



SLOVENSKI STANDARD
oSIST prEN 12080:2024

01-oktober-2024

Nadomešča:

SIST EN 12080:2017+A1:2022

Železniške naprave - Ohišja ležajev kolesnih dvojic - Kotalni ležaji

Railway applications - Axleboxes - Rolling bearings

Bahnanwendungen - Radsatzlager - Wälzlager

Applications ferroviaires - Boîtes d'essieux - Roulements

Ta slovenski standard je istoveten z: prEN 12080

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ICS:		
21.100.20	Kotalni ležaji	Rolling bearings
45.040	Materiali in deli za železniško tehniko	Materials and components for railway engineering

oSIST prEN 12080:2024

en,fr,de

CEN/TC 256

Date: 2024-05

prEN 12080: 2024

Secretariat: DIN

Railway applications — Axleboxes — Rolling bearings
Bahnanwendungen — Radsatzlager — Wälzlager
Applications ferroviaires — Boîtes d'essieux — Roulements

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prEN 12080:2024 (E)**European foreword**

This document (prEN 12080:2024) has been prepared by Technical Committee CEN/TC 256 “Railway Applications”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12080:2017.

EN 12080 includes the following significant technical changes with respect to EN 12080:2017:

- Focus is only on rolling bearing related product requirements. As a consequence, product requirements not related to the rolling bearing or requirements connected with conformity assessment of the rolling bearing have been deleted or transferred to EN 12082-2
- Clause 4 on Technical Specification is revised
- Annex E Approval Procedures and Annex F Criteria to determine the extent of approval procedures are deleted and respective content transferred to EN 12082-2
- Annex G is transferred to EN 12082-2
- With respect to Clause 10.2.3 Soundness of ring surfaces, eddy current testing is more emphasized as an alternative to Magnetic Particle Inspection. A new Annex E is introduced with requirements on how eddy current testing of ring surfaces should be processed
- Concerning Clause 11 Marking, changes are made to harmonize requirements for different rolling bearing types and to address modern practices such as Data Matrix Coding
- Annex D Cages of polymeric material is reviewed with changes across the annex.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex Z, which is an integral part of this document

Introduction

This standard is part of a set of standards: EN 12080, EN 12081, EN 12082-1 and EN 12082-2.

This document 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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prEN 12080:2024 (E)**1 Scope**

This document specifies the quality parameters of axlebox rolling bearings supporting the load of the vehicle, 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 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.

EN 10204:2004, *Metallic products - Types of inspection documents*

prEN 12081:2024,¹ *Railway applications — Axleboxes — Lubricating greases*

prEN 12082-2:2024,² *Railway applications — Axleboxes — Deployment Procedure*

EN 13018:2016, *Non-destructive testing - Visual testing - General principles*

EN ISO 178:2010, *Plastics — Determination of flexural properties (ISO 178:2010)*

EN ISO 179-1:2010, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test (ISO 179-1:2010)*

EN ISO 307:2007, *Plastics — Polyamides — Determination of viscosity number (ISO 307:2007)*

EN ISO 683-17:2014, *Heat-treated steels, alloy steels and free-cutting steels — Part 17: Ball and roller bearing steels (ISO 683-17:2014)*

EN ISO 1172:2003, *Textile-glass-reinforced plastics — Prepregs, moulding compounds and laminates - Determination of the textile-glass and mineral-filler content - Calcination methods (ISO 1172:1996)*

EN ISO 1183-1:2012, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer method and titration method (ISO 1183-1:2012)*

EN ISO 1183-2:2004, *Plastics — Methods for determining the density of non-cellular plastics — Part 2: Density gradient column method (ISO 1183-2:2004)*

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

EN ISO 3059:2012, *Non-destructive testing - Penetrant testing and magnetic particle testing - Viewing conditions (ISO 3059:2012)*

EN ISO 3451-1:2008, *Plastics — Determination of ash — Part 1: General methods (ISO 3451-1:2008)*

¹ Currently under revision

² Currently under revision

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

EN ISO 6508-1:2016, *Metallic materials — Rockwell hardness test — Part 1: Test method (ISO 6508-1:2016)*

