



SLOVENSKI STANDARD
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Železniške naprave - Ohišja ležajev kolesnih dvojic - Kotalni ležaji

Railway applications - Axleboxes - Rolling bearings

Bahnanwendungen - Radsatzlager - Wälzlager

Applications ferroviaires - Boîtes d'essieux - Roulements
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English Version

Railway applications - Axleboxes - Rolling bearings

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

Foreword.....	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Information and requirements to be agreed and documented	7
4.1 General.....	7
4.2 Information to be supplied by customer	7
4.3 Optional requirements	8
4.4 Requirements for agreement.....	8
5 Quality systems	8
6 Manufacture.....	9
6.1 Steel manufacturing	9
6.2 Heat treatment.....	9
6.3 Traceability	9
7 Material properties.....	9
7.1 General.....	9
7.2 Steel for rings and rolling elements.....	9
7.3 Materials of other components (cages, spacers, seals etc.).....	10
8 Geometry and dimensions.....	10
8.1 Dimensions and tolerances	10
8.2 Rolling bearing internal clearance before mounting	10
9 Mechanical properties — inner ring expanding ability.....	10
10 Physical properties.....	10
10.1 Visual aspect.....	10
10.2 Soundness of rings and rolling elements	11
10.3 Case depth.....	11
10.4 Surface hardness.....	12
11 Marking	12
12 Inspection	12
12.1 Inspection plan.....	12
12.2 Sampling	13
13 Quality records.....	13
14 Approval	14
15 Delivery and packing.....	14
15.1 Greasing of rolling bearings.....	14
15.2 Rust protection	14
15.3 Packaging	14
Annex A (normative) Ultrasonic inspection of rolling bearing rings	15
A.1 Purpose.....	15
A.2 Principle.....	15
A.3 Equipment	15
A.4 Operating procedure	15

Annex B (normative) Magnetic particle inspection of ring surfaces	20
B.1 Purpose	20
B.2 Principle	20
B.3 Equipment	20
B.4 Operation procedure	20
Annex C (normative) Eddy current inspection of the raceways of the rollers	22
C.1 Purpose	22
C.2 Principle	22
C.3 Equipment	22
C.4 Operating procedure	22
Annex D (informative) Cages of polymeric material	25
D.1 Purpose	25
D.2 References	25
D.3 Material	25
D.4 Cage requirement	26
D.5 Mechanical tests	27
D.5 Compatibility with lubricating greases	29
Annex E (normative) Approval procedures	30
E.1 General	30
E.2 Complete procedure, type C	30
E.3 Reduced procedure, type R	31
Annex F (informative) Criteria to determine the extent of approval procedures	32
Annex ZA (informative) Relationship between this European standard and the Essential Requirements of EU Directive 2001/16/EC of the European Parliament and of the Council of 19 March 2001 on the interoperability of the trans-European conventional rail system, as modified by EU Directive 2004/50/EC of 29 April 2004	34
Bibliography	35

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Foreword

This document (EN 12080:2007) 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 2008, and conflicting national standards shall be withdrawn at the latest by June 2008.

This document supersedes EN 12080:1998.

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 EU Directive 2001/16¹⁾, as modified by EU Directive 2004/50²⁾ of 29 April 2004.

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

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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¹⁾ Official Journal of the European Communities No. L 110 of 20.4.01.

²⁾ Official Journal of the European Communities No. L 220 of 21.6.04.

Introduction

This European Standard has been drawn up with the purpose of aiming at optimum performance in rail transportation. Performance implies a certain quality level of the vehicle running gear, which every railway undertaking may require, notably by imposing procedures in approval and requesting the existence of a quality assurance system for the supply of rolling bearings intended for rolling stock operating on its network or other networks in Europe.

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1 Scope

This European Standard specifies the quality parameters of axlebox rolling bearings, required for reliable operation of trains on European networks. It covers metallurgical and material properties as well as geometric and dimensional characteristics. It also defines methods for quality assurance and conditions for approval of the products.

