BRITISH STANDARD

BS EN 12080:2007 +A1:2010

Railway applications — Axleboxes — Rolling bearings

ICS 45.040

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

BSI Documents Document Sharing Hub British Standards

Full document details: BS EN 12080:2007+A1:2010

National foreword

This British Standard is the UK implementation of EN 12080:2007+A1:2010. It supersedes BS EN 12080:2007 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment 1 is indicated by ▌A1⟩ ⟨A1▌.

The UK participation in its preparation was entrusted by Technical Committee RAE/3, Railway applications rolling stock material, to Subcommittee RAE/3/-/2, Railway applications - Rolling bearings and lubricants.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

'Normative' — A (mandatory) requirement defined as an 'expression in the content of a document conveying criteria to be fulfilled if compliance with the document is to be claimed and from which no deviation is permitted' [CEN/CENELEC Internal Regulations, Part 3: Rules for the Structure and Drafting of European Standards (PNE-Rules)]. 'Informative' — Information (not mandatory) intended to assist the understanding or use of the document. Informative annexes shall not contain requirements, except as optional requirements. (For example, a test method that is optional may contain requirements but there is no need to comply with these requirements to claim compliance with the document.)

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2008

© BSI 2011

ISBN 978 0 580 70710 0

Amendments/corrigenda issued since publication

Date	Comments
28 February 2011	Implementation of CEN amendment A1:2010

Documents
Document Sharing Hub

Full document details: BS EN 12080:2007+A1:2010

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12080:2007+A1

October 2010

ICS 21.100.20; 45.040

Supersedes EN 12080:2007

English Version

Railway applications - Axleboxes - Rolling bearings

Applications ferroviaires - Boîtes d'essieux - Roulements

Bahnanwendungen - Radsatzlager - Wälzlager

This European Standard was approved by CEN on 8 November 2007 and includes Amendment 1 approved by CEN on 14 September 2010.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

© 2010 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 12080:2007+A1:2010: E

Documents
Document Sharing Hub

Full document details: BS EN 12080:2007+A1:2010

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

Documents
Document Sharing Hub
Full document details: BS EN 12080:2007+A1:2010

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.6 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) **A1 Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community (Recast) A1** 34

Bibliography 37

Documents
Document Sharing Hub
Full document details: BS EN 12080:2007+A1:2010

Foreword

This document (EN 12080:2007+A1:2010) 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 April 2011, and conflicting national standards shall be withdrawn at the latest by April 2011.

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 includes Amendment 1, approved by CEN on 2010-09-14.

This document supersedes [A1⟩ EN 12080:2007 ⟨A1].

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

[A1⟩ This document has been prepared under a mandate given to CEN/CENELEC/ETSI by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document. ⟨A1]

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Documents
Document Sharing Hub
Full document details: BS EN 12080:2007+A1:2010

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.

Documents
Document Sharing Hub
Full document details: BS EN 12080:2007+A1:2010

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

Documents
Document Sharing Hub
Full document details: BS EN 12080:2007+A1:2010

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;

Documents
Document Sharing Hub
Full document details: BS EN 12080:2007+A1:2010

— 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 system[1]. The personnel responsible for non destructive testing shall be qualified and certified[2].

---

[1] The system used should offer equivalence with EN ISO 9001.

[2] The system used should offer equivalence with EN 473.

Documents
Document Sharing Hub
Full document details: BS EN 12080:2007+A1:2010

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.

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.

AVA Documents
Document Sharing Hub

Full document details: BS EN 12080:2007+A1:2010

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.

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).

Documents
Document Sharing Hub
Full document details: BS EN 12080:2007+A1:2010