BS EN 13262:2026

BSI Standards Publication

Railway applications — Wheelsets and bogies — Wheels — Product requirements



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National foreword

This British Standard is the UK implementation of EN 13262:2026. It supersedes BS EN 13262:2020, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RAE/3/-/1, Railway Applications - Wheels and Wheelsets.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Contents

European foreword 4
1 Scope 5
2 Normative references 5
3 Terms and definitions 6
4 Product definition 7
4.1 Chemical composition 7
4.1.1 Values to be achieved 7
4.1.2 Sampling position 7
4.1.3 Chemical analysis 7
4.2 Mechanical characteristics 7
4.2.1 Characteristics from the tensile test 7
4.2.2 Hardness characteristics in the rim 9
4.2.3 Impact resistance characteristics 12
4.2.4 Fatigue characteristics 12
4.2.5 Toughness characteristics of the rim 13
4.3 Heat treatment homogeneity 14
4.3.1 Values to be achieved 14
4.3.2 Test pieces 15
4.3.3 Test method 15
4.4 Material cleanliness 15
4.4.1 Micrographic cleanliness 15
4.4.2 Internal integrity 17
4.5 Residual stresses 19
4.5.1 General 19
4.5.2 Values to be achieved 19
4.5.3 Test piece 20
4.5.4 Measurement methods 20
4.6 Surface characteristics 20
4.6.1 Surface finish 20
4.6.2 Surface condition for the oil injection hole 21
4.6.3 Surface integrity 21
4.7 Geometrical tolerances 22
4.7.1 General 22
4.7.2 Wear groove 25
4.8 Static imbalance 25
4.9 Coating and protection against corrosion 26
4.9.1 General requirements 26
4.9.2 Thermo-sensitive paint on tread braked wheels 26
4.10 Marking 27
4.11 Injection hole thread 28
5 Product qualification 28
6 Conditions of supply of the product 28
7 Tips for choosing the steel grade 28
Annex A (normative) Evaluation process for the acceptance of new materials 29
A.1 General 29
A.2 First step: Characterization of a new steel grade 29
A.3 Step two: Testing in service 29
A.4 Step three: Report 30
Annex B (informative) Examples of test benches for fatigue testing 31
B.1 Test piece 31
B.2 First test method 31
B.3 Second test method 33

Documents
Document Sharing Hub
Full document details: BS EN 13262-2026 Railway applications — Wheelsets and bogies — Wheels — Product requirements

B.4 Third test method **34**
Annex C (informative) Strain gauge method of determining the variation in circumferential residual stresses deep under the running surface (destructive method) **36**
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**
Annex D (normative) Product qualification **41**
D.1 Introduction **41**
D.2 General **41**
D.3 Requirements **43**
D.4 Qualification procedure **44**
D.5 Validity of the qualification **47**
D.6 Qualification record **48**
Annex E (normative) Conditions of supply of the product **49**
E.1 Introduction **49**
E.2 General **49**
E.3 Delivery states **50**
E.4 Unit checks **50**
E.5 Batch sampling check **50**
E.6 Quality plan **52**
E.7 Permissible repairs **53**
E.8 Retest **53**
Annex F (normative) Measurement of the hydrogen content of steel for monobloc wheels **54**
F.1 General **54**
F.2 Sampling **54**
F.3 Analysis method **54**
F.4 Precautions **54**
Annex G (informative) Common applications of steel grades **55**
Annex ZA (informative) Relationship between this European Standard and the essential requirements of EU Directive (EU) 2016/797/EC aimed to be covered **56**
Bibliography **58**

Documents
Document Sharing Hub

Full document details: BS EN 13262-2026 Railway applications — Wheelsets and bogies — Wheels — Product requirements

European foreword

This document (EN 13262:2026) has been prepared by the CEN/TC 256 “Railway applications” Technical Committee, 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 December 2026, and conflicting national standards shall be withdrawn at the latest by December 2026.

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 13262:2020.

The main changes compared with EN 13262:2020 are as follows:

— 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;

— definition of the wheel nominal diameter.

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

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.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this 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.

