
Železniške naprave – Združljivost voznih sredstev in sistemov za detekcijo vlaka

Railway applications - Compatibility between rolling stock and train detection systems

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 50238:2003](https://standards.iteh.ai/catalog/standards/sist/f483480c-4fe0-4ccd-8f2a-121bda88cdca/sist-en-50238-2003)
<https://standards.iteh.ai/catalog/standards/sist/f483480c-4fe0-4ccd-8f2a-121bda88cdca/sist-en-50238-2003>

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

SIST EN 50238:2003

<https://standards.iteh.ai/catalog/standards/sist/f483480c-4fe0-4ccd-8f2a-121bda88cdca/sist-en-50238-2003>

EUROPEAN STANDARD

EN 50238

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2003

ICS 29.180; 45.060.10

English version

Railway applications – Compatibility between rolling stock and train detection systems

Applications ferroviaires –
Compatibilité entre matériel roulant
et systèmes de détection de train

Bahnanwendungen –
Kompatibilität zwischen Fahrzeugen
und Gleisfreimeldesystemen

iTeh STANDARD PREVIEW

(standards.iteh.ai)

This European Standard was approved by CENELEC on 2002-12-01. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This European Standard was prepared by SC 9XA, Communication, signalling and processing systems, of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50238 on 2002-12-01.

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 96/48/EC.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2003-12-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2005-12-01

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

ITEH STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 50238:2003
<https://standards.iteh.ai/catalog/standards/sist/f483480c-4fe0-4ccd-8f2a-121bda88cdca/sist-en-50238-2003>

Contents

	Page
Introduction	5
1 Scope	5
2 Normative references	7
3 Definitions	7
4 Acceptance process	8
4.1 Overview	8
4.2 Responsibilities	9
4.3 Acceptance process	9
4.4 Compatibility case	11
4.5 Quality management	11
4.6 Route identification	11
4.7 Characterisation	11
4.8 Tests	12
4.9 Compatibility analysis	12
4.10 Certificate of acceptance	13
5 Characterisation of train detection systems	13
5.1 Objective of procedure	13
5.2 Physical compatibility	13
5.3 Electromagnetic compatibility	14
5.4 Factor of safety	17
5.5 Track circuit susceptibility	17
5.6 Wheel detector susceptibility	17
5.7 Train detection system gabarit	18
5.8 Interference signal generated by rolling stock and substations	18
5.9 Test report	19
6 Characterisation of rolling stock	20
6.1 Objectives of procedure	20
6.2 Description of rolling stock and factors affecting its characteristics	20
6.3 Configuration (design status)	20
6.4 Test plan	20
6.5 Test report	22
6.6 Archive of test results	22
7 Characterisation of traction power supply systems	22
7.1 Objective	22
7.2 D.C. traction power supplies	23
7.3 A.C. traction power supplies	23

Annex A (informative) Guidelines for the determination of susceptibility of train detection systems	24
Annex B (informative) Guidelines for the measurement of rolling stock characteristics	32
Annex C (informative) Factors affecting rolling stock characteristics	34
Annex D (informative) D.C. traction power supplies	35
Figure 1 – Sources of electromagnetic interference	4
Figure 2 – The parties concerned in the acceptance process	8
Figure 3 – The acceptance process	9
Figure 4 – Relationship between gabarit and permissible interference	11
Figure A.1 – Interference mechanism with rails intact	23
Figure A.2 – Interference mechanism with self-revealing broken rail	23
Figure A.3 – Interference mechanism with unrevealed broken rail	24
Figure A.4 – Double rail track circuit	25
Figure A.5 – Double rail track circuit with broken rail	25
Figure A.6 – Interference mechanism due to voltage between axles – Case 1	26
Figure A.7 – Interference mechanism due to voltage between axles – Case 2	26
Figure A.8 – Effect of inter-vehicle current	27
Figure A.9 – Equivalent circuit for previous figure	27
Figure A.10 – Example of radiated interference	28
Figure A.11 – Sensitive zone of wheel detector	29
Figure B.1 – Example of system for measurement of interference currents	31
Figure D.1 – Rolling stock with DC supply	35
Figure D.2 – Circulation of interference current generated by rolling stock	35
Figure D.3 – Circulation of interference current generated by the substation	35

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. Unfortunately it is not possible to establish general rules for the maximum levels of interference allowed, 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 the problem of compatibility of rolling stock and train detection systems for specific routes to avoid unnecessarily restrictive specifications.

