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Earth-mover tyres and rims —

Part 2:

Loads and inflation pressures

Pneumatiques et jantes pour engins de terrassement —

Partie 2: Charges et pressions de gonflage



Reference number
ISO 4250-2:1995(E)

Foreword

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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 4250-2 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 4250-2:1991), 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 2: Loads and inflation pressures

1 Scope

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

This part of ISO 4250 gives working definitions of masses and load cycles, and specifies tyre loads and reference inflation pressures for narrow and wide base tyres primarily intended for earth-mover machines.

NOTE 1 Terms used are in accordance with ISO 3877-1:1978, *Tyres, valves and tubes — List of equivalent terms — Part 1: Tyres*.

2 Definitions

For the purposes of this part of ISO 4250, the following definitions apply.

2.1 Definitions of masses

2.1.1 maximum load: Maximum loads of individual tyres determined by manufacturer's rated gross machine mass (GMM) distribution assigned to each axle, divided by the number of tyres for that axle.

NOTE 2 The maximum GMM includes masses calculated in 2.1.1.1 to 2.1.1.6 inclusive.

2.1.1.1 operating mass; net weight (deprecated): Actual mass of the base machine with equipment specified by the manufacturer, operator (75 kg), full fuel tank, and full lubricating, hydraulic and cooling systems.

2.1.1.2 optional equipment mass: Difference in operating mass between the optional item and standard item replaced (such as engine, brakes, tyres, etc.).

NOTE 3 This includes the operating mass of additional items offered by the manufacturer which are not replacements for standard items (such as cabs, body-liners, sideboards, air-conditioners, etc.).

2.1.1.3 mass of special modifications: Difference in the operating mass of the machine due to modifications not previously covered in optional equipment mass (such as additional reinforcements, etc.).

2.1.1.4 payload: Total mass of the material being carried.

2.1.1.5 tyre ballast: (If used, this is also included in determination of GMM.)

2.1.1.6 field modifications: Operating mass change due to machine alterations made other than by the original manufacturer (such as modifications for additional capacity, reinforcements, etc.).

2.2 Definitions of operating conditions

2.2.1 maximum speed: Peak velocity attained by the machine.

2.2.2 earth-moving haulage cycle: Cycle where machine self-loads or receives a load from loading equipment, transports it elsewhere and returns unloaded.

NOTES

4 Transportation usually occurs over unimproved surfaces at medium speeds, up to 65 km/h, and short distances, up to 4 km away.

5 Machines in this category are mainly haulage trucks (dumpers) and tractor-scrappers.

2.2.3 loader cycle: Cycle where the machine is used to pick up material and move it a short distance away.

NOTES

6 Tyre loads fluctuate depending on the conditions involved when the equipment picks up the load.

7 Transportation speeds are low, up to 10 km/h, and distances are short, usually less than 75 m away.

2.2.4 load-carry cycle: Cycle where the machine, primarily intended for loader service, picks up a load, transports it elsewhere and returns unloaded.

NOTES

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

9 Machines in this category consist mainly of loaders, logstackers and material-handling equipment.

10 Tyre manufacturers should be consulted for specific conditions.

2.2.5 dozer (tractor) cycle: Condition where a machine is used to move materials (usually earth) by pushing, dragging or grading.

NOTES

11 Tyre loads are relatively constant and speeds are low, up to 10 km/h.

12 Travel distances vary depending on work situations.

2.2.6 grader cycle: Condition where a machine is used in construction and road maintenance.

NOTES

13 Tyre loads are relatively constant during the work cycles.

14 Grader speeds are slower during working periods, with typical transportation speeds reaching about 40 km/h.

15 Travel distances vary depending on work situations.

2.2.7 creep: Movement of equipment at a very low speed (commonly not over 120 m in 60 min).

NOTES

16 During creep motion, loads on the tyres are usually very high and consideration needs to be given to the type of surface over which the equipment is travelling.

17 Tyre manufacturers should be consulted for specific conditions.

2.2.8 drive-away: Movement of a machine from one location to another under non-working conditions.

