International Standard 2175

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Industrial wheels for non-powered equipment — Dimensions and nominal load capacities

Roues de manutention pour engins de manutention non automoteurs — Dimensions et capacités nominales de charge

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Descriptors : handling equipment, industrial trucks, castors, loads (forces), dimensions, specifications, classifications, inspection.

Foreword

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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.

International Standard ISO 2175 was developed by Technical Committee ISO/TC 110, *Industrial trucks*, and was circulated to the member bodies in October 1980.

It has been approved by the member bodies of the following countries :

Australia	Germany, F. R.	South Africa, Rep. of
Austria	India	Spain
Brazil	Ireland	Sweden
Czechoslovakia	Italy	United Kingdom
Egypt, Arab Rep. of	Korea, Rep. of	USA
Finland	Netherlands	
France	Romania	

The member body of the following country expressed disapproval of the document on technical grounds :

Belgium

This second edition cancels and replaces the first edition (i.e. ISO 2175-1972).

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Industrial wheels for non-powered equipment — Dimensions and nominal load capacities

1 Scope and field of application

This International Standard specifies the dimensions and nominal load capacities of industrial wheels, which are classed in four categories (see clause 4).

It applies to industrial wheels used for non-powered equipment.[1)]

2 References

ISO 3, *Preferred numbers — Series of preferred numbers.*

ISO 2163, *Industrial trucks — Wheels and castors — Vocabulary.*

ISO 2184, *Industrial castors — Dimensions of top-plates — Part 1 : Oblong top-plates with 4 bolt holes.*

ISO 3101, *Wheels and castors — Triangular top plates with three fixing holes.*

ISO 3102, *Wheels and castors — Off-set for swivel castors.*

3 Definition

nominal load capacity : The nominal load capacity of an industrial wheel or castor is the load which can be carried by this wheel or castor in the following operating conditions :

— at a speed of 4 km/h with interruptions to travelling;

— at an ambient temperature of 20 ± 10 °C;

— on a hard and horizontal surface of travelling, with obstructions the height of which should not exceed :

— 5 % of the wheel diameter for wheels with soft tread (shore hardness $A \leqslant 90$);

— 2,5 % of the wheel diameter for wheels with hard tread (shore hardness $A > 90$).

4 Classification of wheels

The wheels are classed in four categories : A, B, C, D (see the table). They define four increasing values of the nominal load capacity for the main dimensions (hub diameter and length) of the wheels, taking the material of the tread, its dimensions and the operating conditions into account.

Example : For the wheel 200 mm in diameter, 60 mm hub length, the categories A, B, C, D define the following nominal load capacities :

Category	A	B	C	D
Nominal load capacity, kg	160	250	400	630

1) Subject to conditions in individual countries, the maximum speed of this equipment is limited to 25 km/h.

5 Specifications of wheels

5.1 Selection of standardized characteristics

The standardization applies to the following characteristics :

a) diameter of wheel;

b) hub length;

c) bore, according to the type of mounting (journal mounting or axle mounting);

d) nominal load capacity.

The correspondence between these characteristics is given in the table.

5.2 Dimensions

5.2.1 Diameter of wheels

The diameters are selected from the R 10 series of preferred numbers (rounding the preferred number 315 to 300) with the addition of the preferred number 355, from the R 20 series, rounded to 350, these values being taken according to current manufacturing practice. For the same reason 150 is admitted as an alternative to the preferred number 160.

5.2.2 Hub lengths

5.2.2.1 Five hub lengths, L, have been provided :

30 - 45 - 60 - 90 - 120 mm.

5.2.2.2 If the wheel includes washers or seals located within the hub, they must not protrude outside the hub.

5.2.2.3 The hub length must be selected so that this length is larger than the overall width of the rim or of the tyre. The minimum value of symmetrical excess is to be equal to 5 % of the hub length. The minimum value of symmetrical excess (b) is to be equal to 5 % of the hub length (L) (see the figure of the table).

5.2.3 Bores

5.2.3.1 The wheel bore is the nominal diameter, d, of the hole machined in the hub or nominal inner diameter of the bearing(s) to receive the axle.

