

SLOVENSKI STANDARD
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**Železniške naprave - Združljivost voznih sredstev in sistemov za detekcijo vlaka -
1. del: Splošno**

Railway applications - Compatibility between rolling stock and train detection systems -
Part 1: General

Bahnanwendungen - Kompatibilität zwischen Fahrzeugen und Gleisfreimeldesystemen -
Teil 1: Allgemein

Applications ferroviaires - Compatibilité entre matériel roulant et systèmes de détection
de train - Partie 1 : Généralités

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45.060.10	Vlečna vozila	Tractive stock

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**Railway applications - Compatibility between rolling stock and
train detection systems - Part 1: General**

Applications ferroviaires - Compatibilité entre matériel
roulant et systèmes de détection de train - Partie 1 :
Généralités

Bahnanwendungen - Kompatibilität zwischen Fahrzeugen
und Gleisfreimeldesystemen - Teil 1: Allgemein

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2017-09-22.

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.

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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: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (prEN 50238-1:2017) has been prepared by CLC/SC 9XA "Communication, signalling and processing systems" of CLC/TCTC 9X "Electrical and electronic applications for railways".

This document is currently submitted to the Enquiry.

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)

This document will supersede EN 50238-1:2003.

This European Standard was prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and supports the essential requirements of Directive 2008/57/EC.

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

The significant technical changes with respect to EN 50238-1:2003 are listed below:

— Generic compatibility process to be followed irrespective of whether the trigger is a change to the signalling system, rolling stock or the power system:

- 1) generic Compatibility Process, which is broken into:
 - two stage process for assessing compatibility under Interoperability Régulations;
 - single stage process for light rail and metro type railways;
- 2) rules for characterisation of interface between train and train detection systems;
- 3) rules for characterisation of Rolling Stock;
- 4) rules for characterisation of the Power System;
- 5) references are provided to established CENELEC standards for compatibility;
- 6) terminology is updated and made consistent with Interoperability Régulations.

This European Standard is intended to be read in conjunction with the EN 50121 series.

Annexes designated "informative" are given for information only.

In this standard Annexes A, B, C and D are informative.

Introduction

This European Standard defines a process to obtain the assurance that specific rolling stock operating on a specific route does not interfere with train detection systems installed on this route.

Compatibility problems between train detection systems and rolling stock are a significant obstacle to cross-acceptance of rolling stock in Europe and to a degree, still an open point for assessment under the Interoperability Directive. Unfortunately it is not possible to fully define general rules for the maximum levels of interference allowed, which are valid for every country. This is due to the great diversity of rolling stock, power supply and return current systems, and train detection systems installed in Europe. This diversity leads to consideration of compatibility of rolling stock and train detection systems on a 'route by route' or "network by network" basis, to avoid unnecessarily restrictive specifications.

The compatibility process described in this standard is generic, although reference to published limits in TS50238-parts two and three and ERA/ERTMS/033281 Frequency Management (FrM) rules are made, if applicable.

The process refers to all types of TDS (not only axle counters and track circuits), which may be influenced by electromagnetic emissions.

Compatibility is determined by both physical and electromagnetic considerations. With regard to EMC, the need is not for general values for maximum levels of interference permitted, but for convenient methods by which to specify the level of interference allowed for operation on specific routes.

Main interference sources are considered to be:

- rail currents and voltage sources;
- electromagnetic fields;
- differential voltage between adjacent axles of the train;

as shown in Figure 1. It should be noted that interference sources may affect any railway equipment – trainborne or trackside.

