



SLOVENSKI STANDARD
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Železniške naprave - Zavore - Nosilec zavorne obloge

Railway applications - Braking - Brake pad holder

Bahnanwendungen - Bremse - Bremsbelaghalter

Applications ferroviaires - Freinage - Porte-garnitures

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tehniko **for railway engineering**

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Railway applications - Braking - Brake pad holder

Applications ferroviaires - Freinage - Porte-garnitures

Bahnanwendungen - Bremse - Bremsbelaghalter

This European Standard was approved by CEN on 22 January 2024.

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EN 16451:2024 (E)

European foreword

This document (EN 16451:2024) 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of an identical text or by endorsement, at the latest by October 2024, and conflicting national standards shall be withdrawn at the latest by October 2024.

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 supersedes EN 16451:2015.

In comparison with the previous edition EN 16451:2015, the following technical modifications have been made:

- update of normative and informative references;
- modification of requirements on latch mechanism;
- modification of requirements on loading in the direction of force application and in the direction of the braking moment;
- modifications to Annex A and Annex B;
- content of Annex C switched to Annex E;
- content of Annex E switched to Annex F;
- informative Annex D “Geometry of standard brake pads” has been deleted and references to EN 15328 have been added.

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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.

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.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Introduction

This document gives the requirements to be met for the design, dimensioning, testing and quality assessment of brake pad holders. These requirements cannot be written in sufficient detail to ensure good workmanship or proper construction. Each manufacturer is therefore responsible for taking every necessary step to make sure, that the quality of workmanship and construction is such as to ensure accordance with good engineering practice.

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EN 16451:2024 (E)

1 Scope

This document defines requirements for the brake pad holders with which the heavy rail vehicles and urban rail vehicles are fitted.

This document is applicable to the brake pad holders made from ferrous materials e.g. cast iron, cast steel or forged steel.

This document is not applicable for brake pad holders made of non-ferrous materials.

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 14478:2017, *Railway applications — Braking — Generic vocabulary*

EN 15328:2020, *Railway applications — Braking — Brake pads*

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

EN 60068-2-6:2008, *Environmental testing — Part 2-6: Tests — Test Fc: Vibration (sinusoidal) (IEC 60068-2-6:2007)*

EN 60068-2-47:2005, *Environmental testing — Part 2-47: Tests — Mounting of specimens for vibration, impact and similar dynamic tests (IEC 60068-2-47:2005)*

EN 60721-3-5:1997, *Classification of environmental conditions — Part 3: Classification of groups of environmental parameters and their severities — Section 5: Ground vehicle installations (IEC 60721-3-5:1997)*

EN 61373:2010, *Railway applications — Rolling stock equipment — Shock and vibration tests (IEC 61373:2010)*

EN ISO 6506-1:2014, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1:2014)*

EN ISO 6507-1:2018, *Metallic materials — Vickers hardness test — Part 1: Test method (ISO 6507-1:2018)*

EN ISO 6508-1:2016, *Metallic materials — Rockwell hardness test — Part 1: Test method (ISO 6508-1:2016)*

EN ISO 6892-1:2019, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature (ISO 6892-1:2019)*

EN ISO 9227:2022, *Corrosion tests in artificial atmospheres — Salt spray tests (ISO 9227:2022)*

EN ISO 14284:2022, *Steel and iron — Sampling and preparation of samples for the determination of chemical composition (ISO 14284:2022)*

EN ISO 148-1:2016, *Metallic materials — Charpy pendulum impact test — Part 1: Test method (ISO 148-1:2016)*

EN ISO 18203:2022, *Steel — Determination of the thickness of surface-hardened layers (ISO 18203:2016)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions given EN 14478:2017 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

3.1

compact disc brake unit

disc brake unit, generally with reduced envelope and weight with a single interface to the bogie

