



SLOVENSKI STANDARD
oSIST prEN 15827:2024
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Železniške naprave - Sistemskotehnične zahteve za podstavne vozičke in tekalne sestave

Railway applications - System Engineering requirements for bogies and running gear

Bahnanwendungen - Anforderungen an das System Engineering für Drehgestelle und Fahrwerke

Applications ferroviaires - Exigences systèmes pour l'ingénierie des bogies et des organes de roulement

Ta slovenski standard je istoveten z: prEN 15827

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ICS:

45.040	Materiali in deli za železniško tehniko	Materials and components for railway engineering
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Railway applications - System Engineering requirements for bogies and running gear

Applications ferroviaires - Requis systèmes pour
l'ingénierie des bogies et des organes de roulements

Bahnanwendungen - Anforderungen an das System
Engineering für Drehgestelle und Fahrwerke

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.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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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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prEN 15827:2024 (EN)**European foreword**

This document (prEN 15827:2024) was 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 15827:2011.

prEN 15827:2024 includes the following significant technical changes with respect to EN 15827:2011:

- The content has been rationalised between this document and EN 13749; that is, some content that was in EN 15827:2011 has been moved to the revision of EN 13749. EN 15827 is written as a process specification with general information and references to other standards; EN 13749 gives structural requirements.
- Some of the references have been moved to EN 13749 as a result of the above.
- Terms and definitions have been updated as a result of the above.
- Clause 4 sets out the “Engineering process” (formerly Clause 5), expanded to include functional requirements and risk assessment.
- Clause 5 is now “Requirements and interface management” (replaces former Clause 4).
- Clause 6 gives general “Structural design criteria”; details have been moved to EN 13749.
- Clause 7 gives general “Dynamic performance criteria”.
- Former Clause 8 has been removed as acceptance criteria are covered either elsewhere in this document or in their referenced standards.
- Clause 8 is now “Validation of the design” (formerly Clause 9).
- Clause 9 is the “Quality plan” (formerly Clause 10 “Quality requirement”).
- Clause 10 is the “Maintenance plan” (formerly Clause 11).
- The text from former Clause 12 “Proven operating envelope” has been distributed within Clauses 4, 5, 6 and 7.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

Introduction

This document focusses on system engineering requirements related to the specification, design, validation and maintenance of running gear and its interactions.

System engineering requirements are intended to ensure consistency over the complete life cycle from the specification, through design, validation, operation and maintenance.

The performance requirements for running gear fall into two related areas, covering functionality and safety. Functionality relates to such things as speed, load capacity, ride quality and operating life. Safety covers gauging, structural integrity, dynamic behaviour, resistance to derailment, etc. Functionality and safety are ensured by an appropriate maintenance strategy.

Accordingly, three particular areas of expertise and discipline of the engineering process are relevant and they need to be addressed, namely:

- requirements for structural integrity; Clause 6;
- requirements for running characteristics; Clause 7;
- requirements for the maintenance regime; Clause 10.

The clauses in this document provide top-level information describing how the overall requirements are to be achieved in these specific areas. They contain references to other relevant standards which provide detailed requirements for specific running gear systems. The document structure is typical of the engineering process covering the design, validation and maintenance of bogies.

NOTE Running gear designed and validated in accordance with this document will support the information needed to satisfy the essential requirements of the rolling stock TSIs [\[1\]](#), [\[2\]](#).

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1 Scope

This document is applicable to the system engineering of bogies and running gear for rail vehicles, including those vehicles intended to operate under the Interoperability Directives.

It specifies the requirements to achieve:

- a satisfactory design of bogie or running gear,
- validation of the design within its operating envelope, and
- a maintenance plan

to ensure that the relevant performance and safety criteria are maintained.

The scope of the system engineering process specified in this document includes the design, validation and maintenance of bogies and running gear. No requirements are specified for other systems components that are attached to the bogies or running gear, except to ensure that a satisfactory interface has been provided.

NOTE Specifications that relate to bogies and running gear can only be considered in the context of a specific vehicle application. Therefore, the performance, including safety, can relate only to the bogies and running gear as part of a vehicle configuration and not to the individual elements of the bogies or running gear.