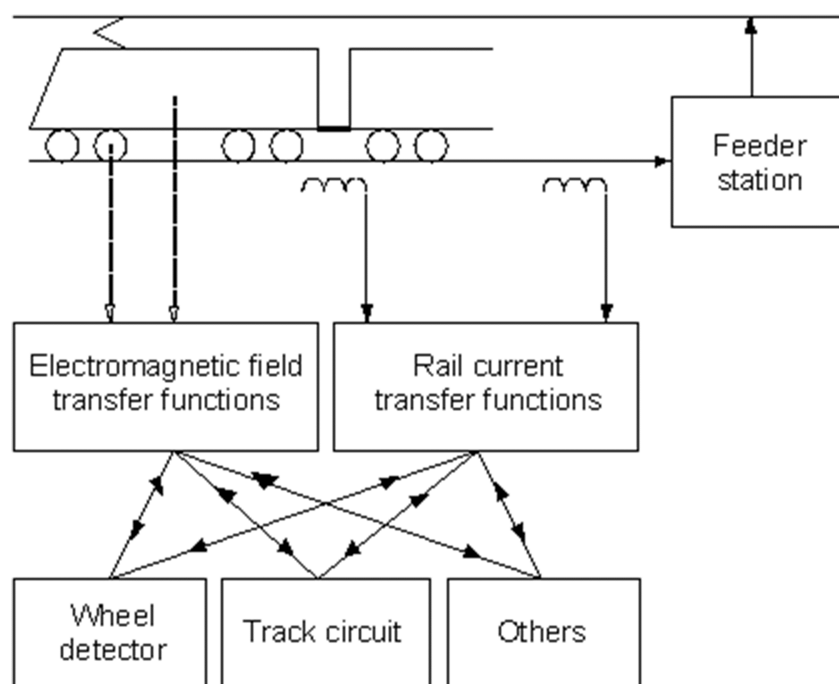


Figure 1 — Sources of electromagnetic interference

177 In practice, the susceptibility of the system is determined by:

- 178 — the sensitivity of individual components of the system and the type of interference it is susceptible to;
- 179 — the application of the components, i.e. the configuration of the system.

180 Therefore the problems concerning TDS are considered separately for each type.

- 181 • TS50238-2 defines compatibility limits for track circuits;
- 182 • TS50238-3 defines compatibility limits for axle counters and wheel detectors;
- 183 • Compatibility with other types of wheel detectors (mechanical or magnetic) is described in 5.4;
- 184 • Compatibility with loops can be established following the guidance in 5.5;
- 185 • Compatibility with any other type of TDS not explicitly covered by this standard can also be
186 established following the generic process in this standard;
- 187 • ERA/ERTMS/033281 defines – in relation with TSI - compatibility requirements and (partly) limits for
188 axle counters, wheel sensors, loops and track circuits.

189 For determining the susceptibility of signalling systems, laboratory/simulation testing methods and *in situ*
190 tests on the “real railway” are proposed. Modelling enables worst-case conditions to be simulated. In
191 addition, particular test sites are selected because, from experience, they are known to provide the test
192 evidence required.

193 Then, taking account of the experience of the railways, it is possible to establish a general method for
194 determining the susceptibility of train detection systems, described in this European Standard. General
195 requirements how to establish immunity have been defined in EN 50617-1 and EN 50617-2.

196 Before assessing the electromagnetic emissions of rolling stock, sufficient knowledge of the electric circuit
197 diagram of the power equipment is required, including switching frequencies of on-board power
198 converters, type of regulation used for power converters, resonant frequency of each filter, operating
199 limits under high and low supply voltages, degraded modes of operation etc.

1 Scope

This European Standard describes a process to demonstrate compatibility between Rolling Stock (RST) and Train Detection Systems (TDS) for specific routes. It references the methods of measurement of interference currents and magnetic fields, the methods of measurement of the susceptibility of train detection systems and the characterization of traction power supplies. The process described in this standard is equally applicable to mainline, lightrail and metro type railways.

The basic parameters of compatibility for mainline railways are covered by the ERA Interface document (ERA/ERTMS/033281).

It should be noted that the demonstration of compatibility between the rolling stock and infrastructure with respect to physical dimensions is not detailed in this standard.

Under the Interoperability Directive, two stages of compatibility are defined. The first stage is for authorization for putting into service against generic limits, and the second stage - for putting into use, when specific limits for compatibility with TDS are addressed which are outside the general limits or non interoperable TDS are installed on the line over which the RST will run.

Compatibility requirements for non-mainline or isolated light rail/metro type lines are addressed in one stage of authorization.

