 **3.1.9**
 233 **resonance frequency**
 234 <in vibration tests> frequency at which resonance exists and the acceleration measured in the response point
 235 is more than three times respect the acceleration measured in the reference point

236 **3.1.10**
 237 **severity of environmental parameter**
 238 value of each quantity, characterizing the environmental parameter

239 EXAMPLE The severity of sinusoidal vibration is defined by values of the acceleration (in m/s^2) and frequency (in Hz).

240 [SOURCE: EN 60721-1:1995, 3.4]

241 **3.1.11**
 242 **specified requirements**
 243 need or expectation that is stated

244 Note 1 to entry: Specified requirements can be stated in normative documents such as regulations, standards and technical
 245 specifications.

246 Note 2 to entry: When the severity of an environmental parameter is chosen considering the environment where the
 247 equipment has to be installed, this becomes a specified requirement. This is the target that the equipment has to fulfil.
 248 Specified requirements can be defined by generic or product standards, by the customer in his specifications, or also by the
 249 supplier, for example when don't exist specifications or standards, considering the environment where he intends to install
 250 his components (e.g. the value of the environmental high temperature to which equipment can operate has to be 70 °C.).

251 [SOURCE: IEC 60050-902:2013, 902-02-01, modified – The Note 2 to entry has been added]

prEN 50736:2024 (E)

252 **3.1.12**
 253 **system**
 254 set of interrelated elements considered in a defined context as a whole and separated from their environment

255 [SOURCE: IEC 60050-351:2013, 351-42-08, modified – The Notes to entry have been omitted.]

256 **3.1.13**
 257 **test fixture**
 258 apparatus to fix the equipment on the test device during testing

259 [SOURCE: ISO 19594:2017, 3.7, modified – The terminological entry “specimen” has been replaced by
 260 “equipment”]

261 **3.1.14**
 262 **test requirements**
 263 prescriptions to be used during the tests

264 Note 1 to entry: These prescriptions are usually defined in generic or product standards. These prescriptions, that regulate
 265 the parameters not properly defined by the basic standards, are necessary to make the test effective to ensure that the
 266 specified requirements are met.

267 Note 2 to entry: e.g. the duration of the dry heat test has to be 10 h.

268 **3.1.15**
 269 **test procedure**
 270 set of instructions in order to obtain a test result

271 Note 1 to entry: Test procedures are usually defined in basic standards (e.g. the test procedures for dry heat test are
 272 described in EN 60068-2-2:2007)

273 **3.1.16**
 274 **type test**
 275 conformity test made on one or more items representative of the production.

276 [SOURCE: IEC 60050-581:2008, 581-21-08]

3.2 Symbols and abbreviations

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

AC	Alternating Current
ASD	Acceleration Spectral Density
DC	Direct Current
EMC	Electro Magnetic Compatibility
EUT	Equipment Under Test
PBA	Printed Board Assembly
PCB	Printed Circuit Board
SPD	Surge Protection Device

4 Relation between environmental conditions and test requirements

280 The following clause define the relation between environmental conditions and the test requirements for type
 281 test.

282 Informative Annex A is added for a better understanding of the document. It shows the analysis of the
283 environmental conditions defined in EN 50125-3:2003 and their influence on the functioning of the EUT, and
284 also the relation with the test requirements for type tests defined in this document.

285 Table 1 shows the relationship between the environmental conditions considered by EN 50125-3:2003, the
286 preparatory and additional information reported in Annex A, and the test requirements defined in this document.
287 The structure of Table 1, and also of the informative Annex A, has been deliberately left the same as
288 EN 50125-3:2003, to allow a better readability of the document, even if for some environmental conditions no
289 test requirements have been defined.

290

Table 1 — List of environmental conditions and related test requirements

Environmental condition	Subclause in EN 50125-3:2003	Preparatory and additional information in Annex A	Test requirements subclause in this document
Pressure	4.2	A.2	5.2 Insulation tests
Temperature	4.3	A.3	5.3 Temperature tests
Humidity	4.4	A.4	5.4 Humidity test
Wind	4.5	A.5	No test requirements defined in this document
Rain	4.6	A.6	5.4 Humidity test 5.8 Test for protection against water ingress
Snow and Hail	4.7	A.7	5.4 Humidity test 5.11 Test for protection against external mechanical impacts
Ice	4.8	A.8	5.4 Humidity test
Solar Radiation	4.9	A.9	5.9 Solar radiation tests
Lightning	4.10	A.10	5.2 Insulation tests 5.7 Surge test
Pollution	4.11	A.11	5.2 Insulation tests 5.10 Test for protection against dust and sand ingress 5.11 Test for protection against external mechanical impacts
Fire Protection	4.12	A.11	No test requirements defined in this document
Vibrations and Shocks	4.13	A.13	5.5 Vibration and shock tests
Electromagnetic compatibility	4.14	A.14	5.6 Electromagnetic compatibility tests
Power supplies	4.15	A.15	No test requirements defined in this document

291 As previously explained, Table 1 relates each environmental condition with the relevant tests requirements
292 defined in this document; this is to allow to the user of this document, considering the environmental conditions
293 to be taken into account, to identify which tests shall be performed to the equipment. Due to this approach and
294 the structure of the Table 1, some test requirements have been repeated on several rows, because the tested
295 characteristics are related to different environmental conditions.

296 To directly identify which tests shall be performed on an equipment for a complete execution of the type tests,
297 in order to take into account all environmental conditions stated in EN 50125-3:2003 for which test requirements
298 have been defined in this document, informative Annex D provides a guide.

prEN 50736:2024 (E)**5 Test requirements for type test****5.1 General test requirements****5.1.1 Test levels**

EN 50125-3:2003 specifies the environmental conditions, with the related severity of environmental parameters, encountered within Europe for railway signalling and telecommunication trackside equipment.

The test levels defined in this document are derived from the severity of the environmental parameters defined in EN 50125-3:2003.

5.1.2 Standard atmospheric conditions

As defined in EN 60068-1:2014, 4.3, the standard range of atmospheric conditions for carrying out measurements and tests are (inclusive values):

Temperature:	15 °C to 35 °C
Relative humidity:	from 25 % to 75 %
Air pressure:	86 kPa to 106 kPa

These standard atmospheric conditions shall be maintained during the execution of all tests defined in this document, unless specifically defined in the respective basic standard. If it is impracticable to carry out measurements in standard atmospheric conditions, a note stating the actual conditions shall be added to the test report.

5.1.3 Performance criteria**5.1.3.1 General**

The expected performance (i.e. the equipment is functioning as specified), from the equipment under test, shall be specified for all operational conditions.

No damage to any connected equipment is allowed when the equipment does not operate as intended during or after the test.

5.1.3.2 Performance criterion A

The EUT shall continue to operate as intended. No change of operational state is allowed. No loss or unintentional change in stored data shall occur.

5.1.3.3 Performance criterion B

Degradation of the performance below the level described in criterion A is permitted, provided the EUT self-recovers to the condition established prior to the application of the test. No loss of stored data is allowed.

5.1.3.4 Performance criterion C

Degradation of performance as described in criteria A and B is permitted provided that the EUT self-recovers to the condition established prior to the application of the test within a maximum defined time, or can be restored after the test by the operator.

5.1.4 Visual Inspection

The visual inspection verifies the mechanical, dimensional and appearance conformance of the equipment, considering the drawings and requirements defined by the manufacturer in its specifications.