



SLOVENSKI STANDARD
SIST EN 50592:2017

01-april-2017

Železniške naprave - Preskušanje elektromagnetne združljivosti voznih sredstev s števci osi

Railway applications - Testing of rolling stock for electromagnetic compatibility with axle counters

Bahnanwendungen - Prüfung von Fahrzeugen auf elektromagnetische Verträglichkeit mit Achszählern

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Applications ferroviaires - Essais du matériel roulant pour la compatibilité électromagnétique avec les compteurs d'essieux

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45.060.01	Železniška vozila na splošno	Railway rolling stock in general

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Railway applications - Testing of rolling stock for electromagnetic compatibility with axle counters

Applications ferroviaires - Essais du matériel roulant pour la compatibilité électromagnétique avec les compteurs d'essieux

Bahnwendungen - Prüfung von Fahrzeugen auf elektromagnetische Verträglichkeit mit Achszählern

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

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EN 50592:2016 (E)**European foreword**

This document (EN 50592:2016) has been prepared by CLC/SC 9XB “Electromechanical material on board rolling stock” of CLC/TC 9X “Electrical and electronic applications for railways”.

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) 2017-07-22
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2019-07-22

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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 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.

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Introduction

This European Standard is being developed to permit compliance with the Railway Interoperability Directives. The vehicle test methodology presented in this European Standard is also applicable to the demonstration of compatibility with all types of axle counters which have established compatibility limits according to EN 50617-2.

Compliance with the limits for rolling stock is necessary for a reliable and safe operation of the railway system.

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EN 50592:2016 (E)**1 Scope**

This European Standard defines, for the purpose of ensuring compatibility between rolling stock and axle counter systems, the measurement and evaluation methods of rolling stock emissions to demonstrate compatibility. The established limits for compatibility are defined as magnetic field strength that can disturb the axle counter detectors, as part of the axle counter system.

In the relevant frequency range of the axle counter detectors the magnetic field is dominant and only this type of field is considered. Experience has shown that the effects of electric fields are insignificant and therefore not considered.

NOTE 1 For axle counters systems whose limits are not defined in terms of magnetic fields at a detector level, National Rules apply where they exist (for more details, see also 4.1).

NOTE 2 The influence from metal parts or inductively coupled resonant circuits on the vehicle, eddy current brakes or magnetic brakes is out of the scope of this EN. Compatibility is established through individual testing according to the EN 50238 series or National Notified Technical Rules.

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 50238-1, *Railway applications — Compatibility between rolling stock and train detection systems — Part 1: General*

CLC/TS 50238-2, *Railway applications — Compatibility between rolling stock and train detection systems — Part 2: Compatibility with track circuits*

CLC/TS 50238-3, *Railway applications — Compatibility between rolling stock and train detection systems — Part 3: Compatibility with axle counters*

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

CISPR 16-4-2, *Specification for radio disturbance and immunity measuring apparatus and methods — Part 4-2: Uncertainties, statistics and limit modelling — Measurement instrumentation uncertainty*

ERA/ERTMS/033281, *Interfaces between Control-Command and Signalling Trackside and Other Subsystems*

3 Terms, definitions and abbreviations**3.1 Terms and definitions**

For the purposes of this document, the terms, definitions and abbreviations given in EN 50238 (all parts) and the following apply.

3.1.1**axle counter detector**

detector consisting of the axle counter sensor and of the detection circuit, which includes in general filters and rectifiers

[SOURCE: EN 50617-2:2015, 3.1.2]

3.1.2**axle counter sensor**

sensor head mounted in the track

[SOURCE: EN 50617-2:2015, 3.1.3]

3.1.3

axle counter system

whole system, including the axle counter detector with its sensor and the evaluation unit

[SOURCE: EN 50617-2:2015, 3.1.4]

3.1.4

EMC plan

plan prepared during the rolling stock design which defines how to provide compliance with EMC requirements, including test evidence

3.1.5

European Train Control System

ETCS

signalling, control and train protection system utilizing balise transmission technology

3.1.6

in-band

working frequency area of an axle counter detector

[SOURCE: EN 50617-2:2015, 3.1.9]

3.1.7

influencing unit

IU

rolling stock influencing the train detection system

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Note 1 to entry: One influencing unit comprises all coupled/connected vehicles, e.g. a complete train with single or multiple traction, single vehicle/single wagon, multiple connected/coupled vehicles and wagons. For locos and coaches, if conditions in 4.2.3.1 are clarified, it is considered sufficient to test only one of them if only identical ones are used in one IU.

