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Tyres and rims (metric series) for agricultural tractors and machines —

Part 1: Tyre designation, dimensions and marking, and tyre/rim coordination

*Pneumatiques et jantes (série millimétrique) pour tracteurs et machines
agricoles —*

*Partie 1: Désignation, cotes et marquage des pneumatiques,
coordination pneumatiques/jantes*

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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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 7867-1 was prepared by Technical Committee ISO/TC 31, *Tyre, rims and valves*, Subcommittee SC 5, *Agricultural tyres and rims*.

This fourth edition cancels and replaces the third edition (ISO 7867-1:1996), which has been technically revised.

ISO 7867 consists of the following parts, under the general title *Tyres and rims (metric series) for agricultural tractors and machines*:

- *Part 1: Tyre designation, dimensions and marking, and tyre/rim coordination*
- *Part 2: Service description and load ratings*

Tyres and rims (metric series) for agricultural tractors and machines —

Part 1:

Tyre designation, dimensions and marking, and tyre/rim coordination

1 Scope

This part of ISO 7867 establishes the size designation, the dimensional calculation and the markings of the metric series of tyres primarily intended for use on agricultural tractors and machines. Tyre and rim coordination is also given.

It applies to bias-belted, diagonal and radial tyres mounted on 5° tapered rims, as specified in ISO 4251-3. Only established rim diameters and widths within the ranges in Tables 1 and 2 are recommended.

This part of ISO 7867 also applies to different concepts and types of tyres and rims; in this case, however, appropriate rim/section ratios K_1 and coefficients K_2 , a and b will be established and added.

Dimensions of existing rims are specified in ISO 4251-3.

NOTE Tyres (ply rating marked series) and rims for agricultural tractors and machines are specified in ISO 4251-1 to ISO 4251-5. Service description (load index — speed symbol) marking of the existing series of agricultural tractor-drive-wheel tyres is given in ISO 8664.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 4223-1:2002, *Definitions of some terms used in the tyre industry — Part 1: Pneumatic tyres*

ISO 4251-3:1994, *Tyres (ply rating marked series) and rims for agricultural tractors and machines — Part 3: Rims*

ISO 7867-2, *Tyres and rims (metric series) for agricultural tractors and machines — Part 2: Service description and load ratings*

3 Terms and definitions

For the purposes of this part of ISO 7867, the terms and definitions given in ISO 4223-1 and the following apply.

3.1

agricultural tyre for special cultivation work

tyre for use on wheels (usually tractor drive wheels) on agricultural machines engaged in surface work or linear cultivation and the transport on roads and tracks of the tools required for such work

4 Tyre designation

4.1 General

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

- size and construction characteristics (see 4.2);
- service description (see 4.3).

4.2 Size and construction characteristics

4.2.1 General

The size and construction characteristics shall be indicated as follows:

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

The nominal section width shall be expressed in millimetres and shall end in 0.

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” for diagonal/bias construction;
- “R” for radial construction.

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

4.2.5 Nominal rim diameter code

For tyres mounted on 5° tapered rims, the rim diameter shall be expressed by a code comprising 1 or 2 digits. The code shall be as given in Table 1.

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 an integral number of millimetres, i.e. comprising 3 or 4 digits.

Table 1 — Nominal rim diameter code

Nominal rim diameter code ^a	Nominal rim diameter, D_r mm
4	101
6	152
8	203
(9)	229
10	254
12	305
(13)	330
14	356
(15)	381
16	406
(17)	432
18	457
(19)	483
20	508
22	559
24	610
25	635
26	660
28	711
30	762
32	813
34	864
36	914
38	965
40	1 016
42	1 067
44	1 118
46	1 168
48	1 219
50	1 270
52	1 321
54	1 372

^a Values in parentheses are not recommended.

Table 2 — Rim width code

Rim width code	Measuring rim width, R_m mm
2.50	63,5
3.00	76,2
3.50	88,9
4.00	101,6
4.50	114,3
5.00	127
5.50	139,7
6.00	152,4
7.00	177,8
8.00	203,2
9.00	228,6
10.00	254
11.00	279,4
12.00	304,8
13.00	330,2
14.00	355,6
15.00	381
16.00	406,4
18.00	457,2
20.00	508
21.00	533,4
23.00	584,2
25.00	635
27.00	685,8
28.00	711,2
31.00	787,4
36.00	914,4
44.00	1 117,6

4.2.6 Rim width code

For tyres mounted on 5° tapered rims, the rim width shall be expressed by a code, as given in Table 2.

For tyres requiring new-concept rims, other code numbers will be established.

4.3 Service description

The service description shall be indicated as follows:

load index speed symbol

The characteristics are specified and explained in ISO 7867-2.

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 Specific indications, if required, may be added to indicate other characteristics.

