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Truck and bus tyres and rims (metric series) —

Part 1: Tyres

Pneumatiques et jantes (séries millimétriques) pour camions et autobus — Partie 1: Pneumatiques

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 4209 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 4209-1 was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves*, Subcommittee SC 4, *Truck and bus tyres and rims*.

This sixth edition cancels and replaces the fifth edition (ISO 4209-1:1993), which has been technically revised.

ISO 4209 consists of the following parts, under the general title *Truck and bus tyres and rims (metric series)*:

— *Part 1: Tyres*

— *Part 2: Rims*

Annexes A, B and C of this part of ISO 4209 are for information only.

Truck and bus tyres and rims (metric series) —

Part 1:
Tyres

1 Scope

This part of ISO 4209 specifies the designation, dimensions and load ratings of the metric series of tyres primarily intended for trucks and buses.

It is applicable to bias-belted, diagonal and radial tyres for trucks and buses, mounted on 5° tapered rims and on 15° tapered (drop-centre) rims.

It is also applicable to different concepts and types of tyres and rims; in these cases, however, appropriate rim/section ratios K_1, K_4, coefficients K_2, K_3, C_R and construction codes have been added to Tables 3, 4 and 5.

ISO 4209-2 deals with requirements for rims.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of ISO 4209. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 4209 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 4223-1:—[1)], *Definitions of some terms used in the tyre industry — Part 1: Pneumatic tyres.*

3 Terms and definitions

For the purposes of this part of ISO 4209, the terms and definitions given in ISO 4223-1 apply.

4 Tyre designation

4.1 Content

The designation of the tyre shall be shown on its sidewall and shall include the following markings, to be shown close to each other:

— size and construction (see 4.2);

— service condition characteristics (see 4.3).

1) To be published. (Revision of ISO 4223-1:1989)

4.2 Size and construction

4.2.1 Marking

The size and construction characteristics shall be indicated as follows:

Nominal section width	/	Nominal aspect ratio	Tyre construction code	Nominal rim diameter

4.2.2 Nominal section width

The nominal section width shall be expressed in millimetres.

For tyres fitted to 5° taper rims and for tyres fitted to 15° taper rims, the nominal tyre section width shall end in 5.

4.2.3 Nominal aspect ratio

The nominal aspect ratio shall be expressed as a percentage and shall be a multiple of 5.

4.2.4 Tyre construction code

The tyre construction code shall be as follows:

B for bias-belted construction;

D, or – , for diagonal/bias construction;

R for radial construction.

NOTE Other codes will be established for new tyre concepts (constructions).

4.2.5 Nominal rim diameter

The nominal rim diameter for 5° tapered bead seat rims and for 15° tapered bead seat (drop-centre) rims shall be expressed by a code (see Table 1 for code correlation).

NOTE 15° tapered rims are to be used only for tyres with load index 122 and larger.

However, it shall be expressed in millimetres for new and future concepts where the mounting of existing tyres on new concept rims or of new concept tyres on existing rims would be incompatible.

4.3 Service condition characteristics

4.3.1 Marking

The characteristics shall be indicated as follows:

Load index single / Load index dual Speed symbol

4.3.2 Load index

The load index is a numerical code associated with the maximum load a tyre can carry at the speed indicated by its speed symbol under the service conditions specified by the tyre manufacturer. See Table 6.

4.3.3 Speed symbol

The speed symbol indicates the speed at which the tyre can carry the load corresponding to its load index under the service conditions specified by the tyre manufacturer. See Table 7.

4.4 Other service characteristics

4.4.1 In the case of tubeless tyres, the marking “TUBELESS” shall be shown on the tyre.

4.4.2 In the case of a preferred direction of rotation of the tyre, an arrow shall be used to indicate that direction.

4.4.3 In the case of special tread tyres (see Table 3), the symbol “ET” shall be shown on the tyre.

4.5 Example

A tyre having

a) a size and construction of:

- nominal section width 275 mm,
- nominal aspect ratio 70 %,
- radial construction,
- nominal rim diameter code 22.5;

b) service condition characteristics of:

- single load 2 500 kg,
- dual load 2 300 kg,
- reference speed 130 km/h;

c) other service characteristics:

- tubeless,
- special tread;

shall be marked:

275/70 R 22.5	140/137 M	TUBELESS ET

5 Tyre dimensions

5.1 Calculation of "design" tyre dimensions

5.1.1 Coefficients

For the choice of coefficients K_1 (theoretical rim/section ratio), K_2 and K_4 (measuring rim/section ratio), see Tables 3 and 4.

5.1.2 Theoretical rim width, R_{th}

The theoretical rim width, R_{th}, is equal to the product of the nominal section width, S_N, and the theoretical rim/section ratio, K_1:

$$R_{th} = K_1 S_N$$

5.1.3 Measuring rim width, R_m

The measuring rim width, R_m, is equal to the product of the nominal section width, S_N, and the coefficient, K_4:

$$R_m = K_4 S_N$$

rounded to the nearest standardized rim width (see Table 2).

5.1.4 Design tyre section width, S

The design tyre section width, S, is the nominal section width, S_N, transferred from the theoretical rim, R_{th} to the measuring rim, R_m:

$$S = S_N + K_2 (R_m - R_{th})$$

rounded to the nearest whole number.

