



# SLOVENSKI STANDARD

## oSIST prEN 13262:2023

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**Železniške naprave - Kolesne dvojice in podstavni vozički - Kolesa - Zahtevane lastnosti proizvoda**

Railway applications - Wheelsets and bogies - Wheels - Product requirements

Bahnanwendungen - Radsätze und Drehgestelle - Räder - Produkthanforderungen

Applications ferroviaires - Essieux montés et bogies - Roues - Prescriptions pour le produit

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**Ta slovenski standard je istoveten z: prEN 13262**

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**ICS:**

45.040      Materiali in deli za železniško      Materials and components  
tehniko      for railway engineering

**oSIST prEN 13262:2023**

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**prEN 13262**

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English Version

## Railway applications - Wheelsets and bogies - Wheels - Product requirements

Applications ferroviaires - Essieux montés et bogies -  
Roues - Prescriptions pour le produit

Bahnanwendungen - Radsätze und Drehgestelle -  
Räder - Produktanforderungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 256.

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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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<b>Contents</b>		Page
<b>European foreword</b> .....		<b>5</b>
<b>1</b>	<b>Scope</b> .....	<b>6</b>
<b>2</b>	<b>Normative references</b> .....	<b>6</b>
<b>3</b>	<b>Terms and definitions</b> .....	<b>7</b>
<b>4</b>	<b>Product definition</b> .....	<b>8</b>
<b>4.1</b>	<b>Chemical composition</b> .....	<b>8</b>
<b>4.1.1</b>	<b>Values to be achieved</b> .....	<b>8</b>
<b>4.1.2</b>	<b>Sampling position</b> .....	<b>8</b>
<b>4.1.3</b>	<b>Chemical analysis</b> .....	<b>8</b>
<b>4.2</b>	<b>Mechanical characteristics</b> .....	<b>8</b>
<b>4.2.1</b>	<b>Characteristics from the tensile test</b> .....	<b>8</b>
<b>4.2.2</b>	<b>Hardness characteristics in the rim</b> .....	<b>10</b>
<b>4.2.3</b>	<b>Impact resistance characteristics</b> .....	<b>13</b>
<b>4.2.4</b>	<b>Fatigue characteristics</b> .....	<b>13</b>
<b>4.2.5</b>	<b>Toughness characteristics of the rim</b> .....	<b>14</b>
<b>4.3</b>	<b>Heat treatment homogeneity</b> .....	<b>16</b>
<b>4.3.1</b>	<b>Values to be achieved</b> .....	<b>16</b>
<b>4.3.2</b>	<b>Test pieces</b> .....	<b>16</b>
<b>4.3.3</b>	<b>Test method</b> .....	<b>16</b>
<b>4.4</b>	<b>Material cleanliness</b> .....	<b>16</b>
<b>4.4.1</b>	<b>Micrographic cleanliness</b> .....	<b>16</b>
<b>4.4.2</b>	<b>Internal integrity</b> .....	<b>18</b>
<b>4.5</b>	<b>Residual stresses</b> .....	<b>21</b>
<b>4.5.1</b>	<b>General</b> .....	<b>21</b>
<b>4.5.2</b>	<b>Values to be achieved</b> .....	<b>21</b>
<b>4.5.3</b>	<b>Test piece</b> .....	<b>21</b>
<b>4.5.4</b>	<b>Measurement methods</b> .....	<b>21</b>
<b>4.6</b>	<b>Surface characteristics</b> .....	<b>21</b>
<b>4.6.1</b>	<b>Surface finish</b> .....	<b>21</b>
<b>4.6.2</b>	<b>Surface condition for the oil injection hole</b> .....	<b>22</b>
<b>4.6.3</b>	<b>Surface integrity</b> .....	<b>22</b>
<b>4.7</b>	<b>Geometrical tolerances</b> .....	<b>23</b>
<b>4.7.1</b>	<b>General</b> .....	<b>23</b>
<b>4.7.2</b>	<b>Wear groove</b> .....	<b>26</b>