This European Standard is not generally applicable to those combinations of rolling stock, traction power supply and train detection system which were accepted as compatible prior to the issue of this European Standard. However, as far as is reasonably practicable, this European Standard may be applied to modifications of rolling stock, traction power supply or train detection systems which may affect compatibility.

2 Normative references

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

EN 50617-1, *Railway applications - Technical parameters of train detection systems for the interoperability of the trans-European railway system - Part 1: Track circuits*

EN 50617-2, *Railway Applications - Technical parameters of train detection systems for the interoperability of the trans-European railway system - Part 2: Axle counters*

EN 50121-5, *Railway applications - Electromagnetic compatibility - Part 5: Emission and immunity of fixed power supply installations and apparatus*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1

competent body

body responsible for the independent evaluation of the compatibility case

Note 1 to entry: This can be an accredited body (NoBo/DeBo/AsBo) or an Independent Safety Assessor. This role is not limited to external parties, unless mandated under the applicable legislation.

239 **3.1.2**
 240 **compatibility case**
 241 suite of documents which records the evidence demonstrating the degree of compatibility between rolling
 242 stock, traction power supplies and train detection systems for a specific route or specific railway network

243 **3.1.3**
 244 **Authorisation Body**
 245 body responsible for autorisation to allow the new or modified systems to be put into service/use

246 Note 1 to entry: This may be subject to conditions/limitations.

247 **3.1.4**
 248 **degraded mode**
 249 mode of operation in the presence of faults which have been anticipated in the design of the rolling stock.,
 250 that will normally allow the rolling stock to complete its journey

251 **3.1.5**
 252 **Frequency Management**
 253 The frequency management defines the maximum permissible levels of RST electromagnetic emissions,
 254 with respect to frequencies, duration and parameters for evaluation

255 **3.1.6**
 256 **Infrastructure Manager**
 257 body responsible for the asset management of the infrastructure

258 **3.1.7**
 259 **rolling stock operator**
 260 body responsible for the operation and maintenance of the rolling stock

261 **3.1.8**
 262 **wheel detector**
 263 sensor which detects the passage of a wheel. It may be used as part of an axle counter system or as a
 264 treadle

