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Railway Applications - Gauges - Part 2: Rolling stock

Bahnanwendungen - Begrenzungslinien - Teil 2: Fahrzeugbegrenzungslinien

Applications ferroviaires - Gabarits - Partie 2 : Matériel roulant

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Railway Applications - Gauges - Part 2: Rolling stock

Bahnanwendungen - Begrenzungslinien - Teil 2:
Fahrzeugbegrenzungslinien

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

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

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Contents

	Page
European foreword.....	8
Introduction	9
1 Scope.....	10
2 Normative references.....	10
3 Terms and definitions	11
4 Symbols and abbreviations	11
5 Gauges and gauging processes	11
5.1 All defined gauges	11
5.2 Defined static and kinematic gauges.....	11
5.3 Dynamic methods	12
5.3.1 General principles.....	12
5.3.2 Dynamic method based on defined gauges.....	13
5.3.3 Absolute gauging process.....	13
5.3.4 Comparative gauging process.....	13
Annex A (normative) Defined kinematic gauges – common rules	14
A.1 General rules.....	14
A.1.1 Requirements for use of defined kinematic gauges.....	14
A.1.2 Dimensional tolerances on vehicles.....	15
A.1.3 Limit of applicability of the present Annex depending on the vehicle configuration	16
A.1.4 Vehicles with no-coincident bogie centre and rotation point.....	17
A.1.5 Bogie classes	17
A.1.6 Designation of running gears.....	17
A.2 Determination of the vehicle heights.....	18
A.2.1 General.....	18
A.2.2 Determination of the minimum heights above running plane	18
A.2.3 Determination of maximum heights above running plane	28
A.3 Determination of the vehicle semi-widths.....	30
A.3.1 General.....	30
A.3.2 Quasi-static displacements.....	31
A.3.3 Lateral reductions – general formulae	32
A.3.4 Rules for bottom lines of gauge – shunting devices and contact ramps.....	36
A.4 Pantograph gauge verification and non-insulated devices on the vehicle's roof	40
A.4.1 Pantograph gauge verification	40
A.4.2 Pantographs in lowered position and non-insulated live parts on vehicle's roof.....	41
A.5 Wheel zone	43
A.6 Specific rules for doors and steps in the open position	46
A.6.1 General.....	46
A.6.2 Access doors.....	46
A.6.3 Movable steps	47
Annex B (normative) Defined kinematic gauges – Passive tilting vehicles and non-tilting vehicles operating with.....	48
B.1 Introduction	48

B.2	Common rules with Annex A	48
B.3	Quasi-static displacements z_{cin} for passive tilting vehicles.....	49
B.4	Quasi-static displacements z_{cin} for non-tilting vehicle operating with $I = I_p > I_c$	50
B.5	Pantographs independent of the tilting body system or mounted on a non-tilting vehicle operating with $I_p > I_c$	50
B.5.1	General	50
B.5.2	Pantograph located between the end wheelsets or the bogie centres.....	52
B.5.3	Pantograph located beyond the end wheelsets or the bogie centres	52
B.6	Rules about devices on the vehicle's roof and pantographs in lowered position inside pantographs reference profile.....	53
Annex C	(informative) Defined kinematic gauges – Active tilting vehicles and pantograph associated with a recentering system	54
C.1	Introduction.....	54
C.2	Risk analyses.....	54
C.3	Active body tilting method	55
C.4	Lateral reductions	55
C.4.1	Basic formulae	55
C.4.2	Modifications to be made to the formulae for calculating active tilting vehicle.....	55
C.4.3	Expression for the values of the lateral clearance when the body is tilted	56
C.4.4	Quasi-static displacements z_p	57
C.4.5	Other associated rules.....	58
C.5	Pantographs coupled to the tilting body and/or a pantograph re-centring system	59
C.5.1	General	59
C.5.2	Pantographs with counter-rotating system fixed to the tilting body	59
C.5.3	Pantographs having a re-centring system (non-tilting vehicles - active or passive tilting systems)	62
Annex D	(normative) Defined kinematic gauge – Graphical method.....	65
D.1	General	65
D.2	Lateral reductions	65
D.2.1	General	65
D.2.2	Determination of lateral displacement $Dpl_{i,(R)}$	66
D.2.3	Determination of lateral displacement $Dpl_{a,(R)}$	74
D.2.4	Quasi-static displacement z_{cin}	76
D.2.5	Determination of lateral reductions.....	77
Annex E	(normative) Defined kinematic gauges G1, GI1, GI2, G2, GA, GB, GC, GB1, GB2, GI3, FR 3.3, BE1, BE2, BE3, BE4, PTb, PTb+, PTc, DE1, DE2, DE3, NL1, NL2, GHE16, GEA16, GEB16, GEC16, GEC14, GEE10, GED10, EBVO1, EBVO2, EBVO3, DK1, GCZ3	78
E.1	Defined kinematic gauges using the same common rules	78
E.2	Gauges for lower part.....	79
E.2.1	Common parts.....	79
E.2.2	Special rules for bottom lines of lower parts.....	80
E.3	Gauges for upper part	82
E.4	Particular rules.....	83
E.4.1	Upper part for German gauges (DE1 or DE2)	83
E.4.2	Belgium gauges (BE1, BE2, BE3 and BE4)	83
Annex F	(normative) Defined static gauges - common rules	84
F.1	General rules	84
F.1.1	General	84

