

# INTERNATIONAL STANDARD

**ISO**  
**4250-1**

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## Earth-mover tyres and rims —

### Part 1:

Tyre designation and dimensions

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ISO 4250-1:1996

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*Pneumatiques et jantes pour engins de terrassement —*

*Partie 1: Désignation et cotes des pneumatiques*



Reference number  
ISO 4250-1:1996(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 4250-1 was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves*, Subcommittee SC 6, *Off-the-road tyres and rims*.

This third edition cancels and replaces the second edition (ISO 4250-1:1994), of which it constitutes a technical revision.

ISO 4250 consists of the following parts, under the general title *Earth-mover tyres and rims*:

- Part 1: *Tyre designation and dimensions*
- Part 2: *Loads and inflation pressures*
- Part 3: *Rims*

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# Earth-mover tyres and rims —

## Part 1:

### Tyre designation and dimensions

#### 1 Scope

ISO 4250 consists of three parts (see the Foreword) laying down the technical elements relating to designation and dimensions of tyres and rims for earth-movers; it also gives load tables for these tyres.

This part of ISO 4250 specifies designations and dimensions for earth-mover tyres, and gives the recommended rims primarily intended for earth-moving machinery as defined in ISO 6165.

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#### 2 Normative references

ISO 4250-1:1996

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 4250. 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 4250 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 4223-1:1989, *Definitions of some terms used in the tyre industry — Part 1: Pneumatic tyres.*

ISO 4250-2:1995, *Earth-mover tyres and rims — Part 2: Loads and inflation pressures.*

ISO 4250-3:—<sup>1)</sup>, *Earth-mover tyres and rims — Part 3: Rims.*

ISO 6165:—<sup>2)</sup>, *Earth-moving machinery — Basic types — Vocabulary.*

#### 3 Definitions

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

NOTE — Terms used are in accordance with ISO 3877-1:—, *Tyres, valves and tubes — List of equivalent terms — Part 1: Tyres.* [To be published. (Revision of ISO 3877-1:1978)]

1) To be published. (Revision of ISO 4250-3:1987)

2) To be published. (Revision of ISO 6165:1987)

## 4 Tyre designation

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

- size and construction characteristics (see 4.1);
- index of tyre strength (see 4.2);

and may include:

- service condition characteristics (see 4.3).

The designation may also include the various use characteristics given in 4.4 and 4.5 as necessary.

### 4.1 Tyre size and construction

The tyre size and construction shall be indicated as specified in 4.1.1 to 4.1.5.

#### 4.1.1 Nominal section width

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

#### 4.1.2 Nominal aspect ratio

Nominal aspect ratio may be expressed as a percentage as a multiple of 5.

#### 4.1.3 Tyre construction code

The tyre construction code shall be as follows:

- (dash) for diagonal/bias construction
- R for radial construction

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In addition the word "RADIAL" may also appear on the tyre.

#### 4.1.4 Nominal rim diameter code

The nominal rim diameter shall be expressed by a code as given in ISO 4250-3:—, table 6. 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.

#### 4.1.5 Tubeless tyres

Tubeless tyres shall be marked "TUBELESS".

## 4.2 Index of tyre strength

The index of tyre strength is used to identify a given tyre with its maximum recommended load when used in a specific type of service. It shall be as specified in 4.2.1 or 4.2.2.

### 4.2.1 Diagonal tyres

The index of tyre strength of diagonal/bias tyres shall be expressed either by a numerical code in conjunction with the letter "PR" (ply rating), e.g. "16 PR" or by service condition characteristics as given in 4.3 or by both the numerical code and service condition characteristics.

### 4.2.2 Radial tyres

The index of tyre strength of radial tyres shall be expressed by a symbol in the form of 1, 2 or 3 stars (symbol marking), e.g. "★" or by service condition characteristics as given in 4.3 or by the symbol and service condition characteristics.

### 4.3 Service condition characteristics

The service condition characteristics shall be indicated as follows:

Load index	Speed symbol	Service description
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For the specific types of service, earth-mover tyres may be marked with several service condition characteristics, for example, those for earth-moving haulage service at 50 km/h, for low speed service at 10 km/h (loading cycle), for grader service at 40 km/h.

NOTE — Definitions of service conditions are given in ISO 4250-2:1995, subclause 2.2.

