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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 50155

February 2019

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.

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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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prEN 50155:2019 (E)230 **European foreword**

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

233 The following dates are fixed:

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have to be withdrawn

234 This document will supersede EN 50155:2017.

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

- 236 a) editorial revision of clause 1: scope
- 237 b) revision of clause 2: normative references
- 238 c) revision of clause 3: terms, definitions and abbreviations, with reorganisation of subclauses
- 239 d) improvement of clause 4: general requirements, in terms of better wording, requirement expansion
240 and reorganisation of subclauses
- 241 e) improvement of clause 5: electrical service conditions, with reorganisation of subclauses
- 242 f) improvement of clause 6: reliability, maintainability and expected useful life, with reorganization of
243 subclauses and introduction of explicative figures
- 244 g) improvement of clause 7: design
- 245 h) revision of clause 8: Electronic equipment not designed for use on rolling stock application
- 246 i) improvement of clause 9: components
- 247 j) improvement of clause 10: construction
- 248 k) revision of clause 11: safety
- 249 l) improvement of clause 12: documentation
- 250 m) improvement of clause 13: testing, text improvement with a particular attention to table “List of tests”
251 and introduction of explaining figures
- 252 n) improvement of the following informative Annexes:
- 253 1) Annex A - List of default requirements of EN 50155 and related clauses
- 254 2) Annex B - Testing approach
- 255 3) Annex C - Severity of the service conditions in different rolling stock locations
- 256 4) Annex D - Example of test report compliance summary

- 257 5) Annex E - Life cycle model examples
- 258 6) Annex F - Design guidelines for electronic hardware used on-board of rolling stock
- 259 7) Annex G - Electronic equipment not designed for use on rolling stock application
- 260 8) Annex H – Paragraphs with agreement with the involved parties
- 261 9) Renaming Annex ZA to Annex ZZ and improvement
- 262 o) introduction of the following informative Annexes:
- 263 1) Annex I – Electronic equipment supplied from AC system power supply
- 264 2) Annex J – Typical datasheet content
- 265 3) Annex K – Insulation test and testing matrix example
- 266 p) Bibliography (extended and corrected)

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

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

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ac3a5b19c2e7/osist-pren-50155-2019](https://standards.iteh.ai/catalog/standards/sist/0caae5f7-bbc0-44d1-a580-ac3a5b19c2e7/osist-pren-50155-2019)

prEN 50155:2019 (E)

271 **Introduction**

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

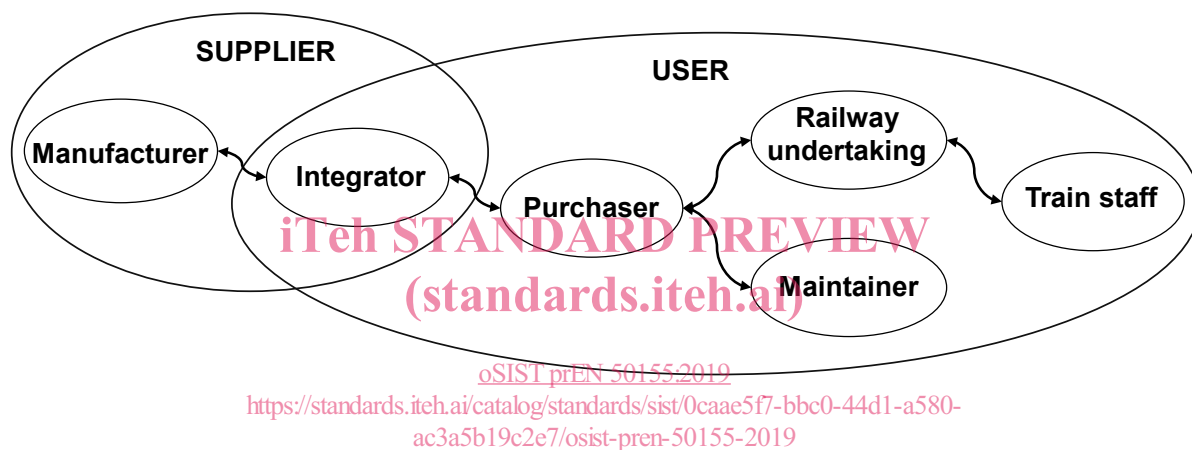
274 It also describes the electrical and environmental operating conditions.