4.8	Static imbalance .....	26
4.9	Coating and protection against corrosion.....	27
4.9.1	General requirements .....	27
4.9.2	Thermo-sensitive paint on tread braked wheels .....	27
4.10	Marking.....	28
5	Product qualification .....	29
6	Conditions of supply of the product.....	29
7	Tips for choosing the steel grade.....	29
<b>Annexe A (normative) Evaluation process for the acceptance of new materials .....</b>		<b>30</b>
A.1	General .....	30
A.2	First step: Characterisation of a new steel grade.....	30
A.3	Step two: Testing in service .....	30
A.4	Step three: Report.....	31
<b>Annexe B (informative) Examples of test benches for fatigue testing.....</b>		<b>32</b>
B.1	Test piece .....	32
B.2	First test method .....	32
B.3	Second test method .....	33
B.4	Third test method .....	34
<b>Annexe C (informative) Strain gauge method of determining the variation in circumferential residual stresses deep under the running surface (destructive method) .....</b>		<b>36</b>
C.1	Method principle.....	36
C.2	Procedure.....	36
C.3	Calculation of the variation of the circumferential residual stress deep under the running surface .....	37
<b>Annexe D (normative) Product qualification .....</b>		<b>41</b>
D.1	Introduction .....	41
D.2	General.....	41
D.3	Requirements .....	43
D.4	Qualification procedure.....	43
D.5	Validity of the qualification .....	46
D.6	Qualification record .....	46
<b>Annexe E (normative) Conditions of supply of the product .....</b>		<b>48</b>
E.1	Introduction.....	48
E.2	General.....	48
E.3	Delivery states.....	49
E.4	Unit checks.....	49
E.5	Batch sampling check .....	49

## prEN 13262:2023 (E)

E.6	Quality plan .....	51
E.7	Permissible repairs .....	52
E.8	Retest.....	52
<b>Annexe F (normative) Measurement of the hydrogen content at the time of development of steel for monobloc wheels .....</b>		<b>53</b>
F.1	General.....	53
F.2	Sampling.....	53
F.3	Analysis method .....	53
F.4	Precautions .....	53
<b>Annexe G (informative) Common applications of steel grades.....</b>		<b>54</b>
<b>Annex ZA (informative) Relationship between this European Standard and the essential requirements of EU Directive (EU) 2016/797/EC aimed to be covered.....</b>		<b>55</b>
<b>Bibliography.....</b>		<b>59</b>

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[oSIST prEN 13262:2023](https://standards.iteh.ai/catalog/standards/sist/6bed17ec-c8b6-403d-9ee3-f3c52f669129/osist-pren-13262-2023)

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## European foreword

This document (prEN 13262:2023) has been prepared by the CEN/TC 256 “Railway applications” Technical Committee, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13262:2020.

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).

For relationship with Directive(s) / Regulation(s), see informative Annex ZA, which forms an integral part of this document.

In comparison with EN 13262:2020, the following technical changes are included in this revision:

- mandatory application of thermo-sensitive paint in tread braked freight application;
- definition of assessment/ product requirements for thermo-sensitive paint;
- an improved definition of the product groups submitted to qualification;
- improved requirements to assess product qualification after changes made in the manufacturing process.

The informative annexes to this document provide additional guidance that is not mandatory but that helps to understand or use the document.

**NOTE** The informative annexes can contain optional requirements. For example, a test method that is optional, or presented as an example, can contain requirements, but it is not necessary to meet these requirements to be in compliance with the document.

**prEN 13262:2023 (E)****1 Scope**

This document specifies the characteristics of wheels for all heavy rail track gauges.

This document applies to heavy rail vehicles and applies, in principle, to other vehicles such as urban rail vehicles. Five steel grades, ER6, ER7, ER8, ERS8 and ER9, are defined in this document.

NOTE 1 Steel grade ERS8 has been introduced in this document as an optimization of steel grades ER8 and ER9 due to contact fatigue (RCF), taking into account service feedback from Europe, for example, BS 5892-3 in force in the United Kingdom.

Some features are provided as a Category 1 or Category 2 function.

The requirements defined in this document apply to cylindrical bores. Most requirements also apply to wheels with tapered bores. Specific requirements for tapered bores (e.g. geometrical dimensions, etc.) are defined in the technical specification.

This document applies to monobloc wheels in vacuum degassed steel, forged and rolled, with surface treated rims, which have already been the subject of extensive commercial applications on a European network or have complied with a technical approval procedure according to EN 13979-1:2020 to validate their design.

