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Railway applications - Gauges - Part 1: General - Common rules for Rolling Stock and Infrastructure

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

Applications ferroviaires- Gabarits - Partie1 : Explications de base et règles communes pour Matériel roulant et Infrastructure

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Railway applications - Gauges - Part 1: General - Common rules for Rolling Stock and Infrastructure

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Explications de base et règles communes pour Matériel
roulant et Infrastructure

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

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 256.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 15273-1:2023) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document, together with prEN 15273-4:2023, will supersede EN 15273-1:2013+A1:2016.

prEN 15273 series consists of the following parts:

- prEN 15273-1:2023, *General -common rules for Rolling stock and Infrastructure* gives the general explanations of gauging and defines the sharing of the space between Rolling stock and infrastructure;
- prEN 15273-2:2023, *Rolling stock* gives the rules for dimensioning vehicles;
- prEN 15273-3:2023, *Infrastructure* gives the rules for positioning the infrastructure;
- prEN 15273-4:2023, *Catalogue of defined gauges* includes a non-exhaustive list of reference profiles and parameters to be used by infrastructure and Rolling stock;
- prCEN/TR 15273-5:2023, *Background, explanation and worked examples*.

The characteristics of issue 2023 of prEN 15273 series are:

- introduction of absolute and comparative gauging process in parts 1, 2, 3 and 5;
- specific rules given for each defined gauge in prEN 15273-2:2023 and prEN 15273-3:2023 are replaced by a common general set of basic formulae applicable for all. The applicable reference profile and the specific associated rules are given in part 4;
- a new prEN 15273-4:2023 gives the catalogue of gauges and associated rules coming from EN 15273-1:2013+A1:2016;
- a new prCEN/TR 15273-5:2023 gives background elements coming from EN 15273-1:2013+A1:2016 and worked examples.

In comparison with the previous edition, the following technical modifications have been made:

- the series was fully restructured, from three parts to five parts;
- Clause 3 and clause 4 now refer to prEN 15273-1:2023 where all terms and symbols are defined;
- harmonisation of symbols and index level for all parts of this series of standards;
- grouping in Annex A of the calculation elements specific to all defined templates from the paragraphs of Clauses 5, 6, 7 and 8;
- grouping in Annex B of elements specific to the defined kinematic gauge of Clauses 5, 6, 7 and 8;
- grouping in Annex C of elements specific to the static gauge defined in Clauses 5, 6, 7 and 8;
- improvement and grouping into Annex D of the dynamic gauge specific elements defined in Clauses 5, 6, 7 and 8;

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- content of 7.3.1.1.3 and 7.3.1.3 moved into prCEN/TR 15273-5:2023;
- Annexes B, C, D and F moved into prEN 15273-4:2023;
- removal of Annexes E, I and K;
- reordering of Annex H;
- Annex J moved into prCEN/TR 15273-5:2023;
- creation of normative Annex E for the description of the absolute gauging process;
- creation of normative Annex F for the description of the comparative gauging process.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

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Introduction

The aim of this document is to define the rules for the calculation and verification of the dimensions of rolling stock and infrastructure from a gauging perspective.

This document sets out gauging processes taking into account the relative movements between rolling stock and infrastructure as well as the necessary margins or clearances.

prEN 15273-1:2023 covers generic explanations and methods of gauging and is used in conjunction with the following parts:

- *Part 2: Rolling stock;*
- *Part 3: Infrastructure;*
- *Part 4: Catalogue of defined gauges;*
- *Part 5: Background, explanation and worked examples.*

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prEN 15273-1:2023 (E)**1 Scope**

This document contains:

- the definitions and symbols for all EN 15273 documents;
- the general explanation of various elements and phenomena affecting heavy rail gauging;
- the general explanation of various calculation methods and processes applicable to the heavy rail gauging that allow the dimensioning of the rolling stock and the infrastructure.

This document is applicable to heavy rail vehicles and networks using various track gauges. Other vehicles and networks are outside the scope of this document, but the rules may be applied to them.