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

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

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

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



282
283

284

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

285 1 Scope

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

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

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

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

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

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

300 2 Normative references

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

304 EN 45545 (series), *Railway applications — Fire protection on railway vehicles*

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

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

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

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

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

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

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

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

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

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

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

321 EN 60068-2-30: 2005, *Environmental testing — Part 2-30: Tests — Test Db: Damp heat, cyclic (12 h +*
322 *12 h cycle)*

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- 323 EN 60297 (series), *Mechanical structures for electrical and electronic equipment — Dimensions of*
324 *mechanical structures of the 482,6 mm (19 in) series*
- 325 EN 60352-1, *Solderless connections — Part 1: Wrapped connections — General requirements, test*
326 *methods and practical guidance*
- 327 EN 60352-2, *Solderless connections — Part 2: Crimped connections — General requirements, test*
328 *methods and practical guidance*
- 329 EN 60529, *Degrees of protection provided by enclosures (IP Code)*
- 330 EN 61249-2-7: *Materials for printed boards and other interconnecting structures — Part 2-7: Reinforced*
331 *base materials, clad and unclad — Epoxide woven E-glass laminated sheet of defined flammability*
332 *(vertical burning test), copper-clad*
- 333 EN 61249-2-22, *Materials for printed boards and other interconnecting structures — Part 2-22:*
334 *Reinforced base materials, clad and unclad — Modified non-halogenated epoxide woven E-glass*
335 *laminated sheets of defined flammability (vertical burning test), copper-clad*
- 336 EN 61373:2010+AC:2017-09, *Railway applications — Rolling stock equipment — Shock and vibration*
337 *tests*
- 338 EN 62326 (series), *Printed boards*
- 339 EN ISO 13732-1: *Ergonomics of the thermal environment — Methods for the assessment of human*
340 *responses to contact with surfaces — Part 1: Hot surfaces*
- 341 ISO/IEC 90003:2014, *Software engineering — Guidelines for the application of ISO 9001:2008 to*
342 *computer software*
- 343 ISO/IEC/IEEE 15289:2017, *Systems and software engineering — Content of life-cycle information items*
344 *(documentation)*
- 345 IPC-A-600, *Acceptability of Printed Boards*
- 346 IPC-A-610, *Acceptability of Electronic Assemblies*
- 347 IPC-2220 (series), *Family of Design Documents*
- 348 IPC-2221, *Generic Standard on Printed Board Design*
- 349 IPC-2222, *Sectional Design Standard for Rigid Organic Printed Boards*
- 350 IPC-2223, *Sectional Design Standard for Flexible Printed Boards*
- 351 IPC-4101, *Specification for Base Materials for Rigid and Multilayer Printed Boards*
- 352 IPC-7711/7721, *Rework, Modification and Repair of Electronic Assemblies*

353 **3 Terms, definitions and abbreviations**

354 **3.1 Terms and definitions**

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

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

- 357 • IEC Electropedia: available at <http://www.electropedia.org/>
- 358 • ISO Online browsing platform: available at <http://www.iso.org/obp>

359 **3.1.1**

360 **printed circuit board (PCB)**

361 **printed board**

362 base material which is cut to size containing all required holes and incorporating at least one conductive
363 layer.

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

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

367 **3.1.2**

368 **printed board assembly (PBA)**

369 printed circuit board with electrical and mechanical components and/or other printed board assemblies
370 attached to it with all manufacturing processes, soldering, coating, etc., completed

371 **3.1.3**

372 **operating temperature**

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

377 **3.1.4**

378 **plug-in unit**

379 unit which plugs into a subrack and is supported by guides

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

382 [SOURCE: IEC ref 581-25-04, modified]

383 **3.1.5**

384 **subrack**

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

386 **3.1.6**

387 **rack**

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

389 [SOURCE: IEC ref 581-25-03]

390 **3.1.7**

391 **enclosure**

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