

# SVENSK STANDARD

## SS-EN 13749:2011



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### **Järnvägar – Hjulpar och boggier – Strukturella krav och metoder för validering av boggiramar**

### **Railway applications – Wheelsets and bogies – Method of specifying the structural requirements of bogie frames**

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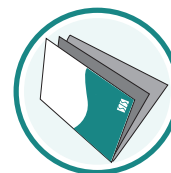
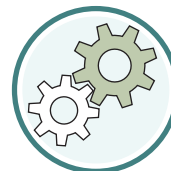
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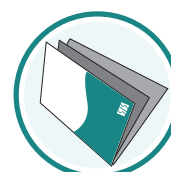
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Denna standard ersätter SS-EN 13749:2005, utgåva 1.

The European Standard EN 13749:2011 has the status of a Swedish Standard. This document contains the official version of EN 13749:2011.

This standard supersedes the Swedish Standard SS-EN 13749:2005, edition 1.

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EUROPEAN STANDARD

**EN 13749**

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2011

ICS 45.040

Supersedes EN 13749:2005

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.

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## 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.

### 3.5

#### **quasi-static force**

force, which changes with time at a rate which does not cause dynamic excitation

NOTE Quasi-static force might remain constant for limited periods.

### 3.6

#### **dynamic force**

transient, impulsive or continuous force, uniform or random, that changes with time at a rate that causes dynamic excitation

### 3.7

#### **load case**

set of loads or combinations of loads that represents a loading condition to which the structure or component is subjected.

### 3.8

#### **exceptional load case**

extreme load case representing the maximum load at which full serviceability is to be maintained and used for assessment against static material properties

### 3.9

#### **fatigue load case**

repetitive load case used for assessment against fatigue strength

### 3.10

#### **safety factor**

factor applied during the strength assessment which makes an allowance for a combination of the uncertainties and the safety criticality

### 3.11

#### **sideframe**

longitudinal structural member of the bogie frame

### 3.12

#### **primary suspension**

suspension system consisting of the resilient elements (and associated connecting and locating parts) generally located between the axlebox and bogie frame

### 3.13

#### **secondary suspension**

suspension system consisting of the resilient elements (and associated connecting and locating parts) generally located between the bogie frame and vehicle body or bolster

### 3.14

#### **track testing**

performing of tests under expected service conditions, on railway infrastructure that represents the actual operating environment, and monitoring and recording the responses

### 3.15

#### **validation**

process of demonstrating by analysis and/or test that the system under consideration meets in all respects the technical specification, including requirements due to regulations, for that system

### 3.16

#### **verification**

process of demonstrating by comparison or testing that an analytical result or estimated value is of an acceptable level of accuracy

## 4 Technical specification

### 4.1 Scope

The technical specification shall consist of all the information describing the functional requirements of the bogie frame and the interfaces with associated components and assemblies. It shall also comprise, as a minimum, the general requirements of use, the conditions associated with the vehicle equipped with the bogies, the operating characteristics, the conditions associated with maintenance and any other particular requirements.

The technical specification shall also identify all appropriate mandatory regulations and define the parts of the validation and acceptance procedure (Clause 6) and the quality requirements (Clause 7), which are specifically required, and the way in which evidence to show that the requirements have been met is to be provided.

**NOTE** If the customer is unable to define the technical specification completely the supplier may propose a technical specification and submit it to the customer (and the approval authority where relevant) for agreement.

### 4.2 General requirements

The technical specification shall indicate the type of bogie required in terms of its use. It shall also indicate the intended life of the bogie, its average annual distance run and its total distance run and all the information that is applicable to a bogie frame associated with the Essential Requirements of a TSI as indicated in EN 15827. Information that is particularly relevant to bogie frame design is indicated in the following clauses.

### 4.3 Design load cases

The technical specification for the bogie frame shall consist primarily of the load cases required for the design of the bogie as specified in EN 15827, plus any additional load cases required by that standard or arising from the application. The load cases shall be based on the vehicle mass states given in EN 15663. However, for some applications and fatigue assessment methods it will be necessary to use additional vehicle loading conditions (expressed as functions of the cases in EN 15663) to obtain an accurate description of the vehicle payload spectrum for design purposes.

The development of the design load cases is discussed in Annex B and examples of design load cases associated with bogie running and due to the attachment of equipment are given in Annexes C and D respectively.

**NOTE** If it is proposed to use the endurance limit approach to fatigue strength assessment the data on the number of events is not required and only the extreme repetitive load conditions need to be defined.

### 4.4 Vehicle conditions and interfaces

The technical specification shall also include the following information from the requirements of EN 15827 interpreted for applicability to the bogie frame:

- vehicle body interfaces and clearances;
- gauge reference profile and bogie movement envelope;
- suspension geometry and attachments;
- interfaces to traction and braking systems and all other attached equipment;
- electrical and pneumatic system connections;
- environmental requirements;
- maintenance requirements.