265 **3.2 Abbreviations**

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

FrM Frequency Management

IM Infrastructure Manager

NTR National Technical Rule

RINF Register of Infrastructure

RSF Right Side Failure

RST Rolling Stock

TDS Train Detection System

WSF Wrong side failure

267 **4 Compatibility process**

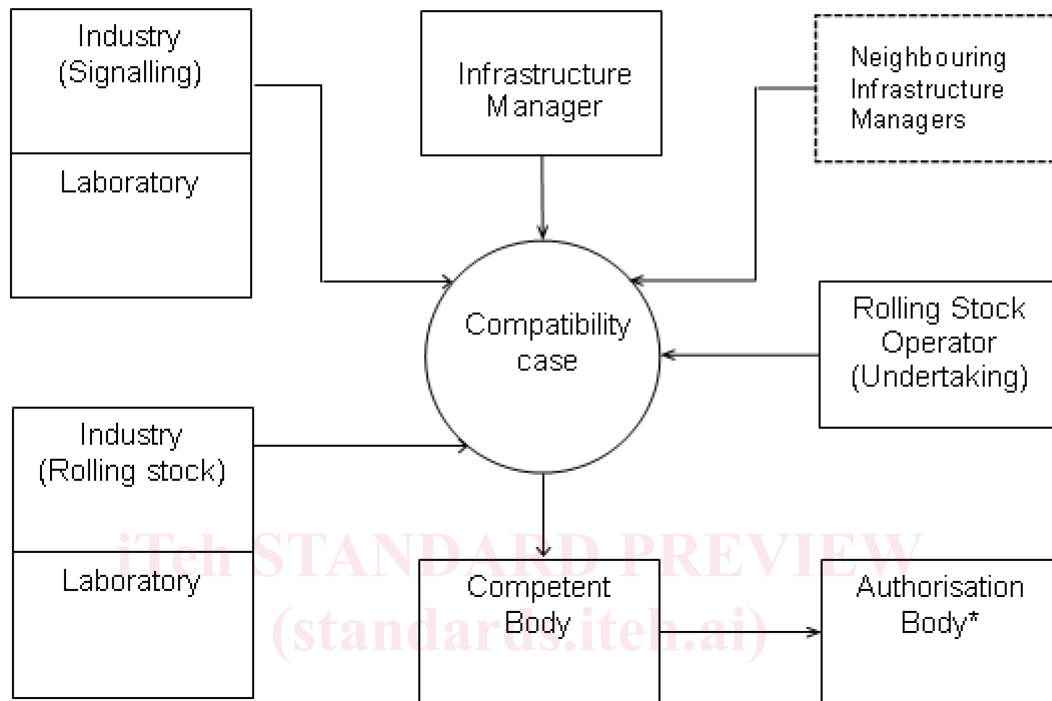
268 **4.1 General**

269 In the following flowdiagram, the compatibility process is described by explaining the role of the parties
 270 involved and the processes performed by these parties. The result of the compatibility process can be an
 271 acceptance certificate.

Under Interoperability, the Authorization Body issues a letter of authorization, based on evidence presented in the Technical File (or Files). The Infrastructure Manager is consulted and their agreement is documented, as part of the evidence presented.

4.2 Overview

The parties concerned in the compatibility process are shown in Figure 2:



*Specific arrangements may exist for local transport authorities

Figure 2 — Parties involved in the compatibility process

The party which introduces a new element or introduces a change of an existing element or system is responsible for demonstrating compatibility between rolling stock, train detection, traction power supply systems and neighbouring infrastructure, if applicable. The party is responsible for initiating the compatibility process. The relevant data shall be made available to the party responsible for constructing/amending the compatibility case. If data are not available or not sufficient, alternative arrangements can be made by both the responsible party and the affected party to demonstrate compatibility, for example by making specific compatibility tests. It is recommended that a competent body assesses the compatibility case if the modification is deemed a significant change. If applicable the compatibility case will be submitted to the Authorization Body, and shall be reviewed when any modification is carried out. Hereunder the specific tasks of the parties depicted in Figure 2 are listed and explained.

4.3 Roles and Responsibilities

4.3.1 Infrastructure Manager

In case of new or modified infrastructure the Infrastructure Manager is responsible for maintaining compatibility with the RST using the infrastructure and – as far as concerned - neighbouring infrastructures (e.g. other railways, power networks or utilities). For a defined route (the application of interest), the Infrastructure manager shall provide the relevant parameters of all train detection systems and the traction power supply systems, necessary for the compatibility case.

298 NOTE This information can be available from RINF (Register of Infrastructure), if one exists.

299 **4.3.2 Rolling Stock Operator/Undertaking**

300 The user/operator is responsible for maintaining compatibility over the full life cycle of the equipment. In
 301 case of new or modified rolling stock the (future) operator of the rolling stock is responsible. The rolling
 302 stock operator shall characterize the emissions which may be generated and propagated by the rolling
 303 stock. These emissions shall be in accordance with the specified infrastructure parameters for the
 304 considered route of operation. The emission levels may form part of the relevant entry in the Register of
 305 RST for this type of train.

306 NOTE The rolling stock operator may need to appoint the Rolling Stock manufacturer to characterize these
 307 emissions.

308 **4.3.3 Competent Body**

309 The Competent Body receives the compatibility case from the responsible party and will assess the
 310 credibility of the compatibility argument against established parameters (e.g. limits declared in the RINF
 311 or the Register of RST if applicable under the Interoperability Directive).

312 **4.3.4 Authorization Body**

313 The Authorization Body shall review the submitted documents and issue a letter of authorization or
 314 certificate of acceptance as applicable.

315 **4.4 Detailed compatibility process**

316 The compatibility process is summarized in Figure 3:

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<https://standards.iteh.ai/catalog/standards/sist/e1fc65c9-1413-4c83-9f58-71ca79c6734f/sist-en-50238-1-2021>