TC 31

International Standard 4000/1

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Passenger car tyres and rims — Part 1 : Tyres (metric series)

Pneumatiques et jantes pour voitures particulières — Partie 1 : Pneumatiques (séries millimétriques)

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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 4000/1 was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves.*

ISO 4000/1 was first published in 1977. This third edition cancels and replaces the second edition, clause 4.2 of which has been technically revised; minor presentation and editorial changes have also been incorporated.

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Passenger car tyres and rims — Part 1 : Tyres (metric series)

1 Scope and field of application

This part of ISO 4000 establishes the designation, dimensions and load ratings of metric series of tyres primarily intended for passenger cars.

ISO 4000/2 will deal with requirements for rims.

2 Reference

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

3 Definitions

For definitions of terms relating to tyres, see ISO 4223/1.

Section one : Tyre designation and dimensions

4 Tyre designation

4.1 Dimensional and constructional characteristics

The characteristics shall be indicated as follows :

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

4.1.1 Nominal section width

The nominal section width of the tyre shall be indicated in millimetres, ending either in "0" or "5", so that in any one series of tyres with the same nominal aspect ratio, the values shall all end with "0" or all end with "5".

4.1.2 Nominal aspect ratio

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

4.1.3 Tyre construction code

The tyre construction code shall be as follows :

B for bias belted construction

D for diagonal construction

R for radial ply construction

NOTE — The use of another code letter (for example, in the case of a new construction type) should first be remitted to ISO for acceptance and inclusion in this list.

4.1.4 Nominal rim diameter code

4.1.4.1 For tyres mounted on these existing rims, the code shall be as follows :

Code	Nominal rim diameter (D_r) mm
10	254
12	305
13	330
14	356
15	381
16	406

4.1.4.2 For tyres requiring new concept rims, for safety reasons especially concerning mounting, the code number shall be equal to the nominal rim diameter, expressed in a whole number of millimetres.

4.2 Service condition characteristics

The characteristics shall be indicated as follows :

Load index	Speed symbol

4.2.1 Load Index

The tyre load capacity corresponding to the service conditions specified by the tyre manufacturer shall be indicated by a Load Index taken from table 3.

This indication is understood to be for a single mounting.

4.2.2 Speed symbol

The speed symbol shall be indicated by a letter taken from table 4 corresponding to the speed category.

4.2.3 Speed category

Speed category means a category assigned to a tyre which denotes the maximum speed for which the use of the tyre is rated.

4.3 Other service characteristics

4.3.1 The word "TUBELESS" shall be used to characterize tyres that can be used without a tube.

4.3.2 Specific indications, if required, may be added to indicate

— the type of vehicle for which the tyre is primarily designed, by using a symbol "P" [1];

— the temporary use of certain spare tyres using indications such as "TEMPORARY USE" and/or symbol "T" [1];

— the direction of mounting;

— the direction of rotation;

— the type of tread pattern;

— other characteristics.

1) This symbol may be used where there may be ambiguity regarding the tyre type. Where this optional marking is used, it should be so positioned that confusion cannot result from its proximity to any other service condition marking.

5 Marking

The marking shall consist of

a) the designation of the dimensional and constructional characteristics;

b) the designation of the load and speed characteristics;

c) the designation of other service characteristics.

The location of the marking of the load and speed characteristics shall be distinct but in the vicinity of the marking of the dimensional and constructional characteristics.

No location is specified for the markings related to other service characteristics (4.3.1 and 4.3.2).

Example :

165/80 R 15	marking of dimensional and constructional characteristics
76 U	marking of load index and speed symbol (distinct location but in the vicinity of the preceding marking)
TUBELESS (other)	location left to the discretion of the tyre manufacturer

The characteristics of a tyre with the above markings would be as follows :

165 : nominal section width equal to 165 mm;

80 : nominal aspect ratio equal to 80;

R : radial ply construction;

15 : nominal rim diameter code, corresponding to 381 mm;

76 : load index (LI) corresponding to a tyre load of 400 kg;

U : speed symbol corresponding to a speed category of 200 km/h;

TUBELESS : tyre that can be used without a tube.

6 Tyre dimensions

6.1 Calculation of "design new tyre" dimensions

Values to be rounded to the nearest millimetre.

6.1.1 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 rim/section ratio (K_1) :

$$R_{Th} = K_1 S_N$$

where $K_1 = 0{,}7$ for tyres having nominal aspect ratio (H/S) from 50 to 95 inclusive mounted on 5° rims (code-designated) with nominal rim diameter expressed by a two figure code. Other K_1 values will be defined later for other tyres and rim types.