NOTES

18 This movement occurs during transportation of a machine from site to site.

19 Tyre manufacturers should be consulted for specific conditions.

20 Load/speed/distance tables in this part of ISO 4250 do not apply to drive-away conditions.

2.3 Definition of vehicle type

2.3.1 industrial vehicle: Vehicle including counter-balanced lift trucks, container handlers, straddle carriers, aircraft tow tractors, mobile crushers, logstackers.

3 Special conditions

For longer hauls and/or speeds in excess of those indicated in the tables, the tyre manufacturers should be consulted for instructions regarding permissible loads and the required inflation pressures.

4 Selection for new machine design

Selection of size and strength index of the tyre used on each axle shall be based on the highest individual wheel load (determined by GMM distribution, including load transfer) and the machine application.

Maximum load per tyre shall not be greater than specified in the applicable tables.

The performance of machines fitted with earth-mover tyres depends on the operating conditions, and more particularly on the specific ground pressure which is governed by the inflation pressure. It is therefore advisable to select tyre size on the basis of low inflation pressure.

5 Inflation pressures — General

5.1 Rim and wheel manufacturers should be consulted to determine if the rim and wheel are of sufficient strength for the intended service conditions (inflation pressure and load).

5.2 Inflation pressures shown in the load/inflation tables are reference pressures and do not include any pressure build-up due to vehicle operation.

5.3 In agreement with tyre manufacturers, inflation pressures may be varied to compensate for extremes of atmospheric temperature or special operating conditions.

5.4 For all tables the inflation pressures are given for guidance only; in actual practice they may be varied according to the operating conditions, in agreement with the tyre manufacturers.

6 Load/inflation tables

Load/inflation relations for diagonal ply rating tyres are given in tables 1 to 8; those for symbol-marked radial tyres are given in tables 9 to 15.

7 Load capacities for earth-mover tyres on industrial vehicles

Load capacities for earth-mover tyres on industrial vehicles are given in table 16.

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Table 1 — Diagonal ply rating marked narrow base tyres for earth-moving slow speed service, reference speed 10 km/h (loaded conditions)

Tyre size designation	Ply rating	Load ¹⁾ kg	Inflation pressure kPa
12.00 — 20	14 16	5 000 5 450	600 700
12.00 — 24 and 12.00 — 25	8 14 16 18 20	4 000 5 600 6 150 6 500 6 900	325 575 675 750 825
13.00 — 24 and 13.00 — 25	8 12 18 20 22	4 375 5 600 7 100 7 500 8 000	300 450 675 750 825
14.00 — 24 and 14.00 — 25	8 10 12 16 20 24 28	4 875 5 600 6 300 7 300 8 500 9 500 10 000	275 350 425 550 700 850 925
16.00 — 24 and 16.00 — 25	12 16 20 24 28 32 36	7 100 8 250 9 750 10 600 11 500 12 500 13 600	325 425 550 650 750 875 975
18.00 — 24 and 18.00 — 25	12 16 20 24 28 32 36 40	8 250 10 000 11 500 12 500 13 600 15 000 16 000 17 000	275 375 475 550 650 750 850 950
18.00 — 33	28 32 36	16 000 17 500 18 500	650 750 850
18.00 — 49	24 28 32	18 500 20 000 21 800	550 650 750
21.00 — 24 and 21.00 — 25	16 20 24 28	11 800 13 200 15 000 16 500	325 400 500 575
21.00 — 35	28 32 36 40 44	19 500 21 200 23 000 24 300 25 000	575 650 750 825 900