prEN 15273-2:2018 (E)

F.1.2	Limitations for the use of defined defined static gauges	84
F.1.3	Limit for applicability of present Annex depending on running gear of the vehicle	84
F.2	Determination of the vehicle heights.....	85
F.2.1	Determination of the minimum heights above running plane	85
F.2.2	Determination of the maximum heights above running plane	85
F.3	Determination of the vehicle semi-widths.....	85
F.3.1	General.....	85
F.3.2	Sections located between the end wheelsets or between the bogie centres	86
F.3.3	Sections located beyond the end wheelsets or beyond the bogie centres.....	86
F.3.4	Rules for bottom lines of gauge – use of shunting devices on curved tracks.....	86
Annex G (normative)	Defined static gauges G1, GI1, GI2, G2, GA, GB, GC, GB1, GB2, GHE16, GEA16, GEB16, GEC16, GEE10, GED 10	87
G.1	Defined static gauges using the same common rules.....	87
G.2	Gauges for lower part	87
G.2.1	Common parts	87
G.2.2	Special rules for bottom lines of lower parts	87
G.3	Gauges for upper part.....	88
Annex H (normative)	Defined static gauges using other rules – UK, FIN1.....	89
H.1	Defined static gauges using other rules	89
H.2	Defined static gauge UK	89
H.3	Defined static gauge FIN1.....	89
H.3.1	General.....	89
H.3.2	Associated rules.....	89
H.3.3	Reduction formulae.....	91
H.3.4	Increase in the minimum height of the lower part of the rolling stock able to pass over marshalling humps and track brakes.....	92
H.3.5	Increase in the minimum height of the lower part of the rolling stock not-permitted to pass over marshalling humps and track brakes.....	92
H.3.6	Passage over transitions and humps	93
H.3.7	Gauge of the vehicle lower step.....	93
H.3.8	Gauge of outwards opening doors and of fold-down steps for coaches and motor vehicles	94
H.3.9	Pantographs and non-insulated parts.....	96
Annex I (informative)	Defined kinematic gauges and defined static gauges using common rules – Common process.....	97
I.1	Establishing the formulae to define a maximum construction gauge.....	97
I.2	Process for defined kinematic gauge using common rules.....	97
I.2.1	Useful elements.....	97
I.2.2	Determination of maximum construction gauge heights	98
I.2.3	Determination of maximum construction gauge semi-widths	98
I.2.4	Maximum construction gauge	100
I.3	Process for defined static gauge using common rules.....	100
I.3.1	Useful elements.....	100
I.3.2	Determination of maximum construction gauge heights	101
I.3.3	Determination of maximum construction gauge semi-widths	102
I.3.4	Maximum construction gauge	102
Annex J (normative)	Practice for dynamic gauging by simulation.....	104
J.1	Background	104
J.2	Principles	104
J.2.1	General.....	104
J.2.2	Responsibilities	105

