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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Narrow and wide base off-road tyres and rims —

Part 2:
Loads and inflation pressures

Pneumatiques et jantes à base étroite et à base large pour engins de génie civil —

Partie 2: Charges et pressions de gonflage

Reference number
ISO 4250-2 : 1987 (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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 4250-2 was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves.*

This first edition and the first editions of ISO 4250-1 and ISO 4250-3 cancel and replace ISO/TR 4250 : 1980, the three parts together constituting a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Narrow and wide base off-road tyres and rims —

Part 2:
Loads and inflation pressures

0 Introduction

ISO 4250 provides technical details on the designation and dimensions of off-road tyres and rims, as well as load ratings for these types of tyres.

This International Standard consists of three parts:

Part 1: Tyre designations and dimensions.

Part 2: Loads and inflation pressures.

Part 3: Rims.

1 Scope

This part of ISO 4250 gives working definitions of masses and load cycles, and sets out tyre loads and reference inflation pressures for narrow and wide base off-road tyres.

2 Field of application

This part of ISO 4250 applies to tyres primarily intended for off-road machines.

3 Definitions

3.1 Definitions of masses

3.1.1 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 — The maximum GMM includes masses calculated in 3.1.1.1 to 3.1.1.6 inclusive.

3.1.1.1 operating mass (net weight): 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.

3.1.1.2 optional equipment mass: Difference in operating mass between the optional item and standard item replaced (such as engine, brakes, tyres, etc.). This includes the operating mass of additional items offered by the manufacturer which are not replacements for standard items (such as cabs, body-liners, side-boards, air conditioners, etc.).

3.1.1.3 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.).

3.1.1.4 payload: Total mass of the material being carried.

3.1.1.5 tyre ballast: (If used, shall also be included in determination of GMM.)

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

3.2 Definitions of operating conditions

3.2.1 maximum speed: Peak velocity attained by the machine.

3.2.2 earth-moving haulage cycle: Cycle where machine self-loads or receives a load from loading equipment, transports it elsewhere and returns unloaded. Transportation usually occurs over unimproved surfaces at medium speeds, up to 65 km/h, and short distances, up to 4 km away.

NOTE — Machines in this category are mainly haulage trucks (dumpers) and tractor-scrapers.

3.2.3 loader cycle: Cycle where the machine is used to pick up material and move it a short distance away. 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 75 m away.

3.2.4 load carry cycle: Cycle where the machine, primarily intended for loader service, picks up a load, transports it elsewhere and returns unloaded. Transportation usually occurs over unimproved surfaces at low speeds, up to 25 km/h, and rather short distances, up to 600 m.

NOTE — Machines in this category consist mainly of loaders, log stackers and material handling equipment. Tyre manufacturers should be consulted for specific conditions.

3.2.5 dozer (tractor) cycle: Condition where a machine is used to move materials (usually earth) by pushing, dragging or grading. Tyre loads are relatively constant and speeds are low, up to 10 km/h. Travel distances vary depending on work situations.

3.2.6 grader cycle: Condition where a machine is used in construction and road maintenance. Tyre loads are relatively constant during the work cycles. Grader speeds are slower during working periods with typical transportation speeds reaching about 40 km/h. Travel distances vary depending on work situations.

3.2.7 creep: Movement of equipment at a very low speed (commonly not over 120 m in 60 min). During creep motion, loads on the tyres are usually very high and consideration must be given to the type of surface over which the equipment is travelling. Tyre manufacturers should be consulted for specific conditions.

3.2.8 drive-away: Movement of a machine from one location to another under non-working conditions. This movement occurs during transportation of a machine from site to site. Tyre manufacturers should be consulted for specific conditions.

NOTE — Load/speed/distance tables in this part of ISO 4250 are not applicable to drive-away conditions.

4 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.

5 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 off-road 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.

6 Inflation pressures — General

6.1 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).

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

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

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

7 Load/inflation tables

Load/inflation relations for diagonal ply rating tyres are given in tables 1 to 4: those for symbol-marked radial tyres are given in tables 5 and 6.

8 Bibliography

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

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 kPa
12.00 — 20/21	14	5 000	600
	16	5 450	700
12.00 — 24/25	8	4 000	325
	14	5 600	575
	16	6 150	675
	18	6 500	750
	20	6 900	825
13.00 — 24/25	8	4 375	300
	12	5 600	450
	18	7 100	675
	20	7 500	750
	22	8 000	825
14.00 — 24/25	8	4 875	275
	10	5 600	350
	12	6 300	425
	16	7 300	550
	20	8 500	700
	24	9 500	850
	28	10 000	925
16.00 — 24/25	12	7 100	325
	16	8 250	425
	20	9 750	550
	24	10 600	650
	28	11 500	750
	32	12 500	875
	36	13 600	975
18.00 — 24/25	12	8 250	275
	16	10 000	375
	20	11 500	475
	24	12 500	550
	28	13 600	650
	32	15 000	750
	36	16 000	850
	40	17 000	950
18.00 — 33	28	16 000	650
	32	17 500	750
	36	18 500	850
18.00 — 49	24	18 500	550
	28	20 000	650
	32	21 800	750
21.00 — 24/25	16	11 800	325
	20	13 200	400
	24	15 000	500
	28	16 500	575