Tyre size designation	Ply rating	Load ¹⁾ kg	Inflation pressure kPa
21.00 — 49	28 32 36 40 44	23 600 25 000 27 250 29 000 30 750	575 650 750 825 900
24.00 — 25	24 30	18 000 20 000	425 525
24.00 — 29	24 30	19 000 21 800	425 525
24.00 — 35	36 42 48 54	26 500 29 000 31 500 34 500	650 750 850 975
24.00 — 43	36 42 48	30 000 32 500 34 500	650 750 850
24.00 — 49	36 42 48	32 500 34 500 37 500	650 750 850
27.00 — 33	24 30 36	22 400 25 750 29 000	350 450 550
27.00 — 49	36 42 48	36 500 40 000 43 750	575 675 775
30.00 — 51	40 46 52	45 000 48 750 53 000	575 650 750
33.00 — 51	42 50 58	51 500 56 000 61 500	550 650 750
36.00 — 51	42 50 58	58 000 65 000 71 000	500 600 675
40.00 — 57	52 60 68	80 000 87 500 92 500	550 650 725

1) For stationary service conditions, the loads in this table may be increased up to 60 % with no increase in inflation pressure.

For special equipment with a high centre of gravity, consult the tyre manufacturer.

Table 2 — Diagonal ply rating marked narrow base tyres for earth-moving service for relatively short hauls, reference speed 50 km/h

Tyre size designation	Ply rating	Load ¹⁾ kg	Inflation pressure kPa
12.00 — 20 and 12.00 — 21	14 16	2 800 3 000	425 475
12.00 — 24 and 12.00 — 25	8 14 16 18 20	2 180 3 000 3 250 3 550 3 750	225 375 450 500 550
13.00 — 24 and 13.00 — 25	8 12 18 20 22	2 360 3 000 3 875 4 000 4 250	200 300 450 500 550
14.00 — 24 and 14.00 — 25	8 10 12 16 20 24 28	2 575 3 000 3 350 4 000 4 625 5 150 5 600	175 225 275 375 475 575 650
16.00 — 24 and 16.00 — 25	12 16 20 24 28 32 36	3 875 4 875 5 450 6 000 6 700 7 300 7 750	225 325 400 475 575 650 725
18.00 — 24 and 18.00 — 25	12 16 20 24 28 32 36 40	4 750 5 600 6 500 7 300 8 000 8 750 9 250 9 750	200 275 350 425 500 575 625 700
18.00 — 33	28 32 36	9 250 10 000 10 600	500 575 625
18.00 — 49	24 28 32	10 600 11 800 12 850	425 500 575
21.00 — 24 and 21.00 — 25	16 20 24 28	6 900 7 750 8 750 9 500	250 300 375 425
21.00 — 35	28 32 36 40 44	11 200 12 150 12 850 14 000 14 500	425 500 550 625 675
21.00 — 49	28 32 36 40 44	13 600 15 000 15 500 17 000 17 500	425 500 550 625 675
24.00 — 25	24 30	10 300 11 800	325 400
24.00 — 29	24 30	11 200 12 500	325 400
24.00 — 35	36 42 48 54	15 500 16 500 18 500 19 500	475 550 650 725
24.00 — 43	36 42 48	17 000 19 000 20 600	475 575 650
24.00 — 49	36 42 48	18 500 20 000 21 800	475 550 650
27.00 — 33	24 30 36	13 200 15 500 16 500	275 350 400
27.00 — 49	36 42 48	21 200 23 000 25 000	425 500 575
30.00 — 33	28 34 40	16 000 18 500 21 200	275 350 425
30.00 — 51	40 46 52	25 750 29 000 30 000	425 500 550
33.00 — 51	42 50 58	30 000 33 500 35 500	425 500 575
36.00 — 51	42 50 58	34 500 37 500 41 250	375 450 525
40.00 — 57	52 60 68	46 250 50 000 54 500	425 475 550

1) Load adjustment for maximum speed 65 km/h:
load × 0,85

Load adjustment for maximum speed 15 km/h:
load × 1,12

Values so calculated to be rounded off to the nearest:

25 kg for loads up to 4 999 kg;
50 kg for loads from 5 000 kg to 9 999 kg;
100 kg for loads equal to or above 10 000 kg.