J.2.3	Computer simulation.....	106
J.2.4	Geometric overthrow	106
J.3	Vehicle simulation model	106
J.4	Model validation	107
J.4.1	General	107
J.4.2	General notes on validation tests	107
J.4.3	Distribution of static wheel forces	109
J.4.4	Assessment of displacement characteristics (sway test).....	109
J.4.5	Dynamic performance assessment	113
J.5	Track data.....	114
J.6	Dynamic simulation.....	115
J.7	Results processing.....	115
J.8	Create swept envelope.....	115
Annex K	(normative) Defined dynamic gauges – Common rules	116
K.1	General	116
K.1.1	Requirements for use of defined dynamic gauges.....	116
K.1.2	Dimensional tolerances on vehicles	116
K.1.3	Limit for applicability depending on vehicle configurations.....	116
K.1.4	Classification of running gears	117
K.1.5	Designation of running gears	117
K.2	Movement calculation by geometric formulae	117
K.2.1	General	117
K.2.2	Calculation of roll movements.....	118
K.2.3	Calculation of downward movements.....	119
K.2.4	Calculation of upward movements.....	123
K.2.5	Calculation of lateral movements.....	124
K.2.6	Calculation of pantograph movements.....	127
K.2.7	Wheel zone.....	128
K.2.8	Specific rules for doors and steps in open position.....	128
K.2.9	Swept envelopes.....	128
K.3	Movement calculation by simulation	128
K.3.1	General	128
K.3.2	To be taken into account.....	129
K.3.3	Simulated movements at the datum point	131
K.3.4	Calculated movements at cross sections.....	132
K.3.5	Statistical processing.....	132
K.3.6	Influence of parameters not included in the model.....	132
K.3.7	Wheel zone.....	135
K.3.8	Specific rules for doors and steps in the open position	135
K.3.9	Vehicle swept envelopes	135
K.4	Comparison with allowed space.....	135
K.5	Input data catalogue (informative).....	136
K.5.1	General	136
K.5.2	Vehicle data.....	136
K.5.3	Track and operational data	137
K.5.4	Environmental data	137
Annex L	(normative) Defined dynamic gauges SEa, SEc, NO1	138
L.1	Defined dynamic gauges - common rules	138
L.2	Gauges.....	138
L.3	Special rules for bottom lines.....	138
Annex M	(normative) Application of dynamic gauging by simulation and calculation of swept envelopes for use in absolute and comparative gauging	141

prEN 15273-2:2018 (E)

M.1	Principles	141
M.2	Provision of data for assessment of compatibility	141
M.3	Creating a simulation model	141
M.3.1	Describing vehicle size and shape.....	141
M.3.2	Constructing the simulation model	144
M.4	Model validation.....	148
M.5	Selection of track data	148
M.5.1	General.....	148
M.5.2	Track roughness.....	148
M.5.3	Track irregularities.....	148
M.5.4	Track quality.....	149
M.5.5	Track length	149
M.5.6	Initial run-in length	149
M.5.7	Initial input.....	149
M.6	Simulation methodology	149
M.6.1	General.....	149
M.6.2	Cant, speed and curve radius: general cases	150
M.6.3	Cant, speed and curve radius: particular cases	150
M.6.4	Application of cant and curve radius	150
M.6.5	Side wind loads	151
M.6.6	Datum positions.....	151
M.7	Results processing.....	152
M.8	Curving analysis of lateral wheelset movements.....	153
M.9	Calculating swept envelopes	154
M.9.1	General.....	154
M.9.2	Input data.....	154
M.9.3	Calculation of movements due to suspension flexibility	156
M.9.4	Calculating lateral wheelset movements.....	160
M.9.5	Lateral swept envelope calculation summary	161
M.9.6	Vertical swept envelope calculation summary	161
M.9.7	Building the swept envelope.....	162
M.10	Data format for rolling stock models used for absolute gauging — RIS-2773-RST	163
M.10.1	General.....	163
M.10.2	General - Presentation of rolling stock specific information	164
M.10.3	Cross sections - Presentation of rolling stock profile data.....	165
M.10.4	Presentation of geometric throw Information	165
M.10.5	Dynamic conditions - presentation of dynamic simulation results	166
M.10.6	Presentation of lateral wheelset movements	167
M.10.7	Rolling stock maintenance and construction tolerances	167
M.11	Defining profiles for candidate vehicles using absolute and comparative gauging swept envelopes (informative)	168
M.11.1	Available methods	168
M.11.2	Required candidate vehicle data	168
M.11.3	Defining profiles for candidate vehicles using comparative methodology.....	169
M.11.4	Defining profiles for candidate vehicles using route template methodology	172
M.11.5	Defining profiles for candidate vehicles using base vehicle profile methodology.....	175
M.12	Equipment that requires contact or close proximity to infrastructure	178
M.13	Absolute gauging methodology for pantographs	179
M.13.1	Background	179
M.13.2	Pantograph gauges	179
M.13.3	Comparison of benchmark pantograph sway values	179
M.13.4	Calculation of pantograph swept envelopes	180

Annex N (normative) List of documents for rolling stock gauge assessment Applicable for defined kinematic, static and dynamic gauges	184
N.1 New vehicle	184
N.2 Existing vehicle.....	184
Annex O (informative) A-deviations	185
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC aimed to be covered.....	187
Bibliography	189

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[oSIST prEN 15273-2:2019](https://standards.iteh.ai/catalog/standards/sist/0507b259-f83f-4b62-9557-0f12a1d1ce4b/osist-pren-15273-2-2019)

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prEN 15273-2:2018 (E)**European foreword**

This document (prEN 15273-2:2018) 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 will supersede EN 15273-2:2013.

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 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

This document is one of the series prEN 15273, *Railway applications — Gauges* as listed below:

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

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

This part of the series EN 15273 covers rolling stock gauges and is used in conjunction with the following parts:

- *Part 1: Generic explanations and methods of gauging;*
- *Part 4: Catalogue of gauges and associated rules;*
- *Part 5: Background, explanation and worked examples.*

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prEN 15273-2:2018 (E)**1 Scope**

The gauges and processes included in this document have been developed for application on mainline railway networks using various track gauges. Other networks such as urban and suburban may apply the gauging rules defined in this document but are outside of its scope.

For a given defined gauge, the application of the rules contained in EN 15273-2, combined with corresponding parameters and reference profiles given in EN 15273-4, makes it possible to determine the maximum exterior dimensions of a vehicle (maximum vehicle construction gauge) compatible with infrastructure gauges obtained according to rules defined in EN 15273-3.

For absolute and comparative gauging, the application of the rules contained within EN 15273-2, combined with infrastructure data defined in EN 15273-3 in accordance with EN 15273-1 makes it possible to determine the dimensions of a vehicle.

EN 15273-2 is applicable to new vehicle designs, to modifications to existing vehicles and for checking existing vehicles to be used on another route or network.

This document contains

- the rules for rolling stock for all defined gauges,
- the swept envelope calculation process used for defined dynamic gauges, absolute and comparative methods,
- the list of documents required to assess vehicle conformity to this standard.

NOTE The rules given in this standard are not applicable to the gauges “S” and “T” referred to in 4.2.3.1. (7) & (8) for track gauge 1 520 mm of the merged TSI Loc and Pass (Commission Regulation N°1302/2014 of 18. November 2014).

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.

EN 14363, *Railway applications - Testing and Simulation for the acceptance of running characteristics of railway vehicles - Running Behaviour and stationary tests*

prEN 15273-1, *Railway applications - Gauges - Part 1: Generic explanations and methods of gauging*

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

prEN 15273-4, *Railway Applications - Gauges - Part 4: Catalogue of gauges and associated rules*

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

EN 15663:2017, *Railway applications — Definition of vehicle reference masses*

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

EN 50215, *Railway applications - Rolling stock - Testing of rolling stock on completion of construction and before entry into service*

EN 50367, *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 terms and definitions given in prEN 15273-1 apply.

4 Symbols and abbreviations

For the purposes of this document, the symbols and abbreviations given in prEN 15273-1 apply.

