



SLOVENSKI STANDARD
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Železniške naprave - Novi materiali - 1.del: Smernica in metodologija potrjevanja

Railway applications - New materials - Part 1: Guideline and validation methodology

Bahnanwendungen - Neue Werkstoffe - Teil 1: Leitfaden und Validierungsmethodik

Applications ferroviaires - Nouveaux matériaux - Partie 1 : Lignes directrices et méthodologie de validation

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ICS:

45.040	Materiali in deli za železniško tehniko	Materials and components for railway engineering
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EUROPEAN STANDARD
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EN 18128-1

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ICS 45.040

English Version

**Railway applications - New materials - Part 1: Guideline
and validation methodology**

Applications ferroviaires - Nouveaux matériaux - Partie
1 : Lignes directrices et méthodologie de validation

Bahnanwendungen - Neue Werkstoffe - Teil 1:
Leitfaden und Validierungsmethodik

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EN 18128-1:2026 (E)**European foreword**

This document (EN 18128-1:2026) 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of an identical text or by endorsement, at the latest by January 2027 and conflicting national standards shall be withdrawn at the latest by January 2027.

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.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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Introduction

The purpose of this document is to specify a process guideline and a methodology to support the introduction of new materials and processes to meet the minimum requirements in the railway sector in a robust, efficient and safe manner whilst supporting the confidence level and acceptability during the approval process.

This document addresses the following points:

- most existing standards for the design of rail vehicles are dedicated to standardized metallic materials and cannot be fully applied to new materials and/or processes. In fact, some of them are non-isotropic materials, multi-layer materials, strongly dependent on external environment, with different behaviour regarding fatigue, impact, etc.
- new materials and/or processes offer improved performance characteristics, e.g. reduced weight, whole life costs/reduced LCC, environmental benefits, energy efficiency, etc.
- new materials offer the opportunity for the product to be more multifunctional e.g. a structural material incorporating insulation (acoustic, thermal, electrical, etc.).
- many existing standards are written around existing materials and might not be appropriate for or limit the use of new materials.
- the acceptance and approval procedures can be prolonged due to uncertainties / lack of experience with new materials.

Further parts of this standard dedicated to each specific material and processes (composite materials, additive manufacturing, new alloys, etc.) will be written based on this guideline and methodology. These new parts will include methodology to define specific criteria, safety factors, tests, controls, etc. associated with each material and processes.

EN 18128-1:2026 (E)

1 Scope

This document specifies a process guideline and a methodology to support the introduction of new materials and processes to meet the minimum requirements in the railway sector for all rolling stock defined in EN 17343 and onboard equipment.

This document is applicable to new materials and processes for all rolling stock and onboard equipment.

2 Normative references

There are no normative references in this document.

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:

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

3.1

new materials

non-conventional materials

any material that has not been previously used in a specific railway application area or that has been developed recently through technological advancements

EXAMPLE Composite for primary structure

3.2

new process

set of processes in manufacturing involving a flow and/or transformation of material, information, energy, control, or any other element in a manufacturing area

EXAMPLE Additive manufacturing, pul-braiding

3.3

CEMS

collision energy management system

system composed of several discrete elements designed to meet the criteria of collision scenarios specified in EN 15227

Note 1 to entry: The CEMS includes components such as central buffer coupler, anti-climbing elements, etc.

3.4

component manufacturer

company responsible for the manufacture of the component with the material(s) and process(es) used

3.5

FEA

finite element analysis

computerized method of idealizing a real model for the purposes of performing structural analysis

3.6**primary structural part**

part whose main purpose is to withstand the principal loads to which the train is subjected, and that has a direct influence on the safety, avoiding serious harm (high risk)

EXAMPLE Carbody, running gear, crash elements, couplers, underframe equipment, jacking and lifting features

3.7**secondary structural part**

part which participates in the distribution of the principal loads to the primary structural part and supplement the safety of people, avoiding serious and moderate harm (medium risk)

EXAMPLE Doors, seats, interior body-mounted equipment, windscreens, windows, gangways

3.8**non-structural part**

part of the vehicle without relevance to the structure and safety of people (low risk)

3.9**crash**

collision between a rail vehicle and a large object

Note 1 to entry: The large object could be, for example, another rail vehicle, a road vehicle, animals or fixed infrastructure.

Note 2 to entry: Crash energy is typically measured in megajoules. See, for example EN 15227.

3.10**impact**

collision between a small object and a rail vehicle, or part thereof

Note 1 to entry: The small object could be, for example, ballast, animal, tools or debris.

Note 2 to entry: Impact includes vandalism such as kicks, screwdriver, etc.

Note 3 to entry: Impact energy is typically less than 1 kilojoule. See, for example, EN 15152.

3.11**design**

all elements that define a part or an assembly of parts

EXAMPLE Geometries, thicknesses, assemblies, surface condition, colour

3.12**advanced 3D design**

accurate 3D model with all detail to manufacture the part incorporating geometries and interfaces, which serves as the basis for detailed mechanical analyses (such as FEA) and for experimental validation, aiming to ensure that the part meets the necessary criteria (for static, fatigue, etc..) before the final validation and production

3.13**full-scale test**

test where the specimen is made using full-scale components from the vehicle being assessed