

# SVENSK STANDARD

## SS-EN 15273-1:2013



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### **Järnvägar – Profiler – Del 1: Allmänt – Gemensamma regler för infrastruktur och fordon**

### **Railway applications – Gauges – Part 1: General – Common rules for infrastructure and rolling stock**



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Denna standard ersätter SS-EN 15273-1:2010, utgåva 1.

The European Standard EN 15273-1:2013 has the status of a Swedish Standard. This document contains the official version of EN 15273-1:2013.

This standard supersedes the Swedish Standard SS-EN 15273-1:2010, edition 1.

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EUROPEAN STANDARD

**EN 15273-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2013

ICS 45.020; 45.060.01

Supersedes EN 15273-1:2009

English Version

## Railway applications - Gauges - Part 1: General - Common rules for infrastructure and rolling stock

Applications ferroviaires - Gabarits - Partie 1: Généralités -  
Règles communes à l'infrastructure et au matériel roulant

Bahnanwendungen - Begrenzungslinien - Teil 1:  
Allgemeines - Gemeinsame Vorschriften für Infrastruktur  
und Fahrzeuge

This European Standard was approved by CEN on 15 December 2012.

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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## Foreword

This document (EN 15273-1:2013) 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of an identical text or by endorsement, at the latest by November 2013, and conflicting national standards shall be withdrawn at the latest by November 2013.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 replaces EN 15273-1:2009.

This document replaces EN 15273-1:2009 resulting from review from national standards organizations relating to the symbols, formulae and other incorrect technical content in the 2009 document.

Modifications compared to EN 15273-1:2009:

- Introduction: change to the last Subclause,
- 3.12: change to the symbols,
- 3.15: change to the definition,
- 3.20: change to the definition,
- 3.26: change to the definition,
- Clause 4. Table 1: change to the symbols and definitions,
- 5.4: change to the symbols,
- 5.5: change to Figure 13 and its key,
- 5.5: change to Figure 14 and its key,
- 5.5: change to Figure 15 and its key,
- 6.1.7: change to Formula 16,
- 7.2.1, Table 2: change to content,
- 7.2.2, Table 3: change to content,
- 7.3.1.1.1: change to Figure 20 and its key,
- 7.3.1.1.1: change to the formula under the 3<sup>rd</sup> indent under Figure 20,
- 7.3.1.1.1: change to Formulae (20), (21), (22), (23), (24), (25),
- 7.3.1.1.2: change to the symbol,

- 7.3.1.1.3.2: change to text and the formula,
- 7.3.1.1.3.2: change to Figure 21 and its key,
- 7.3.1.4.2: change to Formulae (29), (30), (31), (32),
- 7.3.1.4.2.2: change to text,
- 7.3.1.4.2.3: change to text and Formulae (36), (37), (38), (41), (42), (44), (45),
- 7.3.1.5: change to Formulae (51), (58), (59), (60),
- 7.3.1.6: change to Formulae (62), (63), (64), (65),
- 7.3.1.1.7: change to Formula (67),
- 7.3.1.9: integration of new Clause (6 pages),
- 7.3.10.1: change to Formula (78),
- 7.3.10.2: change to Formulae (79), (80),
- 7.3.1.14: change to the two first paragraphs, new Figure 28, new text in front of Formula (88),
- 7.3.2.1: new text,
- 7.3.2.2.1: change to Formulae (97), (98), (99), (100), (101), (102), (103); new Figure 29,
- 7.3.2.2.2: change to the symbols,
- 7.3.2.2.3: new reference in the first Subclause, change to Figure 30 and its key, new Formulae (104), (105) and modified text,
- 7.3.2.2.4: new symbols in the text, new Formulae (106), (107), (108),
- 7.3.2.2.5: new reference in the first paragraph, change to Figure 31 and its key, new Formulae (109), (110), (111), (112) and modified text with new symbols,
- 7.3.2.4.1: change to the symbols and references,
- 7.3.2.4.2: change to symbols, references, new Formula (113) and new Figure 35,
- 7.3.2.4.3: new symbols and references in the text, change to Formulae (114), (115), (116), (121),
- 7.3.3: new symbols and references, change to Figure 38,
- 7.3.3.2: change to Formula (122),
- 7.3.3.3: new symbols and references in the text,
- 7.3.4.1.2: change to Formula (123),
- 7.3.4.1.3: change to references in the text, new Formula (124), new Figures 40 and 41,
- 7.3.4.1.5: new symbols and references in the text, new Formulae (125), new Figure 44,
- 8.1.1: change to text,