5.2.3.2 Nine bores have been provided :

10 - 12 - 20 - 25 - 30 - 35 - 40 - 50 - 60 mm.

(See the annex.)

5.2.4 Tolerances

5.2.4.1 Tolerances on the diameter D :

$^{+\ 2}_{\ 0}$ mm for the diameters 50 - 63 - 80 - 100 mm.

$^{+\ 2}_{\ 0}$ % for the diameters greater than 100 mm.

5.2.4.2 Tolerances on hub length, L :

$^{\ 0}_{-2}$ mm for the lengths 30 - 45 - 60 - 90 mm.

$^{\ 0}_{-4}$ mm for the length 120 mm.

5.3 Nominal load capacities

The standardized nominal load capacities have been selected from the R 10 series of preferred numbers given in ISO 3. (See the annex.)

6 Determination of the category and selection of a wheel

6.1 Determination of the category

When the nominal load capacity mentioned by the manufacturer falls between the nominal load capacities of two consecutive categories, the wheel is classified in the lower category.

The choice of the material and of dimensions other than those fixed for each wheel by the table is left to the manufacturer, who will have to make sure that the resulting wheel can satisfy the requirements for acceptance. (See clause 7.)

6.2 Selection of a wheel

The loads on the wheels of a truck may be determined in advance by considering the useful load and assuming that the dead weight of the truck itself might reach up to 25 % of the useful load, the total load being equally distributed on the wheels.

Example : Load per wheel for a 4-wheel truck having a useful load of 800 kg :

$$\frac{800 \times 1{,}25}{4} = 250 \text{ kg}$$

When the load calculated either in this manner or by taking into account the actual dead weight and the precise distribution of the loads on the wheels does not correspond to one of the loads mentioned in the table, it is necessary to use a wheel intended for the next higher nominal load capacity.

7 Inspection conditions of industrial wheels and castors

Any industrial wheel or castor should be able to pass, without abnormal wear or permanent deformation prejudicial to its good use, an inspection test carried out in the conditions of use for which their nominal load capacity has been defined as indicated below :

a) test load constituted of the actual mass corresponding to the nominal load capacity defined in clause 3, connected to the wheel or castor to be tested and positioned on top of it;

b) at a speed of 4 km/h;

c) at an ambient temperature of 20 ± 10 °C;

d) on a hard and horizontal surface of travelling;

e) with obstacles of hard material, having a rectangular section of 100 mm width, with one edge rounded to 1,25 to 5 mm radius, positioned slantwise, alternately to right and left at 45° in relation to the travel axis, and having a height of :

— 5 % of the wheel diameter for wheels with soft tread (shore hardness $A \leqslant 90$);

— 2,5 % of the wheel diameter for wheels having a hard tread (shore hardness $A > 90$);

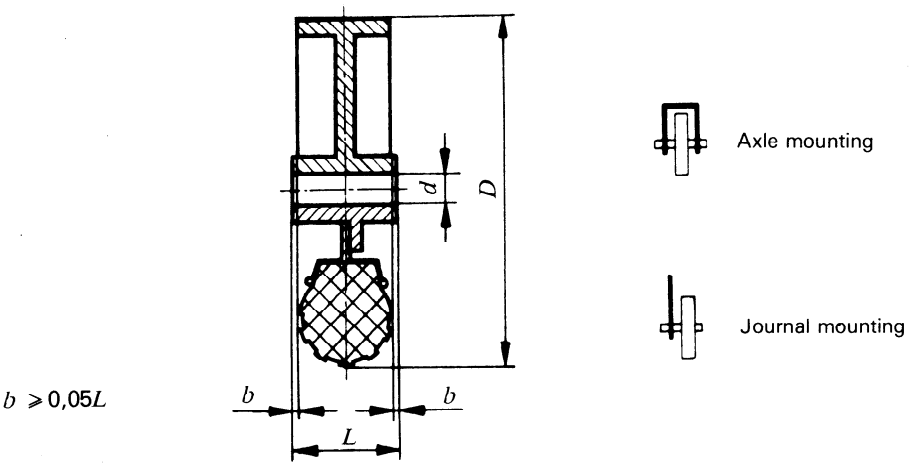
f) the number of obstacles to be negotiated shall be 500, separated from each other by 1 m minimum and 3 m maximum.