Annex A describes the evaluation process for accepting new materials that are not included in this document.

This document defines the requirements to be met for wheels; the technical approval procedure is not part of the scope of this document.

NOTE 2 A "surface-treated rim" is achieved by heat treatment which aims to harden the rim and create compressive residual stress.

**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 10020:2000, *Definition and classification of grades of steel*

EN 13979-1:2020, *Railway Applications - Wheelsets and bogies - Monobloc wheels - Technical approval procedure - Part 1: Forged and rolled wheels*

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

EN ISO 1101:2017, *Geometrical product specifications (GPS) - Geometrical tolerancing - Tolerances of form, orientation, location and run-out (ISO 1101:2017)*

EN ISO 6506-1:2014, *Metallic materials - Brinell hardness test - Part 1: Test method (ISO 6506-1:2005)*

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

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



ISO 4967:2013, *Steel - Determination of content of non-metallic inclusions - Micrographic method using standard diagrams*

ISO 5948:2018, *Railway rolling stock material - Ultrasonic acceptance testing*

ISO 6933:1986, *Railway rolling stock material - Magnetic particle acceptance testing*

ISO/TR 9769:2018<sup>1</sup>, *Steel and iron - Review of available methods of analysis*

ASTM E399-19, *Standard test method for linear-elastic plane-strain fracture toughness  $K_{Ic}$  of metallic materials*

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

#### 3.1

##### **Technical Specification**

document describing specific parameters and/or product requirements in addition to the requirements of this document

#### 3.2

##### **batch**

batch consisting of wheels assumed to have the same characteristics

Note 1 to entry: A batch consists of wheels of the same design, forged with the raw material from a single cast with the same warm forging process and a single heat treatment process. If the raw material is obtained from several casts with the expected chemical composition, the resulting wheels can be combined in a batch. In this case, it is necessary to demonstrate in the product qualification that the wheels manufactured from these different casts meet the requirements for product qualification.

#### 3.3

##### **nominal diameter**

diameter of the running tread of a new wheel as indicated on the wheel drawing

#### 3.4

##### **wheel categories**

classification of the component, based on operational aspects, which determines the list of requirements to be applied

Note 1 to entry: Category 1 is generally selected when the operating train speed is greater than 200 km/h.

Note 2 to entry: Category 2 is generally selected when the operating speed is 200 km/h or less

Note 3 to entry: These categories can also be defined in accordance with the technical specification.

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<sup>1</sup> See also CEN/TR 10261:2018.

## prEN 13262:2023 (E)

## 4 Product definition

### 4.1 Chemical composition

#### 4.1.1 Values to be achieved

The maximum percentages of the different elements specified are given in Table 1.

**Table 1 — Maximum percentages of the different elements specified**

Steel grade	Maximum content in % <sup>a</sup>										
	C	Si	Mn	P <sup>b</sup>	S <sup>b c</sup>	Cr	Cu	Mo	Ni	V	Cr + Mo + Ni
ER6	0,48	0,40	0,75	0,020	0,015	0,30	0,30	0,08	0,30	0,06	0,50
ER7	0,52	0,40	0,80	0,020	0,015	0,30	0,30	0,08	0,30	0,06	0,50
ER8	0,56	0,40	0,80	0,020	0,015	0,30	0,30	0,08	0,30	0,06	0,50
ERS8	0,57	1,10	1,10	0,020	0,015	0,30	0,30	0,08	0,30	0,06	0,60
ER9	0,60	0,40	0,80	0,020	0,015	0,30	0,30	0,08	0,30	0,06	0,50

<sup>a</sup> For specific applications, variations of requirements within the limits of the maximum levels can be agreed in the technical specification.

<sup>b</sup> A maximum content of 0,025 % may be agreed in the technical specification for specific applications.

<sup>c</sup> A minimum sulphur content may be agreed in the technical specification based on the steel development process to protect against hydrogen embrittlement.

#### 4.1.2 Sampling position

The sample for determining the chemical composition shall be taken 15 mm under the running tread at nominal diameter.

NOTE The running tread is the nominal position on the running surface where the wheel and rail are in contact.

The chemical composition can also be determined by casting analysis. In this case, the chemical composition shall be adapted in the technical specification.

