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Railway applications - Systems and procedures for change of track gauge - Part 1: Automatic Variable Gauge Systems

Bahnanwendungen - Systeme und Verfahren zur Umspurung - Automatische Umspursysteme

Applications ferroviaires - Systèmes et procédures de changement d'écartement de voie - Systèmes à écartement variable automatique

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Bahnanwendungen - Systeme und Verfahren zur Umspurung - Teil 1: Automatische Umspursysteme

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European foreword

This document (EN 17069-1:2019) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2019, and conflicting national standards shall be withdrawn at the latest by October 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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 Directive 2008/57/EC.

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

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this document: 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

For historical reasons, several track gauges are used on the rail networks in Europe. In order to cross the borders among these, passengers and goods need to be transferred.

In order to increase comfort of passengers by avoiding transhipments, and to reduce both the risk of damaging goods and the involved cost of transferring them, several systems and procedures for change of track gauge have been developed. Nowadays, there are three main possibilities to attain connection among rail networks with different track gauges:

— automatic variable-gauge systems;

— interchange of complete bogies;

— interchange of complete wheelsets.

The interfaces and the approval methods for such systems were defined in several UIC-leaflets and national regulations. This document is intended to set all related requirements together in a single document for automatic variable-gauge systems.

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1 Scope

This document defines the interfaces and gives guidance for the design of systems and procedures for change of track gauge. It defines also their assessment for technical approval, for the automatic variable-gauge systems.

The document is focused on the change of track gauge among the following nominal track gauges: 1 435 mm, 1 520 mm, 1 524 mm, 1 600 mm and 1 668 mm.

This document is not limited to the aforementioned nominal track gauges but the interfaces to change to/from other nominal track gauges can be different. The established assessment procedures can be used as well.

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 12080, *Railway applications – Axleboxes - Rolling bearings*

EN 12081, *Railway applications – Axleboxes – Lubricating greases*

EN 12082, *Railway applications – Axleboxes – Performance testing*

EN 13103-1, *Railway applications – Wheelsets and bogies – Part 1: Design method for axles with external journals*

EN 13260, *Railway applications – Wheelsets and bogies – Wheelsets – Product requirements*

EN 13261, *Railway applications – Wheelsets and bogies – Axles – Product requirements*

EN 13262, *Railway applications – Wheelsets and bogies – Wheels – Product requirements*

EN 13749, *Railway applications – Wheelsets and bogies – Method of specifying the structural requirements of bogie frames*

EN 13979-1, *Railway applications – Wheelsets and bogies – Monobloc wheels – Technical approval procedure – Part 1: Forged and rolled wheels*

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

EN 15273-1, *Railway applications – Gauges – Part 1: General – Common rules for infrastructure and rolling stock*

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

EN 15437-1, *Railway applications – Axlebox condition monitoring – Interface and design requirements – Part 1: Track side equipment and rolling stock axlebox*

EN 15437-2, *Railway applications – Axlebox condition monitoring – Interface and design requirements – Part 2: Performance and design requirements of on-board systems for temperature monitoring*

EN 15551, *Railway applications – Railway rolling stock – Buffers*

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EN 15663, *Railway applications – Vehicle reference masses*

EN 15827, *Railway applications – Requirements for bogies and running gears*

EN 15839, *Railway applications – Testing for the acceptance of running characteristics of railway vehicles – Freight wagons – Testing of running safety under longitudinal compressive forces*

EN 15877-1, *Railway applications – Marking on railway vehicles – Part 1: Freight wagons*

EN 50126-1, *Railway applications – The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS) – Part 1: Basic requirements and generic process*

EN 50126-2, *Railway Applications – The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS) – Part 2: Systems Approach to Safety*

CLC/TR 50126-3, *Railway applications – The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS) – Part 3: Guide to the application of EN 50126-1 for rolling stock RAM*

EN 50153, *Railway applications – Rolling stock – Protective provisions relating to electrical hazards*

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 standardization at the following addresses:

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

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3.1
nominal track gauge
single value which identifies the track gauge, but may differ from the design track gauge

Note 1 to entry: Definition in addition to the EN 15273 series. As example 1 435 mm.

3.2
gauge changeover technology
set of systems and devices specifically designed to perform the automatic gauge changeover process on certain types of compatible rolling stock fitted with variable-gauge running gear

3.3
automatic variable-gauge running gear
specific type of running gear designed to automatically switch between different track gauges when passing through a gauge changeover facility

Note 1 to entry: This process does not involve the removal or assembly of any component of the running gear.