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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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 rolling 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 13979-1:2023 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 13979-1:2023, *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 6506-1:2014, *Metallic materials - Brinell hardness test - Part 1: Test method (ISO 6506-1:2014)*

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

EN ISO 9712:2022, *Non-destructive testing - Qualification and certification of NDT personnel (ISO 9712:2021)*

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*

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

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

ASTM E399-22, *Standard test method for linear-elastic plane-strain fracture toughness KIc 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
group 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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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 — Limit values by product analysis

	Maximum content in % [a]										
Steel grade	C	Si	Mn	P [b]	S [b c]	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

[a] For specific applications, variations of requirements within the limits of the maximum levels can be agreed in the technical specification.

[b] A maximum content of 0,025 % may be agreed in the technical specification for specific applications.

[c] 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. See key 4 in Figure 1.

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.

NOTE Potential methods are listed in ISO/TR 9769:2018 or ASTM E415-21 and ASTM E1019-18.

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.

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Table 2 — Characteristics in the wheel rim and web

Steel grade	Rim			Web	
	R_{eH} [a] (MPa)	R_m (MPa)	A_5 %	Reduction of R_m [b] (MPa)	A_5 %
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
If there is no distinctive yield strength, the conventional $R_{p0,2}$ limit shall be determined.					
Decrease in tensile strength of the web relative to the rim for the same wheel.					

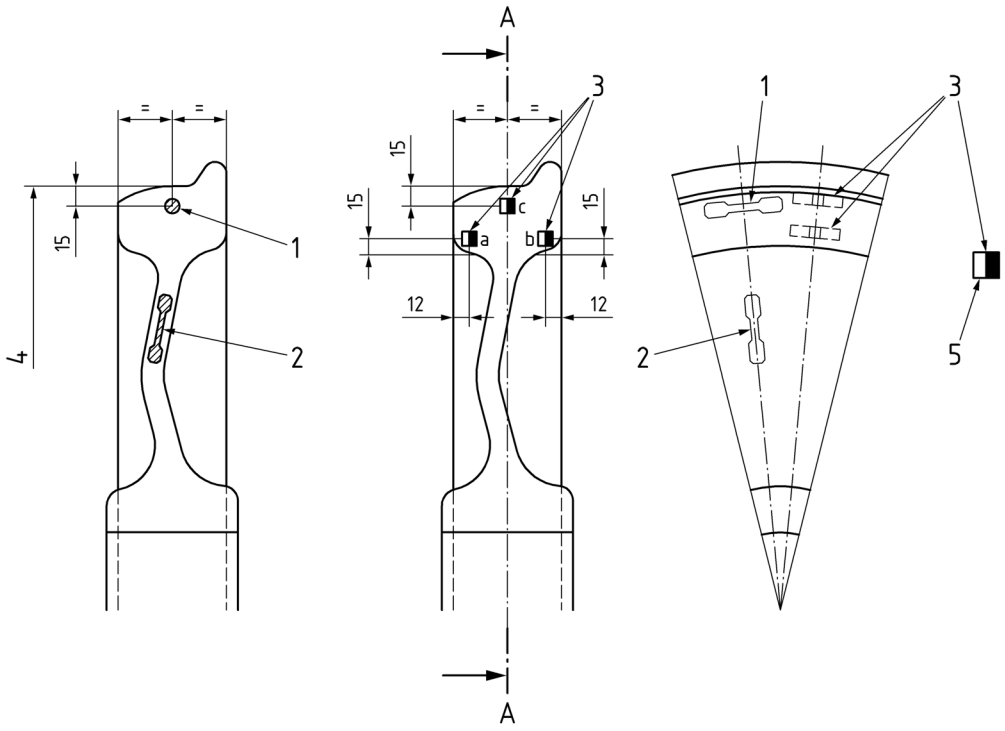
If there are no other requirements in the technical specification, for steel grades ER7, ER8, ERS8 and ER9, a minimum value of 355 MPa for the yield strength in the web is required. For steel grade ER6, a minimum value of 310 MPa for the yield strength in the web is required.

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), position determining the chemical composition

2 tensile test piece in the web

3 impact bending test piece (a, b and c)

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.