3.2

operational mounting condition

normal and nominal conditions of assembly on a vehicle

3.3

referenced technical drawing

drawing used for definition of brake pad holder

4 Symbols and abbreviations

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

<i>A</i>	Percentage elongation after fracture (as specified by EN ISO 6892-1:2019)
<i>F</i>	Force
<i>g</i>	Gravity acceleration 9,81 m/s ²
KV	Absorbed energy for a V-notch test piece (as specified by EN ISO 148-1:2016)
KU	Absorbed energy for a U-notch test piece (as specified by EN ISO 148-1:2016)
SL1 and SL2	Classes of loading
T1 and TX	Classes of temperature (as specified by EN 50125-1:2014)
VL and VH	Classes of vibration

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5 Design and manufacture

5.1 Latch mechanism

The design of the latch mechanism to retain the brake pads shall satisfy the following principles:

- there shall be a positive retention (generation of strain to obtain unlocking) of the latch when in the closed position;
- the brake pad holder and its latch mechanism shall be designed to withstand railway-typical conditions. A secondary retention of the latch mechanism may be installed optionally, which is recommended;
- ease of operation – no special tools to open and close the latch mechanism. Preferably designed to allow use of simple flat bladed screw driver;
- during pad renewal the latch mechanism should remain attached to the brake pad holder;
- renewal of a defective latch mechanism should not require the dismantling of the brake pad holder from the brake unit.

5.2 Interchangeability by applying same main dimensions and geometry

5.2.1 General

Brake pad holders can be designed based on different concepts. The requirements specially for interchangeability are defined below.

5.2.2 Interchangeability for “conventional” brake unit

The requirements for the dimensions for geometric interchangeability for “conventional” brake unit are given in Annex A (see also Annex B for some recommendations). These dimensions are compatible with brake pads defined in EN 15328:2020, Annex F and Annex G. If required a device with mechanical coding should be used. Annex E indicates an example for application.

5.2.3 Interchangeability for “compact” brake unit

The requirements for the dimensions for geometric interchangeability for “compact” brake unit are given in Annex C (see also Annex D for some recommendations). These dimensions are compatible with brake pads defined in EN 15328:2020, Annex F and Annex G. If required a device with mechanical coding should be used. Annex E indicates an example for application.

5.2.4 Dimensional conformity

The dimensional requirements are defined in referenced technical drawings. The conformity assessment of the dimensions of the brake pad holder is verified in accordance with 6.3.1.

5.3 Material

As specified in the scope, this document applies only to the brake pad holders in “ferrous material” e.g. cast iron or steel, manufactured by a forging or casting process. The material used for the design of the brake pad holder shall conform to the technical requirements defined in this document.

The conformity assessment of the brake pad holder material, with referenced technical drawings, shall be verified in accordance with 6.3.2.

5.4 Environmental conditions

5.4.1 Ambient temperature

The brake pad holder shall be able to operate within the temperature classes T1 and TX as specified by EN 50125-1:2014, where the upper limit for TX is +70 °C external air temperature.

5.4.2 Other environmental conditions

5.4.2.1 General

The following environmental conditions shall be considered in the design of the brake pad holder.

If not specifically required to be tested as part of the type testing requirements in this document, suitable tests and/or design assessments considering the effect of the following environmental conditions on the brake pad holder shall be used in the development/design proving of the device, prior to type testing.

5.4.2.2 Humidity

The external humidity levels in accordance with EN 50125-1:2014, 4.4 shall be considered.

5.4.2.3 Rain

The rain rate in accordance with EN 50125-1:2014, 4.6 shall be considered.

5.4.2.4 Snow, ice and hail

The snow, ice and hail requirements in accordance with EN 50125-1:2014, 4.7 and 4.8 shall be considered.

5.4.2.5 Solar radiation

The solar radiation class R2 in accordance with EN 50125-1:2014, 4.9 shall be considered for a duration of 8 h.

5.4.2.6 Resistance to pollution

The effects of pollution shall be considered in the design of equipment and components. Means may be provided to reduce pollution by the effective use of protection of the device. The severity of pollution can depend upon the location of the equipment, therefore the effects of the kinds of pollution indicated in Table 1 shall be considered as a minimum.