Table 3 — Diagonal ply rating marked wide base tyres for earth-moving slow speed service, reference speed 10 km/h (loaded conditions)

Tyre size designation	Ply rating	Load ¹⁾ kg	Inflation pressure kPa
15.5 — 25	8	4 250	250
	10	4 875	325
	12	5 600	400
17.5 — 25	8	4 750	225
	12	6 150	350
	16	7 300	475
	20	8 250	575
20.5 — 25	12	6 700	250
	16	8 250	350
	20	9 500	450
	24	10 300	525
	28	11 500	625
23.5 — 25	12	8 000	225
	16	9 500	300
	20	10 900	375
	24	12 500	475
	28	13 600	550
26.5 — 25	16	11 500	275
	20	13 200	350
	24	14 000	400
	28	15 500	475
	32	17 000	550
26.5 — 29	18	12 850	300
	22	14 500	375
	26	16 000	450
	30	17 500	525
29.5 — 25	16	12 850	250
	22	15 000	325
	28	17 500	425
29.5 — 29	16	14 000	250
	22	16 000	325
	28	19 000	425
	34	21 200	525
	40	23 600	625
29.5 — 35	22	17 500	325
	28	20 600	425
	34	23 000	525

Tyre size designation	Ply rating	Load ¹⁾ kg	Inflation pressure kPa
33.25 — 29	26	20 600	350
	32	23 600	450
	38	25 750	525
33.25 — 35	26	22 400	350
	32	25 750	450
	38	28 000	550
33.5 — 33	26	22 400	350
	32	25 750	425
	38	29 000	525
33.5 — 39	26	24 300	350
	32	27 250	425
	38	30 750	525
37.25 — 35	30	28 000	375
	36	30 750	450
	42	33 500	525
37.5 — 33	30	28 000	375
	36	31 500	450
	42	34 500	525
37.5 — 39	28	29 000	350
	36	33 500	450
	44	37 500	550
37.5 — 51	28	33 500	350
	36	38 750	450
	44	42 500	525
40.5/75 — 39	30	31 500	325
	38	37 500	425
	46	42 500	525

1) For stationary service conditions, the loads in this table may be increased up to 60 % with no increase in inflation pressure.

For special equipment with a high centre of gravity, consult the tyre manufacturer.

Table 4 — Diagonal ply rating marked wide base tyres for earth-moving service for relatively short hauls, reference speed 50 km/h

Tyre size designation	Ply rating	Load ¹⁾ kg	Inflation pressure kPa
15.5 — 25	8	2 575	175
	10	3 000	225
	12	3 250	250
17.5 — 25	8	2 800	150
	12	3 650	225
	16	4 250	300
	20	5 000	400
20.5 — 25	12	4 500	200
	16	5 450	275
	20	6 000	325
	24	6 700	400
	28	7 500	475
23.5 — 25	12	5 300	175
	16	6 150	225
	20	7 300	300
	24	8 000	350
	28	8 750	400
26.5 — 25	16	7 300	200
	20	8 250	250
	24	9 250	300
	28	10 000	350
	32	11 200	425
26.5 — 29	18	8 250	225
	22	9 250	275
	26	10 300	325
	30	11 200	375
29.5 — 25	16	8 000	175
	22	10 000	250
	28	11 500	325
29.5 — 29	16	8 500	175
	22	10 600	250
	28	12 150	325
	34	14 000	400
	40	15 000	475
29.5 — 35	22	11 500	250
	28	13 600	325
	34	15 000	400
33.25 — 29	26	13 600	275
	32	15 000	325
	38	17 000	400

Tyre size designation	Ply rating	Load ¹⁾ kg	Inflation pressure kPa
33.25 — 35	26	14 500	275
	32	16 000	325
	38	18 000	400
33.5 — 33	26	15 000	275
	32	16 500	325
	38	18 500	400
33.5 — 39	26	16 000	275
	32	18 000	325
	38	20 000	400
37.25 — 35	30	17 500	275
	36	19 500	325
	42	21 800	400
37.5 — 33	30	18 000	275
	36	20 000	325
	42	22 400	400
37.5 — 39	28	18 500	250
	36	21 200	325
	44	24 300	400
	52	26 500	475
37.5 — 51	28	20 600	250
	36	24 300	325
	44	27 250	400
40.5/75 — 39	30	20 600	250
	38	24 300	325
	46	27 250	400