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 12081, *Railway applications — Axleboxes — Lubricating greases*

EN 12082, *Railway applications — Axleboxes — Performance testing*

EN ISO 683-17, *Heat treated steels, alloy steels and free-cutting steels — Part 17: Ball and roller bearing steels (ISO 683-17:1999)*

EN ISO 2639, *Steels — Determination and verification of the depth of carburized and hardened cases (ISO 2639:2002)*

EN ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method (ISO 6507-1:2005)*

EN ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T) (ISO 6508-1:2005)*

EN ISO 6508-2, *Metallic materials — Rockwell hardness test — Part 2: Verification and calibration of testing machines (scales A, B, C, D, E, F, G, H, K, N, T) (ISO 6508-2:2005)*

EN ISO 6508-3, *Metallic materials — Rockwell hardness test — Part 3: Calibration of reference blocks (scales A, B, C, D, E, F, G, H, K, N, T) (ISO 6508-3:2005)*

ISO 281, *Rolling bearings — Dynamic load ratings and rating life*

ISO 492, *Rolling bearings — Radial bearings — Tolerances*

3 Terms and definitions

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

3.1

customer

railway undertaking, manufacturer or buyer of railway rolling stock or subassemblies, or their representative

3.2

railway undertaking

organisation or its representative, whatever status it has, which is responsible for the registration of rolling stock

3.3

supplier

supplier of axlebox rolling bearings manufactured under his responsibility

3.4**network**

infrastructure, on which any railway undertaking can operate rolling stock

3.5**axlebox**

assembly of box housing, rolling bearings, sealing and grease

3.6**rolling bearing**

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

3.7**cartridge bearing**

rolling bearing with two or more rows of rolling elements within a single outer ring, greased and equipped with integral seals

3.8**ring**

annular part of a rolling bearing incorporating one or more raceways

3.9**rolling elements**

cylindrical, tapered or convex rollers or balls

3.10**cage**

component, which partly surrounds the rolling elements and moves with them

3.11**grease**

semi-solid lubricant, which consists of a thickener and additives dispersed in a lubricating oil

3.12**sealing**

component that protects the bearings against ingress of water and dust and retains the grease in the rolling bearings

3.13**box housing**

structural component which contains rolling bearings, sealing and grease

4 Information and requirements to be agreed and documented

4.1 General

The following information shall be fully documented by the supplier. Both the requirements specified throughout this European Standard and the following documented requirements shall be satisfied before a claim of compliance with this European Standard can be made and verified.

4.2 Information to be supplied by customer

The following information is to be supplied by customer and shall be fully documented:

- interface drawing showing mounting conditions; all dimensions of the space available for the rolling bearings; dimensions, tolerances and materials of shaft and box housing;

- load spectra;
- ambient temperatures in operation;
- if required special steel composition, cleanliness and soundness class (see 7.1 and 10.2);
- approval procedure type and conditions to be applied (see Clause 14 and Annex E);
- special conditions for quality records and traceability (see 6.3 and Clause 13).

4.3 Optional requirements

If the customer wishes to take up any of the optional requirements given in 8.2, 10.2.1, 10.3, 10.4, Clause 11, Clause 12 and 15.2, such requirements shall be specified and documented.

4.4 Requirements for agreement

The following requirements to be agreed between the contracting parties, which are specified in the clauses referred to, shall be fully documented:

- boundary dimensions and interface tolerances of the rolling bearing (see Clause 8);
- internal clearance values before and after mounting (see Clause 8);
- references to standards and special requirements (see Clause 7 and 10.2);
- use of steel of special composition, manufacture or metallurgical quality (see 7.1);
- soundness Class, 1 or 2, and the test methods to be used (see 10.2);
- type of heat treatment to be applied and methods of testing (see 6.2, 10.3, 10.4 and 12.2);
- marking (see Clause 11);
- inspection plan (see 12.1);
- for cartridge bearings grease designation, quantity and distribution (see 15.1);
- for non-sealed bearings, grease designation and compatibility with preservatives (see 15.2);
- selection of mechanical testing method for cages of polymeric material (see D.5.1).

