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Railway applications - Wheelsets and bogies - Powered
axles - Design method CONSOLIDATED TEXT

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 13104:2009+A2:2012 sisaldab Euroopa standardi EN 13104:2009+A2:2012 ingliskeelset teksti.

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English Version

Railway applications - Wheelsets and bogies - Powered axles - Design method

Applications ferroviaires - Essieux montés et bogies -
Essieux-axes moteurs - Méthode de conception

Bahnanwendungen - Radsätze und Drehgestelle -
Treibradsatzwellen - Konstruktionsverfahren

This European Standard was approved by CEN on 26 December 2008 and includes Amendment 1 approved by CEN on 14 September 2010 and Amendment 2 approved by CEN on 25 September 2012.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 13104:2009+A2:2010) 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of an identical text or by endorsement, at the latest by April 2013, and conflicting national standards shall be withdrawn at the latest by April 2013.

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 comprises amendment 1 adopted by CEN on 2010-09-14 and amendment 2 adopted by CEN on 2012-09-25.

This document supersedes ^{A2} EN 13104:2009+A1:2010 ^{A2}.

The start and end of the text added or modified by the amendment is indicated in the text by ^{A1} ^{A1} and ^{A2} ^{A2}.

^{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 ^{A1}.

^{A1} 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Railway axles were among the first train components to give rise to fatigue problems.

Many years ago, specific methods were developed in order to design these axles. They were based on a feedback process from the service behaviour of axles combined with the examination of failures and on fatigue tests conducted in the laboratory, so as to characterize and optimize the design and materials used for axles.

A European working group under the aegis of UIC¹ started to harmonize these methods at the beginning of the 1970s. This led to an ORE² document applicable to the design of trailer stock axles, subsequently incorporated into national standards (French, German, Italian).

This method was successfully extrapolated in France for the design of powered axles and the French standard also applies to such axles. Consequently this method was converted into a UIC leaflet.

The bibliography lists the relevant documents used for reference purposes. The method described therein is largely based on conventional loadings and applies the beam theory for the stress calculation. The shape and stress recommendations are derived from laboratory tests and the outcome is validated by many years of operations on the various railway systems.

This standard is based largely on this method which has been improved and its scope enlarged.

¹ UIC : Union Internationale des Chemins de fer.

² ORE: Office de Recherches et d'Essais de l'UIC.

1 Scope

This standard:

- defines the forces and moments to be taken into account with reference to masses, traction and braking conditions;
- gives the stress calculation method for axles with outside axle journals;
- specifies the maximum permissible stresses to be assumed in calculations for steel grade EA1N defined in EN 13261;
- describes the method for determination of the maximum permissible stresses for other steel grades;
- determines the diameters for the various sections of the axle and recommends the preferred shapes and transitions to ensure adequate service performance.

This standard is applicable to:

- solid and hollow powered axles for railway rolling stock;
- solid and hollow non-powered axles of motor bogies;
- solid and hollow non-powered axles of locomotives³;
- axles defined in prEN 13261;
- all gauges⁴.

This standard is applicable to axles fitted to rolling stock intended to run under normal European conditions. Before using this standard, if there is any doubt as to whether the railway operating conditions are normal, it is necessary to determine whether an additional design factor has to be applied to the maximum permissible stresses. The calculation of wheelsets for special applications (e.g. tamping/lining/levelling machines) may be made according to this standard only for the load cases of free-running and running in train formation. This standard does not apply to workload cases. They are calculated separately.

For light rail and tramway applications, other standards or documents agreed between the customer and supplier may be applied.

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 13260:2003, *Railway applications — Wheelsets and bogies — Wheelsets — Product requirements*

EN 13261:2003, *Railway applications — Wheelsets and bogies — Axles — Product requirements*

³ In France, the interpretation of the term "locomotive" includes locomotives, locomoteurs or locotracteurs.

⁴ If the gauge is not standard, certain formulae need to be adapted