3.1.8

integration time

parameter for evaluation defined as the window size over which the root mean square (rms) of the output of the band-pass filter is calculated

[SOURCE: EN 50617-2:2015, 3.1.12]

3.1.9

measurement antenna

antenna, mounted on the rail to capture three dimensional magnetic field

Note 1 to entry: The measurement covers the axes X, Y and Z as follows:

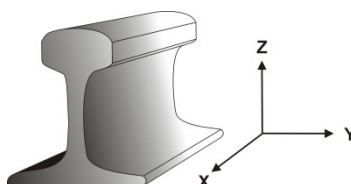


Figure 1 — Orientation of the coordinates

[SOURCE: EN 50617-2:2015, 3.1.13]

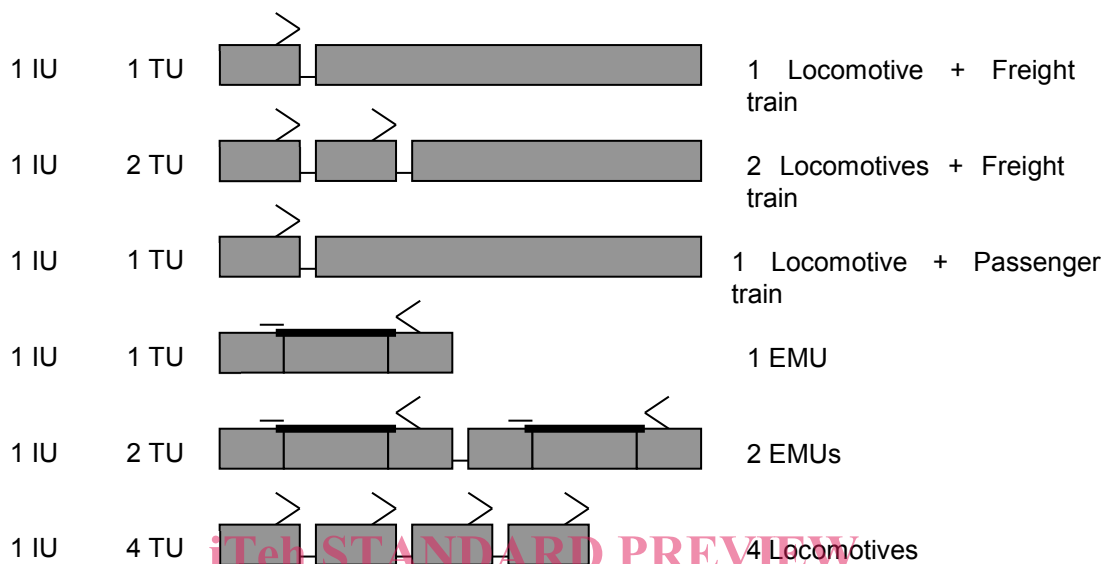
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3.1.10

traction unit

locomotive, motor coach or train unit

Note 1 to entry: For the purposes of this standard, the traction unit is defined as a subset of one locomotive, motor coach or train-unit.



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Figure 2 — Examples of IUs

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[SOURCE: IEC 60050-811: CDV2015, 811-02-04]
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3.1.11

 F_{start} **start frequency**

lowest frequency of the axle counter detector's operating band which also defines the centre frequency of the first of the series of band-pass filters for data processing

3.1.12

 F_{stop} **stop frequency**

highest frequency of the axle counter detector's operating band which also defines the centre frequency of the last of the series of band-pass filters for data processing

3.1.13

 V_{pp} **speed (velocity) power point**

transition point of the tractive effort from a linear to a hyperbolic function, which corresponds to the highest speed achieved by that force

3.2 Abbreviations

For the purposes of this document, the abbreviations given in EN 50238 (all parts) and the following apply.

4QC	Four Quadrant Converter
AC	Alternating current
A/D	Analogue to Digital converter

CCS	Control Command and Signalling
DC	Direct Current
EMC	Electromagnetic Compatibility
EMU	Electrical Multiple Unit
EUT	Equipment Under Test
ETCS	European Train Control System
FFT	Fast Fourier Transformation
HFR	Higher Frequency Range
IU	Influencing Unit
LFR	Lower Frequency Range
MA	Measurement Antenna
NNTR	Notified National Technical Rules
PWM	Pulse Width Modulation
rms	Root Mean Square
RST	Rolling Stock
Tint	Integration time
TSI	Technical Specification for Interoperability
TU	Traction Unit
VSWR	Voltage Standing Wave Ratio

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4 Measurement specification for vehicle emissions

4.1 Rolling stock emission limits

In the scope of interoperability, limits are defined in the TSI Interface document ERA/ERTMS/033281. Outside interoperability, individual limits are defined in CLC/TS 50238-3 or in NNTRs where these exist. In specific application cases outside the scope of Interoperability Regulations, limit values may be notified by the axle counter manufacturer, according to the process, defined in EN 50617-2. The RST under test shall be defined in the context of the definition for an influencing unit. The influencing unit shall be defined in an EMC Management Plan, depending on the sources of magnetic fields.

4.2 Methodology for the demonstration of vehicle compatibility

4.2.1 General approach

Measurements shall be performed using specified measurement antennas described in 4.2.2, under specified operational conditions of rolling stock. Compatibility tests of vehicles can be executed with any rail type. The influence of the type of rail on the measurement result is accounted for in the compatibility limits and the associated margin.

The train shall be tested under the electrification system(s) for which it is to be authorized. The methodology is also applicable to other type vehicles, as explained in 4.2.3.3.

Emissions caused by vehicles are measured as magnetic fields in X, Y and Z directions.

Ambient noise measurements shall be conducted before the tests.

If at specific frequencies or in specific frequency ranges the ambient noise is higher than the limit values less 6 dB, the measurements at these frequencies need not be considered provided there is clear evidence that the emissions are attributable to ambient sources. These frequencies shall be noted in the test report. If the ambient noise within the frequency bands in ERA/ERTMS/033281 or the individual limits in CLC/TS 50238-3