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.

Interference may be caused by

- rail currents,
- electromagnetic fields,
- differential voltage between axles,

as shown in Figure 1:

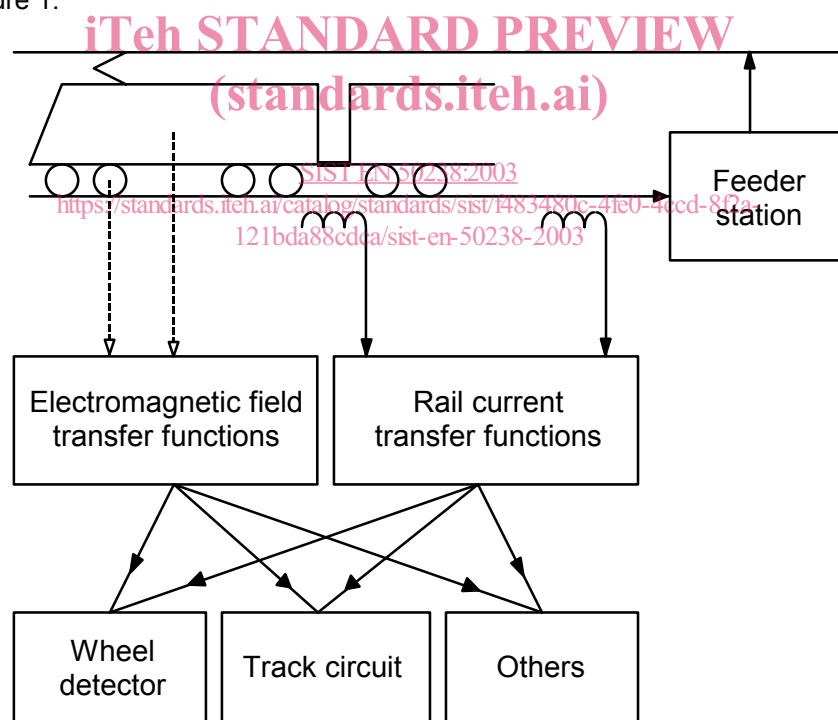


Figure 5 – Sources of electromagnetic interference

In practice, the susceptibility of the system is determined by

- the sensitivity of individual components of the system,
- the application of the components, i.e. the configuration of the system.

Therefore the problems concerning track circuits and axle counters or wheel detection systems will be looked at separately.

For determining the susceptibility of signalling systems, laboratory/simulation testing methods as well as methods to conduct tests on the “real railway” are proposed. Modelling enables worst-case conditions to be simulated. In addition, particular test sites are used because, from experience, they are known to provide the test evidence required. Then, taking account of the experience of the railways, it is possible to establish a general method for determining the susceptibility of train detection systems, described in this European Standard.

Before measuring the interference level on rolling stock, a sufficient knowledge of the electric circuit diagram of the power equipment is required, e.g. switching frequencies of on-board static converters, type of regulation used for power converters, resonant frequency of each filter, operating limits under high and low supply voltages, downgraded modes of operation etc.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 50238:2003

<https://standards.iteh.ai/catalog/standards/sist/f483480c-4fe0-4ccd-8f2a-121bda88cdca/sist-en-50238-2003>

1 Scope

The scope of this European Standard is to describe a procedure for mutual acceptance of rolling stock to run over specific routes. It describes the methods of measurement of interference currents, the methods of measurement of the susceptibility of train detection systems, the characterisation of traction power supplies and the procedure for acceptance. The result of the acceptance procedure is a structured justification document referred to as a “compatibility case”, which documents the evidence that the conditions for compatibility have been satisfied.

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.

The scope of the compatibility case is restricted to the demonstration of compatibility of rolling stock with a train detection system’s characterisation (e.g. gabarit). Radio based signalling systems are not within the scope of this European Standard.

