



SLOVENSKI STANDARD

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Železniške naprave - Kontrola ohišja ležajev kolesnih dvojic - Zahteve pri projektiranju - 2. del: Naprave na vozilu za nadzor temperature

Railway applications - Axlebox condition monitoring - Performance requirements - Part 2: Onboard systems for temperature monitoring

Bahnanwendungen - Zustandsüberwachung von Radsatzlagern - Leistungsanforderungen - Teil 2: Fahrzeugbasierte Systeme für Temperaturüberwachung

Applications ferroviaires - Surveillance des boîtes d'essieux - Exigences - Partie 2: Systèmes embarqués pour surveillance de température

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ICS:

45.060.01 Železniška vozila na splošno Railway rolling stock in general

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ICS

English Version

**Railway applications - Axlebox condition monitoring -
Performance requirements - Part 2: Onboard systems for
temperature monitoring**

Applications ferroviaires - Surveillance des boîtes d'essieux
- Exigences - Partie 2: Systèmes embarqués pour
surveillance de température

Bahnanwendungen - Zustandsüberwachung von
Radsatzlagern - Leistungsanforderungen - Teil 2:
Fahrzeugbasierte Systeme für Temperaturüberwachung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 256.

If this draft becomes a European Standard, CEN 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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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (prEN 15437-2:2010) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This documents is currently submitted to the CEN Enquiry.

This European Standard has been prepared under a mandate given to CEN/CENELEC/ETSI by the European Commission and the European Free Trade Association to support Essential Requirements of

— Directive 2008/57/EC of the European Parliament and of the council of 17 June 2008 on the interoperability of the rail systems within the community¹⁾

For relationship with EU Directives, see informative Annexe ZA which is an integral part of this document.

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SIST EN 15437-2:2014

<https://standards.iteh.ai/catalog/standards/sist/a7bab344-4553-4719-9de8-7635dc5a89d1/sist-en-15437-2-2014>

1) Official Journal of the European Union No L191/1 of 18.07.2008

Introduction

Failed wheelset bearings on rolling stock create a hazard to the safe operation of the railway. If a 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.

This part of EN 15437 covers the monitoring of axle box bearing temperature by onboard systems.

It was developed by Working Group 35 Hot Box Detection of CEN Technical Committee 256 Railway Applications. It defines the minimum requirements for the equipment, monitoring performance, operation and interface in order to provide temperature-based diagnostic information to the onboard diagnosis system.

In most cases, axle boxes continue to be monitored by trackside Hot Axle Bearing Detectors which is the subject of Part 1 of EN15437. For onboard systems, the notable features are that the supervision is performed in a continuous way, based on inputs from temperature sensors. Further, that the system is fitted onboard the train and is able to function autonomously from trackside systems which by nature are ground-based.

In contrast to trackside monitoring systems, the detection characteristic may be adapted to the particular vehicle design, such that the alarm levels employed are configured depending on the bearing properties, sensor arrangement, vehicle type, network characteristics, etc...

The use of onboard monitoring may also provide a solution for overcoming constraints related to bogie design or other aspects of vehicle design or operation which may prevent effective monitoring by means of the trackside systems.

Other devices which apply functionally equivalent alternatives (for example based on the principle of vibration monitoring) may be available and normalized elsewhere, such as in other parts of this series of EN standards.

1 Scope

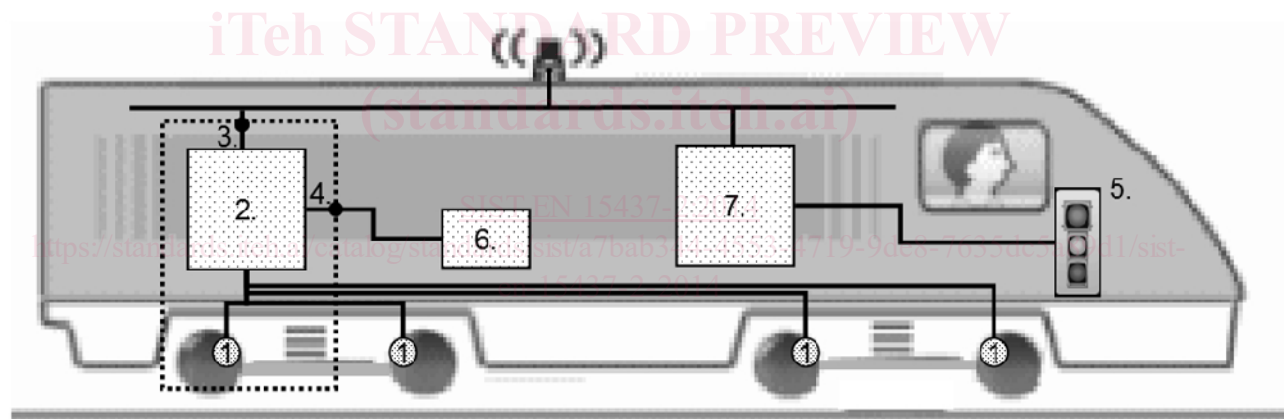
This part of EN 15437 defines the minimum performance requirements of onboard systems for axle box condition monitoring by means of temperature measurements. Such systems are required in order to satisfy the applicable essential requirements of the European Directives for Interoperability.

NOTE this does not exclude use of this standard (or selected parts) in other cases, for example applications involving speeds or vehicle design where the TSI requirements are not applicable.