4.5 Tyre classification and nomenclature (optional)

A tyre classification code – use of which is optional – may be used to describe the primary field of application for the tyre.

NOTE Nomenclature and a classification code are under study.

5 Marking

Tyres meeting the size and construction requirements and service description of this part of ISO 7867 shall be marked on the sidewall as shown in the example below.

EXAMPLE

A tyre having

- a) size and construction characteristics of
 - nominal section width 480 mm,
 - nominal aspect ratio 70,
 - radial construction (symbol R),
 - nominal rim diameter code 38;
- b) service description of
 - basic load 2 900 kg (load index 145),
 - reference speed 40 km/h (speed symbol A8).

The above tyre will be marked

480/70 R 38 145A8

In addition, other service characteristics, such as tubeless will be marked:

TUBELESS

6 Tyre dimensions

6.1 Calculation of “design tyre” dimensions

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 :

$$R_{th} = K_1 \cdot S_N$$

For factor K_1 , see Table 3.

6.1.2 Measuring rim width, R_m

The measuring rim width R_m is the width of the standardized rim nearest to the theoretical rim width R_{th} (see Table 2 and Annex A).

6.1.3 Design tyre section width, S

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

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

Round to the nearest whole number.

For factor K_2 , see Table 3.

6.1.4 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 divided by 100:

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

6.1.5 Design tyre overall diameter, D_o

The design tyre overall diameter D_o is equal to the nominal rim diameter D_r plus twice the tyre section height H :

$$D_o = D_r + 2H$$

For those tyres using a rim diameter code comprising 1 or 2 digits, see Table 1 for the value of D_r , in millimetres, to be used.

6.2 Calculation of “minimum overall tyre dimensions”

6.2.1 Minimum overall width, W_{min}

The minimum overall width W_{min} is equal to the product of the design tyre section width S and the appropriate coefficient c (see Table 3):

$$W_{min} = S \cdot c$$

6.2.2 Minimum overall diameter, $D_{o,min}$

The minimum overall diameter $D_{o,min}$ is equal to the nominal rim diameter D_r plus twice the product of design tyre section height H and the appropriate coefficient d (see Table 3):

$$D_{o,min} = D_r + 2H \cdot d$$

6.3 Calculations of “maximum overall tyre dimensions in service”

6.3.1 General

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

6.3.2 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):

$$W_{\max} = S \cdot a$$

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

6.3.3 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 plus twice the product of the design tyre section height H and the appropriate coefficient b (see Table 3):

$$D_{o,\max} = D_r + 2H \cdot b$$

It includes manufacturing tolerances, the different types of tread patterns (see footnote to Table 3) and growth due to service.

6.4 Coefficients for calculation of tyre dimensions

For all types of tyres (for tractor drive, tractor steer, implement and garden tractor wheels) of all structures (bias-belted, diagonal/bias and radial construction) with nominal aspect ratio $H/S \geq 50$ mounted on 5° tapered rims, the coefficients for the calculation of tyre dimensions shall be as given in Table 3.

For tyres with ratio $H/S < 50$ and/or different-concept tyres and rims, other coefficients will be defined.

Table 3 — Coefficients for calculation of tyre dimensions

Structure	Tyre construction code	Coefficients					
		K_1	K_2	a	b^a	c	d
Bias-belted	B	0,8	0,4	1,08	1,07	0,96	0,97
Diagonal/bias	D						
Radial	R			1,05	1,04		

^a Values are based on regular service tyres. The user should recognize that deep treads and corresponding increased overall diameters may be used for certain specialized tyres.

7 Tyre dimensions

For the relevant dimensions of tyres (metric series) for traction wheels and steering wheels of agricultural tractors and machines, and for agricultural implements, see Annex A.

8 Method of measurement of tyre dimensions

Before being measured, the tyre shall be mounted on its measuring rim, inflated with air or nitrogen 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.

9 Tyre and rim coordination

9.1 Approved rim width

For all types of tyres (for tractor drive, tractor steer, implement and garden tractor wheels) of all structures (bias-belted, diagonal/bias and radial construction) mounted on 5° tapered rims, the coefficients for the calculation of approved rim widths shall be as given in Table 4. The values shall be rounded to the nearest standardized rim from the first column of Table 2.

Table 4 — Coefficients for calculation of approved rim widths

Rim width	Aspect ratio, H/S , %		
	95	90 to 70	≤ 65
minimum	a	0,75	a
maximum	a	0,9	a

^a For tyres with $H/S = 95$ and $H/S \leq 65$ and/or different-concept tyres and rims, other coefficients may be defined.

For minimum and maximum approved rim widths for standardized nominal tyre sections, see Annex B.

9.2 Approved rim contours

For approved rim contours for ranges of existing tyres, see Annex C.

