SLOVENSKI STANDARD
SIST EN 15437-1:2009+A1:2023

01-marec-2023

Železniške naprave - Nadzor ohišja ležajev kolesnih dvojic - Mesto meritev in zahteve pri načrtovanju - 1. del: Progovna oprema in ohišja ležajev železniških vozil (vključno z dopolnilom A1)

Railway applications - Axlebox condition monitoring - Interface and design requirements - Part 1: Track side equipment and rolling stock axlebox

Bahnanwendungen - Zustandsüberwachung von Radsatzlagern - Schnittstellen und Gestaltungsanforderungen - Teil 1: Heißläuferortungsanlagen und Radsatzlagergehäusegestaltung

Applications ferroviaires - Surveillances des boîtes d'essieux - Exigences liées aux interfaces - Partie 1: Équipements des voies et conception des boîtes d'essieu pour matériel roulant

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ICS:

45.040	Materiali in deli za železniško tehniko	Materials and components for railway engineering

SIST EN 15437-1:2009+A1:2023 **en,fr,de**

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English Version

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EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 15437-1:2009+A1:2022) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2023, and conflicting national standards shall be withdrawn at the latest by June 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document includes Amendment 1 approved by CEN on 21 November 2022.

This document will supersede EN 15437-1:2009.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟨A1⟩ ⟨A1⟩.

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

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

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Introduction

Failed axle bearings on rolling stock create a hazard to the safe operation of the railway. If an axle bearing fails whilst rolling stock is in-service there is the potential for a catastrophic event. A catastrophic event may result in fatalities, severe damage to rolling stock and/or the infrastructure and a risk that rolling stock may derail and/or a fire may develop.

One indication that a bearing is about to fail is a rise in the heat generated by the bearing. Bearings that are about to fail may therefore be detected by monitoring their temperature to identify an unacceptable rise.

World-wide experience shows that one way of managing the risk is by installing trackside Hot AxleBox Detectors (HABDs) to monitor the in-service temperature of rolling stock axleboxes.

The sensors of a trackside HABD measure the thermal radiation emitted from the axleboxes of in-service rolling stock. The level of thermal radiation is influenced by the emmissivity of the axlebox surface, which is influenced by the material, design, surface finish and operational conditions (dust, rain, etc). Even though operational conditions are continually changing the surface emmissivity of the axlebox, long term experience indicates that such changing conditions can be tolerated.

This part of EN 15437 covers the monitoring of axlebox temperature by trackside HABD. It was developed by Working Group 35 "Hot Box Detection" of CEN Technical Committee 256 Railway Applications. It defines the minimum requirements for the interface between a trackside HABD and rolling stock, to ensure that the system works. It is important to note that Clause 1, Scope, sets out the minimum requirements for the interface.

The requirements set out in this document are based on long term existing rules, practices and procedures developed and currently in use by European member railway undertaking's (RUs) and infrastructure managers (IMs).

The following principles have been applied:

a) The railway system requires technical rules in order to ensure an acceptable interface between rolling stock and trackside HABD.

b) In view of the increasing significance of international traffic, the standardisation of this interface is required.

c) It is of particular importance that the existing level of safety and reliability is not compromised.

d) The Cartesian co-ordinate system is used to define dimensions and positions, that is X is longitudinal, Y is lateral and Z is vertical.

Some rolling stock, according to their performance or design, is fitted with on-board equipment to monitor axle bearings for potential overheating. However, in most cases, axle bearings continue to be monitored by trackside Hot Axle Bearing Detectors which is the subject of this standard.

〈A1〉 EN 15437-2:2012+A1:2022 covers on-board temperature monitoring of axle bearings. 〈A1〉

Alternative technology is available, or being developed, to monitor the condition of axle bearings, using vibration sensors, thermocouples, etc. and may in the future be addressed by additional parts to this standard.

1 Scope

This part of EN 15437 defines the minimum characteristics for the interface between a trackside Hot Axlebox Detector (HABD) and Rolling Stock (RST) that comply with the European Directives for Interoperability to ensure that the minimum functional requirement of the interface is achieved.

