SLOVENSKI STANDARD
SIST EN 15273-1:2013+A1:2017

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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 - Begrenzungslinien - 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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ICS:

45.060.01	Železniška vozila na splošno	Railway rolling stock in general

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English Version

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European Foreword

This document (EN 15273-1:2013+A1:2016) 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of an identical text or by endorsement, at the latest by May 2017, and conflicting national standards shall be withdrawn at the latest by May 2017.

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 includes the amendment adopted by the CEN on 25 July 2016.

This document replaces ⟦A1⟩ EN 15273-1:2013 ⟨A1⟧.

The start and end of the text added or modified by the amendment is indicated in the text with ⟦A1⟩ and ⟨A1⟧ respectively.

⟦A1⟩ This document was drafted as part of a mandate issued to CEN by the European Commission and European Free Trade Association. ⟨A1⟧

⟦A1⟩ *text deleted* ⟨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

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:

— for the infrastructure:

—gauge clearance;

—maintenance;

—infrastructure monitoring.

— for the rolling stock:

—compliance of the operating rolling stock with the gauge concerned;

—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*

A1

EN 15273-2:2013,+A1:2016 A1, *Railway applications — Gauges — Part 2: Rolling stock gauge*

A1

EN 15273-3:2013+A1:2016 A1, *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.

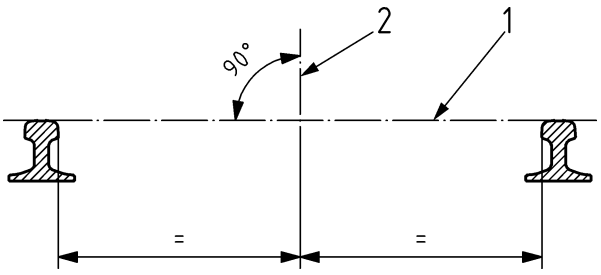
3.1 running surface (of the track)
virtual plane coplanar with the rail tops of a track

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.

3.13
flexibility coefficient
s
ratio of the angle η (between the body tilted on its suspension with the plane perpendicular to the running surface) to the angle δ (between the running surface and the horizontal plane with the vehicle stationary on a canted track)

Note 1 to entry: See detailed explanation in 5.2.

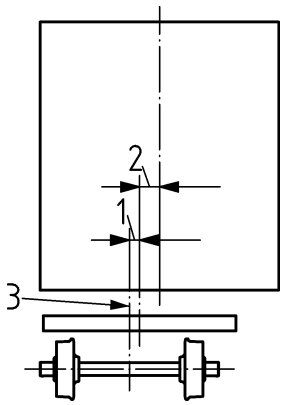
3.14
dissymmetry
η_0
angle η_0 that would be made by the centreline of the body of a stationary vehicle on a level track relative to the vertical in the absence of any friction

Note 1 to entry: See detailed explanation in 5.3.

3.15
clearance between wheelsets and track
$\frac{l-d}{2}$
transverse displacement of the wheelset in relation to the track centre

Note 1 to entry: 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)



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

3.18
additional overthrow
S_i or S_a
excess geometric overthrow of the rolling stock beyond the reference profile

Note 1 to entry: See detailed explanation in 5.5.

3.19
roll centre
C
rotational centre of the body

Note 1 to entry: See detailed explanation in 5.6.

3.20
cant, cant deficiency and cant excess
D , D_{th} , I

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

Note 1 to entry: The theoretical equilibrium cant Dth is the cant for which the resultant of the centrifugal acceleration and gravity is perpendicular to the running surface at a given velocity and track gauge

Note 2 to entry: Cant deficiency I is the difference between the applied cant and the theoretical equilibrium cant:

$$I = D_{th} - D \tag{1}$$

Note 3 to entry: 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

Note 1 to entry: See Figure 14a and Figure 14b.

Note 2 to entry: 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 rolling stock and the track resulting from the condition of the latter and the running speed

Note 1 to entry: They are generated by the dynamic reactions of the rolling stock due to some layout defects such as:

— track geometry;

— sudden layout variations in the vicinity of switches and crossings;

— 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 contact line system
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