#### 4.1.3 Chemical analysis

The chemical composition analysis shall be performed in accordance with ISO/TR 9769:2018 unless another standard is defined in the technical specification.

For example, ASTM E415-14 and ASTM E1019-11 can be applied.

## 4.2 Mechanical characteristics

### 4.2.1 Characteristics from the tensile test

#### 4.2.1.1 Values to be achieved

Characteristics in the wheel rim and web are given in Table 2.

Table 2 — Characteristics in the wheel rim and web

Steel grade	Rim			Web	
	ReH <sup>a</sup> (MPa)	Rm (MPa)	A5 %	Reduction of Rm <sup>b</sup> (MPa)	A5 %
ER6	≥ 500	780/900	≥ 15	≥ 100	≥ 16
ER7	≥ 520	820/940	≥ 14	≥ 110	≥ 16
ER8	≥ 540	860/980	≥ 13	≥ 120	≥ 16
ERS8	≥ 580	900/1020	≥ 13	≥ 110	≥ 14
ER9	≥ 580	900/1050	≥ 12	≥ 130	≥ 14

<sup>a</sup> If there is no apparent yield strength, the conventional Rp0,2 limit shall be determined.

<sup>b</sup> Decrease in tensile strength of the web relative to the rim for the same wheel.

If there are no other requirements in the technical specification, for steel grades ER7, ER8, ERS8 and ER9, a minimum value of 355 MPa for the yield strength in the web is required. For steel grade ER6, a minimum value of 310 MPa for the yield strength in the web is required.

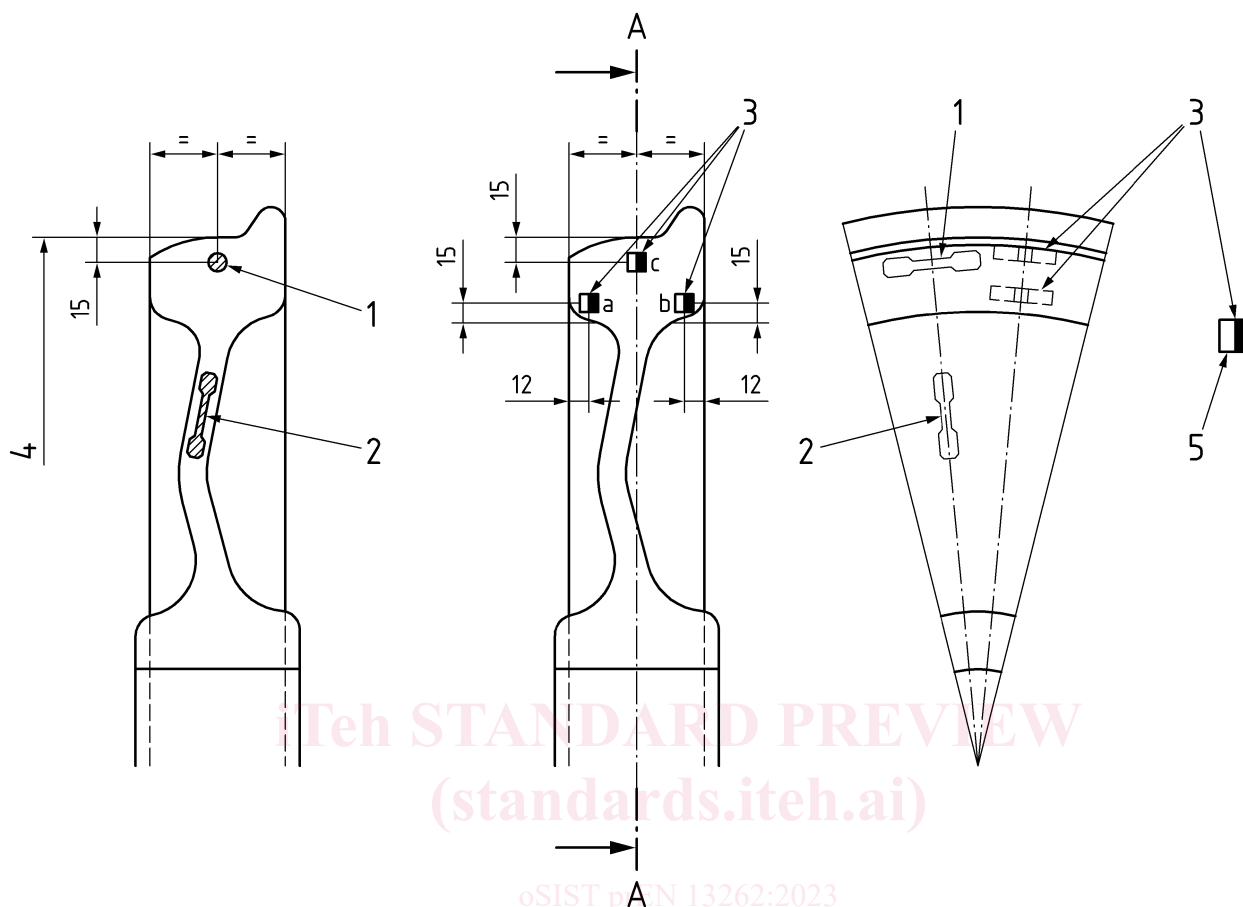
#### 4.2.1.2 Position of the test pieces