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- 8.1.1.2: change to 6<sup>th</sup> indent, new Figure 45, new last sentence,
- 8.1.1.3: new Figure 46,
- 8.1.1.4: new Figure 47,
- 8.1.2: new Formulae (129), (131), (133),
- 8.1.3.1.3: new Title, new Formulae (140), (146), (152), (158), (159),
- 8.1.3.1.4: change to text,
- 8.2.1: new Formulae (163), (164), (165),
- Annex A: change to Table A.1, Table A.2 and Table A.4,
- B.1.1.2.1: new symbol,
- B.1.1.2.2: new Table B.1,
- B.1.1.2.3: new introductory subclause and change to Table B.2,
- B.1.2.1: new key for Figure B.3,
- B.1.2.2: new title, new introductory subclause, new key and title for Figure B.4,
- B.1.2.3.1: new symbol and new Table B.5,
- B.2.3.1: new symbol,
- B.2.3.2: new introductory subclause and change to Figure B.6, Table B.4, and Table B.5,
- B.2.3.3: new introductory subclause and new Table B.6,
- B.3.2: new references,
- B.3.3.1: new symbol,
- B.3.3.2: change to Table B.7 and Table B.8,
- B.3.3.3: new introductory subclause and change to Table B.9,
- B.4.2: new references,
- B.4.3.1: new symbol,
- B.4.3.2: new Table B.10,
- B.4.3.3: new text,
- B.4.4.1: new references,
- B.5.2: new references and new Figure B.15,
- B.5.3.1: new symbol,

- B.5.3.2: new Table B.13,
- B.5.4: new references,
- B.6: new clause (10 pages),
- C.1.1.2.1: new references,
- C.1.1.2.1: new Table C.1
- C.1.2.1.2: new Figure C.4 (and key),
- C.1.2.2.1: new symbol,
- C.2.2: new Figure C.5,
- C.2.3.1: new symbol,
- C.2.3.2: new introductory subclause and change to Table C.4 and Table C.5,
- C.2.3.3: new Table C.6,
- C.2.3.4: new text,
- C.3.3.1: new symbol,
- C.2.3.2: change to Table C.7 and Table C.8,
- C.3.3.3: new Table C.9,
- C.4.2: new Figure C.8,
- C.4.3.1: new symbol,
- C.4.3.2: change to Table C.10,
- C.5.3.1: new symbol,
- C.5.3.2: new Table C.11,
- C.5.3.3: new Table C.12,
- C.6.3.1: new symbol,
- C.6.3.2: new Table C.13 and Table C.14,
- C.6.3.3: new Table C.15,
- C.8.2.1: new symbol,
- C.8.2.2: new Table C.16,
- C.8.3: new Table C.17,
- C.9.1: new Figure C.20,