This document is not applicable to the gauges “S” and “T” for track gauge 1 520 mm.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

prEN 15273-2:2023, *Railway applications — Gauges — Part 2: Rolling stock*

prEN 15273-3:2023, *Railway applications — Gauges — Part 3: Infrastructure*

prEN 15273-4:2023, *Railway applications — Gauges — Part 4: Catalogue of defined gauges*

prCEN/TR 15273-5:2023, *Railway applications — Gauges — Part 5: Background, explanation and worked examples*

EN 15313:2016, *Railway applications - In-service wheelset operation requirements - In-service and off-vehicle wheelset maintenance*

EN 15663:2017+A1:2018, *Railway applications — Vehicle reference masses*

EN 50119:2020, *Railway applications — Fixed installations — Electric traction overhead contact lines*

EN 50367:2020, *Railway applications — Current collection systems — Technical criteria for the interaction between pantograph and overhead line (to achieve free access)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardisation at the following addresses:

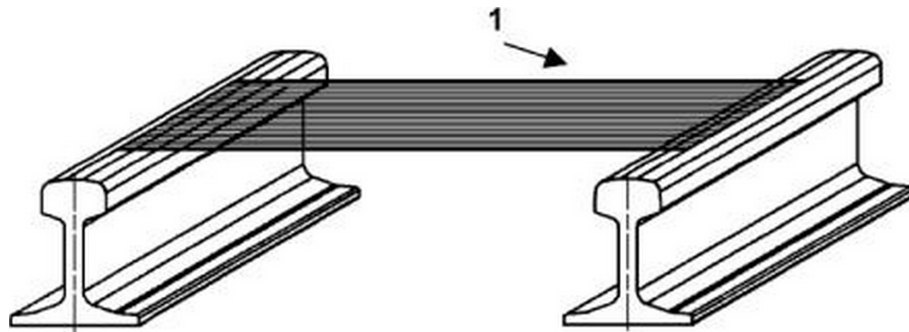
- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 gauging process
 procedure by means of which the dimensional compatibility of rolling stock and infrastructure is determined

3.2

running plane

plane tangential to the running surface as defined in EN 17343:2020, 3.1.5.3.2 and as shown in Figure 1



Key

- 1 running plane

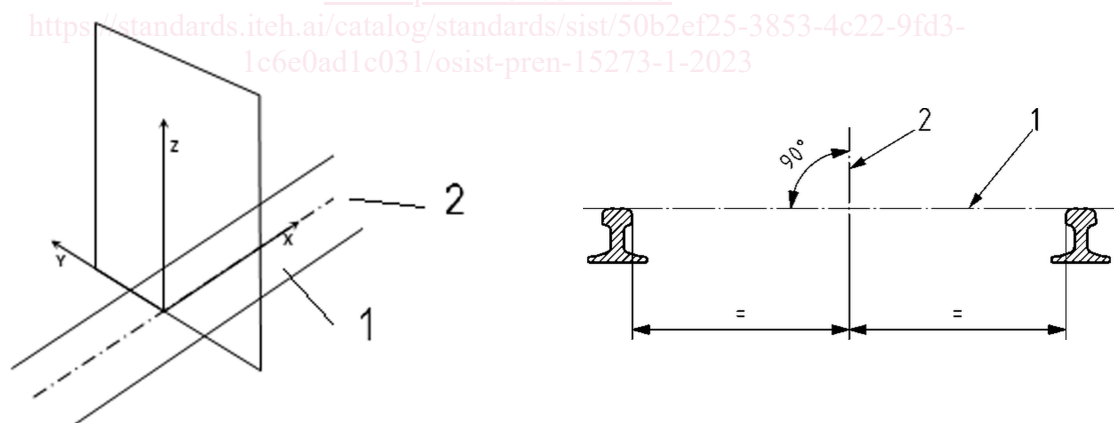
Figure 1 — Running plane

3.3

normal co-ordinates

co-ordinates defined in a plane normal to the longitudinal centreline of the rails at a nominal position on a theoretically perfect track

Note 1 to entry: One of these axes is the intersection of the normal plane with the running plane. The other axis, commonly referred to as vertical axis, is perpendicular to the running plane. For calculation purposes, the vertical axis is used as a common reference for infrastructure and rolling stock (see Figure 2).



Key

- 1 running plane (X and Y)
 2 longitudinal centreline of the vehicle and of the track (X)
 3 vertical centreline of the vehicle (Z)

Figure 2 — Normal co-ordinates

3.4

effective track position

used during the absolute gauging process, and represents a position that the track could realistically or with high probability occupy relative to structures or to an adjacent track at some times within its maintenance cycle

prEN 15273-1:2023 (E)**3.5****reference vehicle**

theoretical or actual vehicle, the parameters of which are used to establish the rules associated with a reference profile to obtain a gauge

3.6**comparator vehicle**

existing rolling stock already geometrically compatible with infrastructure and operating on a specified route to be used for the comparative gauging process

3.7**defined gauge**

reference profile and its associated 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.

3.8**reference profile****CR**

virtual line related to the normal coordinates and used, together with the associated rules, as a common basis to determine infrastructure gauge and the vehicle gauge

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3.9**upper part**

part of the reference profile as set out in prEN 15273-4:2023 for the defined gauges

Note 1 to entry: This corresponds to the upper sector for the absolute and comparative gauging process.