Tyre size designation	Ply rating	Load[1] kg	Inflation kPa
21.00 — 35	28	19 500	575
	32	21 200	650
	36	23 000	750
	40	24 300	825
	44	25 000	900
21.00 — 49	28	23 600	575
	32	25 000	650
	36	27 250	750
	40	29 000	825
	44	30 750	900
24.00 — 25	24	18 000	425
	30	20 000	525
24.00 — 29	24	19 000	425
	30	21 800	525
24.00 — 35	36	26 500	650
	42	29 000	750
	48	31 500	850
	54	34 500	975
24.00 — 43	36	30 000	650
	42	32 500	750
	48	34 500	850
24.00 — 49	36	32 500	650
	42	34 500	750
	48	37 500	850
27.00 — 33	24	22 400	350
	30	25 750	450
	36	29 000	550
27.00 — 49	36	36 500	575
	42	40 000	675
	48	43 750	775
30.00 — 51	40	45 000	575
	46	48 750	650
	52	53 000	750
33.00 — 51	42	51 500	550
	50	56 000	650
	58	61 500	750
36.00 — 51	42	58 000	500
	50	65 000	600
	58	71 000	675
40.00 — 57	52	80 000	550
	60	87 500	650
	68	92 500	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 kPa
12.00 — 20/21	14	2 800	425
	16	3 000	475
12.00 — 24/25	8	2 180	225
	14	3 000	375
	16	3 250	450
	18	3 550	500
	20	3 750	550
13.00 — 24/25	8	2 360	200
	12	3 000	300
	18	3 875	450
	20	4 000	500
	22	4 250	550
14.00 — 24/25	8	2 575	175
	10	3 000	225
	12	3 350	275
	16	4 000	375
	20	4 625	475
	24	5 150	575
	28	5 600	650
16.00 — 24/25	12	3 875	225
	16	4 875	325
	20	5 450	400
	24	6 000	475
	28	6 700	575
	32	7 300	650
	36	7 750	725
18.00 — 24/25	12	4 750	200
	16	5 600	275
	20	6 500	350
	24	7 300	425
	28	8 000	500
	32	8 750	575
	36	9 250	625
	40	9 750	700
18.00 — 33	28	9 250	500
	32	10 000	575
	36	10 600	625
18.00 — 49	24	10 600	425
	28	11 800	500
	32	12 850	575
21.00 — 24/25	16	6 900	250
	20	7 750	300
	24	8 750	375
	28	9 500	425

Tyre size designation	Ply rating	Load [1] kg	Inflation kPa
21.00 — 35	28	11 200	425
	32	12 150	500
	36	12 850	550
	40	14 000	625
	44	14 500	675
21.00 — 49	28	13 600	425
	32	15 000	500
	36	15 500	550
	40	17 000	625
	44	17 500	675
24.00 — 25	24	10 300	325
	30	11 800	400
24.00 — 29	24	11 200	325
	30	12 500	400
24.00 — 35	36	15 500	475
	42	16 500	550
	48	18 500	650
	54	19 500	725
24.00 — 43	36	17 000	475
	42	19 000	575
	48	20 600	650
24.00 — 49	36	18 500	475
	42	20 000	550
	48	21 800	650
27.00 — 33	24	13 200	275
	30	15 500	350
	36	16 500	400
27.00 — 49	36	21 200	425
	42	23 000	500
	48	25 000	575
30.00 — 33	28	16 000	275
	34	18 500	350
	40	21 200	425
30.00 — 51	40	25 750	425
	46	29 000	500
	52	30 000	550
33.00 — 51	42	30 000	425
	50	33 500	500
	58	35 500	575
36.00 — 51	42	34 500	375
	50	37 500	450
	58	41 250	525
40.00 — 57	52	46 250	425
	60	50 000	475
	68	54 500	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 and 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 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
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

NOTE — 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 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
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 × 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 and 9 999 kg;
100 kg for loads equal to or above 10 000 kg.

Table 5 — Symbol-marked narrow base and wide base radial tyres, reference speed 10 km/h (loaded conditions)

a) Narrow base tyres

Tyre size designation	Symbol	Load kg	Inflation kPa tol. ± 15 % [1]
12.00 R 24/25	★	5 150	550
	★★	6 900	800
	★★★	7 300	950
13.00 R 24/25	★★	8 000	800
	★★★	8 500	950
14.00 R 24/25	★★	9 500	800
	★★★	10 000	950
16.00 R 24/25	★	9 000	550
	★★	12 150	800
18.00 R 24/25	★	11 800	550
	★★	16 000	800
18.00 R 33	★★	18 500	800
18.00 R 49	★★	23 000	800
21.00 R 24/25	★★	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
40.00 R 57	★★	100 000	800

b) Wide base tyres

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

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