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Järnvägar – Kontroll av lagerboxar – Utförande- och prestandakrav –
Del 2: System för temperaturkontroll

Railway applications – Axlebox condition monitoring – Interface and design requirements –
Part 2: Performance and design requirements of on-board systems for temperature monitoring

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The European Standard EN 15437-2:2012 has the status of a Swedish Standard. This document contains the official version of EN 15437-2:2012.

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Denna standard är framtagen av kommittén för Järnvägar, SIS/TK 254.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15437-2

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English Version

Railway applications - Axlebox condition monitoring - Interface and design requirements - Part 2: Performance and design requirements of on-board systems for temperature monitoring

Applications ferroviaires - Surveillance des boîtes d'essieux - Exigences liées aux interfaces - Partie 2: Exigences de performance et de conception des systèmes embarqués de surveillance de la température

Bahnanwendungen - Zustandsüberwachung von Radsatzlagern - Leistungsanforderungen - Teil 2: Leistungs- und Konstruktionsanforderungen von fahrzeugbasierten Systemen für Temperaturüberwachung

This European Standard was approved by CEN on 12 August 2012.

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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 CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 15437-2:2012) 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of an identical text or by endorsement, at the latest by March 2013, and conflicting national standards shall be withdrawn at the latest by March 2013.

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

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

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

EN 15437 "*Railway applications - Axlebox condition monitoring - Interface and design requirements*” is comprised of the following parts:

— *Part 1: Track side equipment and rolling stock axlebox*;

— *Part 2: Performance and design requirements of on-board systems for temperature monitoring* (the present document).

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

Introduction

Failed wheelset bearings on rolling stock create a hazard to the safe operation of the railway. If a bearing fails while 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 axlebox bearing temperature by on-board monitoring systems. According to the application, these may be considered to be basic systems or advanced systems.

In most cases, rolling stock axleboxes continue to be monitored by trackside Hot AxleBox Detectors [HABD] which is the subject of Part 1 of EN 15437. The monitoring system is fitted on the rolling stock and is able to function autonomously from trackside monitoring systems which 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 on-board 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 track-side monitoring 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 European Standards.

1 Scope

This European Standard defines the minimum performance requirements of on-board monitoring systems for axlebox condition monitoring by means of temperature measurements.

This European Standard refers to temperature monitoring of the axlebox. However, the design may be such that the rolling bearing itself is monitored directly.

The requirements of this European Standard are intended to apply equally to basic monitoring systems for monitoring the axlebox temperature through to more technically complex systems that may employ a combination of mechatronics.

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

— equipment and characteristics;

— monitoring performance;

— operation and interface.

This part of EN 15437 does not include:

— systems that do not give an indication to the driver;

— how an on-board monitoring system is structured and how it measures the temperature and identifies axlebox position. This is considered part of equipment design and not part of the functional requirements set out in this standard;

— operational requirements for acting on the information reported by the on-board monitoring system;

— operational requirements for conflict of information between trackside monitoring systems and on-board monitoring systems;

— maintenance requirements for on-board temperature monitoring systems.

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 50121-2, *Railway applications — Electromagnetic compatibility — Part 2: Emission of the whole railway system to the outside world*

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*

EN 61373, *Railway applications — Rolling stock equipment — Shock and vibration tests (IEC 61373)*

EN 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems (IEC 61508 (all parts))*

3 Terms and definitions

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

3.1
axlebox
assembly of box housing, rolling bearings, sealing and grease

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
rolling bearing
bearing operating with rolling motion between the parts, supporting load and moving in relation to each other

3.4
on-board monitoring system
system that is capable of detecting a temperature of an axlebox that is indicative of the health of that axlebox and indicates when acceptable temperature conditions have been exceeded

3.5
Safety Integrity Level (SIL)
one of a number of defined discrete levels to specify the safety integrity requirements of the safety functions to be allocated to the safety related systems

Note 1 to entry: The Safety Integrity Level with the highest figure has the highest level of safety integrity.

4 Equipment and characteristics

4.1 Design requirements

The equipment shall respect the applicable requirements regarding the environmental conditions for equipment on-board rolling stock as set out in EN 50125-1. In particular, vibration design of electrical and electronic equipment, as well as their fixing, associated with the measurements on the bearing unit or on the axle box shall respect the requirements set out in EN 61373.

The equipment shall respect the applicable requirements regarding electronic equipment as set out in EN 50155.

On-board monitoring systems shall not interfere or influence the behaviour of trackside equipment or other train-borne equipment.

NOTE This document does not set out the architecture of the environment in which an on-board temperature monitoring system may be installed. The range of architectures may differ significantly (from a freight wagon to a high

speed EMU) and therefore the level of protection required for each installation may be quite different. It is the responsibility of the system installer to establish if the specification of an on-board temperature monitoring system (including any protection for interference from external sources such as electricity or heat) is suitable for the architecture in which it is to be installed and to perform.

4.2 Reliability

The reliability of the on-board monitoring system shall be expressed according to the methods set out in EN 50129. This is to enable the Railway Undertaking (or other responsible entity) to satisfy their requirements when making a risk analysis (concerning rolling stock running with an undetected hot axlebox), for example as described in EN 50126-1.

4.3 Description of alarm levels

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

— Alarm level 1 (“hot” alarm): The temperature limit, indicative of the condition of a bearing, above which damage will occur to the bearing and/or 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.

The axle box tests undertaken as part of the requirements set out in EN 12082 can provide an indication of the values to which the alarm levels should be set. However, the range of operational conditions can be different (grease, loads, speeds, forces, etc.) to those of the tests and therefore the final choice of values should account for operational condition.

NOTE The design and function of trackside HABDs means that the differential alarm is required. However, because the on-board monitoring system is specific to an axlebox, a differential alarm is not required. This does not prevent installing an on-board system that includes a differential alarm.

5 Monitoring performance

5.1 General

To cater for different requirements, this standard sets out requirements for both basic and advanced on-board monitoring systems.

The essential requirement is that the on-board monitoring system shall determine the temperature condition of the axlebox and indicate that acceptable temperature conditions have been exceeded. Advanced on-board monitoring systems shall determine the temperature condition of the axlebox and deliver information on the temperature condition ready for further communication and diagnosis.

5.2 Required information

5.2.1 Basic

Essential information for a basic on-board monitoring system is:

— status that the temperature of the bearing has exceeded Alarm level 1.

5.2.2 Advanced

Essential information for an advanced on-board monitoring system is: