International Standard 1005/8

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Railway rolling stock material — Part 8 : Solid wheels for tractive and trailing stock — Dimensional and balancing requirements

Matériel roulant de chemin de fer — Partie 8 : Roues monoblocs pour matériel moteur et matériel remorqué — Prescriptions dimensionnelles et d'équilibrage

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 1005/8 was prepared by Technical Committee ISO/TC 17, *Steel.*

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Railway rolling stock material — Part 8 : Solid wheels for tractive and trailing stock — Dimensional and balancing requirements

1 Scope and field of application

1.1 This part of ISO 1005 specifies

a) the dimensional requirements[1] shown in table 3 and table 4 (see also 5.1);

b) the surface roughness (see 5.2); and

c) the residual unbalance (see 5.3)

of forged, rolled or cast solid wheels with curved or straight webs in various degrees of finish.

NOTE — The compilation of an International Standard for material, testing and dimensional requirements of wheelset components and assembled wheelsets is difficult because of the different ways in which railways have developed, in both the commercial and the operating sense, in various parts of the world. These different forms of development are characterized, for example, by railway systems in which freight services are integrated with intensive and perhaps high-speed passenger services and by systems largely dedicated to the haulage of freight. The infrastructures of these two systems are normally different and this and commercial policy can determine the practice adopted in wheelset design in terms of both materials and physical characteristics.

The relevant parts of ISO 1005 acknowledge, or will in a future revision acknowledge, these differences by providing in the relevant clauses two categories of material and related quality testing requirements designated as testing categories A and B and two tolerance categories for dimensional requirements designated as Y and Z.

Category A corresponds to the material and quality testing requirements given in the present editions of ISO 1005/3 and ISO 1005/6. Category B will be considered in the revisions of ISO 1005/3 and 1005/6.

The most obvious difference between these categories A and B is that the mechanical properties are specified

— in the case of category A on the basis of tensile and impact tests;

— in the case of category B on the basis of hardness tests.

The differences between the values of the tolerance categories Y and Z are given

— for solid wheels in this part of ISO 1005 (see especially table 4);

— for wheelsets in ISO 1005/7.

Until now, within ISO/TC 17/SC 13, it was impossible to clarify in detail the conditions under which the one or the other testing and tolerance category is preferable. As a general guide, it shall, however, be noted

— that the combination of testing category A with tolerance category Y is principally applied on railway systems where frequent or high-speed passenger operation is predominant or where freight and passenger services are intensively integrated;

— that the combination of testing category B and tolerance category Z is principally applied on railway systems where freight operation is predominant and where freight and passenger services are less integrated;

— that the final combination of the categories shall be left to the discretion of the purchaser.

1.2 The quality requirements for solid wheels are given in ISO 1005/6.

1.3 In addition to the requirements of this part of ISO 1005, the general technical delivery requirements of ISO 404 apply.

2 References

ISO 404, *Steel and steel products — General technical delivery requirements.*

ISO 468, *Surface roughness — Parameters, their values and general rules for specifying requirements.*

ISO 1005, *Railway rolling stock material*

— *Part 6: Solid wheels for tractive and trailing stock — Quality requirements.*

— *Part 7: Wheelsets for tractive and trailing stock — Quality requirements.*

ISO 1101, *Technical drawings — Geometrical tolerancing — Tolerancing of form, orientation, location and run-out — Generalities, definitions, symbols, indications on drawings.*

3 Information to be supplied by the purchaser

The purchaser shall, as partly indicated in ISO 1005/6, supply the following information regarding dimensional, roughness and unbalance requirements in his enquiry and order:

1) The term "dimensional requirements" covers machining allowances, dimensional tolerances and tolerances of form and position.

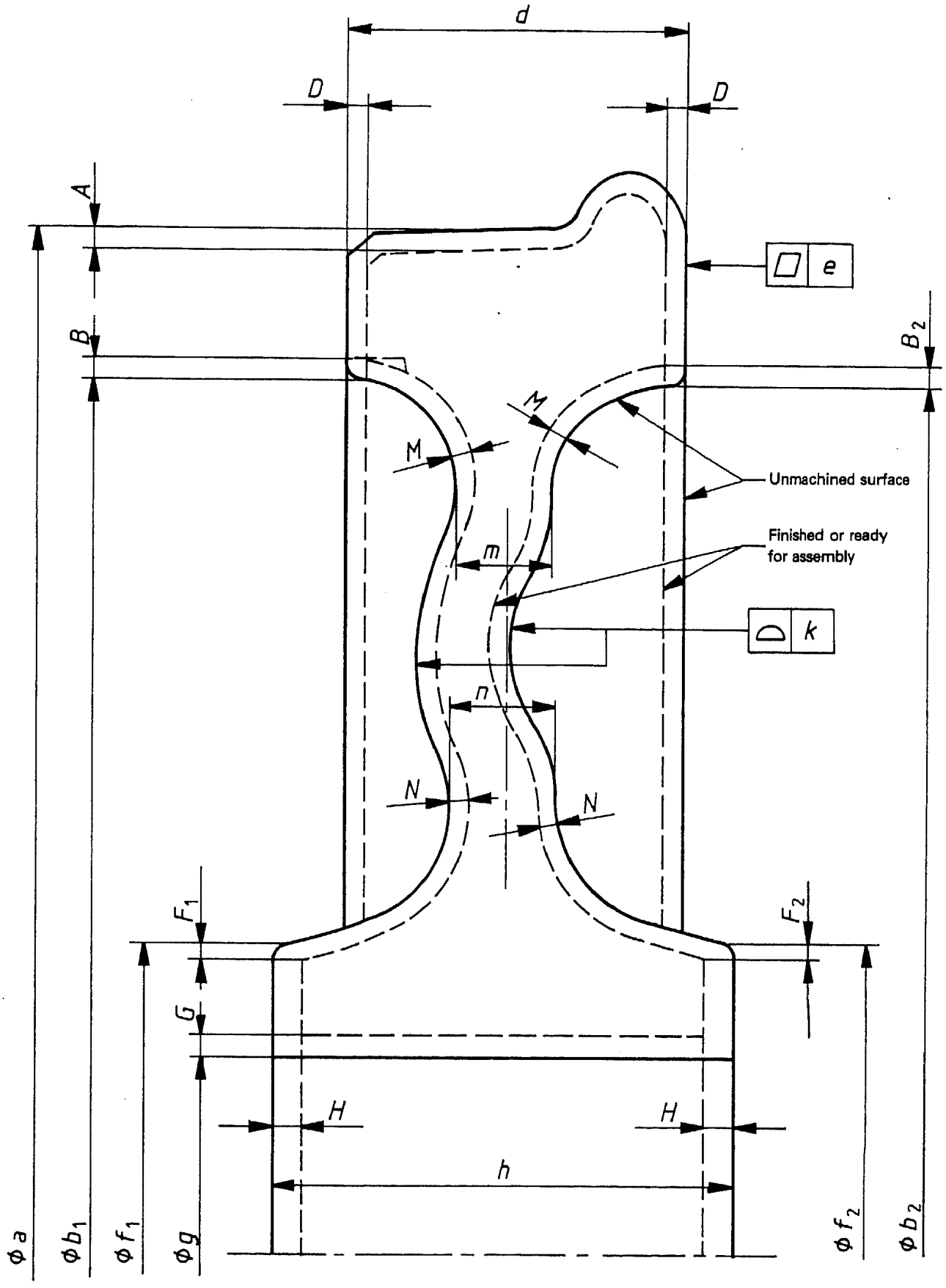

Figure 1 — Symbols for the dimensional characteristics, specified in table 3, for unmachined portions of forged or rolled solid wheels

Table 3 — Dimensional requirements for unmachined [1] portions of forged or rolled solid wheels — category Y and Z [2]

Designation		Symbol in figure 1 for dimensional tolerances	Symbol in figure 1 for geometrical [3] tolerances	Machining allowance (mm)	Tolerance (mm)	Verification [4]
Rim	External diameter	A		4		m
		a			+ 12 0	m
	Internal diameter (outer)	B_1		4 [5]		m
		b_1			0 − 10	m
	Internal diameter (inner)	B_2		4 [5]		m
		b_2			0 − 10	m
	Width	D		4		m
		d			+ 8 0	m
	Flatness [6]		e		5	o
Hub	External diameter (outer)	F_1		5 [5]		m
		f_1			+ 15 0 [7]	m
	External diameter (inner)	F_2		5 [5]		m
		f_2			+ 15 0 [7]	m
	Internal diameter (bore)	G		10		m
		g			0 − 20	m
	Length	H		10		m
		h			+ 10 0	m
Web	Form		k		12	o
	Thickness at the connection with the rim	M		5 [5]		m
		m			+ 8 0	m
	Thickness at the connection with the hub	N		5 [5]		m
		n			+ 10 0	m

1) Term as defined in clause 4.

2) See note to 1.1.

3) See ISO 1101.

4) m is mandatory; o is optional.

5) For freight use, and normal operating speeds in other applications, the web, inner diameter of the rim and the outer diameter of the hub may, with the permission of the purchaser [see also table 4, footnote 7)], be left in the "finished" and " ready for assembly" conditions, in which case the machining allowance does not apply.

6) The unmachined wheel shall be placed wheel flange side down on a flat annular ring, the flatness dimension being measured by the maximum gap between the wheel flange and the ring.

7) $^{+\ 25}_{\ 0}$ for category Z wheels.

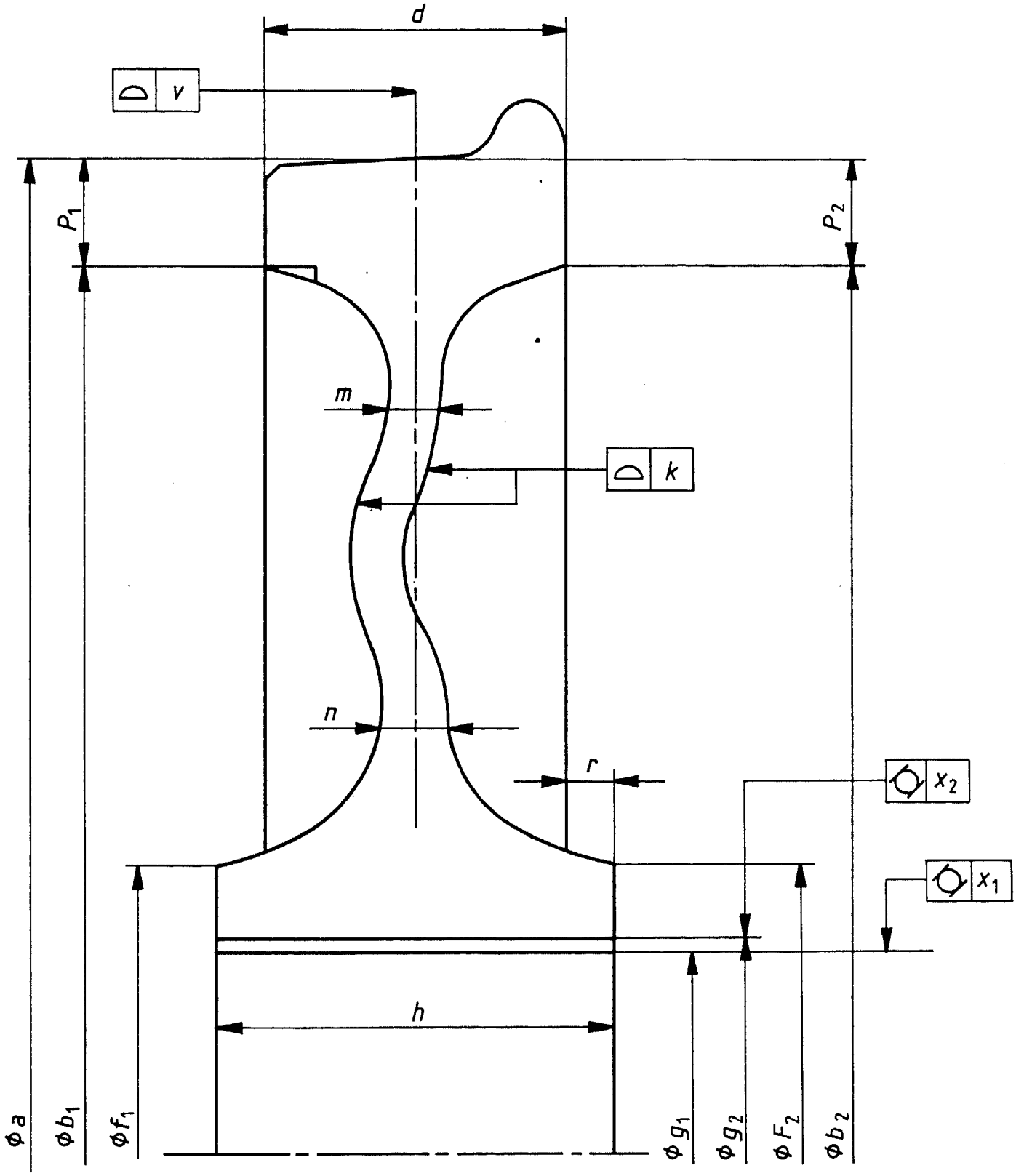

Figure 2 — Symbols for the dimensional characteristics, specified in table 4, for "finished" portions, and for the condition "ready for assembly", of forged, rolled or cast solid wheels

