SLOVENSKI STANDARD
oSIST prEN 50155:2019

01-april-2019

Železniške naprave - Vozna sredstva - Elektronska oprema

Railway applications - Rolling stock - Electronic equipment

Bahnanwendungen - Elektronische Einrichtungen auf Schienenfahrzeugen

Applications ferroviaires - Équipements électroniques utilisés sur le matériel roulant

Ta slovenski standard je istoveten z: **prEN 50155**

ICS:

45.060.01	Železniška vozila na splošno	Railway rolling stock in general

oSIST prEN 50155:2019 **en,fr,de**

EUROPEAN STANDARD

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EUROPÄISCHE NORM

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prEN 50155

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ICS 45.060.01

Will supersede EN 50155:2017

English Version

Railway applications - Rolling stock - Electronic equipment

Applications ferroviaires - Équipements électroniques utilisés sur le matériel roulant

Bahnanwendungen - Elektronische Einrichtungen auf Schienenfahrzeugen

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2019-05-17.

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

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.

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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

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European foreword

This document (prEN 50155:2018) has been prepared by CLC/SC 9XB, “Electrical, electronic and electromechanical material on-board rolling stock, including associated software”.

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2018-04-13
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2020-10-13

This document will supersede EN 50155:2017.

prEN 50155:2019 includes the following significant technical changes with respect to EN 50155:2017:

a) editorial revision of clause 1: scope

b) revision of clause 2: normative references

c) revision of clause 3: terms, definitions and abbreviations, with reorganisation of subclauses

d) improvement of clause 4: general requirements, in terms of better wording, requirement expansion and reorganisation of subclauses

e) improvement of clause 5: electrical service conditions, with reorganisation of subclauses

f) improvement of clause 6: reliability, maintainability and expected useful life, with reorganization of subclauses and introduction of explicative figures

g) improvement of clause 7: design

h) revision of clause 8: Electronic equipment not designed for use on rolling stock application

i) improvement of clause 9: components

j) improvement of clause 10: construction

k) revision of clause 11: safety

l) improvement of clause 12: documentation

m) improvement of clause 13: testing, text improvement with a particular attention to table “List of tests” and introduction of explaining figures

n) improvement of the following informative Annexes:

   1) Annex A - List of default requirements of EN 50155 and related clauses

   2) Annex B - Testing approach

   3) Annex C - Severity of the service conditions in different rolling stock locations

   4) Annex D - Example of test report compliance summary

5) Annex E - Life cycle model examples

6) Annex F - Design guidelines for electronic hardware used on-board of rolling stock

7) Annex G - Electronic equipment not designed for use on rolling stock application

8) Annex H – Paragraphs with agreement with the involved parties

9) Renaming Annex ZA to Annex ZZ and improvement

o) introduction of the following informative Annexes:

1) Annex I – Electronic equipment supplied from AC system power supply

2) Annex J – Typical datasheet content

3) Annex K – Insulation test and testing matrix example

p) Bibliography (extended and corrected)

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

For the relationship with EU Directive 2008/57/EC amended by Commission Directive 2011/18/EU, see informative Annex ZZ, which is an integral part of this document.

Introduction

This standard applies to design, manufacturing, testing of any electronic equipment installed on-board of rolling stock.

It also describes the electrical and environmental operating conditions.

There are not correlations between the operating temperature classes listed in Table 1 and the air temperature classes listed in EN 50125-1:2014, Table 2.

The aim of this standard is not to be a detailed guideline for the design of the electronic equipment; the design is made under the responsibility of the supplier. The supplier should take into account the requirements resulting from the specific location of the on-board installation (see Annex C).

This standard contains the design, the documentation and the testing requirements.

The roles of user and/or supplier are shown in Figure 1 below.

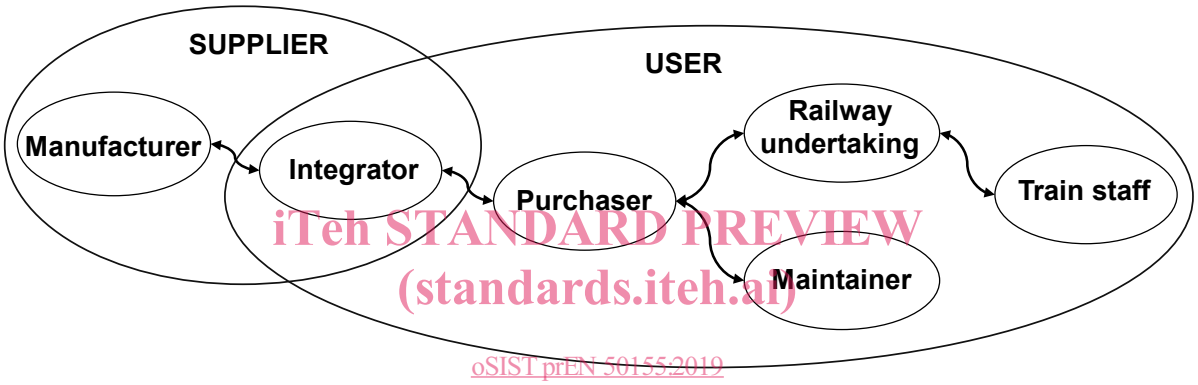

Figure 1 — Roles and relationship of user and/or supplier

1 Scope

This document applies to all electronic equipment for control, regulation, protection, diagnostic, energy supply, etc. installed on rail vehicles.