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3.4
non-rotating axle
axle fixed to bogie frame, that does not rotate and during the service, the wheel can freely-rotate, and lateral movement between wheels and axle is not possible

Note 1 to entry: Only during the automatic gauge changeover process, the wheels can move laterally to reach the corresponding track gauge position.

3.5
rotating axle
axle not fixed to bogie frame, during service wheels rotate together with the axle and lateral movement between wheels and axle is not possible

Note 1 to entry: Only during the automatic gauge changeover process, lateral movements are possible to reach the corresponding track gauge position.

3.6
automatic gauge changeover process
automatic change of track gauge in variable-gauge running gear, consisting at least of the following phases:

— unlocking of the rolling elements;

— displacement of the rolling elements while variable-gauge running gear is in the gauge changeover platform;

— safe locking of the rolling elements in their new position

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3.7
gauge changeover facility
facility where the automatic gauge changeover process is performed when passed through by trains at a given speed

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Note 1 to entry: It includes the gauge changeover platform along with all ancillary systems that may be required to prepare the train for the automatic gauge changeover process (e.g. deicing system) and those for sheltering, if any.

3.8
gauge changeover platform
core element of a gauge changeover facility in which all systems directly related to change of track gauge for variable-gauge running gear are installed

3.9
multi-mode gauge changeover facility
gauge changeover facility where several gauge changeover technologies are implemented and thus more than one mode of change is allowed

3.10
mode of change
configuration of a multi-mode gauge changeover facility for a specific gauge changeover technology

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3.11
area of a gauge changeover facility
area between the signals of entrance and exit of a gauge changeover facility, including the gauge changeover facility itself as well as switches and crossings of shunting track sections

3.12
surroundings of a gauge changeover facility
track section before and after the area of a gauge changeover facility, the considered external limits of which are the entrance and exit signals of main tracks

3.13
nominal passage speed
vehicle speed during the changeover process at which both the gauge changeover facility and the variable-gauge running gear are designed

Note 1 to entry: Nominal passage speed depends on the gauge changeover technology.

4 Symbols

For the purposes of this document, the following symbols apply.

Table 1 — Symbols

Symbol	Designation
a_1	Back to back dimension
a_2	Front-to-front dimension
e	Thickness of flange
h	Height of flange
qR	Face of the flange
d	Wheel diameter
Y_{TA}	Lateral position of the centre of the target area
W_{TA}	Lateral width in mm of the target area
L_{TA}	Longitudinal length in mm of the target area
Y_{PZ}	Lateral position of the centre of the prohibitive zone
W_{PZ}	Lateral width in mm of the prohibitive zone
L_{PZ}	Longitudinal length in mm of the prohibitive zone

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NOTE Symbols given in Table 1 come from EN 15313 and EN 15437-1.

5 General requirements

5.1 Running gear dimensions

Running gear shall comply with minimum and maximum values in Tables 2 and 3 and Tables 4 and 5 for any service condition. For 1 435 mm nominal track gauge, the values which are given in Tables 2 and 3 and Tables 4 and 5 are the same as in EN 15313.

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Table 2 — Limit values for front-to-front and back-to-back dimensions for freight wagons

	Designation	Wheel diameter d [mm]	Minimum value [mm]	Maximum value [mm]
1 435 mm	Front-to-front dimension (a_2) $a_2 = a_1 + e_1 + e_2$	$330 \le d \le 760$	1 415	1 426
		$760 < d \le 840$	1 412	1 426
		$d > 840$	1 410	1 426
	Back to back dimension (a_1)	$330 \le d \le 760$	1 359	1 363
		$760 < d \le 840$	1 358	1 363
		$d > 840$	1 357	1 363
1 524 mm	Front-to-front dimension (a_2) $a_2 = a_1 + e_1 + e_2$	$400 \le d < 840$	1 492	1 514
		$d \ge 840$	1 487	1 514
	Back to back dimension (a_1)	$400 \le d < 840$	1 444	1 448
		$d \ge 840$	1 442	1 448
1 600 mm	Front-to-front dimension (a_2) $a_2 = a_1 + e_1 + e_2$	$690 \le d \le 1\,016$	1 573	1 592
	Back to back dimension (a_1)	$690 \le d \le 1\,016$	1 521	1 526
1 668 mm	Front-to-front dimension (a_2) $a_2 = a_1 + e_1 + e_2$	$330 \le d < 840$	1 648 [a]	1 659
		$840 \le d \le 1\,250$	1 643 [a]	1 659
	Back to back dimension (a_1)	$330 \le d < 840$	1 592	1 596
		$840 \le d \le 1\,250$	1 590	1 596

e_1 and e_2 are the thicknesses of each wheel.

[a] Two-axle wagons with axle load up to 22,5 t the value shall be taken as 1 651 mm.

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