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

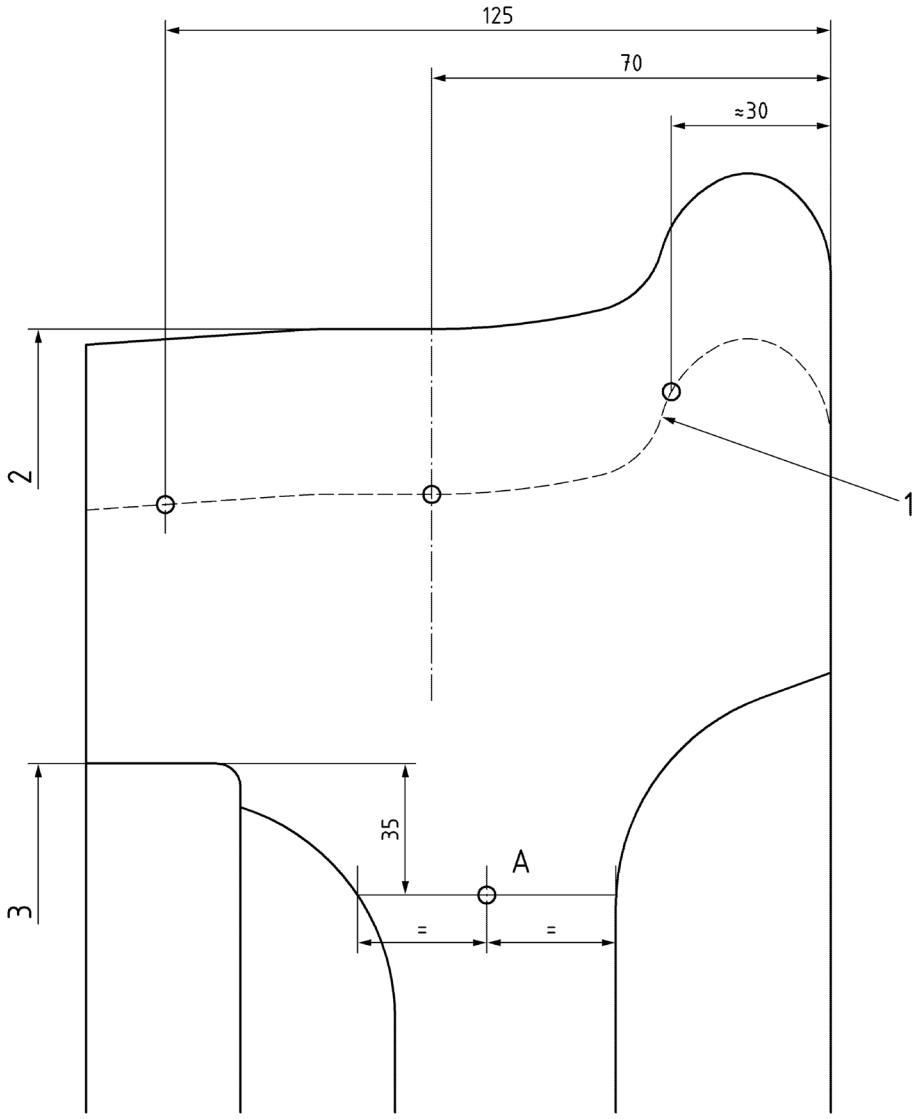
	Minimum Brinell hardness value	
Steel grade	**Category 1**	**Category 2**
ER6	—	225
ER7	245	235
ER8	245	245
ERS8	250	250
ER9	255	255

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 rim profiles may be defined in the technical specification.

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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. 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 Δσ 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 D.4.4.

Table 5 — Values to be achieved for fatigue characteristics of the web

Maximum roughness *Ra* µm	Fatigue stress limits according to the wheel design evaluation procedure (EN 13979-1:2023) Δσ (MPa)	Values to be achieved for fatigue characteristics Δσ (99,7 %) (MPa)
6,3	360	450
12,5	290	315

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NOTE The purpose of obtaining these values is to ensure that the product has characteristics superior to those used to define the allowable stresses required to size the wheel web under fatigue.

