

**Raudteelased rakendused. Rattapaarid ja
pöördvankrid. Pöördvankri raami konstruktsiooninõuete
spetsifitseerimise meetod**

Railway applications - Wheelsets and bogies - Method of
specifying the structural requirements of bogie frames

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 13749:2011 sisaldab Euroopa standardi EN 13749:2011 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 30.04.2011 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 30.03.2011.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 13749:2011 consists of the English text of the European standard EN 13749:2011.

This standard is ratified with the order of Estonian Centre for Standardisation dated 30.04.2011 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 30.03.2011.

The standard is available from Estonian standardisation organisation.

ICS 45.040

Standardite reprodutseerimis- ja levitamiseõigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

Right to reproduce and distribute belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without permission in writing from Estonian Centre for Standardisation.

If you have any questions about standards copyright, please contact Estonian Centre for Standardisation:
Aru str 10 Tallinn 10317 Estonia; www.evs.ee; Phone: 605 5050; E-mail: info@evs.ee

English Version

Railway applications - Wheelsets and bogies - Method of specifying the structural requirements of bogie frames

Applications ferroviaires - Essieux montés et bogies -
Méthode pour spécifier les exigences en matière de
résistance des structures de châssis de bogie

Bahnanwendungen - Radsätze und Drehgestelle -
Festlegungsverfahren für Festigkeitsanforderungen an
Drehgestellrahmen

This European Standard was approved by CEN on 26 February 2011.

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, 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

Contents

Page

Foreword	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Technical specification	7
4.1 Scope	7
4.2 General requirements	7
4.3 Design load cases	7
4.4 Vehicle conditions and interfaces	7
4.5 Particular requirements	8
5 Verification of the design data	8
6 Validation and acceptance of the design	8
6.1 General	8
6.2 The validation plan	8
6.2.1 Content	8
6.2.2 Structural analysis	10
6.2.3 Static tests	10
6.2.4 Fatigue tests	11
6.2.5 Track tests	11
7 Quality requirements	12
Annex A (informative) Symbols and units used in the informative annexes	13
A.1 Forces	13
A.2 Accelerations	13
A.3 Masses	14
A.4 Other symbols and units	14
A.5 Co-ordinate system	14
A.6 Bogie classification	16
Annex B (informative) Load cases	17
Annex C (informative) Loads due to bogie running	19
C.1 General	19
C.2 Examples of loads for bogies of passenger rolling stock - categories B-I and B-II	20
C.2.1 Exceptional loads	20
C.2.2 Normal service loads	21
C.3 Examples of loads for freight bogies with a central pivot and two sidebearers - category B-V	21
C.3.1 Bogie types	21
C.3.2 Relationship of vertical forces	21
C.3.3 Exceptional loads	22
C.3.4 Normal service loads	23
C.4 Examples of loads for bogies of locomotives (with two bogies) - category B-VII	23
C.4.1 Exceptional loads	23
C.4.2 Normal service loads	24
C.5 Examples of loads for bogies of metro, rapid transit, light rail vehicles and trams - categories B-III and B-IV	25
C.5.1 Application	25
C.5.2 Load cases	25
C.5.3 General expressions for the basic load cases	26
Annex D (informative) Loads due to components attached to the bogie frame	27
D.1 General	27
D.2 Component inertia loads	27