EN ISO 6508-2:2015, *Metallic materials — Rockwell hardness test — Part 2: Verification and calibration of testing machines and indenters (ISO 6508-2:2015)*

EN ISO 6508-3:2015, *Metallic materials — Rockwell hardness test — Part 3: Calibration of reference blocks (ISO 6508-3:2015)*

EN ISO 11357-3:2013, *Plastics — Differential scanning calorimetry (DSC) — Part 3: Determination of temperature and enthalpy of melting and crystallization (ISO 11357-3:2011)*

ISO 492:2014, *Rolling bearings — Radial bearings — Geometrical product specifications (GPS) and tolerance values*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12082-2:—, Annex B and the following apply.

ISO and IEC maintain terminological 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

customer

railway undertaking, rolling stock manufacturer, Entity in Charge of Maintenance (ECM) or buyer of railway rolling stock or subassemblies, or their representative

3.2

railway undertaking

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

3.3

manufacturer

manufacturer of axlebox rolling bearings produced under their responsibility

3.4

network

infrastructure, on which any railway undertaking can operate rolling stock

3.5

axlebox (assembly)

axlebox

assembly consisting of the following major components: rolling bearing(s), grease, seal(s) and box housing

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Note 1 to entry: Further components such as axle end cap components, box cover(s), distance rings, fasteners, labyrinth(s) may be also part of the assembly but are not considered as major components. Their presence depends on the axlebox type design.

3.6**bearing sleeve**

component of box housing which contains rolling bearing(s), grease and sealing

3.7**housing cover**

component which retains the bearing in the housing or bearing sleeve

3.8**axle end cap components**

components which secure the rolling bearing axially on the journal

3.9**rolling bearing**

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

3.10**cartridge bearing**

rolling bearing with two or more rows of rolling elements within a self-contained unit, greased and equipped with integral seals

3.11**ring**

annular part of a rolling bearing incorporating one or more raceways with rolling element contact

3.12**rolling elements**

cylindrical, tapered or convex rollers or balls

3.13**cage**

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

3.14**grease**

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

3.15**seal**

component that protects the bearing(s) against ingress of water and dust and retains the grease in the rolling bearing(s)

3.16**box housing**

structural component which contains rolling bearing(s), seal(s) and grease

Note 1 to entry: It may consist of several components such as an upper part, a lower part, bearing sleeve.

3.17

rolling bearing type

designation of the rolling bearing or cartridge bearing according to the shape of the rolling elements (e.g. tapered roller bearing, cylindrical roller bearing, and spherical roller bearing)

3.18

rolling bearing design

designation of a specific rolling bearing or cartridge bearing design within a rolling bearing type (e.g. WJ/WJP 130x240x80 P.C3), bearing design is a subset of a bearing type

3.19

ribs and thrust collars

annular component of a rolling bearing transmitting axial forces (separate from the bearing inner or outer rings) in contact with the rolling element end face in cylindrical roller bearings

3.20

deployment process

methodical procedure of introducing an axlebox or a change to an axlebox into vehicle service

4 Technical specification

4.1 General requirements

The supply of a component shall be based on a comprehensive specification. This specification shall consist of all the information relevant for design and manufacture of the bearing describing the functional requirements over its complete life cycle and the interfaces with associated components and assemblies.

The design and validation process requires the integration of different disciplines and areas of expertise and the knowledge associated with them. Therefore, the specification shall include information defining the intended operating conditions and calculation parameters.

The following information shall be part of the deployment process and be fully documented in the technical specification by either of the contracting parties. Both the requirements specified throughout this document and the following documented requirements shall be satisfied before a claim of compliance with this document can be made and verified.

The technical specification shall cover the items listed in Clause 4.2 in the most suitable format (drawing, text etc.).