Given the approximations inherent in a fatigue calculation, the differentiation of five steel grades is unrealistic for this characteristic. For steel grade ER6, if a lower value is expected, it shall be specified and justified in the technical specification.

4.2.4.2 Fatigue test pieces

The test pieces shall be made up from wheels as delivered. In particular, the surface finishes of the web are those defined in 4.6.

4.2.4.3 Test method

The test method shall enable bending stresses to be created in a section of the wheel web.

The tests shall be conducted in order to be able to use a fatigue test statistical counting method.

The tests are controlled from the radial stresses existing in the cracking area of the wheel web.

The ten million cycles shall be applied after setting the required stress level depending on the test bench and specimen geometry.

Examples of test methods are given in Annex B.

4.2.5 Toughness characteristics of the rim

4.2.5.1 General

This characteristic need only to be verified on tread braked wheels (service brake or parking brake) or equipped with a running surface cleaning system (e.g. scrubbers), whether they are Category 1 or Category 2.

4.2.5.2 Values to be achieved

For steel wheels of grade ER6, the average value obtained on six test pieces shall be greater than or equal to 100 MPa $\sqrt{m}$ and each individual value shall be greater than or equal to 80 MPa $\sqrt{m}$.

For steel wheels of grade ER7, the average value obtained on six test pieces shall be greater than or equal to 80 MPa $\sqrt{m}$ and each individual value shall be greater than or equal to 70 MPa $\sqrt{m}$.

For wheels of other steel grades, the values to be achieved shall be contained in the technical specification.

4.2.5.3 Position of the test pieces

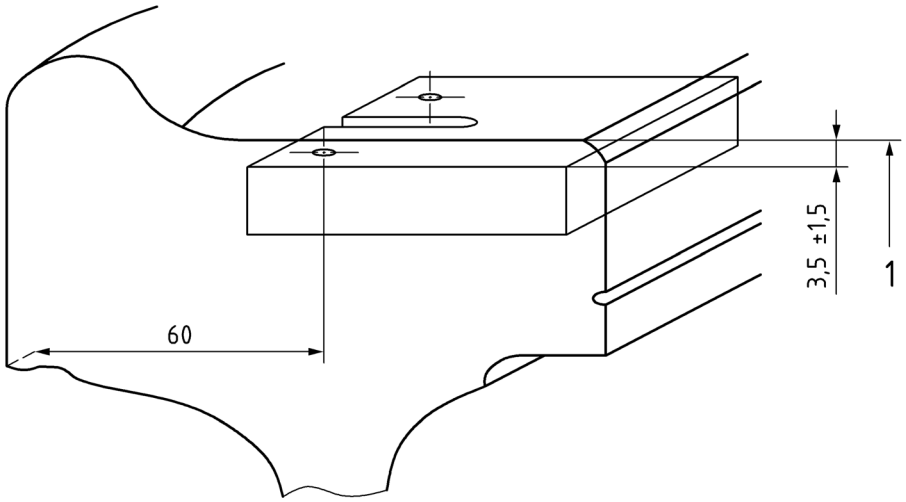
Six test pieces shall be taken from the rim as shown in Figure 3.

The test pieces shall be evenly distributed across the entire rim.

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Dimensions in millimetres



Key

1 nominal diameter

Figure 3 — Test pieces collected from the rim

4.2.5.4 Test method

The test shall be performed according to ASTM E399-22.

The special conditions that shall be used are:

— compact 30 mm thick tensile test pieces (CT30), with chevron notch with aperture angle of 90°;

— test temperature between + 15 °C and + 25 °C;

— measurement of the notch opening at the end of the test piece;

— rate of increase of stress intensity $\Delta K/s$, for the tensile test, between 0,55 MPa $\sqrt{m}\ /s$ and 1 MPa $\sqrt{m}\ /s$.

The toughness value considered shall be the value K_Q, calculated from the force P_Q, determined on the tensile test curve.

For steel grade ER6, when $P_{max}/P_q \geq 1{,}4$, the value P_{max} can be used to determine the value of K_Q.

NOTE This option is explained in document ERRI B169 DT 251.

