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## Earth-mover tyres and rims —

### Part 1: Tyre designation and dimensions

*Pneumatiques et jantes pour engins de terrassement —*

*Partie 1: Désignation et cotes des pneumatiques*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves*, Subcommittee SC 6, *Off-the-road tyres and rims*.

This seventh edition cancels and replaces the sixth edition (ISO 4250-1:2017), which has been technically revised.

The main changes are as follows:

- Deletion and addition of certain tyre size designations to harmonize with ISO 4250-2 and ISO 4250-3.

A list of all parts in the ISO 4250 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Earth-mover tyres and rims —

## Part 1: Tyre designation and dimensions

### 1 Scope

This document specifies designations and dimensions for earth-mover tyres and gives the recommended rims primarily intended for earth-moving machinery as defined in ISO 6165.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *Definitions of some terms used in the tyre industry — Part 1: Pneumatic tyres*

ISO 4250-2, *Earth-mover tyres and rims — Part 2: Loads and inflation pressures*

ISO 4250-3:2020, *Earth-mover tyres and rims — Part 3: Rims*

### 3 Terms and definitions

For the purposes of this document, the definitions given in ISO 4223-1 and ISO 4250-2 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

NOTE For a list of equivalent terms for tyres, valves and tubes, see ISO 3877-1.

### 4 Tyre designation

#### 4.1 General

The designation of the tyre shall be shown on its sidewall and shall include the following details:

- size and construction characteristics (see 4.2);
- index of tyre strength (see 4.3).

The designation can include:

- operating condition (see 4.4);
- various use conditions (see 4.5).

Examples of tyre designation/markings are given in Table 3.

## 4.2 Tyre size and construction

### 4.2.1 General

The tyre size and construction shall be indicated as specified in [4.2.2](#) to [4.2.5](#).

### 4.2.2 Nominal section width

The nominal section width shall be expressed by a code (see [Table 3](#)). In the case of 65, 70, 75, 80, and 90 series tyres, this is followed, separated by a slash (/), by the nominal aspect ratio.

Metric designated tyres shall have a nominal section width ending in '0'. Some legacy tyre sizes continue to exist with the metric nominal section width ending in '5'.

### 4.2.3 Nominal aspect ratio

The nominal aspect ratio is expressed as a multiple of 5. When applicable, see [4.2.2](#).

### 4.2.4 Tyre construction code

The type construction code shall be as follows:

- - (dash), for diagonal/bias construction;
- R, for radial construction.

In addition, for radial construction, the word "RADIAL" can also appear on the tyre.

### 4.2.5 Nominal rim diameter code

The nominal rim diameter shall be expressed by a code as given in ISO 4250-3:2020, Table 8. The suffix "TG" shall be used to identify tyres mounted on rims with a rim diameter code of 24 but having a specified diameter ( $D$ ) of 614,4 mm. The suffix "K" shall be used to identify tyres mounted on rims with a rim diameter code of 15 but having a specified diameter ( $D$ ) of 380,2 mm.

## 4.3 Index of tyre strength

### 4.3.1 General

The index of tyre strength is used to identify a given tyre with its maximum recommended load and corresponding inflation pressure when used in a specific type of service. It shall be as specified in [4.3.2](#) or [4.3.3](#).

### 4.3.2 Diagonal tyres

The index of tyre strength of diagonal/bias tyres shall be expressed by a numerical code in conjunction with the letter "PR" (ply rating), for example, "16 PR", or by operating condition as given in [4.4](#), or by both the numerical code and operating condition.

### 4.3.3 Radial tyres

The index of tyre strength of radial tyres shall be expressed by a symbol in the form of a number of stars (symbol marking), for example, "★", or by operating condition as given in [4.4](#), or by the symbol and operating condition.

## 4.4 Operating condition

### 4.4.1 General

The operating condition can be indicated as follows:

- load index;
- speed symbol;
- usage (optional).

For the specific types of service, earth-mover tyres can be marked with several operating conditions, for example, those for earth-moving haulage service at 50 km/h, for low speed service at 10 km/h (loading cycle), or for grader service at 40 km/h.

NOTE Definitions of operating conditions are given in ISO 4250-2.