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- C.9.2: change to the first sentence and the references,
- C.9.3.1: new symbol,
- C.9.3.2: new Table C.18 and Table C.19,
- C.9.4: new Table C.20,
- C.10.2: new reference for Table C.21,
- C.10.3.1: new symbol,
- C.10.3.2: new symbol,
- C.10.4: new Table C.22,
- C.12: new clause (12 pages),
- D.1.1: change to the first sentence and new Figure D.1,
- D.1.2: change to the first sentence and new Figure D.3,
- D.1.3.1: new symbol,
- D.1.3.2: new Table D.1,
- D.1.3.3: new Table D.2,
- E.1: change to the first sentence,
- E.2.2: new symbol and new formula,
- E.3.2: new symbol,
- Annex F: new introductory subclause,
- F.3.1: new title,
- F.3.1.1: new symbol,
- F.3.1.2: new Figure F.1 with new key, new text, new Formulae (F.2), (F.3), (F.4), (F.6),
- F.3.1.3: new text, new Formulae (F.8) and (F.10),
- F.3.2: new references,
- G.2: change to Table G.1,
- G.3: new references,
- G.4: change to Table G.3,
- G.5.1: change to symbols and formulae in the text, new Figures G.1 and G.2,
- G.5.2: changes to references, symbols and formulae in the text,

- Annex H: new references,
- H.2.1: new references and changes to formula in the text,
- H.2.2.2.2: new references and change to table, new Formulae (H.31) (x2), (H.32), (H.33), (H.34),
- Annex I: new references,
- Annex J: new references,
- J.3: new symbol and change to EN 15273-3:2013 (x2).

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

This document is the first of a series of three standards that comprise the European Standard covering gauges:

- part 1 covers general principles, phenomena shared by the infrastructure and by the rolling stock, reference profiles and their associated rules;
- part 2 gives the rules for dimensioning the vehicles according to their specific characteristics for the relevant gauge and for the related calculation method;
- part 3 gives the rules for dimensioning the infrastructure in order to allow vehicles built according to the relevant gauge taking into account the specific constraints to operate within it.

This standard defines the gauge as an agreement between infrastructure and rolling stock.

The aim of this standard is to define the space to be cleared and maintained to allow the running of rolling stock, and the rules for calculation and verification intended for sizing the rolling stock to run on one or several infrastructures without interference risk.

This standard defines the responsibilities of the following parties:

- a) for the infrastructure:
  - 1) gauge clearance,
  - 2) maintenance;
  - 3) infrastructure monitoring.
- b) for the rolling stock:
  - 1) compliance of the operating rolling stock with the gauge concerned;
  - 2) maintenance of this compliance over time.

This standard includes a catalogue of various railway gauges implemented in Europe, some of which are required to ensure the interoperability, while others are related to more specific applications. This catalogue is not exhaustive and the standard does not preclude the possibility of applying or defining other gauges not included in the catalogue for the specific needs of certain networks.



## 1 Scope

This European Standard is applicable to authorities involved in railway operation and may also be applied for light vehicles (e.g. trams, metros, etc. running on two rails) and their associated infrastructure, but not for systems such as rail-guided buses.

It allows rolling stock and infrastructures to be dimensioned and their compliance to be checked relative to applicable gauging rules.

For rolling stock and infrastructure, this standard is applicable to new designs, to modifications and to the checking of vehicles and infrastructures already in use.

This document EN 15273-1 covers:

- the general principles;
- the various elements and phenomena affecting the determination of gauges;
- the various calculation methods applicable to the elements shared by the infrastructure and by the rolling stock;
- the sharing rules for elements taken into account in calculations specific to the infrastructure and to the rolling stock;
- a catalogue of European gauges.

This document does not cover:

- conditions to be met to ensure safety of passengers on platforms and of persons required to walk along the tracks;
- conditions to be met by the fixed equipment maintenance machines in active position;
- the space to be cleared for the running track of rubber-tyred metros and other vehicles;
- rules applicable to extraordinary transportation, however some formulae may be used;
- rules applicable to the design of the overhead contact line system;
- rules applicable to the design of the current collection system on a third rail;
- simulation methods for the running of vehicles, however, it does not confirm the validity of existing simulations;
- verification rules of wagon loadings;
- coding methods for combined transportation;
- infrastructure gauges for very small curve radii (e.g.  $R < 150$  m for gauge G1).