5.1.5 Design tyre section height, H

The design tyre section height, H, is equal to the product of the nominal section width, S_N, and the nominal aspect ratio, H/S (H/S expressed as a percentage):

$$H = S_N \frac{H/S}{100}$$

rounded to the nearest whole number.

5.1.6 Design tyre overall diameter, D_o

The design tyre overall diameter, D_o, is the sum of the nominal rim diameter, D_r, plus twice the design tyre section height, H:

$$D_o = D_r + 2H$$

For tyres using a nominal rim diameter code, see Table 1 for the value of D_r to be used.

5.1.7 Values

The relevant dimensions (measuring rim width, design section width and design section height) are shown in annexes A and B. For tyres of a given series, with a nominal tyre section over 205, it is recommended that they be in increments larger than 10.

5.2 Calculation of "maximum overall tyre dimensions in service"

These calculations are for use by vehicle manufacturers in designing for tyre clearances.

5.2.1 Maximum overall width in service, W_{max}

The maximum overall width in service, W_{max}, is equal to the product of the design tyre section width, S, and the appropriate coefficient, a (see Table 3):

$$W_{max} = Sa$$

It includes protective ribs, lettering, embellishments, manufacturing tolerances and growth due to service.

5.2.2 Maximum overall diameter in service, $D_{o,max}$

The maximum overall diameter in service, $D_{o,max}$, is equal to the nominal rim diameter, D_r (see Table 1), plus twice the product of the design tyre section height, H, and the appropriate coefficient, b (see Table 3):

$$D_{o,max} = D_r + 2\,Hb$$

It includes manufacturing tolerances, the different types of tread patterns and growth due to service.

5.3 Minimum dual spacing (MDS)

5.3.1 The minimum dual spacing is a guideline value equal to the product of the design tyre section width, S, and the appropriate coefficient, K_3 (see Table 4):

$$MDS = SK_3$$

It is referred to a tyre load according to the load index, in dual application shown in the service characteristics on the tyre at an inflation pressure applicable for normal highway service.

5.3.2 The design tyre section width, S, will change 2,5 mm for each 0.25 change in rim width code. The minimum dual spacing shall be adjusted accordingly.

Table 1 — Nominal rim diameter codes

Code		Nominal rim diameter
5° tapered rims	15° tapered (drop-centre) rims	D_r mm
10	—	254
12	—	305
13	—	330
14	—	356
15	—	381
16	—	406
17	—	432
—	17.5	445
18	—	457
—	19.5	495
20	—	508
—	20.5	521
22	—	559
—	22.5	572
24	—	610
—	24.5	622

Table 2 — Rim width codes

Code		Rim width
5° tapered rims	15° tapered (drop-centre) rims	mm
3.00	—	76
3.50	—	89
4.00	—	101,5
4.50	—	114,5
5.00	—	127
—	5.25	133,5
5.50	—	139,5
6.00	6.00	152,5
6.50	—	165
—	6.75	171,5
7.00	—	178
7.50	7.50	190,5
8.00	—	203
—	8.25	209,5
8.50	—	216
9.00	9.00	228,5
9.50	—	241,5
—	9.75	247,5
10.00	—	254
10.50	10.50	266,5
11.00	—	279.5
—	11.75	298,5
12.00	—	305
—	12.25	311
13.00	13.00	330
14.00	14.00	355,5
15.00	15.00	381
—	16.00	406,5
—	17.00	432
—	18.00	457

Table 3 — Coefficients K_2, b, a for calculation of tyre dimensions

Structure	Tyre construction code	Coefficients		
		K_2	b [a]	a
Bias-belted	B	0,4	1,07	1,08
Diagonal	D	0,4	1,07	1,08
Radial	R	0,4	1,04	1,05
[a] For special tread tyres (see 4.4.3): Bias-belted: b = 1,09 Diagonal: b = 1,09 Radial: b = 1,06				
NOTE Other factors may be established for new tyre concepts (constructions).				

Table 4 — Coefficients K_1, K_3, K_4 for calculation of tyre dimensions

Tyre construction code	Type of rim	Nominal aspect ratio H/S	Theoretical rim/section ratio K_1	Minimum dual spacing K_3	Measuring rim/section ratio K_4
B, D, R	5° tapered	100 to 75	0,70	1,15	0,70
		70 and 65	0,70	1,15	0,75
		60	0,70	1,15	0,75
		55	0,70	1,15	0,80
		50 [a]	0,70	1,15	0,80
	15° tapered (drop-centre)	90 to 65	0,75	1,125	0,75
		60	0,80	1,125	0,80
		55	0,80	1,125	0,80
		50	0,80	—	0,80
		45 [a]	0,85	—	0,85
[a] For H/S lower than 50 or 45 respectively, further coefficients will be established.					
NOTE Other factors may be established for new tyre concepts (constructions).					

5.4 Approved rim widths

The range of approved rim widths, in millimetres, is determined, for each nominal section width, by multiplying the nominal section width, S_N, by the coefficients, C_R, presented in Table 5, i.e.

— minimum rim width: $C_{R,\,min} \times S_N$;

— maximum rim width: $C_{R,\,max} \times S_N$.

The values obtained shall be rounded to the nearest standardized rim width in Table 2.