

# **SLOVENSKI STANDARD**

## **SIST EN 14535-2:2019**

**01-maj-2019**

**Nadomešča:**  
**SIST EN 14535-2:2011**

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**Železniške naprave - Kolutne zavore za železniška vozila - 2. del: Kolutne zavore, nameščene na kolo, mere in zahteve za kakovost**

Railway applications - Brake discs for railway rolling stock - Part 2: Brake discs mounted onto the wheel, dimensions and quality requirements

Bahnanwendungen - Bremsscheiben für Schienenfahrzeuge - Teil 2: Bremsscheiben, die an einem Rad befestigt werden, Abmessungen und Qualitätsanforderungen

Applications ferroviaires - Disques de frein pour matériel roulant ferroviaire - Partie 2 : Disques de frein montés sur la roue, dimensions et exigences de qualité

**Ta slovenski standard je istoveten z: EN 14535-2:2019**

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**ICS:**

45.040	Materiali in deli za železniško tehniko	Materials and components for railway engineering
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**SIST EN 14535-2:2019**

**en,fr,de**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 14535-2**

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ICS 45.060.01

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English Version

**Railway applications - Brake discs for railway rolling stock  
- Part 2: Brake discs mounted onto the wheel, dimensions  
and quality requirements**

Applications ferroviaires - Disques de frein pour  
matériel roulant ferroviaire - Partie 2 : Disques de frein  
montés sur la roue, dimensions et exigences de qualité

Bahnanwendungen - Bremsscheiben für  
Schienenfahrzeuge - Teil 2: Bremsscheiben, die an  
einem Rad befestigt werden, Abmessungen und  
Qualitätsanforderungen

This European Standard was approved by CEN on 14 October 2018.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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.

CEN members are the national standards bodies of 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 United Kingdom.



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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## European foreword

This document (EN 14535-2:2019) 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 September 2019, and conflicting national standards shall be withdrawn at the latest by September 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 supersedes EN 14535-2:2011.

This document has been prepared under a mandate 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.

Compared to the previous edition, the following changes have been made:

- a) the standard's scope has been modified;
- b) normative references have been updated;
- c) terms and definitions have been revised;
- d) requirements on materials, design, dimensions and installation have been revised;
- e) requirements on testing have been revised;
- f) requirements on designation and markings have been revised;
- g) Annexes have been revised.

The EN 14535 series, *Railway applications - Brake discs for railway rolling stock*, consists of the following parts:

- *Part 1: Brake discs pressed or shrunk onto the axle or drive shaft, dimensions and quality requirements;*
- *Part 2: Brake discs mounted onto the wheel, dimensions and quality requirements;*
- *Part 3: Brake discs, performance of the disc and the friction couple, classification.*

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, 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.

**EN 14535-2:2019 (E)****Introduction**

The requirements given in this document 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 design, workmanship and construction is such as to ensure accordance with good engineering practice.

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## 1 Scope

This document specifies requirements for the design and dimensions of the brake disc.

This document applies to brake discs mounted onto the wheel, including the wheel web or wheel hub of railway rolling stock.

This document applies to discs having one or more disc brake rings, each having two axially separated friction faces.

## 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 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 14535-3, *Railway applications — Brake discs for railway rolling stock — Part 3: Brake discs, performance of the disc and the friction couple, classification*

EN 14478, *Railway applications — Braking — Generic vocabulary*

EN ISO 4287, *Geometrical product specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters (ISO 4287)*

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## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14478 and the following 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>

### 3.1

#### **brake disc**

arrangement of two brake rings having co-planar, annular friction faces to which brake pads are applied in order to develop a braking torque

### 3.2

#### **friction face**

surface of a disc that provides the friction interface for transferring the brake force

### 3.3

#### **brake ring**

portion of the disc having the friction face

Note 1 to entry: Brake rings can consist of one or more sectors and can have continuous or non-continuous friction faces.

**EN 14535-2:2019 (E)****3.4****fastening area**

portion of the disc having means for the fastening on the wheel

Note 1 to entry: The fastening area may be constructed integral with the brake ring or connected to it by a separate linking arrangement.

**3.5****non ventilated disc**

disc having a continuity of material or materials extending from the friction face axially to the rear face so preventing the flow of air through the body of the disc

**3.6****ventilated disc**

disc in which passages to conduct a flow of cooling air are located between the friction ring and the web of the wheel

Note 1 to entry: The airflow is usually occasioned by the rotation of the disc.

**3.7****split disc**

disc in which the brake ring is separated in two halves

**3.8****segmented disc**

disc in which the brake ring is separated in more than two parts

**3.9****maximum permissible rotational speed**

highest speed applicable to the application

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**3.10****indirect actuation**

brake in which the brake pad normal force is applied via a lever system

**3.11****performance class**

set of the values of braking energy, braking power and braking torque, related to the outer diameter, width and type of the disc, at which it is type tested to demonstrate its capability to withstand these conditions without exceeding the defined limits of structural degradation

Note 1 to entry: Discs are categorized into the performance classes according to the tests stated in EN 14535-3.

**3.12****technical specification**

document, describing specific parameter and/or product requirements as an addition to the requirements of this standard, including the final clause-by-clause agreement

**4 Symbols and abbreviations**

For the purpose of this document, the symbols and units given in Table 1 apply.



Table 1 — Symbols and units

Symbol	Description	Unit
$d$	Diametrical dimension	mm
$R_a$	Refer to EN ISO 4287	$\mu\text{m}$
$R_z$	Refer to EN ISO 4287	$\mu\text{m}$
$U$	Imbalance	$\text{g} \cdot \text{m}$
$x$	Axial dimension	mm

## 5 Requirements

### 5.1 General

The discs are intended to be used as part of a friction brake and shall not suffer damage or degradation other than normal wear, surface cracks and deformations of the friction face within permissible limits.