## 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.

EN 14067-2, *Railway applications — Aerodynamics — Part 2: Aerodynamics on open track*

EN 14067-3, *Railway applications — Aerodynamics — Part 3: Aerodynamics in tunnels*

EN 14363, *Railway applications — Testing for the acceptance of running characteristics of railway vehicles — Testing of running behaviour and stationary tests*

EN 15273-2:2013, *Railway applications — Gauges — Part 2: Rolling stock gauge*

EN 15273-3:2013, *Railway applications — Gauges — Part 3: Structure gauges*

EN 15313, *Railway applications — In-service wheelset operation requirements — In-service and off-vehicle wheelset maintenance*

EN 50367, *Railway applications — Current collection systems — Technical criteria for the interaction between pantograph and overhead line (to achieve free access)*

EN 50119, *Railway applications — Fixed installations — Electric traction overhead contact lines*

### 3 Terms and definitions

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

#### 3.1

##### running surface (of the track)

virtual plane coplanar with the rail tops of a track

#### 3.2

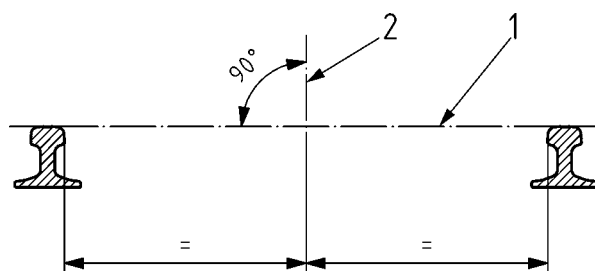
##### normal co-ordinates

are measured in relation to the orthogonal axes defined in a transverse plane, normal to the longitudinal centreline of the rails in the nominal position on a theoretically perfect track

Note 1 to entry: One of these axes, commonly referred to as the horizontal axis, is the intersection of the transverse plane with the running surface.

Note 2 to entry: The other axis, commonly referred to as the vertical axis, is perpendicular to the running surface and is equidistant from the rails.

Note 3 to entry: For calculation purposes, the vertical axis is used as a common reference for the infrastructure and for the rolling stock (see Figure 1).



#### Key

- 1 running surface
- 2 centreline of the vehicle and of the track

Figure 1 — Reference axes

**3.3****gauge**

set of rules including a reference profile and its associated calculation rules allowing definition of the outer dimensions of the rolling stock and the space to be cleared by the infrastructure

Note 1 to entry: According to the calculation method implemented, the gauge will be a static, kinematic or dynamic one.

**3.4****Reference Profile****RP**

line specific to each gauge, representing the cross-section shape and used as a common basis to work out the sizing rules of the infrastructure and of the rolling stock

**3.5****upper parts, lower parts**

upper parts correspond to the upper zone of the gauge and the lower parts correspond to the lower zone of the gauge

Note 1 to entry: The limit between the two parts is defined for each gauge.

**3.6****associated rules**

mathematical laws associated with each reference profile in order to size the infrastructure or rolling stock

**3.7****static gauge**

combination of the specific reference profile and its associated static rules

**3.8****kinematic gauge**

combination of the specific reference profile and its associated kinematic rules

**3.9****dynamic gauge**

combination of the specific reference profile and its associated dynamic rules

**3.10****absolute gauging method**

combination of a directory of the reference position of structures along a given route and of the dynamic rules associated with this route

**3.11****comparative gauging method**

set of rules allowing the comparing of the swept envelopes of various vehicles on the basis of their dynamic movements

**3.12****geometric overthrow**

$d_{gi}$  or  $d_{ga}$

difference between the distance, measured parallel to the running surface and in the transverse direction, of a part of the vehicle under consideration to the centre of a curved track with radius R and the distance of this same part, in the same conditions, to the centre of a straight track

Note 1 to entry: See detailed explanation in 5.1.