4.3 Heat treatment homogeneity

4.3.1 Values to be achieved

For Category 1 wheels, the variation in the Brinell hardness value measured on the outer face of the rim of the tested wheel shall be 30 HB or less.

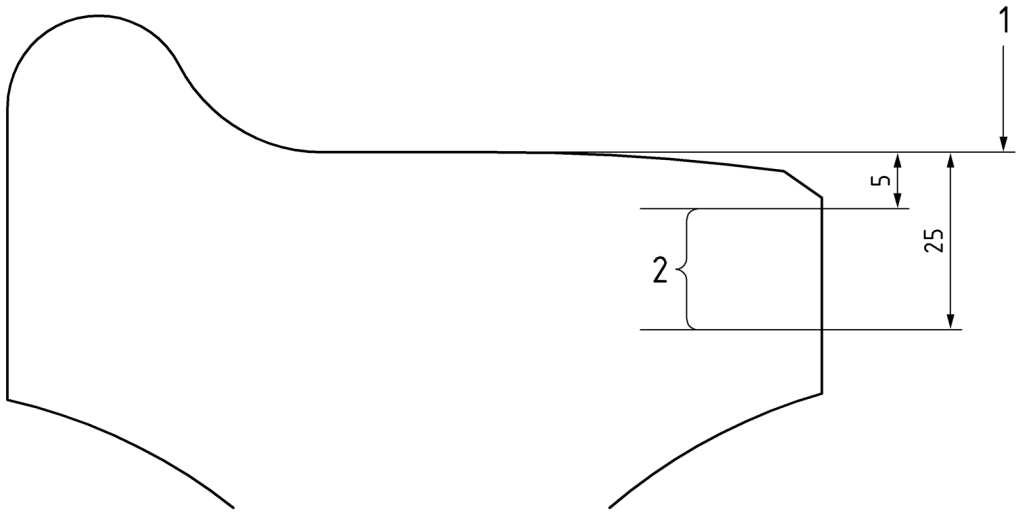
NOTE The values are not correlated with the hardness values measured in the rim according to 4.2.2 or with the results of the wheel rim tensile test according to 4.2.1.

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4.3.2 Test pieces

The hardness values shall be measured at three points located at 120° on the outer face of the rim. The impressions shall be made on the same diameter in an area whose position is defined in Figure 4.

Dimensions in millimetres



Key

1 nominal diameter on the running tread

2 area for Brinell hardness measurement

Figure 4 — Hardness impression area

4.3.3 Test method

The measurements shall be carried out in accordance with EN ISO 6506-1:2014. The diameter of the ball is 10 mm.

4.4 Material cleanliness

4.4.1 Micrographic cleanliness

4.4.1.1 Level to be achieved

The assessment shall be determined from the micrographic examination according to 4.4.1.3. The values to be achieved are given in Table 6.

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Table 6 — Level to be achieved for the micrographic examination