To ensure the compatibility of systems and the effective monitoring functions, this standard defines the requirements in the following areas:

- Equipment and characteristics
- Monitoring performance
- Operation & Interface

The outcome (interface) of the onboard detection is the provision of diagnostic information to the appropriate interface and the scope is entirely onboard, as illustrated in Figure 1.



Key

- 1 sensors (part of the onboard monitoring system)
- 2 monitoring unit (part of the onboard monitoring system)
- 3 interface to train diagnostic system (part of the onboard monitoring system)
- 4 interface to JRU (part of the onboard monitoring system)
- 5 drivers display
- 6 JRU
- 7 train diagnostic system

Figure 1 — Scope of the onboard system for temperature monitoring

prEN 15437-2:2010 (E)

The scope of this part (part 2) of the standard does not include:

- how a onboard temperature monitoring system 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 onboard temperature monitoring system;
- operational requirements for conflict of information between trackside HADB and onboard systems, this is a matter that has to be discussed and procedure agreed with Infrastructure Manager and Railway Undertaking;
- maintenance requirements for onboard temperature monitoring system.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 15437-1, *Railway applications — Axle box condition monitoring — Interface and design requirements — Part 1: Track side equipment and rolling stock axle box*

EN 50125-1, *Railway applications — Environmental conditions for equipment — Part 1: Equipment on board rolling stock*

EN 50126-1, *Railway applications — The specification and demonstration of reliability, availability, maintainability and safety (RAMS) — Part 1: Basic requirements and generic process*

EN 50128, *Railway applications — Communications, signalling and processing systems — Software for railway control and protection systems*

EN 50129, *Railway applications — Communication, signalling and processing systems — Safety related electronic systems for signalling*

EN 50155, *Railway applications — Electronic equipment used on rolling stock*

IEC 61508, *Functional safety of electrical/electronic/programmable electronic safety-related systems*

3 Terms and definitions

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

3.1

axle box

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

3.2

bearing

axle journal bearing or bearing assembly on a rail vehicle axle that transmits a proportion of the weight of the rail vehicle directly to the wheel set

3.3**JRU (Juridical Recorder Unit)**

device to record all actions and exchanges relating to the movement of trains sufficient for off line analysis of all events leading to an incident.

3.4**SIL (Safety Integrity Level)**

One of a number of defined discrete levels for specifying the safety integrity requirements of the safety functions to be allocated to the safety related systems. Safety Integrity Level with the highest figure has the highest level of safety integrity.

3.5**Reliability**

The probability that an item can perform a required function under given conditions for a given time interval (t_1 , t_2). (IEC 60050(191))

4 Equipment and characteristics**4.1 Design requirements**

Sensor devices shall be protected from electrical interference which may cause incorrect measurement of the intended temperature. To ensure that the detection is not influenced by other heat sources from the rolling stock, for example hot payload, braking equipment or exhaust, due attention shall be given to the position of other heat sources on the rolling stock.

The equipment shall respect the applicable requirements regarding the mechanical stresses, vibrations and further environmental conditions as set out in EN 50125-1.

The equipment shall respect the applicable requirements defined in EN 50155.

Train-borne equipment shall not interfere with trackside temperature monitoring equipment installed on the routes concerned.

4.2 Reliability

The reliability of the onboard system (an assessment of the probability of equipment failure) shall be expressed according to the methods of EN 50128 and EN 50129 in order to enable the Railway Undertaking (or other responsible entity) to satisfy their requirements when making a risk analysis (concerning a train running with an undetected hot axle box), for example as described in EN 50126 (RAMS).

4.3 Description of alarm levels

Temperature limits shall be determined for alarms levels depending on the bearing properties, sensor arrangement, vehicle type, network characteristics, etc.

- Alarm level 1 ("hot" alarm): The temperature limit, indicative of the condition of a bearing, above which permanent damage will occur to its functionality, with the potential to lead to a hazardous event.
- Alarm level 2 ("warm" alarm): The temperature limit, indicative of the condition of a bearing, above which accelerated deterioration of its serviceability is anticipated to occur.

5 Monitoring performance

5.1 Health information

The minimum requirement is that the system shall determine essential information about the axle box condition and delivers the diagnostic information ready for further communication of diagnosis messages (alarms) to the driver.

Essential information is:

- status that temperature of bearing has exceeded Alarm level 1;
- status that temperature of bearing has exceeded Alarm level 2;
- status that the detection equipment is faulty;

Each item of this essential information shall include unique identification of the source of the information (equipment or axle box position in the train).

Optional information may include for example:

- time and date stamp;
- temperature values;
- rates of change of temperature;
- trends;
- differential comparisons;
- status indicator for bearing OK;
- status indicator for equipment OK;
- etc...

5.2 Monitoring capability

The arrangement of temperature sensor and monitoring equipment shall determine and evaluate a temperature that is representative of the condition of the axle box bearing.

A sensor shall be used to provide a measured temperature.

The measuring accuracy (maximum deviation of the measured temperature from the actual temperature in the sensor position) shall be no worse than ± 5 °C over the range 16 to 150 °C.

Measured temperatures shall be used by the monitoring equipment as the basis to determine and register the representative temperature.

The registered temperatures shall be evaluated with a maximum periodicity of 30 s (including possible polling periodicity) according to the alarm levels described in 4.3.

The response times of the onboard system shall be no greater than:

- 10 s for availability of the information that a registered temperature has been evaluated as exceeding Alarm level 1;