



# SLOVENSKI STANDARD

## SIST EN 15273-1:2011

01-oktober-2011

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**Železniške naprave - Profili - 1. del: Splošno - Skupna pravila, ki se nanašajo na infrastrukturo in železniška vozila**

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

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

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

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**Ta slovenski standard je istoveten z: EN 15273-1:2009**

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**ICS:**

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EUROPEAN STANDARD

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## 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 3 October 2009.

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**EN 15273-1:2009 (E)****Foreword**

This document (EN 15273-1:2009) 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of an identical text or by endorsement, at the latest by June 2010, and conflicting national standards shall be withdrawn at the latest by June 2010.

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.

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## Introduction

This document is the first of a series of three parts of 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 as a function of 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 a one-to-one agreement between infrastructure and vehicle.

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, **STANDARD PREVIEW**  
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  - 2) maintenance; [SIST EN 15273-1:2011](https://standards.iteh.ai/catalog/standards/sist/65882c4e-8384-4317-8442-10b7db28d6cd/sist-en-15273-1-2011)
  - 3) infrastructure monitoring. <https://standards.iteh.ai/catalog/standards/sist/65882c4e-8384-4317-8442-10b7db28d6cd/sist-en-15273-1-2011>
- 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 standard does not exclude the possibility of implementing other gauges not listed in the catalogue.

**EN 15273-1:2009 (E)****1 Scope**

This European Standard is applicable by 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 vehicles and infrastructures to be dimensioned and their compliance to be checked relative to the gauging rules.

For the rolling stock and for the 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 vehicle;
- a catalogue of European gauges.

This document does not cover:

- conditions to be met to ensure safety of passengers on platforms and of persons walking 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 line;
- rules applicable to the design of the current collection on a third rail;
- simulation methods for the running of vehicles, therefore, 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 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 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, *Railway applications — Gauges — Part 2: Rolling stock gauges*

EN 15273-3:2009, *Railway applications — Gauges — Part 3: Structure gauges*

prEN 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 European Standard, the following terms and definitions apply.

#### 3.1

##### (track) running surface

virtual plane coplanar with the rail tops of a track

#### 3.2

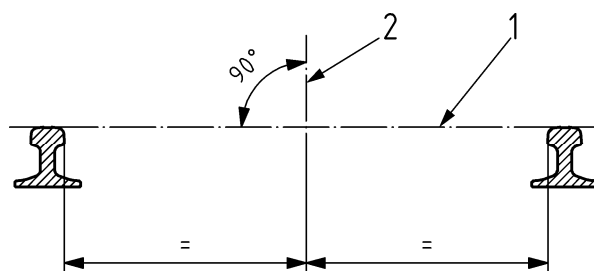
##### normal co-ordinates

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

One of these axes, commonly referred to as the horizontal axis, is coplanar with the running surface.

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

For calculation purposes, the vertical axis is used as a common reference for the infrastructure and for the vehicle (see Figure 1).



#### Key

1 running surface

2 centreline of the vehicle and of the track

Figure 1 — Reference axes

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**3.3 gauge**  
set of rules including a reference profile and its associated calculation rules allowing definition of the outer dimensions of the vehicle and the space to be cleared by the infrastructure

NOTE 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 vehicle

**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 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 a vehicle

**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**  
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 ( $Dpl_i$  or  $Dpl_a$ )**  
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 or radius R and the distance of this same part, in the same conditions, to the centre of a straight track

NOTE See detailed explanation in 5.1.

**3.13****flexibility coefficient ( $s$ )**

ratio of the angle  $\eta$  (between the body tilted on its suspension with the plane perpendicular to the running surface) to the angle  $\delta$  (between the running surface and the horizontal plane with the vehicle stationary on a canted track)

NOTE See detailed explanation in 5.2.

**3.14****dissymmetry ( $\eta_0$ )**

angle  $\eta_0$  that would be made by the centreline of the body of a stationary vehicle on a level track relative to the vertical in the absence of any friction.

NOTE See detailed explanation in 5.3.

**3.15****clearance between wheelset and track ( $\frac{l-d}{2}$ )**

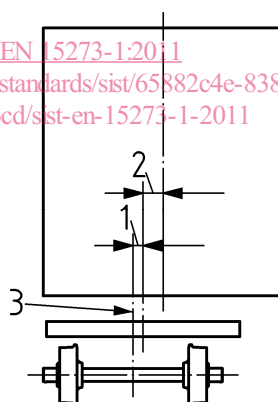
transverse displacement of the wheelset in relation to the track centre.

NOTE See detailed explanation in 5.4.

