

Accreditation



The Deutsche Akkreditierungsstelle attests with this **Accreditation Certificate** that the testing laboratory

ALSTOM Transportation Germany GmbH
Prüfstelle für Schienenfahrzeuge
Am Rathenaupark, 16761 Hennigsdorf

meets the requirements according to DIN EN ISO/IEC 17025:2018 for the conformity assessment activities listed in the annex to this certificate. This includes additional existing legal and normative requirements for the testing laboratory, including those in relevant sectoral schemes, provided they are explicitly confirmed in the annex to this certificate.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of testing laboratories and confirm generally with the principles of DIN EN ISO 9001.

This accreditation was issued in accordance with Art. 5 Para. 1 Sentence 2 of Regulation (EC) 765/2008, after an accreditation procedure was carried out in compliance with the minimum requirements of DIN EN ISO/IEC 17011 and on the basis of a review and decision of the appointed accreditation committees.

This accreditation certificate only applies in connection with the notices of 23.05.2023 with accreditation number D-PL-11003-01.
It consists of this cover sheet, the reverse side of the cover sheet and the following annex with a total of 15 pages.

Registration number of the accreditation certificate: **D-PL-11003-01-00**



Berlin, 23.05.2023

Dr.-Ing. Ernst Ulrich
Head of Technical Unit

Translation issued:
05.10.2023

Dr.-Ing. Ernst Ulrich
Head of Technical Unit

The certificate together with the annex reflects the status as indicated by the date of issue. The current status of any given scope of accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH (www.dakks.de).

Deutsche Akkreditierungsstelle GmbH

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60327 Frankfurt am Main

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The Deutsche Akkreditierungsstelle GmbH (DAkkS) is the entrusted national accreditation body of the Federal Republic of Germany according to § 8 section 1 AkkStelleG in conjunction with § 1 section 1 AkkStelleGBV. DAkkS is designated as the national accreditation authority by Germany according to Art. 4 Para. 4 of Regulation (EC) 765/2008 and clause 4.7 of DIN EN ISO/IEC 17000.

Pursuant to Art. 11 section 2 of Regulation (EC) 765/2008, the accreditation certificate shall be recognised as equivalent by the national authorities within the scope of this Regulation as well as by the WTO member states that have committed themselves in bilateral or multilateral mutual agreements to recognise the certificates of accreditation bodies that are members of ILAC or IAF as equivalent.

DAkkS is a signatory to the multilateral agreements for mutual recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Co-operation (ILAC).

The up-to-date state of membership can be retrieved from the following websites:

EA: www.european-accreditation.org

ILAC: www.ilac.org

IAF: www.iaf.nu

Deutsche Akkreditierungsstelle GmbH

Annex to the accreditation certificate D-PL-11003-01-00 in accordance with DIN EN ISO/IEC 17025:2018

Valid from: 23.05.2023

Issue date: 24.07.2023

Holder of certificate:

ALSTOM Transportation Germany GmbH
Prüfstelle für Schienenfahrzeuge
Am Rathenaupark, 16761 Hennigsdorf

The testing laboratory meets the requirements of DIN EN ISO/IEC 17025:2018 to carry out the conformity assessment activities listed in this Appendix. The testing laboratory shall, where appropriate, comply with additional legal and normative requirements, including those in relevant sectoral programmes, provided that these are explicitly confirmed below.

The requirements for the management system in DIN EN ISO/IEC 17025 are written in a language relevant to testing laboratories and are generally in accordance with the principles of DIN EN ISO 9001.

Investigation of running and braking behavior of railway vehicles; determination of safety against derailment of rail vehicles as well as roll centre height and coefficient of flexibility; test of railway current collectors for overhead lines (interaction current collector / overhead line); acoustic testing of rail vehicles; vibration testing of rail vehicles; test for the assessment of driving comfort in railway vehicles; measurement with strain gauges on railway vehicles and their components

Within the test areas marked with *, the testing laboratory is permitted to use the standardized test methods listed here with different revision levels of the standards without prior disclosure to or agreement by DAKkS.