### 4.4.2 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 1](#).

**Table 1 — 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
120	1 400	160	4 500	200	14 000	240	45 000	280	140 000
121	1 450	161	4 625	201	14 500	241	46 250	281	145 000
122	1 500	162	4 750	202	15 000	242	47 500	282	150 000
123	1 550	163	4 875	203	15 500	243	48 750	283	155 000
124	1 600	164	5 000	204	16 000	244	50 000	284	160 000
125	1 650	165	5 150	205	16 500	245	51 500	285	165 000
126	1 700	166	5 300	206	17 000	246	53 000	286	170 000
127	1 750	167	5 450	207	17 500	247	54 500	287	175 000
128	1 800	168	5 600	208	18 000	248	56 000	288	180 000
129	1 850	169	5 800	209	18 500	249	58 000	289	185 000
130	1 900	170	6 000	210	19 000	250	60 000	290	190 000
131	1 950	171	6 150	211	19 500	251	61 500	291	195 000
132	2 000	172	6 300	212	20 000	252	63 000	292	200 000
133	2 060	173	6 500	213	20 600	253	65 000	293	206 000
134	2 120	174	6 700	214	21 200	254	67 000	294	212 000
135	2 180	175	6 900	215	21 800	255	69 000	295	218 000
136	2 240	176	7 100	216	22 400	256	71 000	296	224 000
137	2 300	177	7 300	217	23 000	257	73 000	297	230 000
138	2 360	178	7 500	218	23 600	258	75 000	298	236 000
139	2 430	179	7 750	219	24 300	259	77 500	299	243 000
140	2 500	180	8 000	220	25 000	260	80 000	300	250 000
141	2 575	181	8 250	221	25 750	261	82 500	301	257 500
142	2 650	182	8 500	222	26 500	262	85 000	302	265 000
143	2 725	183	8 750	223	27 250	263	87 500	303	272 500

**Table 1 (continued)**

LI	TLCC kg	LI	TLCC kg	LI	TLCC kg	LI	TLCC kg	LI	TLCC kg
144	2 800	184	9 000	224	28 000	264	90 000		
145	2 900	185	9 250	225	29 000	265	92 500		
146	3 000	186	9 500	226	30 000	266	95 000		
147	3 075	187	9 750	227	30 750	267	97 500		
148	3 150	188	10 000	228	31 500	268	100 000		
149	3 250	189	10 300	229	32 500	269	103 000		
150	3 350	190	10 600	230	33 500	270	106 000		
151	3 450	191	10 900	231	34 500	271	109 000		
152	3 550	192	11 200	232	35 500	272	112 000		
153	3 650	193	11 500	233	36 500	273	115 000		
154	3 750	194	11 800	234	37 500	274	118 000		
155	3 875	195	12 150	235	38 750	275	121 500		
156	4 000	196	12 500	236	40 000	276	125 000		
157	4 125	197	12 850	237	41 250	277	128 500		
158	4 250	198	13 200	238	42 500	278	132 000		
159	4 375	199	13 600	239	43 750	279	136 000		

**4.4.3 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 reference speeds shall be as given in [Table 2](#).

The speed symbol(s) marked on earth-mover tyres also indicate(s) the type of operating condition(s) for which the tyre is designed.

**Table 2 — Correlation between speed symbol, operating condition, and reference speed**

Speed symbol	Reference speed km/h	Operating condition
A2	10	Slow speed service (loading), loader, dozer, industrial application, etc.
A8	40	Grader service
B	50	Earth-mover service (transport), haulage truck, dumper, scraper, etc.
D	65	Earth-mover service (transport)

**4.4.4 Usage**

The word “CYCLIC” is used to indicate that a tyre cannot be used continuously at the load indicated by its load index and at the speed indicated by its speed symbol.



Table 3 — Examples of tyre designation/markings

Nominal section width code <sup>a</sup>	Construction code	Nominal rim diameter code <sup>b</sup>	Index of tyre strength	Load index	Speed symbol	Usage
a) Symbol-marked radial tyres						
30.00	R	51	**	230	B	CYCLIC
				248	A2	CYCLIC
17.5	R	25	*	176	A2	CYCLIC
17.5	R	25	**	167	B	CYCLIC
40/65	R	39	*	228	A2	CYCLIC
750/65	R	25	*	178	A8	—
b) Ply-rating-marked diagonal tyres						
20.5	—	25	20 PR	160	A8	—
				170	B	CYCLIC
37.5	—	51	44 PR	238	A2	CYCLIC
				223	B	CYCLIC
16.00	—	24 TG	16 PR	160	A8	—
21.00	—	49	40 PR	206	B	CYCLIC
<sup>a</sup> Includes, as necessary, the nominal aspect ratio (see 4.2.2 and 4.2.3).						
<sup>b</sup> Includes, as necessary, the suffix code (see 4.2.5).						