3.10**lower part**

part of the reference profile as set out in prEN 15273-4:2023

Note 1 to entry: This corresponds to the lower sector for the absolute and comparative gauging process.

3.11**bottom line**

line corresponding to the minimum height of the construction gauge

3.12**curve overthrow** **dg**

distance in direction Y or Z between the track and the vehicle in a curve

Note 1 to entry: See details in Figures A.2; E.2 for horizontal curve and A.7 for vertical curve.

Note 2 to entry: “curve overthrow” can also be called “geometric overthrow”.

3.13**associated rules**

set of rules associated with each reference profile in order to size the infrastructure or rolling stock

3.14**lateral projection** **S**

sum of these two values:

- S_R , value agreed between Infrastructure Manager and Railway Undertaking based on the lateral curve overthrow of reference vehicles;
- S_l , is the widening of the track gauge.

Note 1 to entry: See prCEN/TR 15273-5:2023 for more explanations.

Note 2 to entry: Lateral projection is also known as saillie.

3.15**vertical projection** **S_v**

value agreed between Infrastructure Manager and Railway Undertaking based on the vertical curve overthrow of reference vehicles

Note 1 to entry: See prCEN/TR 15273-5:2023 for more explanations.

Note 2 to entry: Vertical projection is also known as saillie.

3.16**absolute (swept envelope) vehicle gauge**

vehicle gauge which may have multiple swept envelopes associated with it

prEN 15273-1:2023 (E)**3.17****absolute (swept envelope) infrastructure gauge**

absolute (swept envelope) vehicle gauge(s) plus track tolerances and clearance

Note 1 to entry: Absolute (swept envelope) Infrastructure gauges are used to facilitate construction and maintenance of the infrastructure, not compatibility.

3.18**clearance**

free space or allowance between two elements, in particular, for absolute and comparative gauging process, the minimum calculated distance between the swept envelope of a vehicle and fixed infrastructure or between swept envelopes of two vehicles on adjacent tracks

3.19**absolute gauging process**

set of rules allowing the comparison of the swept envelope of a vehicle with infrastructure profiles on a given route and vehicles on adjacent track

3.20**comparative gauging process**

set of rules allowing the comparison of the swept envelopes of a candidate vehicle and a comparator vehicle in order to assess route compatibility

3.21**swept envelope**

cross sections perpendicular to the running plane encompassing all the points swept by the vehicle under consideration with its dynamic displacements in any possible position combined with running and operating conditions on a track of a given quality

3.22

hybrid gauging process /standards.iteh.ai/catalog/standards/sist/50b2ef25-3853-4c22-9fd3-
combination of various gauging processes applied to a vehicle to assess route compatibility

3.23**displacement coefficient**

A

factors applied to the clearance between wheelsets and track and to the lateral clearances between wheelsets and bogie frame and between bogie frame and body

3.24**quasi-static roll**

movement resulting from the inclination of the suspended parts under the influence of gravity (canted track) and/or centrifugal acceleration (curved track) without taking account of any additional dynamic effects

3.25**roll centre*****C***

point *C* is known as the roll centre of the vehicle and its distance h_c from the running plane is known as the height of the roll centre

h_c may be measured or calculated, in the case of extreme vehicle/bogie positions, this h_c height shall be taken into account with regard to one of the vehicle/bogie bumps stops:

- rotation movement stop;
- central movement stop.

3.26**cant*****D***

amount by which one running rail is raised above the other running rail, in a track cross section

3.27**equilibrium cant*****D_{eq}***

cant at a particular speed at which the vehicle will have a resultant force perpendicular to the running plane

3.28**cant excess**

difference between applied cant and a lower equilibrium cant

Note 1 to entry: See prCEN/TR 15273-5:2023 for details.

3.29**cant deficiency*****I***

difference between applied cant and a higher equilibrium cant

Note 1 to entry: See prCEN/TR 15273-5:2023 for details.

3.30**cross level**

cant measured on the track

3.31**flexibility coefficient*****s***

ratio of the angle η (angle between the vertical axis of the carbody tilted on its suspensions and the plane perpendicular to the running plane) to the angle δ (between the running plane and the horizontal plane) with the vehicle stationary on a canted track

Note 1 to entry: See detailed explanation in Annex A.

3.32**dissymmetry** **η_0**

angle η_0 between the centreline of the body of a stationary vehicle on a level track and the vertical axis

Note 1 to entry: The dissymmetry may come from construction tolerance or off-centred loading. See detailed explanation in Annex A.