The testing laboratory has an up-to-date list of all test methods within the flexible scope of accreditation.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of testing laboratories. Laboratories that confirm to the requirements of this standard operate generally in accordance with the principles of DIN EN ISO 9001.

The certificate together with the annex reflects the status as indicated by the date of issue. The current status of the scope of accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH (DAkkS). <https://www.dakss.de/en/accredited-bodies-search.html>

Abbreviations used: see last page

Page 1 of 15

This document is a translation. The definitive version is the original German annex to the accreditation certificate.

Annex to the accreditation certificate D-PL-11003-01-00

1 Brake tests of rail vehicles

TSI Loc & Pas EUV 1302/2014 2014-11	Commission Regulation (EU) No 1302/2014 of 18 November 2014 concerning a technical specification for interoperability relating to the "rolling stock - locomotives and passenger rolling stock" subsystem of the rail system in the European Union (here only: chapter 4.2.4, 6.2.3.9, 6.2.3.10)
UIC 540* 2016-08	Brakes - Air Brakes for freight trains and passenger trains
UIC 541-03* 2015-08	Brakes - Specifications for the construction of various brake parts - Driver's brake valve / Driver's brake controller
UIC 541-04* 2014-10	Brakes - Regulations concerning the manufacture of brake components - Self-adjusting load-proportional braking system and automatic "empty-loaded" control device
UIC 541-05* 2016-03	Brakes - Manufacturing specifications for various brake parts - Wheel Slide Protection device (WSP)
UIC 541-06* 2013-03	Brakes - Specifications for the construction of various brake components - Magnetic brakes
UIC 541-1* 2016-10	Brakes - Regulations concerning the design of brake components
UIC 541-5* 2005-12	Brakes - Electropneumatic brake (EP brake) - Electropneumatic emergency brake override (EBO)
UIC 544-1* 2014-10	Brakes - Braking performance
UIC 544-2* 1983-01	Conditions to be observed by the dynamic brake of locomotives and motor coaches so that the extra braking effort produced can be taken into account for the calculation of the brake-weight
UIC 546* 2014-10	Brakes - Specifications for the construction of various brake parts - High power brakes for passenger trains
UIC 547* 1989-07	Brakes; air brake; standard programme of tests
DIN EN 13452-1* 2005-01	Railway applications - Braking - Mass transit brake systems - Part 1: Performance requirements

Valid from: 23.05.2023

Date of issue: 24.07.2023

Annex to the accreditation certificate D-PL-11003-01-00

DIN EN 13452-2* 2005-01	Railway applications - Braking - Mass transit brake systems - Part 2: Methods of test
DIN EN 14198* 2021-07	Railway applications - Braking - Requirements for the brake system of trains hauled by locomotives
DIN EN 15734-2* 2022-04	Railway applications - Braking systems of high speed trains - Part 2: Test methods
DIN EN 15806* 2011-01	Railway applications - Braking - Static brake testing
DIN EN 15595* 2021-07	Railway applications - Braking - Wheel slide protection
DIN EN 15663* 2019-03	Railway applications - Vehicle reference masses
DIN EN 16185-2* 2020-01	Railway applications - Braking systems of multiple unit trains - Part 2: Test methods
DIN EN 16834* 2019-07	Railway applications - Braking - Brake performance
DIN EN 17065* 2018-08	Railway applications - Braking - Passenger coach test procedure
DIN 25008* 2005-10	Railway vehicles - Principles for the determination of vehicle weights - Terms and definitions, symbols, values
DIN EN 50215* (VDE 0115-101) 2010-07	Railway applications - Rolling stock - Testing of rolling stock on completion of construction and before entry into service
EBA-Regelung* 2017-06	Regulations for the brake assessment of rail vehicles in the context of acceptance in accordance with § 32 EBO
BOStrab 1987-12	Regulation on the construction and operation of trams (Tram Construction and Operating Regulations)
BOStrab (TR Br)* 2008-12	Technical Rules for the Design and Testing of Brakes for Vehicles in accordance with the German Federal Regulations on the Construction and Operation of Light Rail Transit Systems (BOStrab) - Technical Rules for Brakes (TR Br)