Annex A

(normative)

Tyre dimensions

Nominal section width S_N , mm	Measuring rim width code	Section width S	Tyre design dimensions, mm									
			Section height H at nominal aspect ratio H/S (%) of									
			95	90	85	80	75	70	65	60	55	50
100	3.00	98	—	90	85	80	—	—	—	—	—	—
110	3.50	110	—	99	94	88	83	—	—	—	—	—
120	4.00	122	—	108	102	96	90	84	—	—	—	—
130	4.00	129	—	117	111	104	98	91	85	—	—	—
140	4.50	141	—	126	119	112	105	98	91	84	—	—
150	4.50	148	—	135	128	120	113	105	98	90	83	—
160	5.00	160	—	144	136	128	120	112	104	96	88	80
170	5.50	171	—	153	145	136	128	119	111	102	94	85
180	5.50	178	171	162	153	—	—	—	—	—	—	—
190	6.00	190	181	171	162	—	—	—	—	—	—	—
200	6.00	197	190	180	170	—	—	—	—	—	—	—
210	7.00	214	200	189	179	168	—	—	—	—	—	—
220	7.00	221	209	198	187	176	—	—	—	—	—	—
230	7.00	228	219	207	196	184	173	—	—	—	—	—
240	8.00	244	228	216	204	192	180	—	—	—	—	—
250	8.00	251	238	225	213	200	188	175	—	—	—	—
260	8.00	258	247	234	221	208	195	182	—	—	—	—
270	9.00	275	257	243	230	216	203	189	176	—	—	—
280	9.00	282	266	252	238	224	210	196	182	—	—	—
290	9.00	289	276	261	247	232	218	203	189	174	—	—
300	9.00	295	285	270	255	240	225	210	195	180	—	—
320	10.00	319	—	288	272	256	240	224	208	192	176	—
340	11.00	343	—	306	289	272	255	238	221	204	187	—
360	11.00	357	—	324	306	288	270	252	234	216	198	180
380	12.00	380	—	—	—	304	285	266	247	228	209	190

Nominal section width <i>S_N</i> , mm	Measuring rim width code	Section width <i>S</i>	Tyre design dimensions, mm									
			Section height <i>H</i> at nominal aspect ratio <i>H/S</i> (%) of									
			95	90	85	80	75	70	65	60	55	50
400	13.00	404	—	—	—	320	300	280	260	240	220	200
420	13.00	418	—	—	—	336	315	294	273	252	231	210
440	14.00	441	—	—	—	352	330	308	286	264	242	220
460	14.00	455	—	—	—	368	345	322	299	276	253	230
480	15.00	479	—	—	—	384	360	336	312	288	264	240
500	16.00	503	—	—	—	400	375	350	325	300	275	250
520	16.00	516	—	—	—	416	390	364	338	312	286	260
540	17.00	540	—	—	—	432	405	378	351	324	297	270
560	18.00	564	—	—	—	448	420	392	364	336	308	280
580	18.00	577	—	—	—	464	435	406	377	348	319	290
600	18.00	591	—	—	—	480	450	420	390	360	330	300
620	20.00	625	—	—	—	496	465	434	403	372	341	310
650	20.00	645	—	—	—	520	488	455	423	390	358	325
680	21.00	676	—	—	—	544	510	476	442	408	374	340
710	23.00	716	—	—	—	568	533	497	462	426	391	355
750	23.00	744	—	—	—	563	525	488	450	413	375	
800	25.00	798	—	—	—	—	560	520	480	440	400	
850	27.00	852	—	—	—	—	—	553	510	468	425	
900	27.00	886	—	—	—	—	—	—	540	495	450	
1 000	30.00	985	—	—	—	—	—	—	—	—	—	500
1 050	33.00	1 049	—	—	—	—	—	—	—	—	—	525
1 100	36.00	1 144	—	—	—	—	—	—	715	660	605	550

NOTE These values serve as a guideline for design of tyre dimensions (metric series) for tyres mounted on 5° tapered drop-centre rims (code-designated).

Annex B
(normative)**Approved rim widths**

The values given in Table B.1 are the minimum and maximum approved rim widths for metric series tyres of aspect ratios, H/S , 95 to 50 inclusive, mounted on 5° tapered drop-centre rims (code-designated).

For tyres with $H/S = 100$ and $H/S \leq 45$, other rim widths may be defined.

