



SLOVENSKI STANDARD

SIST EN 12082:2017

01-november-2017

Nadomešča:

SIST EN 12082:2008+A1:2011

Železniške naprave - Ohišja ležajev kolesnih dvojic - Preskušanje delovanja

Railway applications - Axleboxes - Performance testing

Bahnanwendungen - Radsatzlager - Prüfung des Leistungsvermögens

Applications ferroviaires - Boîtes d'essieux - Essais de performance
iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: EN 12082:2017

<https://standards.iteh.ai/catalog/standards/sist/bc5c004b-32bd-4111-b90f-8255ebc8aaf7/sist-en-12082-2017>

ICS:

45.040	Materiali in deli za železniško tehniko	Materials and components for railway engineering
--------	---	--

SIST EN 12082:2017

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 12082:2017

<https://standards.iteh.ai/catalog/standards/sist/bc5c004b-32bd-4111-b90f-8255cbc8aaf7/sist-en-12082-2017>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12082

September 2017

ICS 45.040

Supersedes EN 12082:2007+A1:2010

English Version

Railway applications - Axleboxes - Performance testing

Applications ferroviaires - Boîtes d'essieux - Essais de
performance

Bahnanwendungen - Radsatzlager - Prüfung des
Leistungsvermögens

This European Standard was approved by CEN on 19 June 2017.

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-CENELEC 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-CENELEC 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

[SIST EN 12082:2017](https://standards.iteh.ai/catalog/standards/sist/bc5c004b-32bd-4111-b90f-8255cbc8aaf7/sist-en-12082-2017)

<https://standards.iteh.ai/catalog/standards/sist/bc5c004b-32bd-4111-b90f-8255cbc8aaf7/sist-en-12082-2017>



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

	Page
European foreword.....	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Symbols and abbreviations	8
5 Test specification	10
5.1 General requirements	10
5.2 Test specification content	10
5.2.1 General	10
5.2.2 Rig tests.....	10
5.2.3 Field test	11
6 Water tightness test	11
7 Rig performance test	11
7.1 General	11
7.2 Test execution	12
7.2.1 Test rig	12
7.2.2 Test parameters.....	13
7.3 Carrying out the test.....	14
7.3.1 Pre-test.....	14
7.3.2 Performance test.....	14
7.4 Acceptance criteria.....	15
7.4.1 Results obtained during the test.....	15
7.4.2 Results obtained after the test	16
7.5 Performance test report.....	16
8 Field test	17
8.1 General.....	17
8.2 Carrying out the test.....	17
8.3 Test parameters.....	17
8.4 Acceptance criteria.....	18
8.4.1 Results to be obtained at intermediate inspections during the test	18
8.4.2 Results to be obtained after the test	18
8.5 Field test report	18
Annex A (normative) Rig performance test.....	19
A.1 Schematic examples of test rigs	19
A.2 Temperature measurements.....	21
A.3 Grease sampling zones.....	22
A.4 Definition of forces	23
A.5 Definition of test cycles.....	23
A.5.1 Speed Classes and cumulative distances for testing.....	23

A.5.2	Conditions for sequenced tests.....	24
A.5.3	Particular conditions for similar rolling bearing(s), grease or box housing.....	24
A.6	Graphical presentation of test cycles	25
A.7	Temperature criteria	26
A.8	Mechanical and physico-chemical acceptance criteria.....	27
A.8.1	Mechanical criteria	27
A.8.2	Physico-chemical criteria	28
A.9	Reference to existing approval results	29
A.9.1	General	29
A.9.2	Preconditions for applicability of existing results	30
Annex B (informative)	Sequenced performance tests	33
B.1	General	33
B.2	High Speed Train example	33
B.3	Passenger train example.....	35
B.4	Freight train example.....	36
B.5	Peri-urban train example.....	38
Annex C (normative)	Water tightness test	40
C.1	General	40
C.2	Test conditions	40
C.3	Test procedure	41
C.4	Pass/fail criterion.....	41
C.5	Test report	41
C.6	Sketches	42
C.6.1	Classic application.....	42
C.6.2	Application with dynamic seals on both sides of the axlebox	43
Annex ZA (informative)	Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC aimed to be covered.....	44
Bibliography	46

EN 12082:2017 (E)**European foreword**

This document (EN 12082:2017) 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 February 2018, and conflicting national standards shall be withdrawn at the latest by February 2018.

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 supersedes EN 12082:2007+A1:2010.

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 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

<https://standards.iteh.ai/catalog/standards/sist/bc5c004b-32bd-4111-b90f-8255cbc8aaf7/sist-en-12082-2017>

Introduction

To improve the reliability, availability, durability, the high speed capacity and maintenance of the European rail transportation system, there is a need to ensure the required quality, safety and efficiency of axleboxes that are covered by the set of standards: EN 12080, EN 12081 and EN 12082.

This European Standard has been drawn up with the purpose of standardizing the performance testing of axleboxes for all types of rolling stock to ensure suitability for the required service, i.e. that the assembly of box housing, bearing(s), seal(s) and grease is well suited for the service requirements.

