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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

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Foreword

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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).

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For an explanation on 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 the following URL: 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 sixth edition cancels and replaces the fifth edition (ISO 4250-2:2014), which has been technically revised.

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

Earth-mover tyres and rims —

Part 2: Loads and inflation pressures

1 Scope

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

This document 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.

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*

3 Terms and definitions

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

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

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

3.1 Definitions of masses

3.1.1
maximum load
load of individual tyres determined by the manufacturer's rated gross machine mass (GMM) distribution assigned to each axle, divided by the number of tyres for that axle

Note 1 to entry: The maximum GMM includes masses calculated in 3.1.1.1 to 3.1.1.5 inclusive.

Note 2 to entry: If tyre ballast is used, this is also included in the determination of GMM.

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* (3.1.1.1) between the optional item and standard item replaced

EXAMPLE Engine, brakes, tyres, etc.

Note 1 to entry: 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.)

3.1.1.3
mass of special modifications
difference in the *operating mass* (3.1.1.1) of the machine due to modifications not previously covered in *optional equipment mass* (3.1.1.2) that includes additional reinforcements, etc.

3.1.1.4
payload
total mass of the material being carried

3.1.1.5
field modification
operating mass change due to machine alterations made other than by the original manufacturer

EXAMPLE 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 a machine self-loads or receives a load from loading equipment, transports it elsewhere and returns unloaded

Note 1 to entry: Transportation usually occurs over unimproved surfaces at medium speeds, up to 65 km/h and short distances, up to 4 km one way.

Note 2 to entry: 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

Note 1 to entry: Tyre loads fluctuate depending on the conditions involved when the equipment picks up the load.

Note 2 to entry: Transportation speeds are low, up to 10 km/h and distances are short, usually less than 75 m one way.

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

Note 1 to entry: Transportation usually occurs over unimproved surfaces at low speeds, up to 25 km/h, and short distances, up to 600 m.

Note 2 to entry: Machines in this category consist mainly of wheel loaders, log stackers and material-handling equipment.

Note 3 to entry: Tyre manufacturers should be consulted for specific conditions.

3.2.5
dozer cycle
<tractor> condition where a machine is used to move materials (usually earth) by pushing, dragging or grading

Note 1 to entry: Tyre loads are relatively constant and speeds are low, up to 10 km/h.

Note 2 to entry: Travel distances vary depending on work situations.

3.2.6
grader cycle
condition where a machine is used in construction and road maintenance

Note 1 to entry: Tyre loads are relatively constant during work cycles.

Note 2 to entry: Grader speeds are slower during working periods, with typical transportation speeds reaching about 40 km/h.

Note 3 to entry: Travel distances vary depending on the work situations.

3.2.7
creep
movement of equipment at a very low speed

Note 1 to entry: Speed is commonly not over 120 m in 60 min.

Note 2 to entry: 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.

Note 3 to entry: 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

Note 1 to entry: This movement occurs during transportation of a machine from site to site.

Note 2 to entry: Tyre manufacturers should be consulted for specific conditions.

Note 3 to entry: Load/speed/distance tables in this document do not apply to drive-away conditions.

3.3 Vehicle type

3.3.1
industrial vehicle
vehicles including counterbalanced lift trucks, container handlers, straddle carriers, aircraft tow tractors, mobile crushers, log stackers

4 Special conditions

For longer hauls and/or speeds in excess of those indicated in Tables 1 to 21, tyre manufacturers should be consulted for instructions regarding permissible loads and the required inflation pressures.

5 Selection of tyres 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 as determined by gross machine mass (GMM) distribution, including load transfer and the machine application.

Maximum load per tyre shall not be greater than that 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.

6 Inflation pressures

6.1 Tyres covered by this document that have a reference speed A2, 10km/h shall not exceed a cold inflation pressure of 1 000 kPa. All other tyres cold inflation pressure shall not exceed 800 kPa. Rim and wheel manufacturers shall be consulted to determine if the rim and wheel are of sufficient strength for the intended service conditions.

6.2 Inflation pressures shown in the load/inflation tables are reference cold inflation pressures and do not include any pressure build-up due to vehicle operation. In practice, the tyre inflation pressure recommended by the different tyre manufacturers can vary according to the reference cold inflation pressure.

6.3 In agreement with tyre manufacturers, inflation pressures can be adjusted to compensate for extreme atmospheric temperature or special vehicle operating conditions.

7 Load/inflation tables

Load/inflation relations for diagonal ply rating tyres are given in Tables 1 to 9; those for symbol-marked radial tyres are given in Tables 10 to 20.

8 Load capacities for earth-mover tyres on industrial vehicles

For industrial application, it is recommended to use specific tyres designed for this purpose.

If tyres designed for earth-mover application are used, a formal approval from the tyre and wheel manufacturers is required as not all the earth-mover tyres can be used in such conditions.

Load capacities for earth-mover tyres on industrial vehicles are given in Table 21.