2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 50121	Series	Railway applications – Electromagnetic compatibility
EN 50126		Railway applications – The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS)
EN 50163		Railway applications – Supply voltages of traction systems
EN/ISO 9001		Quality management systems – Requirements
EN ISO/IEC 17025		General requirements for the competence of testing and calibration laboratories
ORE B108/1		Unification of air-conditioning and electrical equipment in coaches
UIC 737-3		The application of thyristors in railway technology: Measures for the prevention of functional disturbances in signalling installations
UIC 550		Power supply installations for passenger stock

3 Definitions

For the purposes of this European Standard, the following definitions apply:

3.1

accepting body

the body responsible for the evaluation of the compatibility case and the issue of a certificate of acceptance

3.2**compatibility case**

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

3.3**certificate of acceptance**

written authorisation from the accepting body that the compatibility case is acceptable to allow the new or modified systems to enter service (This may be qualified)

3.4**degraded modes**

modes of operation in the presence of faults which have been anticipated in the design of the rolling stock. Degraded modes will normally allow the rolling stock to complete its journey

3.5**gabarit**

the maximum permissible levels of interference signal, with respect to frequencies and duration, to which a train detection system may be exposed

3.6**railway infrastructure authority**

the body responsible for the safety of the track and signalling systems

3.7**right side failure**

a failure of a signalling system which results in a more restrictive condition for the movement of traffic than is appropriate

3.8**rolling stock operator**

the body responsible for the operation and maintenance of the rolling stock

3.9**wheel detector**

a sensor which detects the passage of a wheel. It may be used as part of an axle counter system or as a treadle

3.10**wrong side failure**

a failure of a signalling system which results in a less restrictive condition for the movement of traffic than is appropriate

4 Acceptance process**4.1 Overview**

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

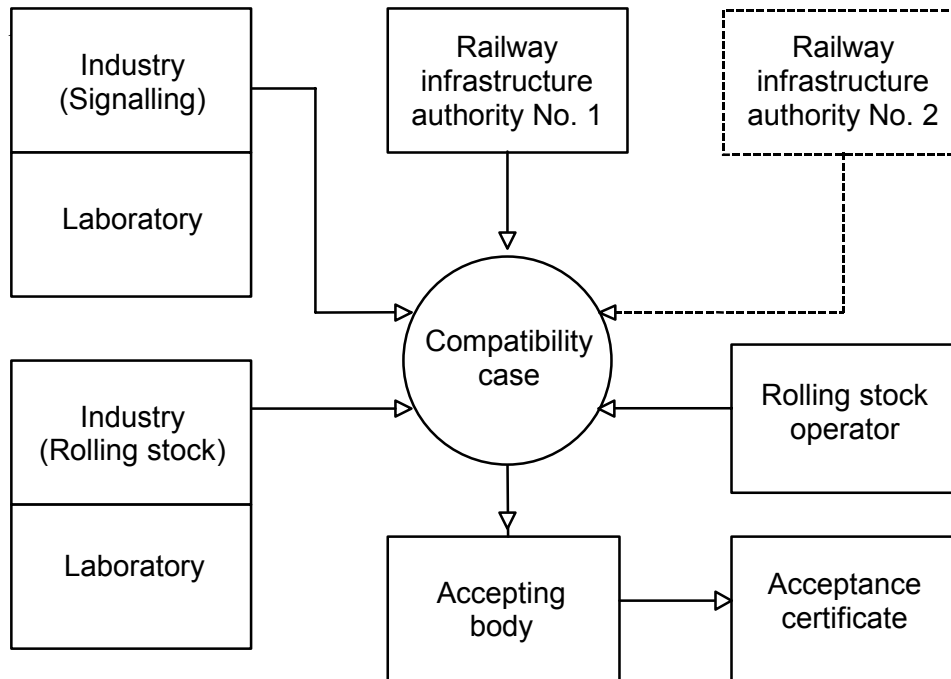


Figure 6 – The parties concerned in the acceptance process

iTeh STANDARD PREVIEW (standards.iteh.ai)

4.2 Responsibilities

The responsibility for demonstrating compatibility between rolling stock, train detection and traction power supply systems, and for maintaining it over the full life cycle of the equipment, is shared between those parties responsible for the particular railway infrastructure and the particular rolling stock. Specific responsibilities for a given compatibility case, including the party taking the lead role, shall be explicit. The documentation, in the form of a compatibility case, shall be submitted to an accepting body, and shall be reviewed when any modification is carried out.

4.2.1 Railway infrastructure authority

For a defined route (the application of interest), the railway infrastructure authority should characterise all train detection systems and the traction power supply system.