This distance shall differ from the spreading of the wheel or of one of its multiples ($K \pi D$, where K is a whole number and D is the diameter of the wheel).

g) The test consists of a continuous succession of several elementary tests or cycles having a maximum duration of 4 min.

Each of these cycles may include a stop which shall not exceed 25 % of the total duration of the cycle.

Table and corresponding figure



Wheel diameter D	Hub length L	Category A			Category B			Category C			Category D		
		Bore d		Load[1] Q	Bore d		Load[1] Q	Bore d		Load[1] Q	Bore d		Load[1] Q
		Axle mounting	Journal mounting		Axle mounting	Journal mounting		Axle mounting	Journal mounting		Axle mounting	Journal mounting	
mm	mm	mm	mm	kg	mm	mm	kg	mm	mm	kg	mm	mm	kg
50	30	10	—	30	10	—	40	10	—	50	10	—	63
63	30	10	—	40	10	—	50	10	—	63	10	—	80
80	30	10	—	40	10	—	50	10	—	63	10	—	80
	45	12	—	50	12	—	63	12	—	80	12	—	100
100	30	10	—	40	10	—	50	10	—	63	10	—	80
	45	12	—	63	12	—	80	12	—	100	12	—	125
125	45	12	20	80	12	20	100	12	20	125	12	20	160
	60	20	25	100	20	25	160	20	25	250	20	25	400
150	45	20	20	100	20	20	125	20	20	160	20	20	200
160	60	20	25	125	20	25	200	20	25	320	20	30	500
200	45	20	20	125	20	20	160	20	20	200	20	20	250
	60	20	25	160	20	25	250	20	25	400	20	30	630
	90	25	30	250	25	30	400	25	35	630	25	40	1 000
	120	—	30	320	—	35	500	—	40	800	—	50	1 250
250	60	25	25	200	25	25	320	25	30	500	25	35	800
	90	25	30	320	25	35	500	25	40	800	25	50	1 250
	120	—	30	400	—	35	630	—	40	1 000	—	50	1 600
300	60	25	25	200	25	25	320	25	30	500	25	35	800
	90	25	30	400	25	35	630	25	40	1 000	25	50	1 600
	120	—	35	500	—	40	800	—	50	1 250	—	50	2 000
350	90	25	30	400	25	35	630	25	40	1 000	25	50	1 600
	120	—	35	500	—	40	800	—	50	1 250	—	50	2 000
400	90	25	30	400	25	35	630	25	40	1 000	25	50	1 600
	120	—	35	500	—	40	800	—	50	1 250	—	50	2 000
500	90	25	35	500	25	40	800	25	50	1 250	25	50	2 000
	120	—	35	630	—	40	1 000	—	50	1 600	—	60	2 500

1) Nominal load capacities for 4 km/h (see clause 3).

NOTES

1 If the speed of the wheels is over 4 km/h up to 25 km/h, the nominal load capacity should be reduced in relation to increase of speed. Further study is required in the matter.

2 Wheels having a bore for journal mounting may also be axle mounted.

Annex

Nominal load capacities

A.1 Depending on the mounting of the wheels (journal mounting or axle mounting), the classical method of assessing material strength can be used to check, for the various hub lengths, that the loads given in the table are compatible with the bores given in 5.2.3.2, under the following assumptions :

a) that the stress on the metal does not exceed 100 MPa for mild steel;

b) that, for journal mountings, the load is concentrated at a distance from the support equal to 6/10 of the hub length, to take into account distance pieces;

c) that, for axle mountings with smooth axle, the load is uniformly distributed on the hub length;

d) that, for axle mountings with ball bearings or conical roller bearings, the load is concentrated equally on each of the bearings, placed 1/4 of the hub length apart from the support so as to take into account locking washers or seals.

A.2 It has been checked that nominal loads chosen from the R 10 series of preferred numbers are lower than those which can be supported by the axles corresponding to the bores shown, under the conditions mentioned in A.1.

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