6.1.2 Design new tyre section width (S)

The design new tyre section width is the nominal section width (S_N) transferred from the theoretical rim (R_{Th}) to the measuring rim (R_M) :

$$S = S_N + 0{,}4\,(R_M - R_{Th})$$

where R_M and R_{Th} are expressed in millimetres.

6.1.3 Design new tyre section height (H)

The design new tyre section height is equal to the product of the nominal section width (S_N) and the nominal aspect ratio, (H/S) divided by 100 :

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

6.1.4 Design new tyre overall diameter (D_o)

The design new tyre overall diameter is the sum of the nominal rim diameter (D_r) plus twice the design new tyre section height (H) :

$$D_o = D_r + 2H$$

For those tyres using a nominal rim diameter code, see 4.1.4.1 for the corresponding value of D_r in millimetres to be used.

6.1.5 Values

A guideline for the "new tyre design dimensions" for metric series of passenger car tyres mounted on 5° rims (code-designated) is given in the annex.

6.2 Calculation of "maximum overall (grown) tyre dimensions in service"

(for use by vehicle manufacturers in determining tyre clearances)

These dimensions are to be calculated with the coefficients (see table 1) appropriate to the design new tyre section width and design new tyre section height.

6.2.1 Maximum overall (grown) width in service (W_{max})

The maximum overall (grown) width in service is equal to the product of the design new tyre section width (S) and the appropriate coefficient, a, (see table 1) :

$$W_{max} = Sa$$

6.2.2 Maximum overall (grown) diameter in service ($D_{o,\,max}$)

The maximum overall (grown) diameter in service is equal to the nominal rim diameter (D_r) plus twice the product of the

design new tyre section height (H) and the appropriate coefficient, b, (see table 1) :

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

7 Tyre dimension tables

The format of tyre dimension tables is shown in table 2 for tyres mounted on 5° rims (code-designated) and nominal rim diameter expressed by a two figure code (see 4.1.4).

8 Method of measurement of tyre dimensions

Before being measured, the tyre shall be mounted on its measuring rim, inflated to the recommended pressure, and allowed to stand for a minimum of 24 h at normal room temperature, after which the inflation pressure shall be readjusted to the original value.

Table 1 — Coefficients for the calculation of the maximum overall (grown) tyre dimensions in service

Tyre construction	Construction code	Nominal aspect ratio (H/S)	Coefficients	
			a	b
Diagonal Bias belted	D B	All	1,10	1,08
Radial ply	R	50 to 80 inclusive 85 to 95 inclusive	1,08* 1,07*	1,07 1,05

* The maximum overall section width may be exceeded by the thickness of a special protective rib on one sidewall only.

Table 2 — Tyre dimension tables

Tyre size designation[1]	Measuring rim width[2] R_M	Design new tyre[3]		In service (grown)	
		Section width S	Overall diameter D_o	Maximum overall width W_{max}	Maximum overall diameter[4] $D_{o,\,max}$
	code	mm	mm	mm	mm

NOTES

1) See 4.1.

2) The measuring rim width (R_M) is expressed by a code. It should equal the standardized rim width code closest to the theoretical rim width (R_{Th}) which is 70 % of the nominal tyre section width for nominal aspect ratios from 50 to 95 inclusive. For nominal aspect ratios below 50, other percentages for R_{Th} will be defined.

3) *Values to be rounded to the nearest millimetre.*

4) For special tyres (for example, mud and snow, etc.), the values given may be exceeded.

Section two : Load ratings

9 Tyre load-carrying capacity

Load indices are shown in table 3.

Table 3 — Correlation between load index (LI) and tyre load-carrying capacity (TLCC)

LI	TLCC kg	LI	TLCC kg
50	190	90	600
51	195	91	615
52	200	92	630
53	206	93	650
54	212	94	670
55	218	95	690
56	224	96	710
57	230	97	730
58	236	98	750
59	243	99	775
60	250	100	800
61	257	101	825
62	265	102	850
63	272	103	875
64	280	104	900
65	290	105	925
66	300	106	950
67	307	107	975
68	315	108	1 000
69	325	109	1 030
70	335	110	1 060
71	345	111	1 090
72	355	112	1 120
73	365	113	1 150
74	375	114	1 180
75	387	115	1 215
76	400	116	1 250
77	412	117	1 285
78	425	118	1 320
79	437	119	1 360
80	450	120	1 400
81	462		
82	475		
83	487		
84	500		
85	515		
86	530		
87	545		
88	560		
89	580		

10 Speed symbol

Speed symbols are shown in table 4.

Table 4 — Correlation between speed symbol and speed category

Speed symbol	Speed category km/h
L	120
M	130
N	140
P	150
Q	160
R	170
S	180
T	190
U	200
H	210

NOTE — This list is not restrictive; other categories may be determined later.