The test pieces shall be taken from the wheel rim and web. Their positions are shown in Figure 1.

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Dimensions in millimetres

**Key**

- 1 tensile test piece in the rim (15 mm axis under the running surface considering its nominal diameter)
- 2 tensile test piece in the web
- 3 impact bending test piece
- 4 nominal diameter
- 5 notch

**Figure 1 — Position of test pieces****4.2.1.3 Test method**

The test shall be carried out in accordance with the requirements of EN ISO 6892-1:2019. The nominal diameter of the test piece shall be at least 10 mm and the length of the deformation gauge shall be five times the diameter. If the test pieces cannot be taken from the web, a smaller diameter shall be agreed in the technical specification.

**4.2.2 Hardness characteristics in the rim****4.2.2.1 Values to be achieved**

The minimum Brinell hardness values given in Table 3 apply up to a maximum of 35 mm of wear range under the running surface. If the thickness of the wear range is greater than 35 mm, the values shall be defined in the technical specification.

The hardness value at the connection between the web and the rim (point A in Figure 2) shall be at least 10 points lower than that measured at the wear range limit.

**Table 3 — Values to be achieved for hardness characteristics in the rim**

Steel grade	Minimum Brinell hardness value	
	Category 1	Category 2
ER6	—	225
ER7	245	235
ER8	245	245
ERS8	250	250
ER9	255	255