4.2 Technical specification content

4.2.1 New bearing development

The following information should be considered during the development of a new bearing:

- interface drawing showing mounting conditions as in service; all dimensions of the space available for the rolling bearings; dimensions, tolerances and materials of shaft and box housing;
- load specification at least according to EN 12082-1;
- ambient temperatures in operation;
- deployment procedure type and conditions to be applied (see Clause 14 and EN 12082-2, Annex E);
- clearance values after mounting (see Clause 8);

prEN 12080:2024 (E)**4.2.2 Information from bearing supplier**

The following information of the bearing shall be made available by the bearing supplier

- boundary dimensions and tolerances of the rolling bearing (see Clause 8);
- internal clearance measurement process and clearance values before mounting (see Clause 8);
- type of coating and influence on boundary dimensions (see 6.4);
- type of heat treatment to be applied
- soundness Class, 1 or 2, and the test methods to be used (see 10.2, A.4.2 and E.4.1);
- for cartridge bearings grease designation, quantity and distribution (see 15.1);
- marking (see Clause 11);

4.2.3 Bearing supplier quality management system

Additionally the following requirements which are specified in the clauses referred to shall be fully documented in the bearing supplier quality management system:

- if required, special steel composition, cleanliness and soundness class (see 7.1 and 10.2);
- special conditions for quality records and traceability (see 6.3 and Clause 13);
- 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);
- type of heat treatment to be applied and methods of testing (see 6.2, 10.3, 10.4 and 12.2);
- inspection plan (see 12.1);
- selection of mechanical testing method for cages of polymeric material (see D.4.1)
- material data sheet for polymer cage material;
- proof of batch release according to EN 12081 for traceability;
- method for determining steel cleanliness.

5 Quality systems

The quality of workmanship and manufacturing shall be demonstrated to ensure the requirements of the technical specification are met.

NOTE 1 The manufacturer is responsible for this.

NOTE 2 Quality management system according to EN ISO 9001 is usually used.

NOTE 3 Competency of non-destructive testing staff can be demonstrated, e.g. according to ISO 9712, ASNT recommended practice No. SNT-TC-1A or NAS 410.

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 deployment procedure.

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 temperature category shall be given and documented in the Technical specification (Clause 4).

The bearings (inner and outer rings) shall be heat-treated to retain dimensional stability at least for operating temperatures up to 150 °C.

Inner rings of cylindrical roller bearings that are heated during mounting or dismounting shall be dimensionally stable up to 200 °C.

For other steels, the retained austenite content must be defined in the course of the (type) deployment procedure.

The inspection frequency of the retained austenite content is specified in Table 3 — Inspection plan, 12.1. The method of measurement of retained austenite is according to ASTM E975 -or to be defined in the technical specification (Clause 4).

6.3 Traceability

For the manufacturing process a system of identification and traceability of finished products shall be set up and maintained. This system shall allow identification, of the following elements:

- raw material for rings and rollers;
- inspection certificate 3.1 in accordance with EN 10204 or equivalent. Minimum content:
 - chemical analysis (all elements according steel grade specification);
 - steel production method;
 - microstructure (CN, CG, CZ);
 - inclusion content (see 7.2.2);

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- polymeric cages:
 - raw material (granulate material) + raw material manufacturer;
 - inspection results; inspections at least in accordance with EN 12080, Annex D;
 - manufacturer, manufacturer's mark, date of manufacture;
- rolling bearing grease:
 - name, manufacturer;
 - inspection certificate 3.1 in accordance with EN 10204 or equivalent. The content of the certificate is according to EN 12081.
- production locations of rings and rollers;
- traceability of heat treatment:
 - method;
 - temperature variations including nominal and actual values per heat treatment batch;
 - microstructural examination per heat treatment batch;
 - hardness values/case-hardening depth of rings and rollers in accordance with EN 12080, Table 3;
 - retained austenite content, inspection frequency in accordance with 6.2;
 - if there are several heat treatment batches per production batch they must be assignable to the production batch;
- significant changes in the finishing process after heat treatment that could lead to defects, e.g. so called “grinding burns”;
- traceability of the inspection results in accordance with the inspection plan (see 12.1);
- quality records in accordance with Clause 13 and records of inspection plans, inspection instructions and calibrations.
- production of cartridge bearings
 - name, manufacturer
 - amount of grease
 - assembly date