

INTERNATIONAL STANDARD

ISO
13442

First edition
2004-04-01

Tyres and rims for construction machines

Pneumatiques et jantes pour engins de construction

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Reference number
ISO 13442:2004(E)

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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.org
Web www.iso.org

Published in Switzerland

Foreword

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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 13442 was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves*.

Tyres and rims for construction machines

1 Scope

This International Standard sets the designation, dimensions, load ratings and reference speeds for tyres and rims fitted to construction machines (backhoe loaders, small dumpers, loaders, excavators, etc.) operating on building sites under loading and transport conditions.

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

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

ISO 4250-1:1996, *Earth-mover tyres and rims — Part 1: Tyre designation and dimensions*

ISO 4250-3:1997, *Earth-mover tyres and rims — Part 3: Rims*

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

ISO 4251-4, *Tyres (ply rating marked series) and rims for agricultural tractors and machines — Part 4: Tyre classification and nomenclature*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

haulage service

⟨transport⟩ cycle where machine self-loads or receives a load from loading equipment, transports it elsewhere and returns unloaded

NOTE Transportation occurs over unimproved surfaces at medium speeds and short distances, up to 4 km one way.

3.2 Slow speed service (loading)

3.2.1

loading cycle

cycle where the machine is used to pick up material and move it a short distance away

NOTE Tyre loads fluctuate depending on the conditions involved when the equipment picks up the load. Transportation speeds are low, up to 10 km/h and distances are short, usually less than 150 m one way.

3.2.2

load and carry cycle

cycle where the machine, primarily intended for loader service, picks up a load, transports it elsewhere and returns unloaded

NOTE Transportation usually occurs over unimproved surfaces at low speeds, up to 25 km/h, and rather short distances, up to 600 m one way.

4 Tyre designation and marking

4.1 General

The designation of the tyre shall be shown on its sidewall and shall include the details in 4.2 and 4.3. It may also include those details given in 4.4 and 4.5, unless otherwise indicated in Tables 3 and 4.

4.2 Tyre size and construction code

4.2.1 General

Construction machine tyres are designated by the nominal section width, tyre construction code and nominal rim diameter code. In addition, the low section height tyres are designated, with the nominal aspect ratio or an "L" after the nominal section width or a code prior to the nominal section width. (For designation/markings/size examples, see 4.5.)

4.2.2 Nominal section width

The nominal section width is expressed by a code. It shall be expressed in millimetres for new sizes, ending 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:

- a dash (—) for diagonal/bias construction;
- "R" for radial construction; in addition, the word "radial" may also appear on the tyre.

4.2.5 Nominal rim diameter code

The nominal rim diameter shall be expressed by a code given in Table 7 of ISO 4250-3:1997 and in Table 1 of ISO 4251-3:1994.

4.2.6 Diameter code

The diameter of some low section height tyres should be expressed as a code and included in size prior to nominal section width.

EXAMPLE 23X8. 50-12

4.3 Index of strength

4.3.1 General

The term is used to identify a given tyre with its maximum recommended load when used in a specific type of service. One of the markings specified in 4.3.2, 4.3.3 or 4.4 shall be shown.

4.3.2 Diagonal tyres

The tyre strength of diagonal/bias tyres shall be expressed by a numerical code in conjunction with the letters "PR" (ply rating).

EXAMPLE 16 PR

4.3.3 Radial tyres

The tyre strength of radial tyres shall be expressed by a symbol in the form of 1, 2 or 3 stars (symbol marking).

EXAMPLE **

4.4 Service description

4.4.1 General

The service condition characteristics or service description shall be indicated as follows:

Load index	Speed symbol
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For the specific type of service, construction tyres shall be marked with one or — as applicable — several service descriptions.

4.4.2 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 specified operating conditions.

The correlation between load indices and tyre load carrying capacity shall be in accordance with Table 1.

