INTERNATIONAL STANDARD

ISO 4250-2

Third edition
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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

INTERNATIONAL ISO

Reference number
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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.

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-scrapers.

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 counterbalanced 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 conditons, 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.

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
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 10 12	4 250 4 875 5 600	250 325 400
17.5 — 25	8 12 16 20	4 750 6 150 7 300 8 250	225 350 475 575
20.5 — 25	12 16 20 24 28	6 700 8 250 9 500 10 300 11 500	250 350 450 525 625
23.5 — 25	12 16 20 24 28	8 000 9 500 10 900 12 500 13 600	225 300 375 475 550
26.5 — 25	16 20 24 28 32	11 500 13 200 14 000 15 500 17 000	275 350 400 475 550
26.5 — 29	18 22 26 30	12 850 14 500 16 000 17 500	300 375 450 525
29.5 — 25	16 22 28	12 850 15 000 17 500	250 325 425
29.5 — 29	16 22 28 34 40	14 000 16 000 19 000 21 200 23 600	250 325 425 525 625
29.5 — 35	22 28 34	17 500 20 600 23 000	325 425 525
33.25 — 29	26 32 38	20 600 23 600 25 750	350 450 525
33.25 — 35	26 32 38	22 400 25 750 28 000	350 450 550
33.5 — 33	26 32 38	22 400 25 750 29 000	350 425 525
33.5 — 39	26 32 38	24 300 27 250 30 750	350 425 525
37.25 — 35	30 36 42	28 000 30 750 33 500	375 450 525
37.5 — 33	30 36 42	28 000 31 500 34 500	375 450 525
37.5 — 39	28 36 44	29 000 33 500 37 500	350 450 550
37.5 — 51	28 36 44	33 500 38 750 42 500	350 450 525
40.5/75 — 39	30 38 46	31 500 37 500 42 500	325 425 525

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 10 12	2 575 3 000 3 250	175 225 250
17.5 — 25	8 12 16 20	2 800 3 650 4 250 5 000	150 225 300 400
20.5 — 25	12 16 20 24 28	4 500 5 450 6 000 6 700 7 500	200 275 325 400 475
23.5 — 25	12 16 20 24 28	5 300 6 150 7 300 8 000 8 750	175 225 300 350 400
26.5 — 25	16 20 24 28 32	7 300 8 250 9 250 10 000 11 200	200 250 300 350 425
26.5 — 29	18 22 26 30	8 250 9 250 10 300 11 200	225 275 325 375
29.5 — 25	16 22 28	8 000 10 000 11 500	175 250 325
29.5 — 29	16 22 28 34 40	8 500 10 600 12 150 14 000 15 000	175 250 325 400 475
29.5 — 35	22 28 34	11 500 13 600 15 000	250 325 400
33.25 — 29	26 32 38	13 600 15 000 17 000	275 325 400
33.25 — 35	26 32 38	14 500 16 000 18 000	275 325 400
33.5 — 33	26 32 38	15 000 16 500 18 500	275 325 400
33.5 — 39	26 32 38	16 000 18 000 20 000	275 325 400
37.25 — 35	30 36 42	17 500 19 500 21 800	275 325 400
37.5 — 33	30 36 42	18 000 20 000 22 400	275 325 400
37.5 — 39	28 36 44 52	18 500 21 200 24 300 26 500	250 325 400 475
37.5 — 51	28 36 44	20 600 24 300 27 250	250 325 400
40.5/75 — 39	30 38 46	20 600 24 300 27 250	250 325 400

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

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.