The minimum requirements of the interface apply to:

a) Rolling stock conforming to standard European railway gauge, that is 1 435 mm;

b) Rolling stock axles fitted with outboard bearings;

NOTE 1 The design of rolling stock axles fitted with inboard bearings should respect the requirements set out in Note 2 of 5.2.

c) [A1] Rolling stock with a maximum design speed lower than 250 km/h [A1];

[A1] *deleted text* [A1]

NOTE 2 Interoperable rolling stock [A1] with a maximum design speed higher than or equal to 250 km/h [A1] are mandated to have on-board equipment for axlebox condition monitoring. The requirements for on-board equipment are described in [A1] EN 15437-2:2012+A1:2022 [A1].

NOTE 3 Interoperable rolling stock [A1] with a maximum design speed higher than or equal to 250 km/h [A1] are outside the scope of this Part of the standard. However, if [A1] such rolling stock [A1] are required to be monitored by HABDs their target area should comply with the requirements specified in this standard, except where stated otherwise.

d) [A1] Trackside HABDs that are required to monitor rolling stock with a maximum design speed higher than or equal to 250 km/h [A1].

The rolling stock requirements of the interface are described in Clause 5 and for the HABD requirements of the interface are described in Clause 6.

The scope of this part (part 1) of the standard does not include:

— Hot Wheel (Hot Disc) Detectors (HWDs). However, HWD are often installed in combination with trackside HABD to provide a dual monitoring system. This standard does not prevent the use of such a combination;

— how a HABD measures the temperature and identifies axle box position. This is part of an individual equipment design and not part of the functional requirements of this standard;

— operational requirements for acting on the information reported by the HABD system;

— maintenance requirements for HABD systems.

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.

[A1]

EN 15273-3:2013+A1:2016, *Railway applications — Gauges — Part 3: Structure gauges*

EN 15437-2:2012+A1:2022, *Railway applications — Axlebox condition monitoring — Interface and design requirements — Part 2: Performance and design requirements of on-board systems for temperature monitoring*

EN 50121-4:2016, *Railway applications — Electromagnetic compatibility — Part 4: Emission and immunity of the signalling and telecommunications apparatus*

EN 50125-3:2003, *Railway applications — Environmental conditions for equipment — Part 3: Equipment for signalling and telecommunications*

EN IEC 62368-1:2020, *Audio/video, information and communication technology equipment - Part 1: Safety requirements (IEC 62368-1:2018)*

ISO 14837-1:2005, *Mechanical vibration — Ground-borne noise and vibration arising from rail systems — Part 1: General guidance*

〈A1〉

3 Terms and definitions

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

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

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
axle bearing
bearing or bearing assembly on a rail vehicle axle that transmits a proportion of the weight of the rail vehicle directly to the wheelset

Note 1 to entry: For the purpose of this definition bearings associated with the mounting of traction motors or traction drives are excluded.

3.1.1
inboard axle bearing
axle bearings that are positioned on the wheelset axle between the wheels of the wheelset

3.1.2
outboard axle bearing
axle bearings that are positioned on the wheelset axle ends outside of the space between the wheels of the wheelset

3.2
axlebox
structure, including for example cartridge bearing adaptor, which houses, or is in contact with, the axle journal bearing and provides an interface with the bogie and/or suspension arrangement

3.3
hot axlebox detector (HABD)
trackside system that includes:

— sensors that measure the thermal radiation emitted from a defined area on each axlebox of a passing rail vehicle;

— data processing that calculates a temperature for each axlebox from these measured data;

— data processing that identifies signs that an axlebox is (or axleboxes are) overheated;

— communication link to transmit and receive data

3.4
target zone
defined area on the underside of an axlebox that is designed to have its temperature monitored by a HABD

3.5
target area
plan view dimensions, that is in the XY plane, of the target zone

3.6
axlebox temperature
temperature of the target zone as calculated by a HABD

3.7
differential temperature
temperature difference between the two axlebox temperatures of a wheelset, or of a pair of wheels at the same position, as calculated by the HABD

3.8
temperature alarm
indication that a calculated axlebox temperature has exceeded a preset temperature level