This testing is made in two stages, a “rig test”, described in detail in this European Standard, and a “field test”. The extent of testing to be applied depends on the novelty of bearing design, seal design, grease formulation and/or box housing, as well as the application (see EN 12080 and EN 12081).

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 12082:2017](https://standards.iteh.ai/catalog/standards/sist/bc5c004b-32bd-4111-b90f-8255cbc8aaf7/sist-en-12082-2017)

<https://standards.iteh.ai/catalog/standards/sist/bc5c004b-32bd-4111-b90f-8255cbc8aaf7/sist-en-12082-2017>

EN 12082:2017 (E)

1 Scope

This European Standard specifies the principles and methods for a rig performance test of the system of axlebox rolling bearing(s), housing, seal(s) and grease. Test parameters and minimum performance requirements for vehicles in operation on main lines are specified. Different test parameters and performance requirements may be selected for vehicles in operation on other networks (e.g. urban rail). This standard is historically developed for outboard applications but can be used for vehicles with other bearing arrangements (e.g.: inboard application or single wheels).

It gives some possible examples where a “sequenced performance test” addresses the broad range of different service conditions within a specific application or vehicle platform into account.

It describes in detail the water tightness test and basic principles and minimum requirements for a field test.

This European Standard only applies to axleboxes equipped with rolling bearings and greases according to EN 12080 and EN 12081.

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.

ASTM D7303:2012, *Standard Test Method for Determination of Metals in Lubricating Greases by Inductively Coupled Plasma Atomic Emission Spectrometry*

DIN 51460-1:2007, *Testing of petroleum products - Method for sample preparation - Part 1: Microwave incineration*

DIN 51829:2013, *Petroleum products - Determination of additive and wear elements in greases - Analysis by wavelength dispersive X-ray fluorescence spectrometry*

EN 12080:2017, *Railway applications - Axleboxes - Rolling bearings*

EN 12081:2007+A1:2010, *Railway applications - Axleboxes - Lubricating greases*

EN 15663:2017, *Railway applications - Definition of vehicle reference masses*

EN ISO 11885:2009, *Water quality - Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES) (ISO 11885:2007)*

ISO 15243:2017, *Rolling bearings — Damage and failures — Terms, characteristics and causes*

3 Terms and definitions

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

3.1

axlebox

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

Note 1 to entry: Further components such as axle end cap components, bearing sleeve, box cover(s), distance rings, fasteners, labyrinth(s) may be also part of the assembly but their presence depends on the axlebox type design.

3.2**box housing**

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

3.3**ovality**

change (permanent deformation) in the bore's shape of an axlebox housing becoming slightly oval

3.4**rolling bearing**

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

3.5**cartridge bearing**

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

3.6**grease**

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

3.7**seal**

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.8**roller set**

assembly of cage and rollers

[SIST EN 12082:2017](https://standards.iteh.ai/catalog/standards/sist/bc5c004b-32bd-4111-b90f-8255cbc8aaf7/sist-en-12082-2017)

<https://standards.iteh.ai/catalog/standards/sist/bc5c004b-32bd-4111-b90f-8255cbc8aaf7/sist-en-12082-2017>

3.9.1**inboard**

<with reference to an axlebox with more than one bearing row> designates the bearing row closer to the middle of the wheelset or the test rig

3.9.2**inboard**

with reference to the vehicle or application, designates a configuration with rolling bearings that are positioned on a wheelset axle between the wheels of a wheelset

3.10.1**outboard**

with reference to an axlebox with more than one bearing row, designates the bearing row that is next to the inboard bearing row to the outside direction

3.10.2**outboard**

with reference to the vehicle or application, designates a configuration with rolling bearings that are positioned on wheelset axle ends, outside of the space between the wheels of a wheelset

EN 12082:2017 (E)

3.11

maximum operational test speed V_{\max}

maximum operational speed for normal service (in km/h) for which the vehicle shall be homologated

3.12

nominal rotational test speed n_{test} rotational speed (using the half worn wheel diameter) corresponding to V_{\max} increased by 10 % (in rpm)

3.13

target zone

defined area on the underside of an axlebox that is designed to have its temperature monitored by a hot axlebox detector (HABD)

3.14

main line

railway network open to different types of rolling stock

3.15

urban rail

public transport systems permanently guided at least by one rail, intended for the operation of local, urban and suburban passenger services with self-propelled vehicles and operated either segregated or not from general road and pedestrian traffic

[SOURCE: CEN-CENELEC Guide 26]

3.16

network

infrastructure, on which any railway undertaking can operate rolling stock

[SIST EN 12082:2017](https://standards.iteh.ai/catalog/standards/sist/bc5c004b-32bd-4111-b90f-8255cbc8aaf7/sist-en-12082-2017)<https://standards.iteh.ai/catalog/standards/sist/bc5c004b-32bd-4111-b90f-8255cbc8aaf7/sist-en-12082-2017>

4 Symbols and abbreviations

For the purposes of this document, the symbols and abbreviations given in Tables 1 and 2 apply.