Table 1 — Correlation between load index (LI) and tyre load carrying capacity (TLCC)

LI	TLCC kg	LI	TLCC kg	LI	TLCC kg
83	487	118	1 320	153	3 650
84	500	119	1 360	154	3 750
85	515	120	1 400	155	3 875
86	530	121	1 450	156	4 000
87	545	122	1 500	157	4 125
88	560	123	1 555	158	4 250
89	580	124	1 600	159	4 375
90	600	125	1 650	160	4 500
91	615	126	1 700	161	4 625
92	630	127	1 750	162	4 750
93	650	128	1 800	163	4 875
94	690	129	1 850	164	5 000
95	710	130	1 900	165	5 150
96	730	131	1 950	166	5 300
97	750	132	2 000	167	5 450
98	775	133	2 060	168	5 600
99	800	134	2 120	169	5 800
100	825	135	2 180	170	6 000
101	850	136	2 240	171	6 150
102	875	137	2 300	172	6 300
103	900	138	2 360	173	6 500
104	925	139	2 430	174	6 700
105	950	140	2 500	175	6 900
106	975	141	2 575	176	7 100
107	1 000	142	2 650	177	7 300
108	1 030	143	2 725	178	7 500
109	1 030	144	2 800	179	7 750
110	1 060	145	2 900	180	8 000
111	1 090	146	3 000	181	8 250
112	1 120	147	3 075	182	8 500
113	1 150	148	3 150	183	8 750
114	1 180	149	3 250	184	9 000
115	1 215	150	3 350	185	9 250
116	1 250	151	3 450	186	9 500
117	1 285	152	3 550		

4.4.3 Speed symbol

The speed symbol is a symbol indicating the maximum speed at which a tyre can carry a load corresponding to its load index under the specified operating condition.

The correlation between speed symbols and reference speeds/operating conditions shall be in accordance with Table 2.

Table 2 — Correlation between speed symbol, reference speed/operating condition

Speed symbol	Reference speed km/h	Operating condition
A2	10	Slow speed service (loading)
A4	20	
A6	30	
A8	40	
B	50	
D	65	Haulage service (transport)
E	70	

4.5 Other service characteristics

4.5.1 Tubeless

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

4.5.2 Preferred direction of rotation

The preferred direction of rotation shall be indicated by an arrow.

4.5.3 Code system for tyre usage

Tyres may be identified by their type of service and tread design in accordance with ISO 4250-1:1996, Tables 4 and 5; and ISO 4251-4.

4.6 Examples for designation/markings of construction machine tyres

See Table 3.

Table 3 — Designation/markings examples

Radial tyres		
Tyre size designation	Load index	Speed symbol
17.5R25	176	A2
525/80R25	168 179	B A2
14.9R24	142	B
17.5LR24	154	A2
Diagonal tyres		
Tyre size designation	Ply rating	
23 X8.50-12	6 PR	
16.9-28	8 PR	
12.5/70-16	6 PR	

4.7 Tyre dimensions

For tyre dimensions, see Tables 4 and 5.

Table 4 — Tyre dimensions — Diagonal construction tyres

Tyre size designation	Measuring rim width code	Design new tyre		In service	
		Section width	Overall diameter	Max. overall width	Max. overall diameter
9.5-20	8.00	241	922	260	947
12.4-16	11.00	315	931	340	963
14.9-24	13.00	378	1 241	408	1 279
16.9-24	15.00	429	1 310	463	1 355
16.9-28	15.00	429	1 410	463	1 455
16.9-30	15.00	429	1 461	463	1 503
18.4-24	16.00	467	1 375	504	1 421
18.4-26	16.00	467	1 425	504	1 470
17.5L-24	15.00	445	1 241	481	1 278
19.5L-24	17.00	495	1 314	535	1 356
23X8.50-12	7.00	213	574	230	590
27X8.50-15	7.00	213	678	230	696
27X9.50-15	7.00	229	686	252	717
33X12.5-15	10.00	310	843	341	889
42X17-20	14.00	432	1 073	467	1 107
16.5/85-24	13.00	417	1 322	438	1 358
16.5/85-28	13.00	417	1 423	438	1 454
10.5/80-18	9.00	274	885	288	906
12.5/80-18	9.00	308	965	323	990
15.5/80-24	13.00	394	1 240	414	1 271
10.0/70-12	8.50	256	655	276	676
12.5/70-16	10.00	316	848	341	875
15.5/70-18	13.00	404	1 017	436	1 051
15.5/70-20	13.00	404	1 068	436	1 102
16.0/70-20	14.00	418	1 075	439	1 105
12.5/65-18	10.00	316	867	341	892
14.0/65-15	11.00	353	843	381	871
15.5/60-18	13.00	404	937	436	966
17.5/65-20	14.00	448	1 094	484	1 129
13.00-24	10.00	351	1 301	379	1 342
14.00-24	10.00	375	1 368	405	1 414
15.5-25	12.00	394	1 277	437	1 328
17.5-25	14.00	445	1 348	494	1 405
20.5-25	17.00	520	1 492	577	1 561