## 4.5 Other service characteristics

### 4.5.1 Preferred direction of rotation

In the case of a preferred direction of rotation, this direction shall be indicated by an arrow.

### 4.5.2 Tubeless tyres

Tubeless tyres shall be marked "TUBELESS".

### 4.5.3 Code for usage

Tyres can be identified by a code for usage indicating their type of service and tread design as shown in Tables 4 and 5, respectively.

The use of these identification codes is at the discretion of the individual tyre manufacturer.

Table 4 — Type of service

Code	Type of service
C	Compactor
E	Earth-mover (dumper and tractor-scraper)
G	Grader
L	Loader and dozer

Table 5 — Tread design

Code <sup>a b</sup>	Type of service	Tread type
C-1	Compactor	Smooth
C-2	Compactor	Grooved
E-1	Earthmover	Rib regular
E-2	Earthmover	Traction regular
E-3	Earthmover	Regular
E-4	Earthmover	Deep
E-7	Earthmover	Flotation
G-1	Grader	Rib regular
G-2	Grader	Traction regular
G-3	Grader	Regular
G-4	Grader	Deep
L-2	Loader and dozer	Traction regular
L-3	Loader and dozer	Regular
L-4	Loader and dozer	Deep
L-5	Loader and dozer	Extra deep

<sup>a</sup> Where smooth treads are used in the “L” series, this should be denoted by the suffix “S” (e.g. L-5S).

<sup>b</sup> Code types 1, 2, and 3 are designated as regular tread depth.

## 5 Tyre dimensions

### 5.1 General

The designation of dimension, measuring rim, design tyre dimension, and maximum overall dimensions in-service are given in the following tables:

- a) [Table 6](#) - tyre dimensions for narrow-base diagonal tyres;
- b) [Table 7](#) - tyre dimensions for narrow-base diagonal tyres on SDC rims;
- c) [Table 8](#) - tyre dimensions for narrow-base diagonal tyres on 15° rim contours;
- d) [Table 9](#) - tyre dimensions for wide-base, 75, 80 and 85 series diagonal tyres;
- e) [Table 10](#) - tyre dimensions for 65 and 70 series diagonal tyres;
- f) [Table 11](#) - tyre dimensions for diagonal compactor tyres;
- g) [Table 12](#) - tyre dimensions for narrow-base radial tyres;
- h) [Table 13](#) - tyre dimensions for narrow-base radial tyres on SDC rims;
- i) [Table 14](#) - tyre dimensions for narrow-base radial tyres on 15° rim contours;
- j) [Table 15](#) - tyre dimensions for wide-base and 75 series radial tyres;
- k) [Table 16](#) - tyre dimensions for 65 and 70 series radial tyres;
- l) [Table 17](#) - tyre dimensions for 80 series radial tyres;
- m) [Table 18](#) - tyre dimensions for 90 series radial tyres;
- n) [Table 19](#) - tyre dimensions for radial compactor tyres;
- o) [Table 20](#) - tyre dimensions for metric 65 series radial tyres;

p) [Table 21](#) - tyre dimensions for metric 70, 75 and 80 series radial tyres.

## 5.2 In-service dimensions

In-service dimensions are the maximum dimensions for grown tyres in-service for use by machine manufacturers in designing for tyre clearances.

The maximum overall width in-service,  $W_{\max}$ , is given by [Formula \(1\)](#):

$$W_{\max} = S (1 + a) \quad (1)$$

where

$S$  is the design new tyre section width (see tyre dimension tables);

$a$  is equal to 0,08 for  $S < 380$  mm;

$a$  is equal to 0,11 for  $S \geq 380$  mm.

The maximum overall width includes any projection such as buttressing, scuff ribs or decorations.