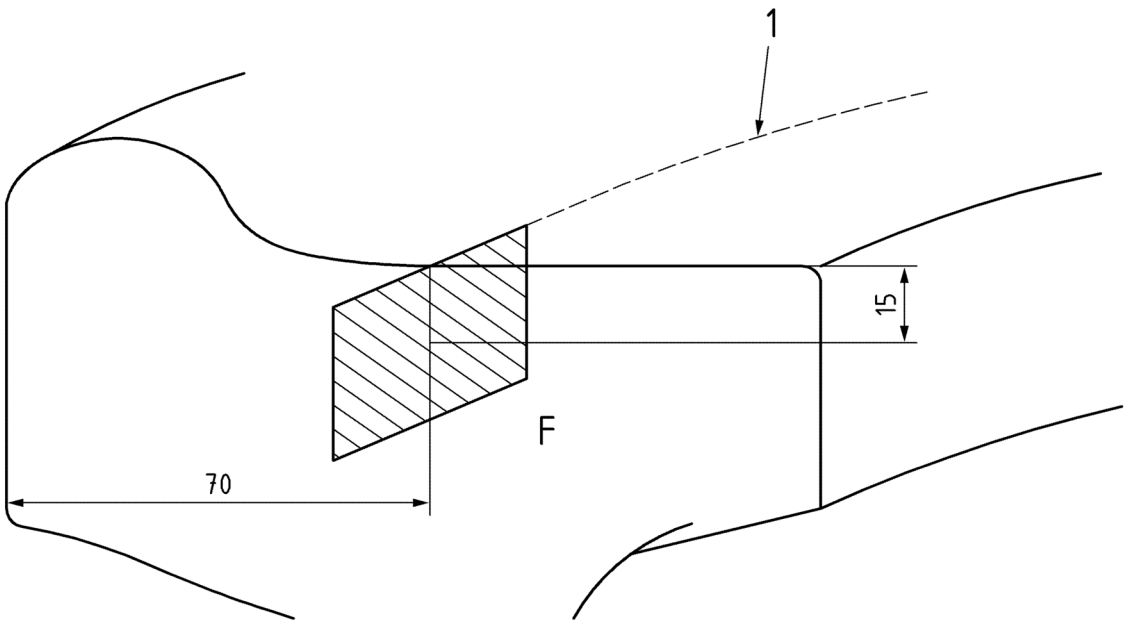
Type of inclusions	Category 1		Category 2	
	Thick series (max)	Thin series (max)	Thick series (max)	Thin series (max)
A (Sulphide)	1,5	1,5	1,5	2
B (Aluminium)	1	1,5	1,5	2
C (Silicates)	1	1,5	1,5	2
D (Globular oxides)	1	1,5	1,5	2
B + C + D	2	3	3	4
DS	1,5		2	

4.4.1.2 Position of the micrographic sample

The field to be examined corresponds to the hatched area in Figure 5.

Its centre “F” is located 15 mm below the running surface.

Dimensions in millimetres



Key

1 nominal running tread

Figure 5 — Position of the micrographic sample

4.4.1.3 Test method

The level of cleanliness shall be determined in accordance with ISO 4967:2013, Method “A”.

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4.4.2 Internal integrity

4.4.2.1 General

The internal integrity of the wheels shall be determined from an ultrasound examination. Standard defects are flat bottomed holes of different diameters.

4.4.2.2 Level to be achieved

4.4.2.2.1 Wheel rim

The wheel rims shall not have internal defects giving indications of anomalies equal to or greater than those obtained for standard defects, located at the same depth. The diameter of this standard defect is given in Table 7.

Table 7 — Diameter of the standard defect

	Category 1	Category 2
Standard defect diameter (mm)	1	2 [a]
A value of 3 mm can only be adopted for wheels up to 120 km/h, and shall be indicated in the technical specification.		

For the axial examination, a drop of backwall echo equal or greater than 4 dB due to internal discontinuities is not tolerated.

NOTE This allows to identify non-coaxially-reflective discontinuities, clusters of discontinuities lower than the acceptance criteria and other acoustic attenuation phenomena that cause local signal absorption or diffusion

4.4.2.2.2 Wheel web

The wheel web shall not have:

— More than 10 indications of anomalies equal to or greater than those observed for standard defects of Ø 3 mm. Each of these indications shall also be at least 50mm apart;

— Indications of anomalies equal to or greater than those observed for standard defects of Ø 5 mm.

4.4.2.2.3 Wheel hub

The wheel hub shall not have:

— More than 3 indications of anomalies equal to or greater than those observed for standard defects of Ø 3 mm. Each of these indications shall also be at least 50mm apart;

— Indications of anomalies equal to or greater than those observed for standard defects of Ø 5 mm.

For the same circumferential examination, a drop of backwall echo equal or greater than 6 dB due to internal discontinuities is not tolerated.

NOTE This allows to identify non-coaxially-reflective discontinuities, clusters of discontinuities lower than the acceptance criteria and other acoustic attenuation phenomena that cause local signal absorption or diffusion

4.4.2.3 Test piece

The test piece shall consist of the complete wheel, after heat treatment, regardless its surface status (forged, rough, machined), but before corrosion protection.

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Full document details: BS EN 13262-2026 Railway applications — Wheelsets and bogies — Wheels — Product requirements