4.2.2 Rolling stock operator

The rolling stock operator should characterise the interference which may be generated and propagated by the rolling stock.

4.2.3 Accepting body

The accepting body shall review submitted documents and as a result issue a certificate of acceptance. As part of this process, the accepting body should ensure that the compatibility case is reviewed by experts who are qualified to assess and evaluate it.

4.3 Acceptance process

The acceptance process is summarised in Figure 3:

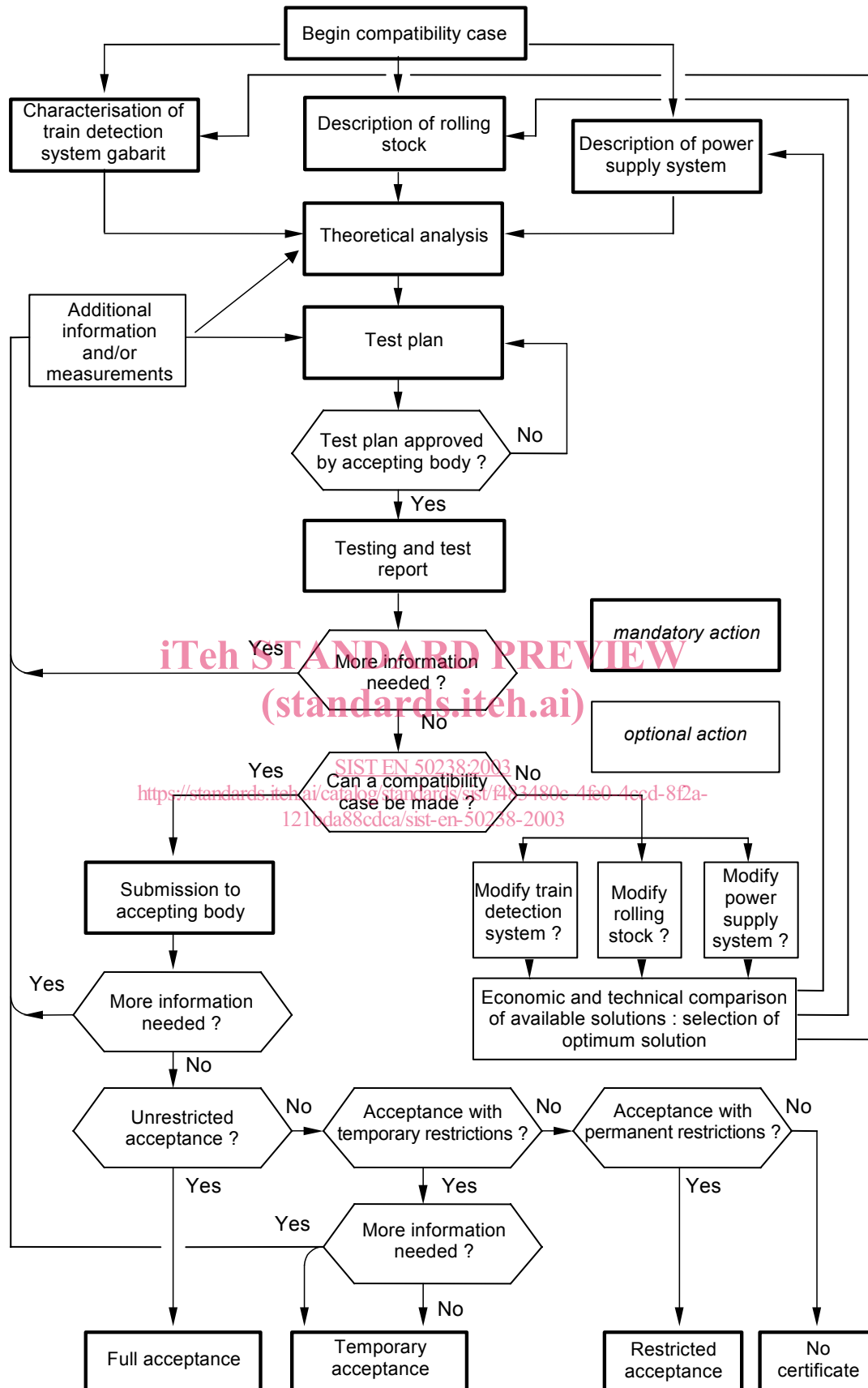


Figure 7 – The acceptance process