1) Load adjustment for maximum speed 65 km/h:
load $\times$ 0,83

Load adjustment for maximum speed 15 km/h:
load $\times$ 1,12

Values so calculated to be rounded off to the nearest:

25 kg for loads up to 4 999 kg;
50 kg for loads from 5 000 kg to 9 999 kg;
100 kg for loads equal to or above 10 000 kg.

Table 5 — Diagonal ply rating marked 65 series tyres for earth-moving service

Tyre size designation	Ply rating	Earth-moving service for relatively short hauls, reference speed 50 km/h		Earth-moving slow speed service, reference speed 10 km/h (loaded conditions)	
		Load kg	Inflation pressure kPa	Load kg	Inflation pressure kPa
25/65 — 25	12	4 375	175	7 300	250
	16	5 150	225	8 500	325
	20	5 800	275	9 750	400
30/65 — 25	16	6 700	200	10 900	275
	20	7 500	250	12 500	350
30/65 — 29	16	7 100	200	11 500	275
	20	8 250	250	13 200	350
	24	9 000	300	15 000	425
35/65 — 33	24	11 500	250	19 000	350
	30	12 850	300	21 200	425
	36	14 500	375	23 600	525
40/65 — 39	30	—	—	27 250	375
	36	—	—	30 000	450
45/65 — 45	38	—	—	40 000	450
50/65 — 51	46	—	—	51 500	450

Table 6 — Diagonal ply rating marked tyres in grader service, reference speed 40 km/h

Tyre size designation ¹⁾	Ply rating	Load kg	Inflation pressure kPa
10.00 — 24 TG	8	1 700	250
12.00 — 24 TG	6	1 600	150
	8	1 900	225
	12	2 430	325
13.00 — 24 TG	8	2 060	200
	10	2 360	250
	12	2 725	300
	14	3 000	350
14.00 — 24 TG	8	2 500	175
	10	2 800	225
	12	3 075	275
	14	3 450	325
	16	3 650	375
16.00 — 24 TG	12	3 650	225
	14	4 000	275
	16	4 500	325
18.00 — 25	12	4 125	200
	16	5 000	275

Tyre size designation ¹⁾	Ply rating	Load kg	Inflation pressure kPa
15.5 — 25	8	1 950	150
	10	2 180	175
	12	2 650	225
17.5 — 25	8	2 120	125
	12	2 900	200
	14	3 000	225
	16	3 350	275
	20	3 650	325
20.5 — 25	12	3 550	175
	16	4 000	225
	20	4 500	275
23.5 — 25	12	4 000	150
	16	4 750	200
	20	5 450	250
25/65 — 25	12	3 350	125
	16	4 125	175

1) "TG" is a designation to be used to identify tyres mounted on SDC rims.

Table 7 — Diagonal ply rating marked tyres, reference speed 10 km/h

Tyre size designation¹⁾	Ply rating	Load index	Speed symbol	Load kg	Inflation pressure kPa
12.00 — 24 TG	10	160	A2	4 500	400
	12	165	A2	5 150	500
13.00 — 24 TG	8	159	A2	4 375	300
	10	164	A2	5 000	375
	12	168	A2	5 600	450
	14	171	A2	6 150	525
	16	173	A2	6 500	600
14.00 — 24 TG	8	163	A2	4 875	275
	10	168	A2	5 600	350
	12	172	A2	6 300	425
	16	177	A2	7 300	550
16.00 — 24 TG	12	176	A2	7 100	325
	16	181	A2	8 250	425

1) "TG" is a designation to be used to identify tyres mounted on SDC rims.