For the purpose of this document, electronic equipment is defined as equipment mainly composed of semiconductor devices and recognized associated components. These components are mainly mounted on printed circuit boards.

Sensors (e.g. current, voltage, speed) and semiconductor drive units for power electronic devices are covered by this standard. Complete semiconductor drive units and power converters are covered by EN 61287-1.

This document covers the conditions of operation, design requirements, documentation, and testing of electronic equipment, as well as basic hardware and software requirements considered necessary for compliant and reliable equipment.

Specific requirements related to practices necessary to ensure defined levels of functional safety will be determined in accordance with relevant railway safety standards.

The software requirements for on-board railway equipment are specified by EN 50657.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 45545 (series), *Railway applications — Fire protection on railway vehicles*

EN 45545-2, *Railway applications — Fire protection on railway vehicles — Part 2: Requirements for fire behaviour of materials and components*

EN 50121-3-2, *Railway applications — Electromagnetic compatibility — Part 3-2: Rolling stock - Apparatus*

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

EN 50125-1:2014, *Railway applications — Environmental conditions for equipment — Part 1: Rolling stock and on-board equipment*

EN 50126-1, *Railway Applications — The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS) — Part 1: Generic RAMS Process*

EN 50153, *Railway applications — Rolling stock — Protective provisions relating to electrical hazards*

EN 50163, *Railway applications — Supply voltages of traction systems*

EN 50657, *Railway applications — Rolling stock applications — Software on board of rolling stock*

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

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

EN 60068-2-11:1999, *Environmental testing — Part 2: Tests — Test Ka: Salt mist*

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

EN 60297 (series), *Mechanical structures for electrical and electronic equipment — Dimensions of mechanical structures of the 482,6 mm (19 in) series*

EN 60352-1, *Solderless connections — Part 1: Wrapped connections — General requirements, test methods and practical guidance*

EN 60352-2, *Solderless connections — Part 2: Crimped connections — General requirements, test methods and practical guidance*

EN 60529, *Degrees of protection provided by enclosures (IP Code)*

EN 61249-2-7: *Materials for printed boards and other interconnecting structures — Part 2-7: Reinforced base materials, clad and unclad — Epoxide woven E-glass laminated sheet of defined flammability (vertical burning test), copper-clad*

EN 61249-2-22, *Materials for printed boards and other interconnecting structures — Part 2-22: Reinforced base materials, clad and unclad — Modified non-halogenated epoxide woven E-glass laminated sheets of defined flammability (vertical burning test), copper-clad*

EN 61373:2010+AC:2017-09, *Railway applications — Rolling stock equipment — Shock and vibration tests*

EN 62326 (series), *Printed boards*

EN ISO 13732-1: *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces*

ISO/IEC 90003:2014, *Software engineering — Guidelines for the application of ISO 9001:2008 to computer software*

ISO/IEC/IEEE 15289:2017, *Systems and software engineering — Content of life-cycle information items (documentation)*

IPC-A-600, *Acceptability of Printed Boards*

IPC-A-610, *Acceptability of Electronic Assemblies*

IPC-2220 (series), *Family of Design Documents*

IPC-2221, *Generic Standard on Printed Board Design*

IPC-2222, *Sectional Design Standard for Rigid Organic Printed Boards*

IPC-2223, *Sectional Design Standard for Flexible Printed Boards*

IPC-4101, *Specification for Base Materials for Rigid and Multilayer Printed Boards*

IPC-7711/7721, *Rework, Modification and Repair of Electronic Assemblies*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

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

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
printed circuit board (PCB)
printed board
base material which is cut to size containing all required holes and incorporating at least one conductive layer.

Note 1 to entry: Printed circuit boards are typically subdivided according to:

- their structure (e.g. single and double sided, multilayers);
- the nature of the base material (e.g. rigid, flexible).

3.1.2
printed board assembly (PBA)
printed circuit board with electrical and mechanical components and/or other printed board assemblies attached to it with all manufacturing processes, soldering, coating, etc., completed

3.1.3
operating temperature
temperature range in which the electronic equipment is operating (e.g. cubicle temperature, rack temperature, roof box temperature) in full conformity with its performance criteria. Outside of the operating temperature range there can be temporary or permanent degradation of the equipment performances

3.1.4
plug-in unit
unit which plugs into a subrack and is supported by guides

Note 1 to entry: Plug-in units can be of various types, e.g. a PBA with or without enclosure designed with a plug-in connection to insert into a subrack.

[SOURCE: IEV ref 581-25-04, modified]

3.1.5
subrack
structural unit for housing PBA/PBAs and plug-in units

3.1.6
rack
free-standing or fixed structure for housing electrical and electronic equipment

[SOURCE: IEV ref 581-25-03]

3.1.7
enclosure
adequate housing for electrical and/or electronic equipment, provided by the equipment manufacturer to mount the equipment and to protect it from accidental damage, and occasionally from EMC or environmental effects.