



**SLOVENSKI STANDARD**  
**SIST EN 13979-1:2024**

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**Železniške naprave - Kolesne dvojice in osnovni vozički - Monoblok kolesa -  
Postopek za tehnično odobritev - 1. del: Kovana in valjana kolesa**

Railway applications - Wheelsets and bogies - Monobloc Wheels - Technical approval  
procedure - Part 1: Forged and rolled wheels

Bahnanwendungen - Radsätze und Drehgestelle - Vollräder - Technische  
Zulassungsverfahren - Teil 1: Geschmiedete und gewalzte Räder

Applications ferroviaires - Essieux montés et bogies - Roues monobloc - Procédure  
d'évaluation de la conception - Partie 1 : Roues forgées et laminées

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## Railway applications - Wheelsets and bogies - Monobloc Wheels - Technical approval procedure - Part 1: Forged and rolled wheels

Applications ferroviaires - Essieux montés et bogies -  
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Geschmiedete und gewalzte Räder

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

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## European foreword

This document (EN 13979-1:2023) 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of an identical text or by endorsement, at the latest by June 2024, and conflicting national standards shall be withdrawn at the latest by June 2024.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 13979-1:2020.

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

- A new link to the pre-designing state of the art methods defined by UIC (thermo-mechanical calculation);
- Some recommendations for the rim geometrical design in order to ensure sufficient material to withstand thermal loading;
- A clearer definition of the wheel homologation scope and a new definition of the process to homologate a wheel design derived from a previously homologated one (Clause 3);
- Correction of the recommended reference combined roughness spectrum representative of the different types of braking system for the acoustical assessment (Table I.1).

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 EU Directive(s) / Regulation(s).

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.

## EN 13979-1:2023 (E)

### Introduction

An assessment of the two following aspects is carried out before a wheel is commissioned:

- assessment of the design as described in this standard;
- assessment of the quality of the product (EN 13262:2020).

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## 1 Scope

This document specifies a design assessment procedure for a forged and rolled monobloc wheel (RST). This assessment is carried out before the wheel is commissioned. This document specifies, in particular, the assessment to be performed in order to use wheels on a European network which, in addition, have quality requirements in conformity with those specified in EN 13262:2020.

This assessment requires that the conditions of use for the wheel are defined and this document provides a method for defining those conditions.

The assessment of the design covers four aspects:

- a geometrical aspect: to allow interchangeability of different solutions for the same application;
- a thermomechanical aspect: to manage wheel deformations and to ensure that braking will not cause wheels to fracture;
- a mechanical aspect: to ensure that no fatigue cracks occur in the wheel web and that no permanent deformation occurs under exceptional loading;
- an acoustic aspect: to ensure that the solution chosen is as good as the reference wheel.

This document does not cover assessment of the hub or the rim.

This document has been drawn up for wheels of non-powered tread-braked wheelsets and applies in full to this type of wheel. For wheels on which mounted brake discs are mounted or toothed transmission wheels or even wheels with noise reduction devices, the requirements may be amended or supplemented.

For urban railway vehicles, other standards or documents may be used.

## 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 13103-1:2017+A1:2022, *Applications ferroviaires - Essieux montés et bogies - Partie 1: Méthode de conception des essieux-axes avec fusées extérieures*

EN 13262:2020, *Applications ferroviaires - Essieux montés et bogies - Roues - Prescriptions pour le produit*

## 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: <https://www.electropedia.org/>
- ISO Online browsing platform: <https://www.iso.org/obp>

### 3.1

#### technical specification

document describing specific parameters and/or design assessment procedure requirements as an addition to the requirements of this document

**EN 13979-1:2023 (E)****3.2****diameter after last reprofiling**

nominal value defined by a 5 × 5 mm nominal chamfer and the slope of the new tread profile

Note 1 to entry: Modified values can be defined, for example, in the maintenance plan or in the technical specification. See Figure C.1.

**3.3****worn diameter**

theoretical minimum diameter in service, and cylindrical profile from the outer side of the rim to D0 (wheel tread reference point) and then original new profile to the inner side of the rim

**4 Parameters for the definition of the application covered****4.1 General**

The application for which a wheel is to be assessed shall be defined by the parameters set out below.

If the application parameters are changed for an assessed wheel, the assessment shall be reviewed.

Clause 10.1 and Table 2 give information and/or recommendations for this assessment.

**4.2 Geometric parameters for interchangeability****4.2.1 General**

The application shall be defined by geometric parameters for interchangeability, which can be split into three categories according to whether they are related to functional requirements, assembly requirements or maintenance requirements.

NOTE For rolling stock wheels that have to conform to the Directive 2016/797, some of the geometrical parameters are given in the TSIs concerned (see Annex ZA).

**4.2.2 Functional requirements**

- the nominal tread diameter that influences the buffer height and the loading gauge;
- the maximum rim width linked to the switches and crossings and the track brakes;
- the tread profile outside the conical part of the tread;
- the position of the inner side of the rim relative to the corresponding side of the hub;
- the conicity of the hub bore;
- the space required for disc brakes mounted on the wheel;
- the space required on the bogie frame, braking equipment and suspension equipment.

**4.2.3 Assembly requirements**

- the bore diameter;
- the wheel hub length shall ensure it overhangs the wheelseat.