3.8.1
hot temperature alarm
indication that a calculated axlebox temperature has exceeded a preset hot temperature level

3.8.2
warm temperature alarm
indication that a calculated axlebox temperature has exceeded a preset warm temperature level

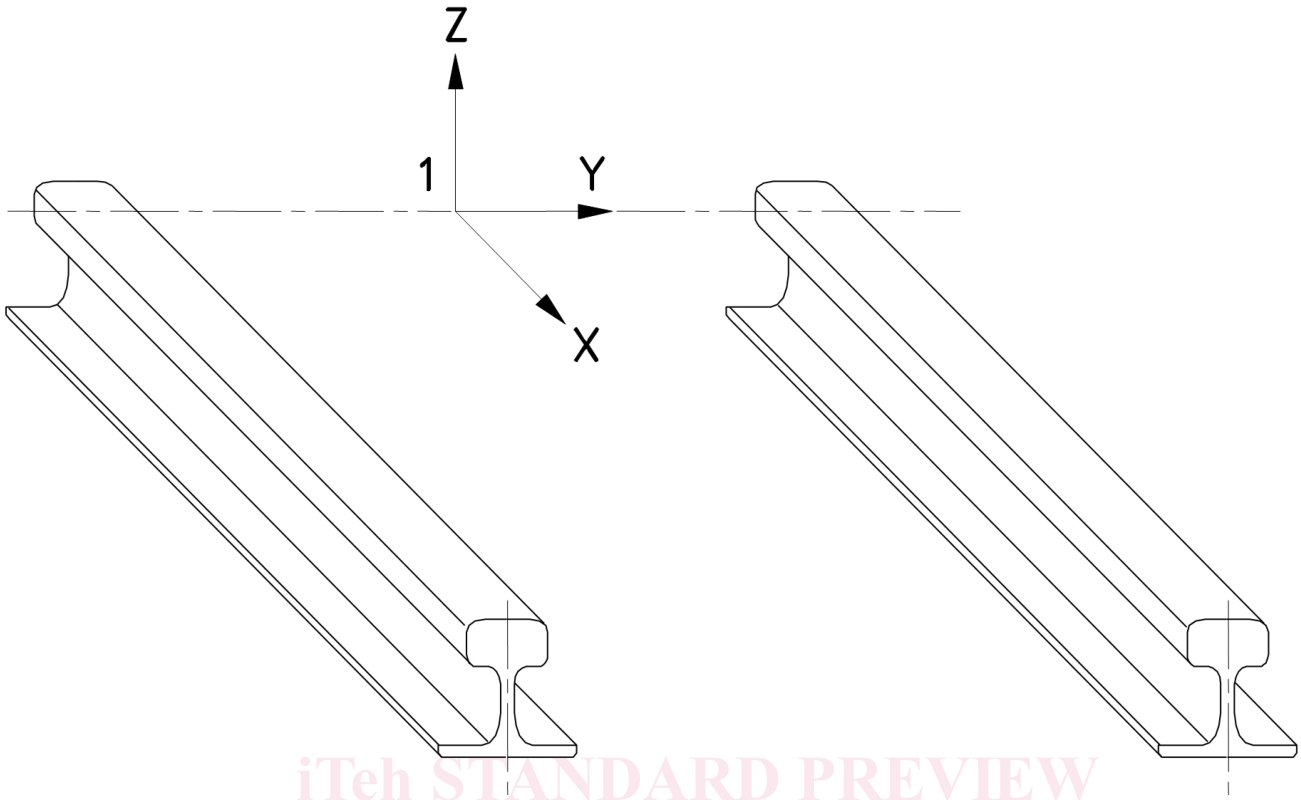
3.8.3
differential temperature alarm
indication that a calculated differential temperature, between the left and right axleboxes of a wheelset, has exceeded a preset differential temperature level

3.8.4
train-side differential temperature alarm
indication that a calculated differential temperature, between the temperature of the axlebox compared to the average temperature of all the axleboxes along its side of the train, has exceeded a preset train-side differential temperature level

3.9
prohibitive zone
zone in which heat sources such as exhausts, which might influence the behaviour of a HABD, are excluded or thermally shielded

3.10
track coordinates
track coordinates, Figure 1, are based on the right hand rule Cartesian coordinate system, where the positive X-axis (longitudinal) is along the track in the direction of travel, the Z-axis is vertically upwards and the origin is at the centre of the track and level with the top of the rail

Note 1 to entry: The Y-axis is the lateral axis.