Table 8 — Diagonal ply rating marked tyres for compactor service

Tyre size designation	Ply rating	Load index	Speed symbol	Load kg	Inflation pressure kPa
7.50 — 15	6	129	A2	1 850	400
	12	142	A2	2 650	750
7.50 — 16	6	130	A2	1 900	400
8.25 — 20	10	149	A2	3 250	600
	12	153	A2	3 650	725
	14	155	A2	3 875	800
9.00 — 20	10	153	A2	3 650	525
	12	156	A2	4 000	625
	14	159	A2	4 375	725
	16	162	A2	4 750	825
10.5/80 — 16	6	130	A2	1 900	300
11.00 — 20	12	162	A2	4 750	550
	14	165	A2	5 150	650
	16	167	A2	5 450	725
	18	170	A2	6 000	825
	20	172	A2	6 300	925
	22	174	A2	6 700	1 025
12.00 — 16	10	157	A2	4 125	450
12.00 — 20	14	168	A2	5 600	600
13.00 — 24	18	180	A2	8 000	700

NOTE — For site-to-site transfer, consult tyre/wheel manufacturer.

Table 9 — Symbol-marked narrow base radial tyres, reference speed 10 km/h (loaded conditions)

Tyre size designation	Symbol	Load kg	Inflation pressure kPa tol. $\pm 15\%$ ¹⁾
12.00 R 24 and 12.00 R 25	★ ★★ ★★★	5 150 6 900 7 300	550 800 950
13.00 R 24 and 13.00 R 25	★★ ★★★	8 000 8 500	800 950
14.00 R 24 and 14.00 R 25	★★ ★★★	9 500 10 000	800 950
16.00 R 24 and 16.00 R 25	★ ★★	9 000 12 150	550 800
18.00 R 24 and 18.00 R 25	★ ★★	11 800 16 000	550 800
18.00 R 33	★★	18 500	800
18.00 R 49	★★	23 000	800
21.00 R 24 and 21.00 R 25	★★	20 600	800
21.00 R 35	★★	24 300	800
21.00 R 49	★★	29 000	800
24.00 R 35	★★	30 750	800
24.00 R 43	★★	34 500	800
24.00 R 49	★★	37 500	800
27.00 R 33	★★	37 500	800
27.00 R 49	★★	45 000	800
30.00 R 51	★★	56 000	800
33.00 R 51	★★	65 000	800
36.00 R 51	★★	80 000	800
37.00 R 57	★★	82 500	800
40.00 R 57	★★	100 000	800

1) The tolerance on inflation pressure is in recognition of the wide variety of service conditions encountered.

Table 10 — Symbol-marked wide base radial tyres, reference speed 10 km/h (loaded conditions)

Tyre size designation	Symbol	Load kg	Inflation pressure kPa tol. $\pm 15\%$ ¹⁾
15.5 R 25	★ ★★	5 800 7 100	475 600
17.5 R 25	★ ★★	7 100 8 500	475 600
20.5 R 25	★ ★★	9 500 11 500	475 600
23.5 R 25	★ ★★	12 150 14 500	475 600
26.5 R 25	★ ★★	15 000 18 500	475 600
26.5 R 29	★ ★★	16 000 19 500	475 600
29.5 R 25	★ ★★	18 000 22 400	475 600
29.5 R 29	★ ★★	19 500 23 600	475 600
29.5 R 35	★ ★★	21 200 25 750	475 650
33.25 R 29	★ ★★	23 600 29 000	475 650
33.25 R 35	★ ★★	25 750 31 500	475 650
33.5 R 33	★ ★★	25 750 31 500	475 650
33.5 R 39	★ ★★	28 000 34 500	475 650
37.25 R 35	★ ★★	31 500 37 500	475 650
37.5 R 33	★ ★★	31 500 37 500	475 650
37.5 R 39	★ ★★	33 500 41 250	475 650
37.5 R 51	★ ★★	37 500 46 250	475 650
40.5/75 R 39	★ ★★	37 500 46 250	475 650

1) The tolerance on inflation pressure is in recognition of the wide variety of service conditions encountered.