5 Gauges and gauging processes

5.1 All defined gauges

- a) It is mandatory to retain the association between the reference profile and its associated rules.
- b) If the candidate vehicle does not fully meet the requirements of the defined gauge, in exceptional cases it may be approved for operation with derogation. It is not then compatible with all the Infrastructures cleared for the same specified gauge.
- c) When the vehicle is intended to be operated separately or in multiples, it shall meet the requirements of this document both individually and when forming a part of a train. When the vehicle may be permanently coupled in a train formation, this formation shall also meet the requirements of this standard.
- d) The vehicle characteristics that influence the gauge shall be maintained throughout the operational life of the vehicle and shall be stated in the maintenance documentation, including the factors influencing displacements and their limiting or maximum values (e.g. limits of wear on suspension components).
- e) Wear limits of all parts, equipment and systems influencing movements of the vehicle shall be included in the documents provided by the manufacturer for approving the use of the vehicle.
- f) For consistency, the maximum construction gauge is drawn with the vehicle in loading condition "dead mass" as defined by EN 15663, nevertheless calculations are made taking into account of all loading conditions.

5.2 Defined static and kinematic gauges

Principles are given in prEN 15273-1.

This standard prEN 15273-2 contains:

- a) in Annex A (normative), common rules for defined kinematic gauges;
- b) in Annex B (normative), general principles for passive tilting vehicles and non-tilting vehicles operating with $I = I_p > I_c$ to use with a defined kinematic gauge;
- c) in Annex C (informative), general principles for active tilting vehicles and pantograph associated with a recentering system to use with a defined kinematic gauge;
- d) in Annex D (normative), graphical method;

prEN 15273-2:2018 (E)

- e) in Annex E (normative), application of defined kinematic gauges for rolling stock;
- f) in Annex F (normative), common rules for defined static gauges;
- g) in Annex G (normative), application of defined static gauges for rolling stock using common rules;
- h) in Annex H (normative), application of defined static gauges for rolling stock using other rules;
- i) in Annex I (informative) Common process for defined kinematic gauges and defined static gauges using common rules;
- j) in Annex N (normative), list of documents for rolling stock assessment for defined gauges.

5.3 Dynamic methods**5.3.1 General principles**

- a) in Annex J (normative), practice for dynamic gauging by simulation;
- b) in Annex K (normative), common rules for dynamic gauges with reference profiles;
- c) in Annex L (normative), application of dynamic gauges with reference profiles for rolling stock;
- d) in Annex M (normative), application of dynamic gauging by simulation and calculation of swept envelopes for use in absolute and comparative gauging:
 - 1) movement calculation by geometric formulae;
 - 2) movement calculation by simulation:
 - create vehicle simulation model;
 - validate the model;
 - select track data;
 - carry out simulations;
 - process the results;
 - create swept envelopes.
 - nominal dimensions of the rolling stock;
 - geometric overthrow on curves (in the horizontal plane and in the vertical plane);
 - vehicle and maintenance tolerances;
 - dissymmetry of the vehicle inclination;
 - deflection under load;
 - suspension displacement and wear;

- wheel radius differences between bogies or wheelsets;
- adjustment devices to compensate for varying wheel diameters;
- pantograph flexibility.

The vehicle simulation model shall be validated by calculations, by comparisons with other vehicles, by testing or by other appropriate means commensurate with the level of risk, complexity and innovation in the vehicle design. The method of validation will depend on the process being followed.

5.3.2 Dynamic method based on defined gauges

The vehicle shall not exceed a certain reference profile including the curve radii dependent projections added under specified conditions. Multiple vehicle swept envelopes shall be calculated by defining the maximum vehicle space to be occupied under normal service and certain failure conditions for each curve radius. The dynamic movement may be calculated either by use of geometric formulae or by simulations. This envelope shall remain within the dynamic reference profile including the adding of curve radii dependent projections on routes where the vehicle is required to operate.

5.3.3 Absolute gauging process

The absolute gauging process requires calculation of clearance between the swept envelope of the vehicle and the infrastructure at every location along a route. The local conditions (e.g. track curvature, installed cant, line speed, and track fixity) are used to determine the swept envelope of the vehicle and the minimum acceptable clearance at every location. The dynamic movements are calculated by use of simulations.

5.3.4 Comparative gauging process

The comparative gauging process relies on existing vehicles known as comparator vehicles operating safely on a route. Where all swept envelopes of the candidate vehicle are within the swept envelopes of a comparator vehicle, or vehicles, having been assessed as having gauging compatibility with the section of track, then gauging compatibility shall be deemed to be achieved. The swept envelopes of both comparator and candidate vehicles are calculated on a virtual route by use of simulations.