31

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

Part 1:
Tyre designation, dimensions and marking

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

Partie 1: Désignation, cotes et marquage des pneumatiques

Reference number
ISO 7867-1:1992(E)

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.

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.

International Standard ISO 7867-1 was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves*, Sub-Committee SC 5, *Agricultural tyres and rims*.

This second edition cancels and replaces the first edition (ISO 7867-1:1988), of which it constitutes a technical revision.

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*

— *Part 2: Dimensions and load ratings for tyres primarily designed for agricultural tractors and self-propelled machines*

— *Part 3: Dimensions and load ratings for tyres primarily designed for agricultural implements and garden tractors*

— *Part 4: Rims — Dimensions and tyre and rim coordinations*

Ply rating marked series of tyres and rims for agricultural tractors and machines are specified in ISO 4251-1 to ISO 4251-4. Service description (load index — speed symbol) marking of the existing series of agricultural tractor drive-wheel tyres will be given in ISO 8664.

Annex A forms an integral part of this part of ISO 7867.

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

Part 1:
Tyre designation, dimensions and marking

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.

It applies to bias-belted, diagonal and radial tyres mounted on 5° tapered rims, as defined in ISO 3877-1. 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, b, c and d will be established and added.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 7867. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 7867 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3877-1:1978, *Tyres, valves and tubes — List of equivalent terms — Part 1: Tyres.*

ISO 4223-1:1989, *Definitions of some terms used in the tyre industry — Part 1: Pneumatic tyres.*

ISO 8664:—[1], *Agricultural tractor drive-wheel tyres — Service description (load index — speed symbol) marked tyres.*

3 Definitions

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

3.1 agricultural tyre for special cultivation work: Tyre for use on wheels (usually tractor drive-wheels) on agricultural machines engaged on surface work or linear cultivation and the transport on roads and tracks of the tools required for such work.

4 Tyre designation

The designation of the tyre shall be shown on the sidewall of the tyre and shall include the following information to be shown together:

— size and construction (see 4.1);

— service condition characteristics (see 4.2).

4.1 Size and construction

The characteristics shall be indicated as follows:

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

1) To be published.

4.1.1 Nominal section width

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

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 used shall be as follows:

B for bias-belted construction;

D for diagonal/bias construction;

R for radial construction.

NOTE 1 Other codes will be established for new concepts (constructions) of tyres.

4.1.4 Nominal rim diameter code

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

Table 1 — Nominal rim diameter code

Nominal rim diameter code[1)]	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
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

1) Values in parentheses are not recommended.

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. formed by 3 or 4 digits.

4.1.5 Rim width code

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

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

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

4.2 Service condition characteristics

The characteristics shall be indicated as shown in ISO 8664, and include:

Load index Speed symbol

4.2.1 Load index

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

The correlation between load indices and tyre load-carrying capacities shall be as given in table 3.