Valid from: 23.05.2023

Date of issue: 24.07.2023

2 Testing of running characteristics of railway vehicles

TSI WAG EUV 321/2013 2013-03	Commission Regulation (EU) No 321/2013 of 13 March 2013 concerning the technical specification for interoperability relating to the subsystem "rolling stock - freight wagons" of the rail system in the European Union and repealing Decision 2006/861/EC <i>(here only: chapter 4.2.3.5.2; 6.2.2.3; Annex B)</i>
TSI Loc & Pas EUV 1302/2014 2014-11	Commission Regulation (EU) No 1302/2014 of 18 November 2014 concerning a technical specification for interoperability relating to the "rolling stock - locomotives and passenger rolling stock" subsystem of the rail system in the European Union <i>(here only: chapter 4.2.3.2, 4.2.3.4.2, 4.2.3.4.3, 6.2.3.4 and 6.2.3.6)</i>
UIC 518* 2009-10	Testing and approval of railway vehicles from the point of view of their dynamic behaviour - Safety - Track fatigue - Ride quality
UIC 519* 2004-12	Method for determining the equivalent conicity
DIN EN 14363* 2022-10	Railway applications - Testing and Simulation for the acceptance of running characteristics of railway vehicles - Running Behaviour and stationary tests
DIN EN 15302* 2021-12	Railway applications - Wheel-rail contact geometry parameters - Definitions and methods for evaluation
DIN EN 15654-2* 2019-06	Railway applications - Measurement of vertical forces on wheels and wheelsets - Part 2: Test in workshop for new, modified and maintained vehicles

Annex to the accreditation certificate D-PL-11003-01-00

3 Determination of safety against derailment of rail vehicles

ERRI B55/RP8* 1983-04	Prevention of derailment of goods wagons on distorted tracks
DIN EN 14363* 2022-10	Railway applications - Testing and Simulation for the acceptance of running characteristics of railway vehicles - Running Behaviour and stationary tests
TSI WAG EUV 321/2013 2013-03	Commission Regulation (EU) No 321/2013 of 13 March 2013 concerning the technical specification for interoperability relating to the subsystem "rolling stock - freight wagons" of the rail system in the European Union and repealing Decision 2006/861/EC <i>(here only: chapter 6.2.2.2)</i>
TSI Loc & Pas EUV 1302/2014 2014-11	Commission Regulation (EU) No 1302/2014 of 18 November 2014 concerning a technical specification for interoperability relating to the "rolling stock - locomotives and passenger rolling stock" subsystem of the rail system in the European Union <i>(here only: chapter 4.2.3.4.1 und 6.2.3.3)</i>

4 Determination of the roll center height and the coefficient of flexibility

TSI WAG EUV 321/2013 2013-03	Commission Regulation (EU) No 321/2013 of 13 March 2013 concerning the technical specification for interoperability relating to the subsystem "rolling stock - freight wagons" of the rail system in the European Union and repealing Decision 2006/861/EC <i>(here only: chapter 6.2.2.2)</i>
TSI RST HS 2008/232/EG 2008-09	Commission Decision of 21 February 2008 concerning a technical specification for interoperability relating to the "rolling stock" sub-system of the trans-European high-speed rail system <i>(here only: chapter 4.2.3.9)</i>
TSI Loc & Pas EUV 1302/2014 2014-11	Commission Regulation (EU) No 1302/2014 of 18 November 2014 concerning a technical specification for interoperability relating to the "rolling stock - locomotives and passenger rolling stock" subsystem of the rail system in the European Union <i>(here only: chapter 4.2.3.1)</i>
UIC 505-1* 2006-05	Railway transport stock - Rolling stock construction gauge