**3.16****transverse clearance between wheelset and body ( $q + w$ )**

sum of the amount " $q$ " at the level of the axle boxes and of the amount " $w$ " between the bogie frame and the body (see Figure 2)

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**Key**

- 1 transverse clearance " $q$ " between wheelset and bogie frame or between wheelset and body for vehicles not fitted with bogies
- 2 transverse clearance " $w$ " between body and bogie
- 3 centre of wheelset

**Figure 2 — Transverse clearances  $q$  and  $w$**

**3.17****coefficient of displacement ( $A$ )**

parameter " $A$ " to take into account the orientation of the bogie and body position as a result of the wheelset position on the track

**EN 15273-1:2009 (E)****3.18****additional overthrow ( $S_i$  or  $S_a$ )**

excess geometric overthrow of the vehicle beyond the reference profile

NOTE See detailed explanation in 5.5.

**3.19****roll centre ( $C$ )**

rotational centre of the body

NOTE See detailed explanation in 5.6.

**3.20****cant ( $D$ ), ( $D_{th}$ ), cant deficiency ( $I$ ) and cant excess**

cant  $D$  is the difference in height of the centres of the two rails of a track at the level of the running surface.

The theoretical equilibrium cant  $D_{th}$  is the cant for which the resultant of the centrifugal acceleration and gravity is perpendicular to the running surface at a given velocity.

Cant deficiency  $I$  is the difference between the applied cant and the theoretical equilibrium cant:

$$I = D_{th} - D \quad (1)$$

A negative value of cant deficiency denotes cant excess.

**3.21****quasi-static roll**

corresponds to the roll movements of the vehicle due to the roll of the sprung weight under the effect of the transverse accelerations due to gravity (see Figure 14 a)) or to the centrifugal force not compensated by the cant (see Figure 14 b)).

[SIST EN 15273-1:2011](https://standards.iteh.ai/catalog/standards/sist/65882c4e-8384-4317-8442-100002800000/sist-en-15273-1-2011)

[https://standards.iteh.ai/catalog/standards/sist/65882c4e-8384-4317-8442-](https://standards.iteh.ai/catalog/standards/sist/65882c4e-8384-4317-8442-100002800000/sist-en-15273-1-2011)

This roll is referred to as quasi-static because it is determined for a moving vehicle on the basis of a transverse acceleration considered as steady and taking no account of the additional dynamic or random effects

**3.22****random dynamic movements**

additional oscillations of the vehicle, in relation to its quasi-static position, generated by the interaction of the vehicle and the track resulting from the condition of the latter and the running speed.

They are generated by the dynamic reactions of the vehicle due to some layout defects such as:

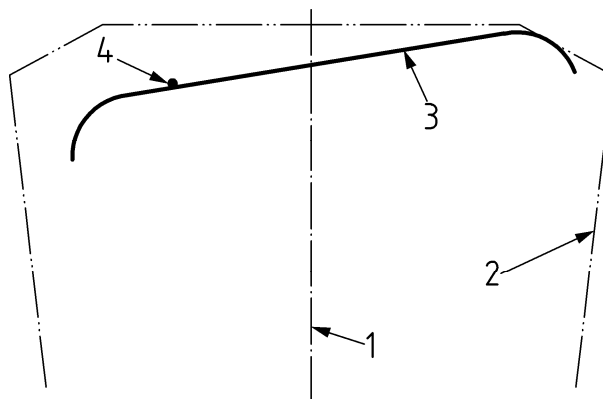
- track geometry;
- sudden layout variations in the vicinity of turnouts;
- elastic deformation and the degradation of track due to traffic;
- a sequence of rail joints generating resonance phenomena;
- hunting movements;
- effects of cross winds and aerodynamic phenomena

**3.23****pantograph gauges and interface with the overhead line**

specific reference profile combined with specific associated rules allowing verification that the pantograph head remains inside the allotted space, and location of infrastructure structures at a sufficient mechanical and electrical distance according to the pantograph head type used with live or insulated parts

**3.23.1****pantograph gauge**

reference profile with its associated rules allowing verification that the pantograph head in a raised position remains within the allotted space (see Figure 3)

**Key**

- 1 track centreline
- 2 pantograph reference profile
- 3 displaced pantograph head
- 4 contact wire raised by the pantograph

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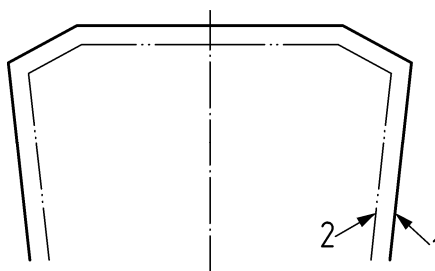
SIST EN 15273-1:2011

<https://standards.iteh.ai/catalog/standards/sist/65882c4e-8384-4317-8442-10b7db28d6cd/sist-en-15273-1-2011>

**Figure 3 — Pantograph gauge**

**3.23.2****mechanical structure gauge**

reference profile and its associated rules allowing the definition of the space to be cleared by all the structures in order to ensure passage of the pantograph in raised position, taking account of the maintenance allowances and of the displacements considered by the infrastructure (see Figure 4)

**Key**

- 1 mechanical structure gauge
- 2 pantograph reference profile

**Figure 4 — Mechanical structure gauge**