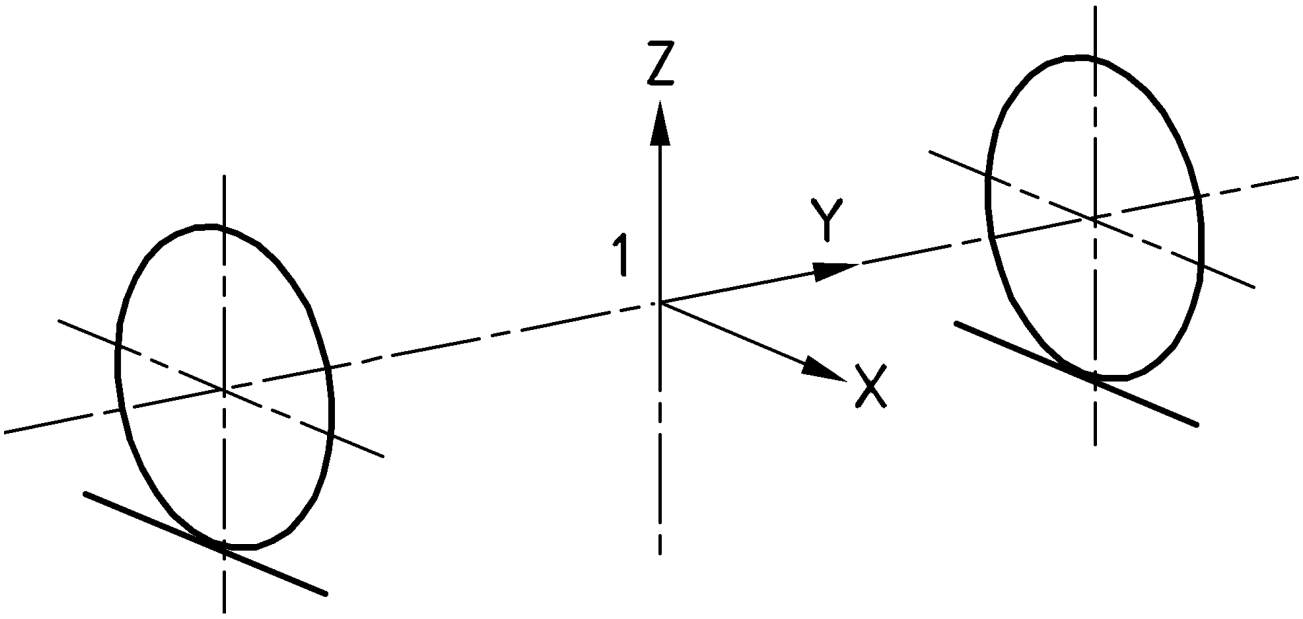
Key

1 Centre of track

Figure 1 — Track Coordinates

3.11
rolling stock coordinates
rolling stock coordinates, Figure 2, are based on the right hand rule Cartesian coordinate system, where the positive X-axis (longitudinal) is along the vehicle in the direction of travel, the Z-axis is vertically upwards and the origin is at the centre of a wheelset's axle

Note 1 to entry: The Y-axis is the lateral axis.



Key

1 Centre of axle (or pair of wheels)

Figure 2 — Rolling Stock Coordinates

3.12
wheelset
unit comprising: an axle, two wheels and their axle bearings, or a pair of independent wheels located at the same longitudinal position and their bearings

3.13
heat source
part of the rolling stock that may have a temperature above the in-service running temperature of the underside of the axlebox, such as a hot load or an exhaust pipe

3.14
temperature measuring zone
virtual cuboidshape fixed in size and space relative to the track in which an HABD system focuses to measure thermal radiation