Valid from: 23.05.2023

Date of issue: 24.07.2023

Page 5 of 15

- Translation -

Annex to the accreditation certificate D-PL-11003-01-00

UIC 505-5* Annex C4 1977-01	Basis conditions common to leaflets 505-1 to 505-4; notes on the preparation and provisions of these leaflets <i>(withdrawn standard)</i>
UIC 505-5* Annex C4 2010-04	History, justification and commentaries on the elaboration and development of UIC leaflets of the series 505 and 506 on gauges
DIN EN 14363* 2022-10	Railway applications - Testing and Simulation for the acceptance of running characteristics of railway vehicles - Running Behaviour and stationary tests

5 Test of railway Pantographs for overhead lines (interaction Pantographs / overhead line)

IEC 60494-1* 2013-09	Rolling stock - Pantographs - Characteristics and tests - Part 1: Pantographs for main line vehicles <i>(here only: chapter 6.9, 6.10, 6.11)</i>
IEC 60494-2* 2013-09	Rolling stock - Pantographs - Characteristics and tests - Part 2: Pantographs for metros and light rail vehicles <i>(here only: chapter 6.9)</i>
IEC 62846* 2016-10	Railway applications - Current collection systems - Requirements for and validation of measurements of the dynamic interaction between pantograph and overhead contact line <i>(except: section 8, 9; Annex A, B)</i>
DIN EN 50206-1* 2011-02	Railway applications - Rolling stock - Pantographs: Characteristics and tests - Part 1: Pantographs for main line vehicles <i>(here only: chapter 6.3.2, 6.9, 6.10, 6.11 und 6.12)</i>
DIN EN 50206-2* 2011-02	Railway applications - Rolling stock - Pantographs: Characteristics and tests - Part 2: Pantographs for metros and light rail vehicles <i>(here only: chapter 6.9)</i>
DIN EN 50317* 2012-05	Current collection systems - Requirements for and validation of measurements of the dynamic interaction between pantograph and overhead contact line <i>(except: chapter 8 und 9)</i>

Valid from: 23.05.2023
Date of issue: 24.07.2023

Annex to the accreditation certificate D-PL-11003-01-00

VO (EU) 1301/2014 2014-11	Commission Regulation (EU) No 1301/2014 of 18 November 2014 on the technical specifications for interoperability relating to the 'energy' subsystem of the rail system in the Union (only sections 4.2.11, 4.2.12, 6.1.4.1, 6.2.4.5)
EUV 1301/2014BER 2015-01	Corrigendum to Commission Regulation (EU) No 1301/2014 of 18 November 2014 on the technical specifications for interoperability relating to the "energy" subsystem of the rail system in the Union
EUV 2018/868 2018-06	Commission Implementing Regulation (EU) 2018/868 of 13 June 2018 amending Regulation (EU) No 1301/2014 and Regulation (EU) No 1302/2014 as regards provisions on energy measuring system and data collecting system
EUV 2019/776 2019-05	Commission Implementing Regulation (EU) 2019/776 of 16 May 2019 amending Commission Regulations (EU) No 321/2013, (EU) No 1299/2014, (EU) No 1301/2014, (EU) No 1302/2014, (EU) No 1303/2014 and (EU) 2016/919 and Commission Implementing Decision 2011/665/EU as regards the alignment with Directive (EU) 2016/797 of the European Parliament and of the Council and the implementation of specific objectives set out in Commission Delegated Decision (EU) 2017/1474 (only sections 4.2.11, 4.2.12, 6.1.4.1, 6.2.4.5)
VO (EU) 1302/2014 2014-11	Commission Regulation (EU) No 1302/2014 of 18 November 2014 concerning a technical specification for interoperability relating to the 'rolling stock — locomotives and passenger rolling stock' subsystem of the rail system in the European Union (only sections 4.2.8.2.9.5, 4.2.8.2.9.6, 4.2.8.2.9.10, 5.3.10, 6.1.3.7, 6.2.3.20)
EUV 1302/2014BER 2015-01	Corrigendum to Commission Regulation (EU) No 1302/2014 of 18 November 2014 concerning a technical specification for interoperability relating to the "rolling stock - locomotives and passenger rolling stock" subsystem of the rail system in the European Union
EUV 1302/2014BER 2015-12	Corrigendum to Commission Regulation (EU) No 1302/2014 of 18 November 2014 concerning a technical specification for interoperability relating to the "rolling stock - locomotives and passenger rolling stock" subsystem of the rail system in the European Union