#### 4.2.2.2 Position of measuring points

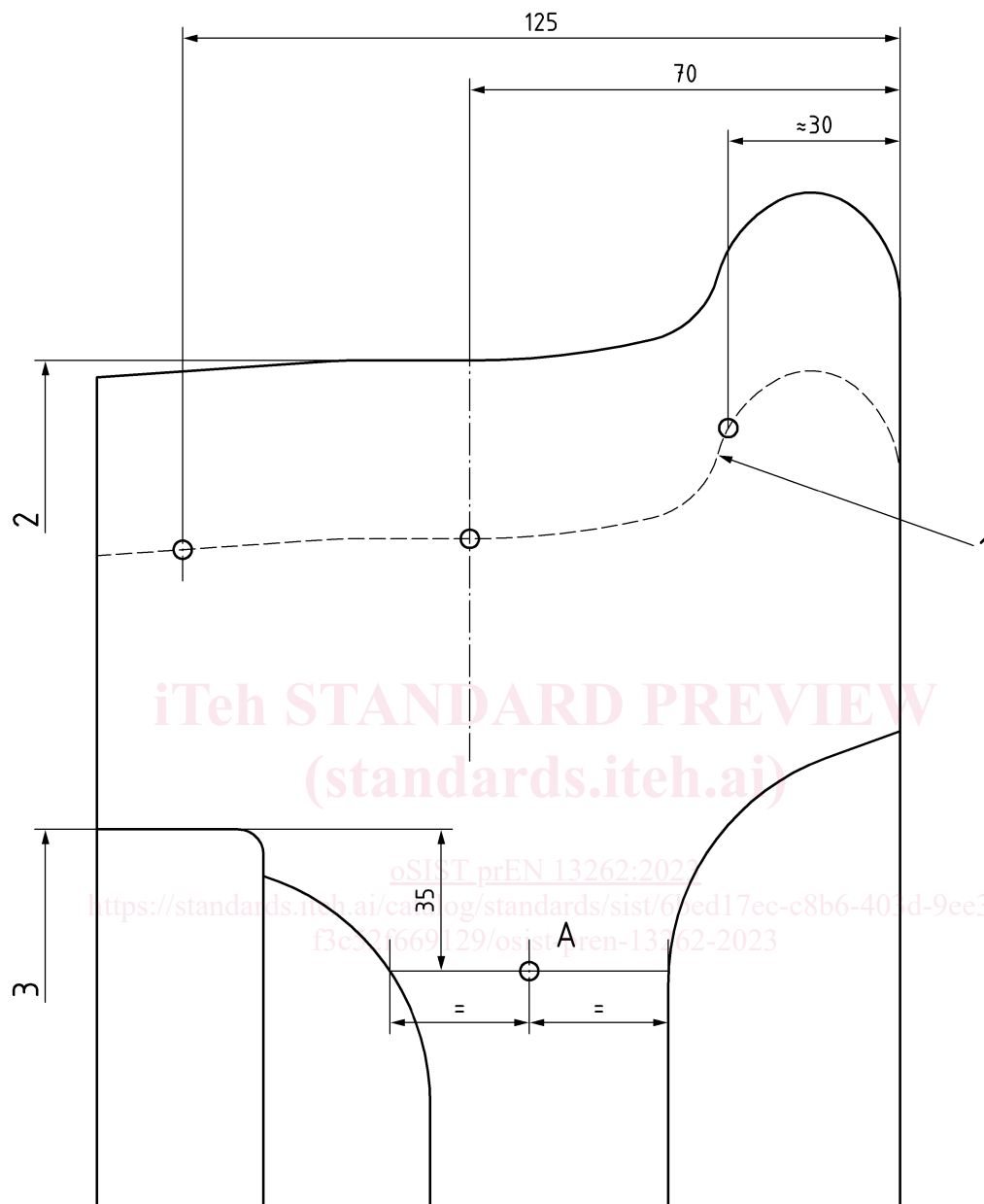
Four measurements are made on a radial section of the rim, as shown in Figure 2.

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Dimensions in millimetres

**Key**

- 1 limit of wear range or diameter of last achievable re-profiling (according to technical specification).
- 2 nominal diameter
- 3 internal diameter (on external face)

**Figure 2 — Measurements made on a radial section of the rim**

The values in Figure 2 are valid for standard gauge axles and for a rim profile width of 135 mm and above. Other gauges and profiles may be defined in the technical specification.

**4.2.2.3 Test method**

It shall be carried out according to EN ISO 6506-1:2014. The diameter of the ball is 5 mm.

### 4.2.3 Impact resistance characteristics

#### 4.2.3.1 Values to be achieved

The values to be achieved for the impact test are given in Table 4. For each temperature, they represent the average value and the minimum value for the three test pieces defined in 4.2.3.2, and on the other hand the minimum unit values. At + 20 °C, U-notch test pieces shall be used. At - 20 °C, V-notch test pieces shall be used.

**Table 4 — Values to be achieved for impact resistance characteristics**

Steel grade	KU (Joules) at + 20 °C		KV (Joules) at - 20 °C	
	Average values	Minimum values	Average values	Minimum values
ER6	≥ 17	≥ 12	≥ 12	≥ 8
ER7	≥ 17	≥ 12	≥ 10	≥ 7
ER8	≥ 17	≥ 12	≥ 10	≥ 5
ERS8	≥ 15	≥ 11	≥ 9	≥ 5
ER9	≥ 13	≥ 9	≥ 8	≥ 5

#### 4.2.3.2 Position of the test pieces

The position of the three test pieces is given in Figure 1. The axis of the bottom of the notches shall be parallel to the A-A axis in Figure 1.

#### 4.2.3.3 Test method

The test shall be carried out in accordance with EN ISO 148-1:2016.

### 4.2.4 Fatigue characteristics

#### 4.2.4.1 Values to be achieved

The stress magnitude  $\Delta\sigma$  that a wheel web shall withstand, regardless of the steel grade, for 10 million cycles without showing crack initiation with a probability of 99,7 % is given in Table 5.

This requirement is met by testing two wheels, in accordance with Annex D, D.4.4.