### 5.2 Materials, design and manufacture

The materials, design and manufacture of the disc shall, for all specified operating conditions, take into account:

- in the case of discs mounted on the wheel, the main dimensions given in Table 2;
- the rotational speed;
- the magnitude of the braking torque;
- the quantity of braking energy to be converted and dissipated and its rate of conversion and dissipation;
- the frictional working conditions, especially with the interaction with the brake pad;
- ventilation losses;
- noise;
- mass of disc;
- imbalance of disc;
- environmental influence, e.g.: storage, transport, climatic, shock and vibration conditions;
- the integrity, life and maintenance requirements of the disc, associated brake components, and brake and vehicle systems.

Where a disc consists of more than one constructional element designed for in-service replacement of the brake ring or part of it, the associated parts of that disc shall be interchangeable while the fastening area or carrier remains installed on the wheel within the vehicle.

The design shall be such as to prevent the detachment of any part of the disc at any speed up to and including the maximum permissible rotational speed in all degraded conditions (e.g. wear, cracking) up to the limits given in the technical specification.

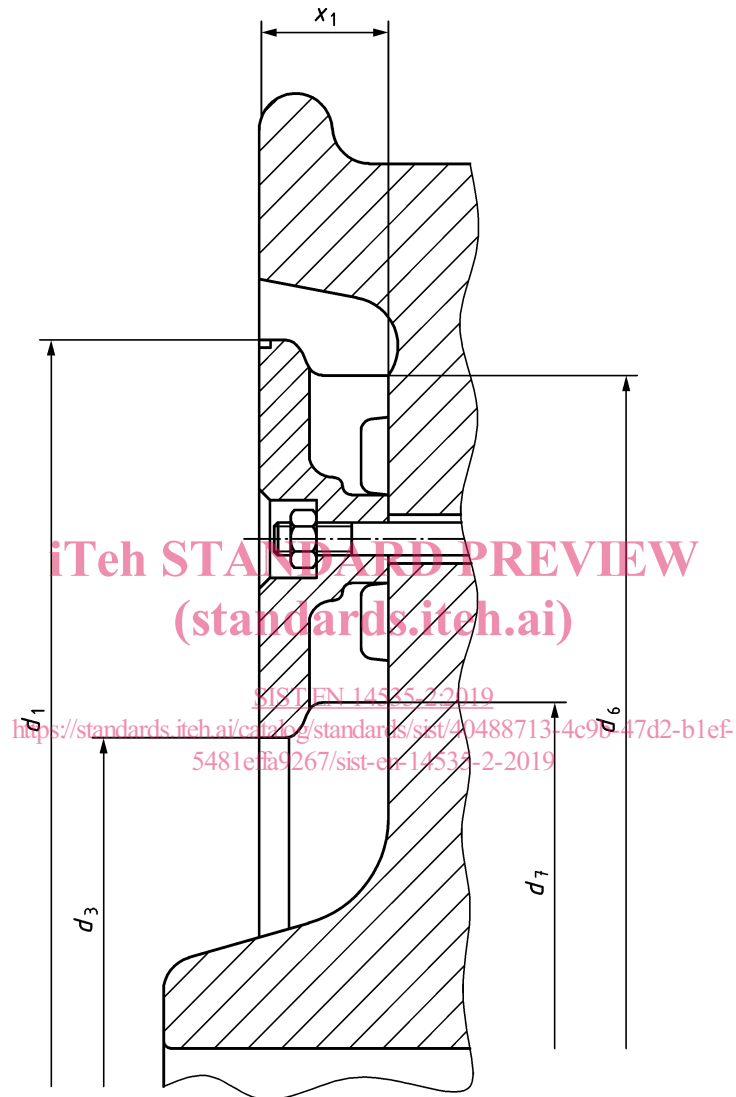
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If any special application conditions are necessary, they shall be specified and documented.

### 5.3 Dimensions

#### 5.3.1 Brake disc

The disc major dimensioning shall be as shown in Figure 1.



#### Key

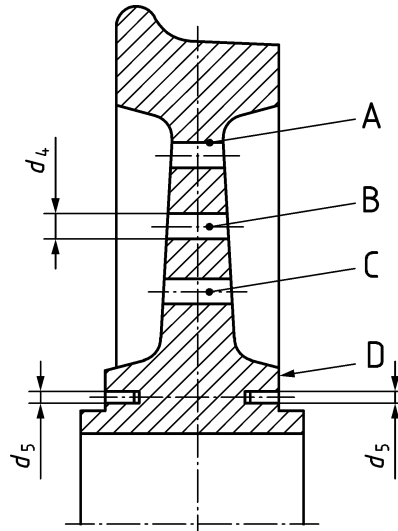
- $d_1$  major diameter of brake ring
- $d_3$  minor diameter of brake ring
- $d_6$  major diameter dimension of brake ring to wheel interface
- $d_7$  minor diameter dimension of brake ring to wheel interface
- $x_1$  brake ring width

**Figure 1 — Disc major dimensions**

### 5.3.2 Characteristics of dimensions and areas for the fastening

Examples of the disc fastening areas are shown in Figure 2. All fastening areas may be used solely or in any combination. The preferred ranges of major fastening and interface dimensions are given in Table 2. The measures are explained in Figure 3.

The form of the disc fastening areas features should be requested in the technical specification.



#### Key

Index	Denomination	Fastening area position
A	outer	close to wheel rim
B	central	middle of the web
C	inner	close to wheel hub
D	hub	directly to the wheel hub
$d_4$	fixing bore diameter	
$d_5$	fixing thread diameter	

**Figure 2 — Disc, definition of fastening areas**