Annex to the accreditation certificate D-PL-11003-01-00

EUV 1302/2014BER 2016-04	Corrigendum to Commission Regulation (EU) No 1302/2014 of 18 November 2014 concerning a technical specification for interoperability relating to the "rolling stock - locomotives and passenger rolling stock" subsystem of the rail system in the European Union
EUV 2018/868 2018-06	Commission Implementing Regulation (EU) 2018/868 of 13 June 2018 amending Regulation (EU) No 1301/2014 and Regulation (EU) No 1302/2014 as regards provisions on energy measuring system and data collecting system
EUV 2019/776 2019-05	Commission Implementing Regulation (EU) 2019/776 of 16 May 2019 amending Commission Regulations (EU) No 321/2013, (EU) No 1299/2014, (EU) No 1301/2014, (EU) No 1302/2014, (EU) No 1303/2014 and (EU) 2016/919 and Commission Implementing Decision 2011/665/EU as regards the alignment with Directive (EU) 2016/797 of the European Parliament and of the Council and the implementation of specific objectives set out in Commission Delegated Decision (EU) 2017/1474

6 Acoustic testing of rail vehicles

ISO 1996-2* 2017-07	Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels
ISO 1999* 2013-10	Acoustics - Estimation of noise-induced hearing loss
ISO 9612* 2009-04	Acoustics - Determination of occupational noise exposure - Engineering method
TSI PRM 2008/164/EG 2008-07	Commission Decision of 21 December 2007 concerning the technical specification of interoperability relating to "persons with reduced mobility" in the trans-European conventional and high-speed rail system (here only: chapter 4.2.2.4 und 4.2.2.8.3)
TSI PRM EUV 1300/2014 2014-11	Commission Regulation (EU) No 1300/2014 of 18 November 2014 on the technical specifications for interoperability relating to accessibility of the Union's rail system for persons with disabilities and persons with reduced mobility (here only: chapter 4.2.2.3, 4.2.2.7.4)

Valid from: 23.05.2023
Date of issue: 24.07.2023

Annex to the accreditation certificate D-PL-11003-01-00

UIC 644* 1980-07	Warning devices used on tractive units employed on international services
UIC 651* 2002-07	Layout of driver's cabs in locomotives, railcars, multiple unit trains and driving trailers
DIN EN ISO 3095* 2014-07	Acoustics - Railway applications - Measurement of noise emitted by rail bound vehicles
DIN EN ISO 3381* 2022-09	Railway applications - Acoustics - Noise measurement inside rail bound vehicles
DIN EN ISO 3382-2* 2008-09	Acoustics - Measurement of room acoustic parameters - Part 2: Reverberation time in ordinary rooms
DIN EN ISO 3740* 2019-08	Acoustics - Determination of sound power levels of noise sources - Guidelines for the use of basic standards
DIN EN ISO 3743-1* 2011-01	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for small, movable sources in reverberant fields - Part 1: Comparison method for a hard-walled test room
DIN EN ISO 3744* 2011-02	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane
DIN EN ISO 3746* 2011-03	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane
DIN EN ISO 3747* 2011-03	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering/survey methods for use in situ in a reverberant environment
DIN EN ISO 9614-1* 2009-11	Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 1: Measurement at discrete points