Table 1 — Diagonal ply rating marked narrow base tyres for earth-moving slow speed service, reference speed A2, 10 km/h (loaded conditions)

Tyre size designation	Ply rating	Load index	Load[a,b] kg	Inflation pressure[b] kPa
12.00—20	14	164	5 000	600
	16	167	5 450	700
	20	171	6 150	825
	24	175	6 900	1 000
12.00—24 and 12.00—25	8	156	4 000	325
	14	168	5 600	575
	16	171	6 150	675
	18	173	6 500	750
	20	175	6 900	825

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

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

Table 1 *(continued)*

Tyre size designation	Ply rating	Load index	Load[a,b] kg	Inflation pressure[b] kPa
13.00—24 and 13.00—25	8	159	4 375	300
	12	168	5 600	450
	18	176	7 100	675
	20	178	7 500	750
	22	180	8 000	825
14.00—20	20	178	7 500	700
	24	182	8 500	850
14.00—24 and 14.00—25	8	163	4 875	275
	10	168	5 600	350
	12	172	6 300	425
	16	177	7 300	550
	20	182	8 500	700
	24	186	9 500	850
	28	188	10 000	925
16.00—21	20	183	8 750	550
	24	187	9 750	650
	28	190	10 600	775
16.00—24 and 16.00—25	12	176	7 100	325
	16	181	8 250	425
	20	187	9 750	550
	24	190	10 600	650
	28	193	11 500	750
	32	196	12 500	875
	36	199	13 600	975
18.00—24 and 18.00—25	12	181	8 250	275
	16	188	10 000	375
	20	193	11 500	475
	24	196	12 500	550
	28	199	13 600	650
	32	202	15 000	750
	36	204	16 000	850
	40	206	17 000	950
18.00—33	28	204	16 000	650
	32	207	17 500	750
	36	209	18 500	850
18.00—49	24	209	18 500	550
	28	212	20 000	650
	32	215	21 800	750

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

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

Table 1 *(continued)*

Tyre size designation	Ply rating	Load index	Load[a,b] kg	Inflation pressure[b] kPa
21.00—24 and 21.00—25	16	194	11 800	325
	20	198	13 200	400
	24	202	15 000	500
	28	205	16 500	575
21.00—35	28	211	19 500	575
	32	214	21 200	650
	36	217	23 000	750
	40	219	24 300	825
	44	220	25 000	900
21.00—49	28	218	23 600	575
	32	220	25 000	650
	36	223	27 250	750
	40	225	29 000	825
	44	227	30 750	900
24.00—25	24	208	18 000	425
	30	212	20 000	525
24.00—29	24	210	19 000	425
	30	215	21 800	525
24.00—35	36	222	26 500	650
	42	225	29 000	750
	48	228	31 500	850
	54	231	34 500	975
24.00—43	36	226	30 000	650
	42	229	32 500	750
	48	231	34 500	850
24.00—49	36	229	32 500	650
	42	231	34 500	750
	48	234	37 500	850
27.00—33	24	216	22 400	350
	30	221	25 750	450
	36	225	29 000	550
27.00—49	36	233	36 500	575
	42	236	40 000	675
	48	239	43 750	775
30.00—51	40	240	45 000	575
	46	243	48 750	650
	52	246	53 000	750
33.00—51	42	245	51 500	550
	50	248	56 000	650
	58	251	61 500	750

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

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

Table 1 *(continued)*

Tyre size designation	Ply rating	Load index	Load[a,b] kg	Inflation pressure[b] kPa
36.00—51	42	249	58 000	500
	50	253	65 000	600
	58	256	71 000	675
40.00—57	52	260	80 000	550
	60	263	87 500	650
	68	265	92 500	725

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

[b] 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 B, 50 km/h

Tyre size designation	Ply rating	Load index	Load[a] kg	Inflation pressure kPa
12.00—20	14	144	2 800	425
	16	146	3 000	475
12.00—24 and 12.00—25	8	135	2 180	225
	14	146	3 000	375
	16	149	3 250	450
	18	152	3 550	500
	20	154	3 750	550
13.00—24 and 13.00—25	8	138	2 360	200
	12	146	3 000	300
	18	155	3 875	450
	20	156	4 000	500
	22	158	4 250	550
14.00—20	16	153	3 650	375
	20	157	4 125	475
14.00—24 and 14.00—25	8	141	2 575	175
	10	146	3 000	225
	12	150	3 350	275
	16	156	4 000	375
	20	161	4 625	475
	24	165	5 150	575
	28	168	5 600	650
16.00—21	16	159	4 375	325
	20	164	5 000	400

[a] Load adjustment for maximum speed 65 km/h: load × 0,85.

Table 2 *(continued)*

Tyre size designation	Ply rating	Load index	Load[a] kg	Inflation pressure kPa
16.00—24 and 16.00—25	12	155	3 875	225
	16	163	4 875	325
	20	167	5 450	400
	24	170	6 000	475
	28	174	6 700	575
	32	177	7 300	650
	36	179	7 750	725
18.00—24 and 18.00—25	12	162	4 750	200
	16	168	5 600	275
	20	173	6 500	350
	24	177	7 300	425
	28	180	8 000	500
	32	183	8 750	575
	36	185	9 250	625
	40	187	9 750	700
18.00—33	24	182	8 500	425
	28	185	9 250	500
	32	188	10 000	575
	36	190	10 600	625
18.00—49	24	190	10 600	425
	28	194	11 800	500
	32	197	12 850	575
21.00—24 and 21.00—25	16	175	6 900	250
	20	179	7 750	300
	24	183	8 750	375
	28	186	9 500	425
21.00—35	28	192	11 200	425
	32	195	12 150	500
	36	197	12 850	550
	40	200	14 000	625
	44	201	14 500	675
21.00—49	28	199	13 600	425
	32	202	15 000	500
	36	203	15 500	550
	40	206	17 000	625
	44	207	17 500	675
24.00—25	24	189	10 300	325
	30	194	11 800	400
24.00—29	24	192	11 200	325
	30	196	12 500	400

[a] Load adjustment for maximum speed 65 km/h: load × 0,85.