D.2.1	Derivation.....	27
D.2.2	Design accelerations for equipment attached to the bogie frame.....	28
D.2.3	Design accelerations for equipment attached to the axlebox.....	28
D.3	Loads resulting from viscous dampers.....	28
D.4	Loads resulting from braking.....	29
D.5	Loads resulting from traction motors.....	29
D.6	Forces applied on anti-roll systems.....	29
Annex E	(informative) Analysis methods and acceptance criteria.....	30
E.1	General.....	30
E.2	Loads.....	30
E.3	Analysis and acceptance.....	30
E.4	Structural acceptance criteria.....	30
E.4.1	Principle.....	30
E.4.2	Utilisation.....	31
E.4.3	Safety factor.....	31
E.4.4	Material strength.....	32
E.4.4.1	Requirement.....	32
E.4.4.2	Static strength.....	33
E.4.4.3	Fatigue strength.....	34
E.4.4.4	Stiffness criteria.....	36
Annex F	(informative) Examples of static test programmes.....	37
F.1	General.....	37
F.2	Static test programme for bogies of passenger rolling stock with body supported directly to the sideframes (categories B-I and B-II).....	38
F.2.1	Tests under exceptional loads.....	38
F.2.2	Tests under normal service loads.....	38
F.3	Static test programme for bogies with central pivot and two sidebearers (category B-V).....	40
F.3.1	Bogie types.....	40
F.3.2	Tests under exceptional loads.....	40
F.3.3	Tests under normal service loads.....	40
F.4	Static test programme for bogies of locomotives.....	42
F.5	Static test programme for bogies of light rail vehicles and trams.....	42
F.5.1	General.....	42
F.5.2	Tests under exceptional loads.....	42
F.5.3	Tests under normal service loads.....	43
Annex G	(informative) Examples of fatigue test programmes.....	44
G.1	General.....	44
G.2	Fatigue test programme for bogies with the body supported directly on the sideframes (categories B-I and B-II).....	45
G.3	Fatigue test programme for a freight bogie with a central pivot and two sidebearers (category B-V).....	48
G.3.1	General.....	48
G.3.2	Vertical loads.....	48
G.3.3	Transverse loads.....	48
G.4	Fatigue test programme for locomotive bogies (category B-VII).....	50
G.5	Fatigue test programme for bogies of light rail vehicles and trams (category B-IV).....	50
Annex ZA	(informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC.....	51
	Bibliography.....	53

Foreword

This document (EN 13749:2011) 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 September 2011, and conflicting national standards shall be withdrawn at the latest by September 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 will supersede EN 13749:2005.

The general scope and requirements of EN 13749 are unaltered by this revision. Changes were necessary to make the standard compatible with more recent Euronorms. Certain areas of the normative text had to be revised to make correct reference to the structural analysis and validation processes now specified in the new bogie and running gear standard EN 15827. Other new normative references are to EN 15085 and EN 15663.

The other main changes that have been made concern the informative annexes and are summarized as follows:

- a) to comply with CEN rules, the symbols and units have been removed from the normative text and added as informative Annex A, as they apply only to the other informative annexes;
- b) the old informative Annex C has been removed and reference made to EN 15663, which now covers vehicle mass data;
- c) the informative Annex E has been re-written to present the structural analysis and acceptance process as specified in EN 15827;
- d) a number of errors in the example load case equations in informative Annex C have been corrected;
- e) the guidance on component loads in informative Annex D has been revised to better reflect present practice;
- f) the limitations of the example load case data in informative Annexes C, D, F and G have been given greater emphasis and it has been stressed that the loads should be used as presented only when it can be shown that they are applicable to the specific design.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to support 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 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, 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.

1 Scope

This European Standard specifies the method to be followed to achieve a satisfactory design of bogie frames and includes design procedures, assessment methods, verification and manufacturing quality requirements. It is limited to the structural requirements of bogie frames including bolsters and axlebox housings. For the purpose of this European Standard, these terms are taken to include all functional attachments, e.g. damper brackets.

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 15085-1, *Railway applications — Welding of railway vehicles and components — Part 1: General*

EN 15085-2, *Railway applications — Welding of railway vehicles and components — Part 2: Quality requirements and certification of welding manufacturer*

EN 15085-3, *Railway applications — Welding of railway vehicles and components — Part 3: Design requirements*

EN 15085-4, *Railway applications — Welding of railway vehicles and components — Part 4: Production requirements*

EN 15085-5, *Railway applications — Welding of railway vehicles and components — Part 5: Inspection, testing and documentation*

EN 15663, *Railway applications — Definition of vehicle reference masses*

EN 15827:2011, *Railway applications — Requirements for bogies and running gear*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15827:2011 and the following apply.

NOTE Annex A identifies the symbols, units, co-ordinate system and bogie categories used in the informative annexes to this European Standard.

3.1

axlebox

assembly comprising the box housing, rolling bearings, sealing and grease

3.2

bogie frame

load-bearing structure generally located between primary and secondary suspension

3.3

bolster

transverse load-bearing structure between vehicle body and bogie frame

3.4

static force

force which is constant with time

NOTE Force due to gravity is an example of static force.