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

LI	TLCC kg	LI	TLCC kg	LI	TLCC kg	LI	TLCC kg	LI	TLCC kg
0	45	40	140	80	450	120	1 400	160	4 500
1	46,2	41	145	81	462	121	1 450	161	4 625
2	47,5	42	150	82	475	122	1 500	162	4 750
3	48,7	43	155	83	487	123	1 550	163	4 875
4	50	44	160	84	500	124	1 600	164	5 000
5	51,5	45	165	85	515	125	1 650	165	5 150
6	53	46	170	86	530	126	1 700	166	5 300
7	54,5	47	175	87	545	127	1 750	167	5 450
8	56	48	180	88	560	128	1 800	168	5 600
9	58	49	185	89	580	129	1 850	169	5 800
10	60	50	190	90	600	130	1 900	170	6 000
11	61,5	51	195	91	615	131	1 950	171	6 150
12	63	52	200	92	630	132	2 000	172	6 300
13	65	53	206	93	650	133	2 060	173	6 500
14	67	54	212	94	670	134	2 120	174	6 700
15	69	55	218	95	690	135	2 180	175	6 900
16	71	56	224	96	710	136	2 240	176	7 100
17	73	57	230	97	730	137	2 300	177	7 300
18	75	58	236	98	750	138	2 360	178	7 500
19	77,5	59	243	99	775	139	2 430	179	7 750
20	80	60	250	100	800	140	2 500	180	8 000
21	82,5	61	257	101	825	141	2 575	181	8 250
22	85	62	265	102	850	142	2 650	182	8 500
23	87,5	63	272	103	875	143	2 725	183	8 750
24	90	64	280	104	900	144	2 800	184	9 000
25	92,5	65	290	105	925	145	2 900	185	9 250
26	95	66	300	106	950	146	3 000	186	9 500
27	97,5	67	307	107	975	147	3 075	187	9 750
28	100	68	315	108	1 000	148	3 150	188	10 000
29	103	69	325	109	1 030	149	3 250	189	10 300
30	106	70	335	110	1 060	150	3 350	190	10 600
31	109	71	345	111	1 090	151	3 450	191	10 900
32	112	72	355	112	1 120	152	3 550	192	11 200
33	115	73	365	113	1 150	153	3 650	193	11 500
34	118	74	375	114	1 180	154	3 750	194	11 800
35	121	75	387	115	1 215	155	3 875	195	12 150
36	125	76	400	116	1 250	156	4 000	196	12 500
37	128	77	412	117	1 285	157	4 125	197	12 850
38	132	78	425	118	1 320	158	4 250	198	13 200
39	136	79	437	119	1 360	159	4 375	199	13 600

4.2.2 Speed symbol

The speed symbol is a symbol indicating the speed at which the tyre can carry a load corresponding to its load index under service conditions specified by the tyre manufacturer.

The correlation between speed symbols and speed category shall be as given in table 4.

Table 4 — Correlation between speed symbol and speed category

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

Speed symbol	Speed category km/h
A1	5
A2	10
A3	15
A4	20
A5	25
A6	30
A7	35
A8	40
B	50

4.3 Other service characteristics

4.3.1 In the case of tubeless tyres, the marking "TUBELESS" shall be shown on the tyre.

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

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

4.4 Tyre classification and nomenclature (optional)

A tyre classification code — use of which is optional — will describe the primary field of application for the tyre. Nomenclature and a classification code are under study.

5 Marking

Tyres meeting the size and construction requirements and service condition characteristics of this part of ISO 7867 shall be marked on the sidewall as shown.

EXAMPLE

A tyre having

a) a size and construction of:

- nominal section width 450 mm,
- nominal aspect ratio 80,
- "radial" construction,
- rim diameter code 38;

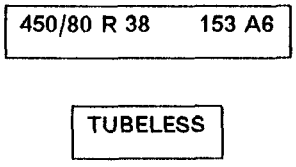
b) service condition characteristics of:

- basic load 3 650 kg (load index 153),
- speed category 30 km/h (speed symbol A6);

c) other service characteristics:

- tubeless;

shall be marked as follows:



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:

$$R_{th} = K_1 S_N$$

For factor K_1, see table 5.

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).

6.1.3 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 width, R_m:

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

rounded to the nearest whole number.

For factor K_2, see table 5.

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 (H/S expressed as a percentage):

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

rounded to the nearest whole number.

6.1.5 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 those tyres using a rim diameter code formed by 1 or 2 digits, see table 1 for the value of D_r, in millimetres, to be used.

6.2 Calculation of "minimum new overall tyre dimensions"

6.2.1 Minimum new overall width, W_{min}

The minimum new overall width, W_{min}, is equal to the product of the design tyre section width, S, and the appropriate coefficient, c (see table 5):

$$W_{min} = Sc$$

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

The minimum new overall diameter, $D_{o,min}$, is equal to the nominal rim diameter, D_r, plus twice the product of the design tyre section height, H, and the appropriate coefficient, d (see table 5):

$$D_{o,min} = D_r + 2Hd$$

6.3 Calculation of "maximum overall tyre dimensions in service"

This calculation is for use by vehicle manufacturers in designing for tyre clearance.