Valid from: 23.05.2023

Date of issue: 24.07.2023

Annex to the accreditation certificate D-PL-11003-01-00

DIN EN ISO 9614-2* 1996-12	Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 2: Measurement by scanning (ISO 9614-2:1996); German version EN ISO 9614-2:1996
DIN EN ISO 11820* 1997-04	Acoustics - Measurements on silencers in situ
DIN EN 14752* 2020-03	Railway applications - Bodyside entrance systems for rolling stock German version EN 14752:2019
DIN EN 15153-2* 2020-03	Railway applications - External visible and audible warning devices - Part 2: Warning horns for heavy rail
DIN EN 15461* 2011-01	Railway applications - Noise emission - Characterisation of the dynamic properties of track sections for pass by noise measurements
DIN EN 15610* 2021-11	Railway applications - Acoustics - Rail and wheel roughness measurement related to rolling noise generation
DIN EN 15892* 2011-05	Railway applications - Noise Emission - Measurement of noise inside driver's cabs
DIN EN 16584-2* 2017-03	Railway applications - Design for PRM use - General requirements - Part 2: Information (<i>here only: chapter 5.3.5.4e), 5.3.3.2 b), c), d), e), Annex G</i>)
DIN CEN/TR 16891* DIN SPEC 38451 2017-03	Railway applications - Acoustics - Measurement method for combined roughness, track decay rates and transfer functions
DIN EN 17285* 2021-12	Railway applications - Acoustics - Measuring of door audible warnings
DIN 45642* 2004-06	Measurement of traffic noise
DIN 45680* 1997-03	Measurement and assessment of low-frequency noise immissions in the neighbourhood

Annex to the accreditation certificate D-PL-11003-01-00

DIN 45681* 2005-03	Acoustics - Determination of tonal components of noise and determination of a tone adjustment for the assessment of noise immissions
DIN 45681* Berichtigung 2 2006-08	Acoustics - Determination of tonal components of noise and determination of a tone adjustment for the assessment of noise immissions
DIN EN 60268-16* 2021-10	Sound system equipment - Part 16: Objective rating of speech intelligibility by speech transmission index
BGBL. II NR. 90/2006 2006-02	Ordinance of the Federal Government on the Protection of Employees from Exposure to Noise and Vibration (B-VOLV)
BGBL. NR. 414/1993 1993-06	Regulation: Rail vehicle noise permissibility regulation - SchLV Ordinance of the Federal Minister for Public Economy and transport of the Republic of Austria on the admissibility of noise from rail vehicles
VDV-Schrift 154* 2011-10	Noise caused by urban rail vehicles
VDV Mitteilung 1541* 2017-11	Sounds of railway vehicles in vehicle parking including preparatory and final service

7 Vibration testing of rail vehicles *

ISO 2631-1 2010-07 + Änderung 1 2010-07	Mechanical vibration and shock - Evaluation of human exposure to whole-body vibration - Part 1: General requirements; Amendment 1
ISO 14837-1 2005-07	Mechanical vibration - Ground-borne noise and vibration arising from rail systems - Part 1: General guidance
DIN ISO 10816-1 2017-03	Mechanical vibration - Measurement and evaluation of machine vibration - Part 1: General guidelines

Valid from: 23.05.2023
Date of issue: 24.07.2023

Annex to the accreditation certificate D-PL-11003-01-00

DIN ISO 10816-3 2018-01	Mechanical vibration - Evaluation of machine vibration by measurements on non-rotating parts - Part 3: Industrial machines with nominal power above 15 kW and nominal speeds between 120 r/min and 15000 r/min when measured in situ (ISO 10816-3:2009+Amd. 1:2017)
DIN ISO 13373-1 2002-07	Condition monitoring and diagnostics of machines - Vibration condition monitoring - Part 1: General procedures (ISO 13373-1)
DIN EN 60034-14 VDE 0530-14 2019-04	Rotating electrical machines - Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher - Measurement, evaluation and limits of vibration severity (IEC 60034-14:2018)
DIN EN ISO 5349-1 2001-12	Mechanical vibration - Measurement and evaluation of human exposure to hand-transmitted vibration - Part 1: General requirements
DIN EN ISO 5349-2 2015-12	Mechanical vibration - Measurement and evaluation of human exposure to hand-transmitted vibration - Part 2: Practical guidance for measurement at the workplace
DIN 45669-1 2020-06	Measurement of vibration immissions - Part 1: Vibration meters - Requirements and tests (<i>except: chapter 6.2</i>)
DIN 45669-2 2005-06	Measurement of vibration immission - Part 2: Measuring method
DIN 45672-1 2018-02	Vibration measurement associated with railway traffic systems - Part 1: Measuring method for vibration
DIN 45672-2 2020-11	Vibration measurement on railway traffic systems - Part 2: Evaluation method