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 12663-1:2010+A2:2023, *Railway applications - Structural requirements of railway vehicle bodies - Part 1: Locomotives and passenger rolling stock (and alternative method for freight wagons)*

EN 13749:2021+A1:2023, *Railway applications - Wheelsets and bogies - Method of specifying the structural requirements of bogie frames*

EN 14363:2016+A2:2022, *Railway applications - Testing and Simulation for the acceptance of running characteristics of railway vehicles - Running Behaviour and stationary tests*

EN 15273 (all parts), *Railway applications. Gauges*

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

EN 15437-1:2009+A1:2022, *Railway applications - Axlebox condition monitoring - Interface and design requirements - Part 1: Track side equipment and rolling stock axlebox*

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

EN 15839:2012+A1:2015, *Railway applications - Testing for the acceptance of running characteristics of railway vehicles - Freight wagons - Testing of running safety under longitudinal compressive forces*

EN 16235:2023, *Railway applications - Testing for the acceptance of running characteristics of railway vehicles - Freight wagons - Conditions for dispensation of freight wagons with defined characteristics from on-track tests according to EN 14363*

EN 16404:2016, *Railway applications - Re-railing and recovery requirements for railway vehicles*

EN 17023:2018, *Railway applications - Railway vehicle maintenance - Creation and modification of maintenance plan*

EN 50125-1:2014, *Railway applications - Environmental conditions for equipment - Part 1: Rolling stock and on-board equipment*

EN ISO 3095:2013, *Acoustics - Railway applications - Measurement of noise emitted by railbound vehicles (ISO 3095:2013)*

EN ISO 3381:2021, *Railway applications - Acoustics - Noise measurement inside railbound vehicles (ISO 3381:2021)*

3 Terms and definitions

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

ISO and IEC maintain terminology 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>

3.1 validation

process of ensuring that the system is fit for its intended use in its intended operational environment

Note 1 to entry: When applied to a numerical model, validation is the process of demonstrating that the model of the system responds in the manner of the actual system to a sufficient level of accuracy for its purpose.

3.2 verification

process of demonstrating that specific requirements are met

Note 1 to entry: Verification is answering whether a specific requirement is met, without questioning this requirement

3.3 technical specification

document specifying other or additional requirements not specified in this document

Note 1 to entry: Usually this is produced by and agreed between the customer and/or the manufacturer (sometimes called the supplier) or even a railway undertaking and can be an accompaniment to contractual requirements.

3.4 analysis

assessment of performance by calculation, comparison or simulation

3.5 testing

subjecting a specimen to a selection of specified inputs and measuring and recording its responses

3.6 partial factor

factor applied during the strength assessment which makes an allowance for a combination of the uncertainties and the safety criticality

3.7 reverse curve

two curves with alternating direction, with shortest distance between them in accordance with track design conditions, including S-curves as defined in EN 14363:2016+A2:2022

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3.8

regulation

requirement stipulated by legislation, rules or conditions mandated by legislation, by an infrastructure manager, relevant industry body or similar

3.9

design operating envelope

set of parameters specifying the intended use in the intended operational environment

Note 1 to entry: This is the input for the running gear design and validation process.

3.10

validated operating envelope

operating envelope for which a specific product has been successfully validated

3.11

load case

set of loads or combinations of loads that represents a loading condition to which a structure or component is subjected

3.12

permanent deformation

residual plastic deformation of ductile material, that is not recoverable when the applied load is removed

3.13

significant permanent deformation

permanent deformation of an amount that infringes on the functionality of the structure by exceeding the component geometric tolerances

3.14

simulation

method that uses a set of parameters and rules to describe a system (product or component) in a manner that enables a representative response to be determined from a given set of inputs

3.15

track testing

performing tests on railway infrastructure and monitoring and recording the responses

3.16

laboratory testing

performing of tests under controlled conditions with the capability of applying the required inputs and with the equipment capable of monitoring and recording the response

3.17

structural component

any component or constituent part of a structure that transfers or transmits load from one part of the structure to another

3.18

load-transmitting equipment

component or assembly which transfers or generates inertia loads, equipment loads (such as traction, braking, and suspension component forces), including attachment brackets and housings

3.19

running gear

transmits forces between car body and wheels, for example a bogie

4 Engineering process

4.1 General

Bogies and running gear shall be designed and validated by a consistent engineering process that incorporates all the requirements of this document. It shall follow a quality management system that controls and provides traceability of decision making.

NOTE A process consistent with [3] ISO 22136 would meet the above requirements.

The engineering process shall provide a comprehensive list of requirements including the relevant validation evidence.

4.2 Process stages

The engineering process shall address the following as illustrated in Figure 1:

- collecting the top-level requirements
- developing the bogie system design and functions and subsequent requirements
- developing the components design and functions
- verification and validation of the components
- verification and validation of the bogie system
- verification and validation of the system integration

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