Table 1 — Symbols

Symbol	Unit	Description
d_{average}	m	average wheel diameter between new and fully worn condition
d_{max}	m	wheel diameter in new condition
d_{min}	m	wheel diameter at limit of wear condition
D_{max_n}	m	maximum bore diameter under loaded condition of the new housing
D_{min_n}	m	minimum bore diameter under loaded condition of the new housing
D_{max_r}	m	maximum bore diameter under loaded condition of the reference housing
D_{min_r}	m	minimum bore diameter under loaded condition of the reference housing

Symbol	Unit	Description
F	N	force
F_0	N	reference vertical force applied per wheelset on the track
F_a	N	axial test force
F_{an}	N	nominal axial test force
F_r	N	radial test force
F_{rn}	N	nominal radial test force
g	m/s ²	acceleration due to gravity (9,81 m/s ²)
j	-	number of wheelsets per vehicle
m_2	kg	wheelset mass and masses on the wheelset between rolling circles, like brake disc, etc.
m_{max}	kg	vehicle design mass according to EN 15663
n	rpm	rotational test speed corresponding to v
n_{test}	rpm	nominal rotational test speed corresponding to v_{max} with an increase of 10 %
t_1	s	time of one test cycle (see A.6)
t_2	s	time of one elementary trip
t_3	s	ramp up or ramp down time from $n = 0 \rightarrow n = n_{test}$ or $n = n_{test} \rightarrow n = 0$ during one elementary trip
t_4	s	time at rotational speed n_{test} during one elementary trip
t_5	s	stop time ($n = 0$)
t_6	s	time of one half load cycle of the alternating axial test force
t_7	s	time during which axial test force is applied (including ramp up and ramp down) within the period t_6
t_8	s	ramp up or ramp down time from $F_a = 0 \rightarrow F_a = F_{an}$ or $F_a = F_{an} \rightarrow F_a = 0$ during one half load cycle of the alternating axial test force
t_9	s	axial test force recovery time
T_a	°C	ambient temperature
T_{z20}	°C	measured temperature re-calculated to an ambient temperature of 20 °C
T_{zm}	°C	measured temperature at a position z (measured positions are loading zones and target zones)
v	km/h	speed of the vehicle
v_{max}	km/h	maximum permissible operational speed of the vehicle for normal service

Table 2 — Abbreviations

Abbreviation	Description
HABD	hot axlebox detector
ICP	inductively coupled plasma (spectrometry)
MEP	mounted end play
XRF	X-ray fluorescence (spectrometry)

5 Test specification

5.1 General requirements

The test specification shall consist of all the information describing test parameters and acceptance criteria. It includes the inputs of the rig performance test, the optional water tightness test and the field test.

The following information shall be fully documented in the test specification and shall be part of the approval process. The requirements as specified in this European Standard shall be satisfied before a claim of compliance with this European Standard can be made and verified.

5.2 Test specification content

5.2.1 General

The following requirements which are specified in the clauses referred to shall at least be fully documented and included in the test specification.

5.2.2 Rig tests

a) Performance test:

- performance test report recipients list;
- quality management system accreditation and its scope;
- interface drawing showing mounting conditions of all components as in-service;
- boundary dimensions and interface tolerances of the rolling bearing(s);
- MEP requirements;
- conditions of production of the bearings (serial production, prototype);
- grease (according to EN 12081) designation, quantity and distribution, batch reference and production date;
- specification of the test parameters according to 7.2.2;
- deviations to the test parameters in A.4 and A.6;
- approval procedure type with regard to Clause 14 and Annex E of EN 12080:2017 as well as A.9 of this standard;
- required test distance;

- deviations to the performance test report according to 7.5;
- possible extrapolation of the physico-chemical criteria according to A.8.2.

b) Water tightness test (optional):

- water tightness report recipients list;
- requirement of a water tightness test according to Annex C;
- quality management system accreditation and its scope;
- interface drawing showing mounting conditions of all components as in-service;
- conditions of production of the bearings (serial production, prototype);
- specification of the test parameters according to C.3.

5.2.3 Field test

- field test report recipients list;
- reference to the linked performance test report or proven design application;
- specification of the test parameters according to 8.3;
- required test distance;
- annual specified distance travelled of the intended service;
- minimum quantity of axleboxes to be monitored;
- duration (in terms of time or distance travelled) of each intermediate inspection interval;
- scope of monitoring and inspections activities;
- values for iron content and copper content if a grease analysis is specified and if not, for information only.

6 Water tightness test

The test specification shall specify whether a water tightness test shall be made.

This test shall be performed as described in Annex C.

In case of a new seal, a water tightness test should be performed.

7 Rig performance test

7.1 General

The purpose of the rig performance test is to check the satisfactory design and safe function of the axlebox during a sequence of simulated journeys.

Rig performance test and mandatory grease analyses shall be performed by a competent test facility.

NOTE Competence of a test facility is usually proven by accreditation to EN ISO/IEC 17025.