8 Test for the assessment of driving comfort in railway vehicles *

ISO 2631-1 1997-05	Mechanical vibration and shock - Evaluation of human exposure to whole-body vibration - Part 1: General requirements
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Annex to the accreditation certificate D-PL-11003-01-00

UIC 513 1994-07	Guidelines for evaluating passenger comfort in relation to vibration in railway vehicles
UIC 518 2009-10	Testing and approval of railway vehicles from the point of view of their dynamic behaviour - Safety - Track fatigue - Ride quality
ISO 2631-1 AMD 1 2010-07	Mechanical vibration and shock - Evaluation of human exposure to whole-body vibration - Part 1: General requirements; Amendment 1
DIN EN 12299 2009-08	Railway applications - Ride comfort for passengers - Measurement and evaluation
DIN EN 14253 2008-02	Mechanical vibration - Measurement and calculation of occupational exposure to whole-body vibration with reference to health - Practical guidance
DIN EN 14363 2019-11	Railway applications - Testing and simulation for the acceptance of running characteristics of railway vehicles - Running behaviour and stationary tests
ERRI B153/RP8 1986-09	Application of the ISO 2631 standard to railway vehicles - Mechanical vibrations Measurement and analysis of the vibrations to which passengers and staff are exposed when travelling in railway vehicles
ERRI B153 RP11 1986-09	Application of the ISO 2631 standard to railway vehicles - Mechanical vibration Rail vehicle seat Laboratory method for evaluating vibration transmission
ERRI B207/RP2 1997-03	Effects of vibrations on passengers and drivers. Applications of the ISO and CEN standards concerned - Comfort evaluation of passengers seated in tilting and nontilting vehicles on curved track
ERRI C116 RP8 1977-04	Interaction between vehicles and track - Methods for assessing the comfort quality of passenger vehicles
VDI 2057 Blatt 1 2017-08	Human exposure to mechanical vibrations - Whole-body vibration
VDI 2057 Blatt 3 2017-03	Human exposure to mechanical vibration - Whole-body vibration at workplaces in buildings

Valid from: 23.05.2023

Date of issue: 24.07.2023

Page 13 of 15

- Translation -

Annex to the accreditation certificate D-PL-11003-01-00

9 Measurement with strain gauges on railway vehicles and their components *

DIN EN 13749 2011-06	Railway applications - Wheelsets and bogies - Method of specifying the structural requirements of bogie frames <i>(here only: chapter 6.2.5)</i>
DIN EN 12663-1 2015-03	Railway applications - Structural requirements of railway vehicle bodies - Part 1: Locomotives and passenger rolling stock (and alternative method for freight wagons) <i>(here only: chapter 8.3 c)</i>
DIN Paperback 491/1 2013-03	Railway vehicles 1 - Wheelsets <i>(here only: Annex 1)</i>
DIN Paperback 491/2 2013-10	Railway vehicles 2 – Railway applications wheelsets and bogies Bahnanwendungen - Radsätze und Drehgestelle <i>(here only: Application guideline for on-track testing in accordance with DIN EN 13749)</i>

Abbreviations used:

AMD	Amendment
ANSI	American National Standards Institute
BOStrab	Regulation on the construction and operation of trams
BGBL	Ordinance of the Federal Government
BNA	Federal Network Agency
CCS	control-command and signalling
DB	Guidelines of Deutsche Bahn AG
DIN	German Institute for Standardization
EBA	Federal Railway Authority
EN	European standards
ENE	Energy
ERRI	European Rail Research Institut
HENP	House procedure Alstom Special Testing
HS	High Speed
IEC	International Standard
ISO	International Organization of Standardization
Loc & Pas	locomotives and passenger rolling stock
UIC	Union Internationale des Chemins de fer
PRM	persons with reduced mobility
RST	rolling stock
TSI	Technical Specification for Interoperability
VDB	Association of the Railway Industry in Germany
VDI	Association of German Engineers
VDV	Association of German Transport Companies
WAG	rolling stock-freight wagons