Table 4 — Dimensional requirements for "finished" portions [1] and for the condition "ready for assembly" [1] of forged, rolled or cast solid wheels

Designation		Symbol in figure 2 for dimensionnal tolerances	Symbol in figure 2 for geometrical [2] tolerances	Tolerances (mm) Wheels of Category Y Normal speeds YN	Tolerances (mm) Wheels of Category Y High speeds YH	Tolerances (mm) Wheels of Category Z [3]	Verification [4]
Rim	External diameter	a		+ 4 [5] 0	+ 4 [5] 0	+ 14 − 5	m
	Internal diameter (outer)	b_1		0 − 6	0 − 6	[6]	m
	Internal diameter (inner)	b_2		0 [7] − 6	0 − 6	[6]	m
	Width	d		+ 1 − 1	+ 1 − 1	+ 3 − 3	m
	Rim thickness variation (outer)	p_1		1,5 [7]	1	3	m [8]
	Rim thickness variation (inner)	p_2		1,5 [7]	1	3	m [8]
	Tread profile		v	The tolerance to be as indicated on the drawing			m
	Others			See 5.1.1.3.1 or as an alternative 5.1.1.3.2			
Hub	External diameter (outer)	f_1		+ 10 [7] 0	+ 5 0	+ 25 0	m
	External diameter (inner)	f_2		+ 10 [7] 0	+ 5 0	+ 25 0	m
	Internal diameter (bore) — "finished" condition [10]	g_1		0 [9] − 2	0 [9] − 1	+ 1 − 4	m
	Internal diameter (bore) — "ready for assembly" condition [10]	g_2		— [11]	— [11]	— [11]	m
	Internal diameter (bore) cylindricity — "finished" condition [10]		x_1	0,5	0,5	0,5	o
	Internal diameter (bore) cylindricity — "ready for assembly" condition [10]		x_2	0,015 [12]	0,015 [12]	0,025 [12]	m
	Length	h		+ 3 0	+ 1 0	+ 6 − 6	m
	Hub to wheel rim overhang	r		+ 3 [5] 0	+ 3 [5] 0	+ 3 − 3	m
	Others			See 5.1.1.3.1 or as an alternative 5.1.1.3.2			
Web	Form		k	8 [7] [13]	4 [13]	4 [13]	o
	Thickness at the connection with the rim	m		+ 5 [7] 0	+ 2 0	+ 8 0	m
	Thickness at the connection with the hub	n		+ 5 [7] 0	+ 2 0	+ 8 0	m

1) Terms as defined in clause 4.

2) See ISO 1101.

3) If for cast wheels the tolerances of this category are met by the manufacturing process, machining is not required.

4) m is mandatory; o is optional.

5) For tractive stock, other values may be necessary.

6) Not applicable — governed by other rim dimensions.

7) For normal operating speeds, the web, inner diameter of the rim and the outer diameter of the hub may, with the permission of the purchaser, be left unmachined in the "finished" and "ready for assembly" conditions, in which case, unless otherwise agreed, the tolerance values shown in table 3 are applicable.

8) If verification of the specific geometrical tolerances s and j is undertaken, the checking of dimensions p_1 and p_2 is superfluous and may be omitted (see also 6.1).

9) The machining allowance on bore of "finished" wheel shall be 3 mm (i.e. $g_2 - g_1 = 6$ mm).

10) See 4.4 for terms related to bore of hub.

11) The tolerance on diameter and the interference value to ensure the required fit on the axle shall be in accordance with the specification or the drawing.

12) Any slight taper within the permitted tolerance shall be such that the "larger" diameter is at the axle entry end of the bore on assembly of the wheel on to the axle.

13) For shapes other than those given in figure 2, the form tolerance, k, for the web may not be applicable.