Table 5 — Tyre dimensions — Radial construction tyres

Tyre size designation	Measuring rim width code	Design new tyre		In service	
		Section width	Overall diameter	Max. overall width	Max. overall diameter
14.9R24	13.00	378	1 245	408	1 275
14.9R28	13.00	378	1 350	408	1 380
16.9R24	15.00	429	1 320	463	1 350
16.9R28	15.00	429	1 420	463	1 450
16.9R30	15.00	429	1 475	463	1 505
18.4R24	16.00	467	1 395	504	1 425
18.4R26	16.00	467	1 440	504	1 475
18.4R28	16.00	467	1 490	504	1 520
17.5LR24	15.00	445	1 250	481	1 275
19.5LR24	17.00	495	1 320	535	1 345
21LR24	18.00	533	1 395	576	1 425
15.5R25	12.00	394	1 277	437	1 328
17.5R25	14.00	445	1 348	494	1 405
20.5R25	17.00	520	1 492	577	1 561
275/80R18	9.00	278	897	292	915
275/80R20	9.00	278	948	292	974
335/80R18	11.00	339	993	356	1 015
335/80R20	11.00	339	1 044	366	1 076
365/80R20	11.00	360	1 092	389	1 127
405/80R25	13.00	407	1 283	452	1 335
445/80R25	14.00	445	1 347	494	1 404
405/70R18	13.00	407	1 025	452	1 070
405/70R20	13.00	407	1 076	452	1 121
405/70R24	13.00	407	1 178	452	1 223
455/70R24	14.00	452	1 248	502	1 299
525/80R25	17.00	530	1 475	588	1 542
555/70R24	17.00	550	1 388	611	1 450

4.8 Tyre loads

For tyre loads, see Tables 6 to 10.

Table 6 — Tyre loads — Diagonal construction, derived from agricultural tyres

Tyre size designation	Ply rating	A8 (40 km/h)		A2 (10 km/h)		B (50 km/h)	
		Basic tyre load	Reference inflation pressure	Basic tyre load	Reference inflation pressure	Basic tyre load	Reference inflation pressure
		kg	kPa	kg	kPa	kg	kPa
12.4-16	6	1 120	200	1 400	200	1 060	200
14.9-24	10	2 575	250	3 250	250	2 360	250
16.9-24	10	2 905	220	3 630	220	2 725	220
16.9-24	12	3 250	260	4 060	260	3 075	260
16.9-28	8	2 830	190	3 540	190	2 650	190
16.9-28	10	3 095	220	3 870	220	2 900	220
16.9-30	10	3 195	220	3 995	220	3 000	220
18.4-24	10	3 325	210	4 155	210	3 150	210
18.4-26	12	3 880	250	4 875	250	3 550	250
17.5L-24	8	2 410	170	3 010	170	2 240	170
17.5L-24	10	2 770	220	3 460	220	2 575	220
19.5L-24	8	2 720	170	3 400	170	2 575	170
19.5L-24	10	3 030	190	3 790	190	2 800	190
19.5L-24	12	3 450	230	4 310	230	3 250	230