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Table B.1 — Approved rim widths for tyres with aspect ratios 95 to 50, inclusive

Nominal section width S_N mm	Approved rim width code	
	min	max
100	3.00	3.50
110	3.00	4.00
120	3.50	4.50
130	4.00	4.50
140	4.00	5.00
150	4.50	5.50
160	4.50	5.50
170	5.00	6.00
180	5.50	6.00
190	5.50	7.00
200	6.00	7.00
210	6.00	7.00
220	6.00	8.00
230	7.00	8.00
240	7.00	9.00
250	7.00	9.00
260	8.00	9.00
270	8.00	10.00
280	8.00	10.00
290	9.00	10.00
300	9.00	11.00
320	9.00	11.00
340	10.00	12.00
360	11.00	13.00
380	11.00	13.00
400	12.00	14.00
420	12.00	15.00
440	13.00	16.00
460	14.00	16.00
480	14.00	16.00
500	15.00	18.00
520	15.00	18.00
540	16.00	20.00
560	16.00	20.00
580	18.00	21.00
600	18.00	21.00
620	18.00	21.00
650	20.00	23.00
680	20.00	25.00
710	21.00	25.00
750	23.00	27.00
800	23.00	27.00
850	25.00	27.00
900	27.00	33.00
1 000	30.00	36.00
1 050	31.00	37.00
1 100	35.00	41.00

Annex C

(informative)

Approved rim contours

C.1 This annex gives information additional to 9.2.

C.2 In addition to the measuring rim width calculated according to 6.1.2 and the approved rim widths according to 9.1, approved rim contours for ranges of existing tyres are given in Tables C.1 to C.9. The tyre manufacturer shall be consulted for the preferred rim contours within the approved rim contours.

C.3 The tyre and the rim/wheel manufacturer shall be consulted for confirmation of the suitability of the tyre/wheel assembly for the intended service.

Table C.1 — Approved rim contours: “95” series tyres

Tyre section code	Nominal rim diameter code	Approved rim contours
180/95	40	W6
210/95	32, 36, 44	W6, W7
230/95	32, 36, 40, 44	W7, W8
	48	W8
250/95	34, 50	W8
270/95	32, 36, 38, 42, 44, 46	W8, W8L, W9, W10, DW10
	48, 54	W8, W9, W10, W10A
290/95	34	W10
300/95	42	W9, W10, DW10, W11
	46, 52	W9, W10, W10A, W11

Table C.2 — Approved rim contours: “90” series tyres

Tyre section code	Nominal rim diameter code	Approved rim contours
290/90	38	W10
	42	W9, W10
320/90	42	W9, W10
	46, 50, 52	W9, W10, W10A, DW10A, W11
380/90	54	W10A
	46	W12A, W13A, DW13A
	50	DW12A
420/90	54	W12A
	30	W12, W13, W13A, DW14A

Table C.3 — Approved rim contours: “85” series tyres

Tyre section code	Nominal rim diameter code	Approved rim contours
240/85	24, 28	W7, W8
250/85	24, 28	W7, W8, W9
280/85	24	W9, W10
	28	W9, W10, DW10
320/85	24	W9, W10, W11
	28	W9, W10, W11
	20, 32, 34	W10, W10L, W11, DW11
	36	W9, W10, W11
	38	W10, W11, DW10A
340/85	24	W11, W12
	28	W11, W12
	36	W11, W12
	38	W11, W12
	46	W10, W12A, DW10A, DW12A
380/85	24	W11, W12, W13
	28	W11, W12, W13
	30, 34	W12, W13, DW13A
420/85	24	W13, W14L, W15L
	28	W12, W13, W14L, W15L
	30	W13, DW13A, W14L, W15L, DW15A
	34	W13, W14L, W15L
	38	W13, W14L, W15A, W15L, DW15A
460/85	30	W14L, W15L, W16L
	34, 38, 42	W14L, W15L, W16A, W16L, DD16
480/85	34	W15L, W16L, W16A, DW14A, DW15A
520/85	38, 42	W16A, W18A, 16DD, 18DD, DW16A, DW16L, DW18A, DW18L
	46	DW16A, DW16L, DW18A, DW18L
650/85	38	DW23A
680/85	32	DW20A, DW21A

Table C.4 — Approved rim contours: “80” series tyres

Tyre section code	Nominal rim diameter code	Approved rim contours
210/80	16	W6, 6.00F, 6LB, 61/2L, W7
250/80	16, 18	W7, W8, W9, 9, 9.00
260/80	20	W8, W9, 9
340/80	20	11, 12, 11SDC, 12SDC, W10, W11
380/80	38	W12
420/80	46	W12A, W13A, W13L, DW13A, W14L, W15L
440/80	28	W13L, W14L, W15L
480/80	38	W15L, W15A, W16A, DW15A, DW16A, DD16
	42, 46	W15A, W15L, W16A, 16DD, DW16A, DD16
	50	DW15A

Table C.5 — Approved rim contours: “75” series tyres

Tyre section code	Nominal rim diameter code	Approved rim contours
320/75	24	W10, W11
340/75	20	W10, W10L, W11
380/75	20	W11, W12
400/75	38	W12, W13, W14L
620/75	26, 30, 34	DW20A
650/75	32	DW21A, DH21
	34	DW20A, DW21A
	38	DW20A, DW21A, DW23A
680/75	32	DW20A, DW21A, DH21
710/75	34	DW23A, MW23A