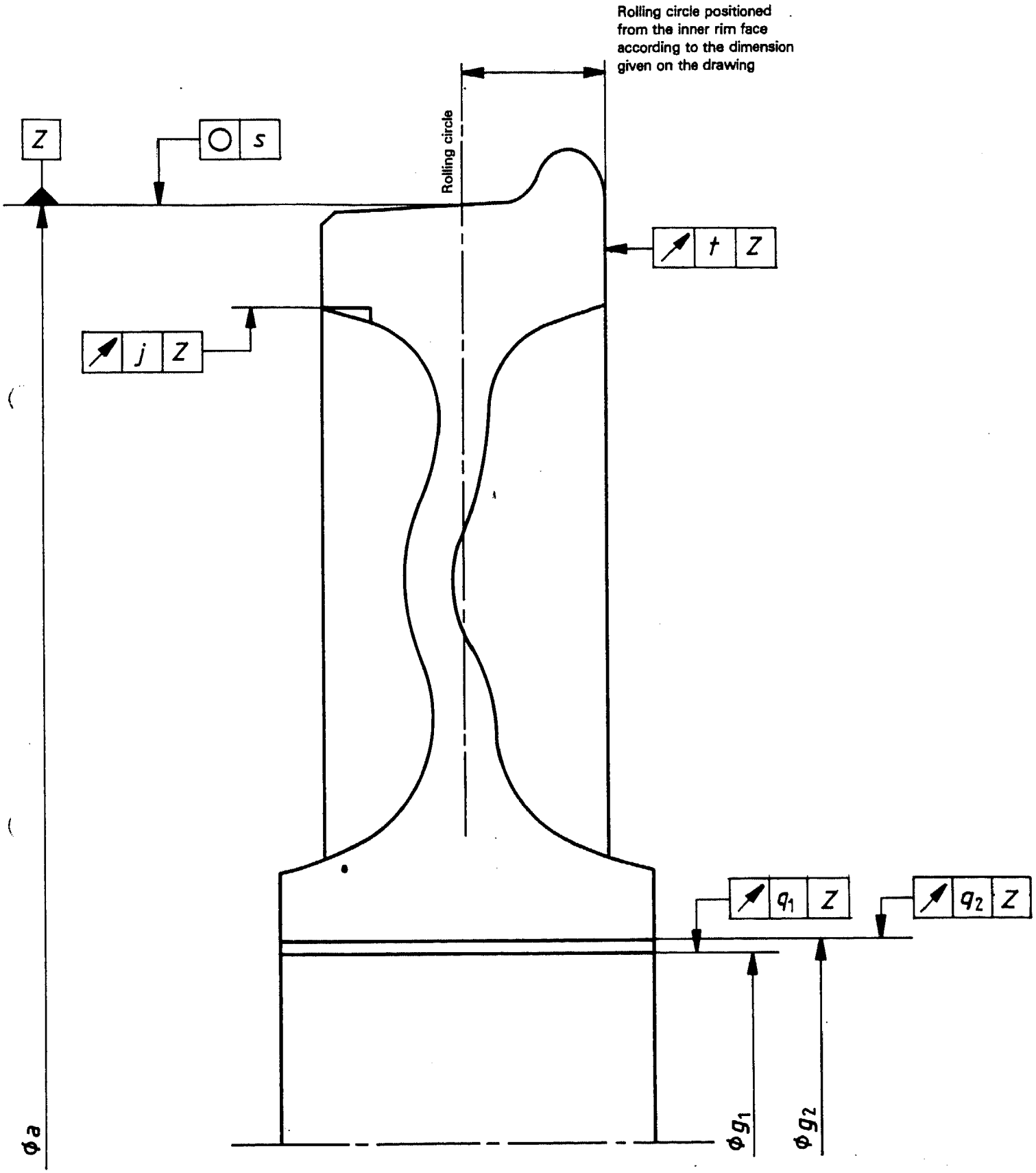

Figure 3 — Specific geometrical tolerances (see 5.1.1.3.2) specified in table 5, for "finished" and "ready for assembly"[1] forged, rolled or cast solid wheels.

Table 5 — Specific geometrical tolerances (see 5.1.1.3.2) for "finished" and "ready for assembly"[1] forged, rolled or cast solid wheels

Designation		Symbol in figure 3 for geometrical tolerances[2]	Tolerances (mm)			Verification[3]
			Category Y		Category Z	
			Normal speeds YN	High speeds YH		
Rim	Tread roundness	s	0,2	0,2	0,8	o
	Radial run-out of outer internal diameter	j	0,2	0,2	— [4]	o
	Axial run-out	t	0,5	0,5	1,6	o
Hub	Bore run-out; "finished" condition[5]	q_1	1,0[6] 0,1[7]	1,0[6] 0,1[7]	1,6[6]	o
	Bore run-out; "ready for assembly" condition[5]	q_2	0,3[6] 0,1[7]	0,1	0,2	o

1) Terms as defined in clause 4.

2) See ISO 1101.

3) o is optional.

4) Category Z wheels normally have rim/web transition shapes other than those shown in figure 3; therefore this tolerance may not be applicable.

5) See 4.4 for terms related to bore of the hub.

6) Applicable if balancing is not required or if the wheel tread is to be used as the datum for balancing.

7) Applicable if the bore of the hub is to be used as the datum for balancing.