6.3.1 Maximum overall width in service, W_{max}

The maximum overall width in service, W_{max}, is equal to the product of design tyre section width, S, and the appropriate coefficient, a (see table 5):

$$W_{max} = Sa$$

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

6.3.2 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, plus twice the product of the design tyre section height, H, and the appropriate coefficient, b (see table 5):

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

This includes manufacturing tolerances, the different types of tread patterns (see footnote in table 5) and growth due to service.

6.4 Coefficients for the 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 $H/S \geqslant 50$ mounted on 5° tapered rims, the coefficients for the calculation of tyre dimensions shall be as given in table 5.

Table 5 — Coefficients for calculation of tyre dimensions

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

1) Figures 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.

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

7 Tyre dimension tables

For the relevant dimensions of tyres (metric series) for agricultural tractors and machines, and for agricultural implements and garden tractors, see annex A.

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.

Annex A
(normative)

Tyre dimension tables

The values given in tables A.1 and A.2 serve as a guideline for design of new tyre dimensions, metric series, mounted on 5° tapered drop-centre rims (code designated).

Table A.1 — Guideline values for tyres for traction wheels

Nominal section width S_N mm	Measuring rim width code	Tyre design dimensions, mm										
		Section width S	Section height, H, at nominal aspect ratios H/S (%)									
			95[1]	90[1]	85[1]	80	75	70	65	60	55	50
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	—	—	—	—	—	—	—
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	—	—	—	256	240	224	208	192	176	—
340	11.00	343	—	—	—	272	255	238	221	204	187	—
360	11.00	357	—	—	—	288	270	252	234	216	198	180
380	12.00	380	—	—	—	304	285	266	247	228	209	190
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	18.00	550	—	—	—	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) For tyres for special cultivation work preferably.

Table A.2 — Guideline values for tyres for steering wheels and for implement tyres

Nominal section width S_N mm	Measuring rim width code	Tyre design dimensions, mm									
		Section width S	Section height, H, at nominal aspect ratios H/S (%)								
			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	162	153	144	135	126	117	108	99	90
190	6.00	190	171	162	152	143	133	124	114	105	95
200	6.00	197	180	170	160	150	140	130	120	110	100
210	7.00	214	189	179	168	158	147	137	126	116	105
220	7.00	221	198	187	176	165	154	143	132	121	110
230	7.00	228	207	196	184	173	161	150	138	127	115
240	8.00	244	216	204	192	180	168	156	144	132	120
250	8.00	251	225	213	200	188	175	163	150	138	125
260	8.00	258	234	221	208	195	182	169	156	143	130
270	9.00	275	243	230	216	203	189	176	162	149	135
280	9.00	282	252	238	224	210	196	182	168	154	140
290	9.00	289	261	247	232	218	203	189	174	160	145
300	9.00	295	270	255	240	225	210	195	180	165	150
320	10.00	319	288	272	256	240	224	208	192	176	160
340	11.00	343	306	289	272	255	238	221	204	187	170
360	11.00	357	324	306	288	270	252	234	216	198	180
380	12.00	380	342	323	304	285	266	247	228	209	190
400	13.00	404	360	340	320	300	280	260	240	220	200
420	13.00	418	378	357	336	315	294	273	252	231	210
440	14.00	441	396	374	352	330	308	286	264	242	220
460	14.00	455	414	391	368	345	322	299	276	253	230
480	15.00	479	—	408	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	18.00	550	—	—	—	405	378	351	324	297	270
560	18.00	564	—	—	—	—	392	364	336	308	280
580	18.00	577	—	—	—	—	406	377	348	319	290
600	18.00	591	—	—	—	—	—	390	360	330	300