#### 4.3.1 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 1.

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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
120	1 400	170	6 000	220	25 000	270	106 000
121	1 450	171	6 150	221	25 750	271	109 000
122	1 500	172	6 300	222	26 500	272	112 000
123	1 550	173	6 500	223	27 250	273	115 000
124	1 600	174	6 700	224	28 000	274	118 000
125	1 650	175	6 900	225	29 000	275	121 000
126	1 700	176	7 100	226	30 000	276	125 000
127	1 750	177	7 300	227	30 750	277	128 500
128	1 800	178	7 500	228	31 500	278	132 000
129	1 850	179	7 750	229	32 500	279	136 000
130	1 900	180	8 000	230	33 500	280	140 000
131	1 950	181	8 250	231	34 500	281	145 000
132	2 000	182	8 500	232	35 500	282	150 000
133	2 060	183	8 750	233	36 500	283	155 000
134	2 120	184	9 000	234	37 500	284	160 000
135	2 180	185	9 250	235	38 750	285	165 000
136	2 240	186	9 500	236	40 000	286	170 000
137	2 300	187	9 750	237	41 250	287	175 000
138	2 360	188	10 000	238	42 500	288	180 000
139	2 430	189	10 300	239	43 750	289	185 000
140	2 500	190	10 600	240	45 000	290	190 000
141	2 575	191	10 900	241	46 250	291	195 000
142	2 650	192	11 200	242	47 500	292	200 000
143	2 725	193	11 500	243	48 750	293	206 000
144	2 800	194	11 800	244	50 000	294	212 000
145	2 900	195	12 150	245	51 500	295	218 000
146	3 000	196	12 500	246	53 000	296	224 000
147	3 075	197	12 850	247	54 500	297	230 000
148	3 150	198	13 200	248	56 000	298	236 000
149	3 250	199	13 600	249	58 000	299	243 000
150	3 350	200	14 000	250	60 000	300	250 000
151	3 450	201	14 500	251	61 500	301	257 500
152	3 550	202	15 000	252	63 000	302	265 000
153	3 650	203	15 500	253	65 000	303	272 500
154	3 750	204	16 000	254	67 000		
155	3 875	205	16 500	255	69 000		
156	4 000	206	17 000	256	71 000		
157	4 125	207	17 500	257	73 000		
158	4 200	208	18 000	258	75 000		
159	4 375	209	18 500	259	77 500		
160	4 500	210	19 000	260	80 000		
161	4 625	211	19 500	261	82 500		
162	4 750	212	20 000	262	85 000		
163	4 875	213	20 600	263	87 500		
164	5 000	214	21 200	264	90 000		
165	5 150	215	21 800	265	92 500		
166	5 300	216	22 400	266	95 000		
167	5 450	217	23 000	267	97 500		
168	5 600	218	23 600	268	100 000		
169	5 800	219	24 300	269	103 000		

### 4.3.2 Speed symbol

The speed symbol is a symbol indicating the speed at which the tyre can carry a load corresponding to its 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.

### 4.3.3 Service description

The word "CYCLIC" shall be 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. It indicates that the tyre is designed for operations in a work cycle.

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

**Table 3 — Examples of tyre designation/markings**

Nominal section width code <sup>1)</sup>	Construction code	Nominal rim diameter code <sup>2)</sup>	Index of tyre strength	Load index	Speed symbol	Service description
a) Symbol-marked radial tyres						
30.00	R	51	★★	230 248	B A2	CYCLIC CYCLIC
17.5	R	25	★	176	A2	CYCLIC
17.5	R	25	★★	167	B	CYCLIC
40/65	R	39	★	228	A2	CYCLIC
b) Ply-rating-marked diagonal tyres						
20.5	—	25	20 PR	160 170	A8 B	CYCLIC
37.5	—	51	44 PR	238 223	A2 B	CYCLIC CYCLIC
16.0	—	24 TG	16 PR	160	A8	
21.00	—	49	40 PR	206	B	CYCLIC
1) Includes, as necessary, the nominal aspect ratio (see 4.1.1 and 4.1.2).						
2) Includes, as necessary, the "TG" suffix (see 4.1.4).						

#### 4.4 Other service characteristics

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

4.4.2 Tyres may 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

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**Table 5 — Tread design**

Code	Tread type
C-1	Smooth
C-2	Grooved
E-1	Rib
E-2	Traction
E-3	Rock
E-4	Rock (deep tread)
E-7	Flotation
G-1	Rib
G-2	Traction
G-3	Rock
L-2	Traction
L-3	Rock
L-4	Rock (deep tread)
L-5	Rock (extra-deep tread)

NOTES

- Where smooth treads are used in the "L" series, this should be denoted by the suffix "S" (for example, L-5S).
- Code types 1, 2 and 3 are designated as normal tread depth.



## 5 Tyre dimensions

The designation of dimension, measuring rim, design tyre dimension and maximum overall width in-service are given in

- a) table 6 for narrow-base tyres;
- b) table 7 for narrow-base tyres on SDC rims;
- c) table 8 for narrow-base tyres on 15° rim contours;
- d) table 9 for wide-base tyres;
- e) table 10 for 65 series tyres;
- f) table 11 for compactor tyres.

## 6 Dual spacing

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

## 7 Approved rims

Approved rims are given in

- a) table 12 for narrow-base tyres;
- b) table 13 for narrow-base tyres on SDC rims;
- c) table 14 for narrow-base tyres on 15° contour rims;
- d) table 15 for wide-base tyres;
- e) table 16 for 65 series tyres;
- f) table 17 for compactor tyres;
- g) table 18 for tyres on 5° SDC rims for graders;
- h) table 19 for tyres for earth-movers, mining and logging service, mobile cranes, shovels, mining cars, loaders and dozers.