The maximum overall diameter in-service,  $D_{o, \max}$ , is given by [Formula \(2\)](#):

$$D_{o, \max} = (D_o - D) (1 + b) + D \quad (2)$$

where

$D$  is the rim diameter expressed in mm as specified in ISO 4223-1:2017, Table A.3;

$D_o$  is design overall diameter of new tyre (see tyre dimension tables);

$b$  is equal to 0,06 for  $S < 380$  mm;

$b$  is equal to 0,08 for  $S \geq 380$  mm.

## 6 Dual spacing

The minimum dual spacing should be section width,  $S \times 1,2$ .

## 7 Approved rims

Certain approved rim contours may not be standardised under ISO but can be found in other national or regional standards.

Approved rims are given in the following tables:

- a) [Table 22](#) - approved rims for diagonal and radial narrow-base tyres for earth-movers, mobile cranes, shovels, mining cars, loaders, and dozers;
- b) [Table 23](#) - approved rims for radial 80 series tyres;
- c) [Table 24](#) - approved rims for radial 90 series tyres;
- d) [Table 25](#) - approved rims for diagonal and radial narrow-base tyres on SDC rims for road graders;
- e) [Table 26](#) - approved rims for diagonal and radial narrow-base tyres on 15° rim contours;
- f) [Table 27](#) - approved rims for diagonal and radial wide-base tyres for earth-movers, mining and logging service, mobile cranes, shovels, mining cars, loaders, and dozers;

- g) [Table 28](#) - approved rims for diagonal and radial 65 and 70 series tyres;
- h) [Table 29](#) - approved rims for metric 65 series radial tyres;
- i) [Table 30](#) - approved rims for metric 70, 75 and 80 series radial tyres;
- j) [Table 31](#) - approved rims for diagonal and radial compactor tyres;
- k) [Table 32](#) - approved rims for diagonal and radial tyres on 5° DC rims for graders.

## 8 Method of measurement of tyre dimensions

Before measuring, the tyre shall be mounted on a 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 6 — Tyre dimensions for narrow-base diagonal tyres**

Dimensions in millimetres

Tyre size designations	Measuring rim width code	Design new tyre <sup>a</sup>			In-service <sup>b</sup>		
		Section width <i>S</i>	Overall diameter regular tread <i>D<sub>o</sub></i>	Overall diameter deep and extra deep tread <i>D<sub>o</sub></i>	Maximum overall width <i>W<sub>max</sub></i>	Maximum overall diameter regular tread <i>D<sub>o,max</sub></i>	Maximum overall diameter deep and extra deep tread <i>D<sub>o,max</sub></i>
12.00-20	8.50	315	1 146	1 173	340	1 184	1 214
12.00-24	8.50	315	1 247	1 275	340	1 285	1 315
12.00-25	8.50	315	1 247	1 275	340	1 285	1 315
13.00-24	10.00	351	1 301	1 350	379	1 342	1 394
13.00-25	10.00	351	1 301	1 350	379	1 342	1 394
14.00-20	10.00	375	1 266	1 317	405	1 311	1 366
14.00-24	10.00	375	1 368	1 418	405	1 414	1 467
14.00-25	10.00	375	1 368	1 418	405	1 414	1 467
16.00-21	11.25	432	1 391	1 447	480	1 460	1 520
16.00-24	11.25	432	1 493	1 548	480	1 561	1 623
16.00-25	11.25	432	1 493	1 548	480	1 561	1 623
18.00-24	13.00	498	1 615	1 673	553	1 693	1 758
18.00-25	13.00	498	1 615	1 673	553	1 693	1 758
18.00-33	13.00	498	1 818	1 877	553	1 896	1 960
18.00-49	13.00	498	2 227	2 283	553	2 306	2 366
21.00-24	15.00	571	1 750	1 798	634	1 839	1 891
21.00-25	15.00	571	1 750	1 798	634	1 839	1 891
21.00-35	15.00	571	2 004	2 052	634	2 093	2 145
21.00-49	15.00	571	2 360	2 407	634	2 449	2 500
24.00-25	17.00	653	1 875	1 921	725	1 974	2 024
24.00-29	17.00	653	1 975	2 023	725	2 074	2 126
24.00-35	17.00	653	2 127	2 175	725	2 226	2 278

<sup>a</sup> Design new tyre dimensions quoted are used for tyre design purposes only.

<sup>b</sup> In-service dimensions are the maximum dimensions for grown tyres in-service for use by machine manufacturers in designing for tyre clearances.