5 Quality systems

The supplier shall operate a quality management system³⁾. The personnel responsible for non destructive testing shall be qualified and certified⁴⁾.

³⁾ The system used should offer equivalence with EN ISO 9001.

⁴⁾ The system used should offer equivalence with EN 473.

6 Manufacture

6.1 Steel manufacturing

The process of steel manufacture in mass production shall be such that the metallurgical characteristics are the same as those of the rolling bearings submitted for the approval procedure.

NOTE The choice of manufacturing procedures is left to the discretion of the supplier.

6.2 Heat treatment

The heat treatment processes for the rolling bearing components shall be such that the hardness values specified in 10.3 and/or 10.4 are respected. The heat treatment processes shall be such that all the rolling bearings produced in a production batch are treated uniformly.

The bearings shall be heat-treated to retain dimensional stability for operating temperatures up to + 150 °C, (designated S0 stabilisation in bearing catalogues).

6.3 Traceability

At the customer's request, the supplier shall set up and maintain a system of identification and traceability of finished products (see Clause 4), which allows the detection, based on an identification mark, of the following elements:

- material origin including the chemical analysis of every heat and steel manufacturing batch;
- heat treatments;
- inspection of boundary dimensions as well as inspection of soundness;
- batch number.

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7 Material properties

7.1 General

The grades and qualities of materials used shall conform to the requirements in 7.2 and 7.3.

7.2 Steel for rings and rolling elements

7.2.1 Grades

Steels should be selected from the grades specified in EN ISO 683-17. Alternative steel grades selected by bearing suppliers may be used by agreement between customer and supplier. For particular applications (high rotational speed, reliability etc.) it may be requested that the rolling bearings are made from steel with special composition, metallurgical quality or manufacturing processes (see Clause 4).

7.2.2 Inclusion content

The methods for determining the inclusion content shall be agreed between customer and supplier.

The applicable acceptance limits shall meet the requirements of EN ISO 683-17.

For steel with special composition, metallurgical quality or manufacturing processes, the inclusion content shall be documented in accordance with Clause 4.

7.3 Materials of other components (cages, spacers, seals etc.)

The materials of each one of these components shall be documented in accordance with Clause 4 and endorsed by the customer at the time of approval. For cages of polymeric material, if not otherwise specified, refer to Annex D.

8 Geometry and dimensions

8.1 Dimensions and tolerances

The boundary dimensions shall be agreed and documented in accordance with 4.4.

Applicable tolerances shall be those given in ISO 492, normal tolerance class, unless otherwise agreed and documented in 4.4.

8.2 Rolling bearing internal clearance before mounting

Rolling bearing internal clearance, axial and/or radial, depending on the type of rolling bearing, shall conform to the values documented in accordance with 4.4.

The methods for radial and/or axial clearance inspection can be agreed and documented in accordance with 4.3.

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9 Mechanical properties — inner ring expanding ability

With the exception of case-hardened rings and bainite hardened rings, an expansion test shall be performed to guarantee that the inner rings can withstand an increase of the bore diameter without causing fracture in service. This test shall be performed before the inspection for surface soundness. The value of this diameter increase shall not be less than 0,001 5 times the diameter. The rings shall neither rupture nor show any traces of cracks (see 10.2.3). This expansion test shall be made with an expandable mandrel that is inserted in the bore of the inner ring. The expansion shall be achieved progressively in a few seconds.

10 Physical properties

10.1 Visual aspect

10.1.1 Rings and rolling elements

Rings and rolling elements shall be free of any defects, especially on working surfaces, which can be harmful to their function (such as burrs, scratches, rust stains, nicks and dents).

10.1.2 Cages

Rolling bearing cages shall exhibit no defects that might affect their function (such as burrs, scratches, rust). To avoid crack initiation, the connection between the cage bars and the annular body shall be smooth and conform to the rounding-off shown on the detail drawing.

If not otherwise documented in accordance with Clause 4, the requirements for cages of polymeric material shall be taken into account (see Annex D).