#### 4.2.4 Maintenance requirements

- the wear limit diameter or the last reprofiling diameter;
- the wear groove shape, if necessary;
- the geometry of the area for wheel clamping on reprofiling machines;
- the position and shape of the hole and groove for displacement under oil pressure;
- the general rim shape to allow ultrasonic measurement of residual stresses in tread-braked wheels.

### 4.3 Parameters for thermomechanical assessment of tread-braked wheels

#### 4.3.1 Geometrical requirements for tread-braked wheels

A suitable inner diameter on the inner and outer side of the rim shall be applied in order to enable suitable conditions for residual stress measurement. This means that, in order to enable this measurement, the residual rim thickness, on both sides, should be larger than the ultrasonic probes used for the measurements during maintenance and approval.

Freight wagon wheels with a nominal diameter of 920 mm that are fully tread braked shall be designed in order that the surface of the rim section when the wheel is fully worn has a residual area  $A_{\text{rim}}$  equal or larger than 0,23 dm<sup>2</sup>.

NOTE For tread-braked wheels other than 920 mm nominal diameter, this requirement may be updated, based on service experience, following a similar technical approach.

The residual area is calculated as follows:

- when the inner diameter of the rim is the same both on the inner and outer side, the area to be considered is the rectangle between the outer diameter of the wear limit groove ( $w$  in EN 13262:2020) and the inner diameter of the rim ( $b_1$  and  $b_2$  in EN 13262:2020),
- when the inner diameter of the rim is different on the inner and outer side, the area defined above shall be completed with the triangle resulting from this difference (see Figure 1 – in this example  $b_1$  is smaller than  $b_2$ ).

This calculation is carried out referring to the nominal values of the quoted parameters.

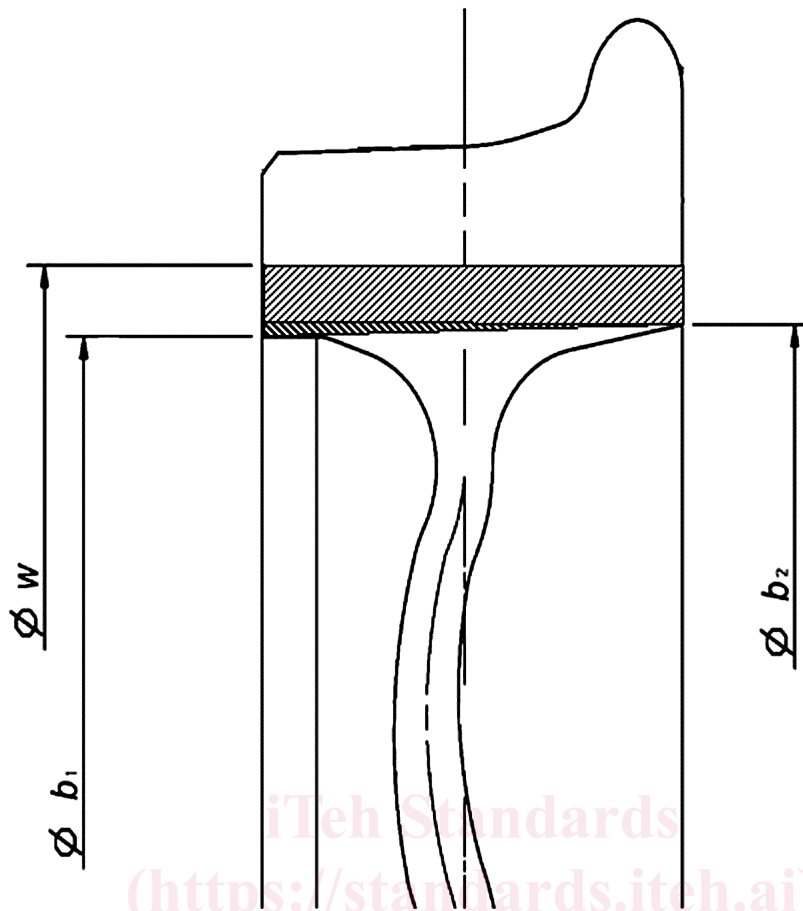


Figure 1 — Definition of the residual area (example)

#### 4.3.2 Drag braking or consecutive stop braking

##### 4.3.2.1 General

The application shall be defined based on the maximum braking energy ( $P_a$  nominal braking power,  $t_a$  application time (duration of the test) and  $V_a$  average speed of the vehicle) generated by the friction of the brake shoes on the tread, as well as the type of brake shoes applied to the wheel (the type – cast iron brake shoe or composite brake shoe – dimensions and number).

If the tests are carried out with composite brake shoes, they do not need to be repeated with cast iron brake shoes. The braking test with two opposing brake shoes covers the braking test with a single brake shoe. The braking test is independent of the manufacturing origin of the brake shoes.

Non approved composite brake shoes can be used for these tests providing that they are able to withstand the test conditions.

NOTE The non-approved brake shoe Becorit 929-1 is widely used to perform these kind of tests

##### 4.3.2.2 Freight wagons

When monobloc wheels fitted to a wagon are 100 % tread braked, the parameters in Table A.1 of Annex A shall apply, unless the technical specification defines them differently.

NOTE This table is the same as the table in the freight wagons TSI.