## 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 tyres

Dimensions in millimetres

Tyre size designation <sup>1)</sup>	Measuring rim width code	Design new tyre <sup>2)</sup>		In-service <sup>3)</sup>	
		Section width <i>S</i>	Overall diameter <sup>4)</sup> <i>D<sub>o</sub></i>	Maximum overall width <i>W<sub>max</sub></i>	Maximum overall diameter <sup>4)</sup> <i>D<sub>o,max</sub></i>
12.00 — 20	8.50	315	1 146	340	1 184
12.00 — 21	8.50	315	1 146	340	1 184
12.00 — 24	8.50	315	1 247	340	1 285
12.00 — 25	8.50	315	1 247	340	1 285
13.00 — 24	10.00	351	1 301	379	1 342
13.00 — 25	10.00	351	1 301	379	1 342
14.00 — 20	10.00	375	1 266	405	1 311
14.00 — 21	10.00	375	1 266	405	1 311
14.00 — 24	10.00	375	1 368	405	1 414
14.00 — 25	10.00	375	1 368	405	1 414
16.00 — 20	11.25	432	1 391	480	1 460
16.00 — 21	11.25	432	1 391	480	1 460
16.00 — 24	11.25	432	1 493	480	1 561
16.00 — 25	11.25	432	1 493	480	1 561
18.00 — 24	13.00	498	1 615	553	1 693
18.00 — 25	13.00	498	1 615	553	1 693
18.00 — 33	13.00	498	1 818	553	1 896
18.00 — 49	13.00	498	2 227	553	2 306
21.00 — 24	15.00	571	1 750	634	1 839
21.00 — 25	15.00	571	1 750	634	1 839
21.00 — 35	15.00	571	2 004	634	2 093
21.00 — 49	15.00	571	2 360	634	2 449
24.00 — 25	17.00	653	1 875	725	1 974
24.00 — 29	17.00	653	1 975	725	2 074
24.00 — 35	17.00	653	2 127	725	2 226
24.00 — 43	17.00	653	2 331	725	2 430
24.00 — 49	17.00	653	2 483	725	2 582
27.00 — 33	22.00	762	2 242	846	2 354
27.00 — 49	19.50	737	2 649	818	2 761
30.00 — 33	22.00	823	2 389	914	2 513
30.00 — 51	22.00	823	2 846	914	2 970
33.00 — 51	24.00	894	2 997	992	3 133
36.00 — 51	26.00	988	3 165	1 097	3 315
37.00 — 57	27.00	1 016	3 370	1 118	3 524
40.00 — 57	29.00	1 097	3 526	1 218	3 692

1) For radial tyres, replace the dash (—) in the size designation with "R".

2) Design new tyre dimensions quoted are used for tyre design purposes only.

3) 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 is given by the equation

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

where

*S* is the design new tyre section width;

$$d = 0,08 \text{ for } S < 380 \text{ mm}$$

$$d = 0,11 \text{ for } S \geq 380 \text{ mm}$$

The maximum overall diameter in-service is given by the equation

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

where

*D* is the rim diameter specified in ISO 4250-3;

$$d = 0,06 \text{ for } S < 380 \text{ mm}$$

$$d = 0,08 \text{ for } S \geq 380 \text{ mm}$$

4) Figures are based on tyres with normal tread depth. The machine manufacturer should recognize that tyres with deep tread and corresponding increased overall diameter may be used.

Table 7 — Tyre dimensions for narrow-base tyres on SDC rims

Dimensions in millimetres

Tyre size designation <sup>1) 2)</sup>	Measuring rim width code	Design new tyre <sup>3)</sup>		In-service <sup>4)</sup>	
		Section width <i>S</i>	Overall diameter <sup>5)</sup> <i>D<sub>o</sub></i>	Maximum overall width <i>W<sub>max</sub></i>	Maximum overall diameter <sup>5)</sup> <i>D<sub>o,max</sub></i>
10.00 — 24 TG	8.00	283	1 151	306	1 184
12.00 — 24 TG	8.00	312	1 226	337	1 263
13.00 — 24 TG	8.00	333	1 278	360	1318
14.00 — 24 TG	8.00	362	1 348	391	1 392
16.00 — 24 TG	10.00	427	1 459	474	1 527

1) For radial tyres, replace the dash (—) in the size designation with "R".

2) "TG" is a designation to be used to identify tyres mounted on rims with a specified diameter *D* of 614,4 mm.

3) Design new tyre dimensions quoted are used for tyre design purposes only.

4) 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 is given by the equation

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

where

*S* is the design new tyre section width,

*d* = 0,08 for *S* < 380 mm

*d* = 0,11 for *S* ≥ 380 mm

The maximum overall diameter in-service is given by the equation

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

where

*D* is the rim diameter specified in ISO 4250-3;

*d* = 0,06 for *S* < 380 mm

*d* = 0,08 for *S* ≥ 380 mm

5) Figures are based on tyres with normal tread depth. The machine manufacturer should recognize that tyres with deep tread and corresponding increased overall diameter may be used.