Table 7 — Tyre loads — Diagonal construction, miscellaneous tyres

Tyre size designation	Ply rating	A8 (40 km/h)		A2 (10 km/h)	
		Basic tyre load	Reference inflation pressure	Basic tyre load	Reference inflation pressure
		kg	kPa	kg	kPa
9.5-20	6	875	240	1 215	240
23X8.50-12	4	487	260	690	260
27X8.50-15	4	600	260	850	260
27X9.50-15	4	670	220	950	220
27X9.50-15	6	850	325	1 180	325
33X12.5-15	6	1 285	240	1 800	240
42X17-20	6	1 950	180	2 725	180
42X17-20	10	2 650	300	3 650	300
16.5/85-24	8	3 350	190	4 625	a
16.5/85-28	10	3 875	230	5 450	a
10.5/80-18	8	1 550	300	2 120	a
10.5/80-18	10	1 750	370	2 430	a
12.5/80-18	8	1 900	250	2 600	a
12.5/80-18	10	2 120	310	3 000	a
15.5/80-24	10	3 350	250	4 625	a
10.0/70-12	4	500	160	690	160
12.5/70-16	6	1 000	200	1 400	200
12.5/70-16	8	1 180	260	1 650	260
15.5/70-18	8	1 750	220	2 430	220
15.5/70-20	10	2 060	260	2 900	260
16.0/70-20	10	2 725	250	3 750	a
12.5/65-18	6	1 030	200	1 450	200
12.5/65-18	8	1 215	260	1 700	260
14.0/65-15	6	1 060	180	1 500	180
14.0/65-15	8	1 250	240	1 750	240
17.5/65-20	10	2 300	240	3 150	240
15.5/60-18	8	1 600	220	2 180	220
15.5/60-18	10	1 750	260	2 430	260
^a Consult tyre manufacturer for recommended inflation pressure.					

Table 8 — Tyre loads — Radial construction derived from agricultural tyres

Tyre size designation	LI	A8 (40 km/h)		A2 (10 km/h)		B (50 km/h)	
		Basic tyre load	Reference inflation pressure	Basic tyre load	Reference inflation pressure	Basic tyre load	Reference inflation pressure
		kg	kPa	kg	kPa	kg	kPa
14.9R24	145	2 900	300	3 650	300	2 725	300
14.9R28	147	3 075	300	3 875	300	2 900	300
16.9R24	151	3 450	300	4 375	300	3 150	300
16.9R28	148	3 150	250	4 000	250	2 900	250
16.9R28	154	3 750	300	4 875	300	3 450	300
18.4R24	157	4 125	300	5 150	300	3 750	300
18.4R26	147	3 075	240	3 875	240	2 800	240
18.4R28	159	4 375	300	5 450	300	4 000	300
17.5LR24	145	2 900	250	3 625	250	2 650	250
17.5LR24	150	3 350	300	4 250	300	3 075	300
19.5LR24	149	3 250	250	4 125	250	3 000	250
19.5LR24	156	4 000	300	5 000	300	3 650	300
21LR24	161	4 625	300	5 800	300	4 250	300

Table 9 — Tyre loads — Radial construction derived from earth-mover tyres

Tyre size designation	LI	A2 (10 km/h)		LI	B (50 km/h)	
		Basic tyre load	Reference inflation pressure		Basic tyre load	Reference inflation pressure
		kg	kPa		kg	kPa
15.5R25	169	5 800	475	152	3 550	350
17.5R25	176	7 100	475	157	4 125	350
20.5R25	186	9 500	475	168	5 600	350
275/80R18	142	2 650	375	130	1 900	375
275/80R20	144	2 800	375	132	2 000	375
335/80R18	151	3 450	375	139	2 430	375
335/80R20	147	3 075	375	136	2 240	375
365/80R20	153	3 650	375	141	2 575	375
405/80R20	163	4 875	375	152	3 550	375
445/80R25	169	5 800	375	157	4 125	375
525/80R25	179	7 750	375	168	5 600	375
405/70R18	153	3 650	375	141	2 575	375
405/70R20	155	3 875	375	143	2 725	375
405/70R24	158	4 250	375	146	3 000	375
455/70R24	165	5 150	375	154	3 750	375
555/70R24	177	7 300	375	166	5 300	375