
Castors and wheels — Requirements for castors for hospital beds

Roues et roulettes — Exigences pour roulettes pour lits d'hôpitaux

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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.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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.

The committee responsible for this document is ISO/TC 110, *Industrial trucks*.

This second edition results from the reinstatement of ISO 22882:2004, which was withdrawn in 2014 and with which it is technically identical.

Introduction

The industry stakeholders have expressed the need for this important International Standard. Therefore, the interested parties agreed to republish the withdrawn International Standard as a new edition.

In order to ensure that the International Standard will be actively used in the ISO member countries worldwide, procedures may be necessary to replace the existing national standards and technical regulations by the International Standard.

Only by these actions will there be a guarantee that products in accordance with International Standards can be shipped worldwide freely without any technical barriers.

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Castors and wheels — Requirements for castors for hospital beds

1 Scope

This document specifies the technical requirements, the appropriate dimensions and the requirements for the testing of swivel castors for hospital beds with a wheel diameter of 100 mm or more and which have a central locking device. Swivel castors may be used with the main principal dimensions.

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 22878:2004, *Castors and wheels — Test methods and apparatus*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22877 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 Symbols are given in ISO 22878:2004, Annex A.

4 Dimensions and classification

4.1 Characteristics

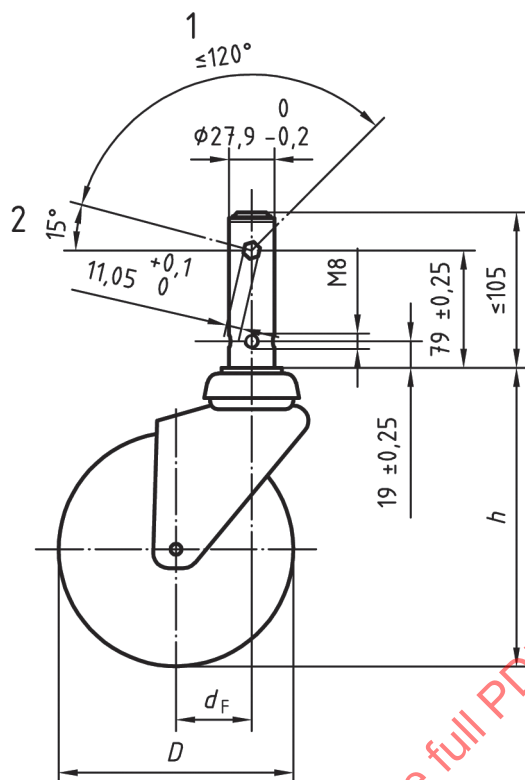
The characteristics of a castor are as follows:

- wheel diameter;
- overall height;
- offset;
- fixing system;
- load capacity.

4.2 Dimensions

The dimensions listed in [Table 1](#) and shown in [Figure 1](#) shall be used.

For dimensions of non-central locking castors used in hospital beds, refer to the relevant tables in ISO 22881.

**Key**

- 1 working angle
2 unlocked position

Figure 1 — Principal dimensions of the central locking fixing system**Table 1**

Wheel diameter ^a	Overall height ^b	Offset ^b
D	h	d_F
100	150	46
125	175	56
150	200	65
200	250	70
250	300	80
^a Tolerance ± 1 %.		
^b Maximum.		

4.3 Fixing system

The principal dimensions of the fixing system with the central locking are as follows:

- stem length;
- stem diameter;
- distance of the threaded hole centre from the stem collar;
- thread size;

- distance of the hexagon hole centre from the stem collar;
- dimension of the hexagon hole;
- working angle of the hexagon hole.

4.4 Load capacity

This is the maximum load, in newtons, which can be carried by a wheel or a castor so as to fully comply with the required acceptance criteria.

5 Requirements for testing

5.1 General

Test methods and apparatus shall be as specified in ISO 22878.

5.2 Standard conditions

5.2.1 Environmental conditions

Tests shall be carried out at a temperature between 15 °C and 28 °C. During the 24 h prior to the test, the samples shall remain at the specified temperature, in an environment with a relative humidity between 40 % and 70 %.

Samples shall not be artificially cooled during testing.

5.2.2 Test sequence

Tests, where relevant, shall be carried out in the sequence shown in [Table 2](#).

Table 2

Reference in this document	Test sequence	Castor types	Test procedure given in ISO 22878:2004
5.3	Initial wheel play	All	4.2
5.4	Initial swivel play	Swivel castors with or without accessories	4.3
5.5	Electrical resistance	Castors antistatic or electrically conductive	4.4
5.6	Fatigue test for locking/braking device	Castors with a central locking/braking device	4.5
5.7	Efficiency check of wheel braking and/or locking device	Castors with a central locking/braking device	4.6
5.8	Efficiency check of swivel braking and/or locking device	Castors with a central locking/braking device	4.7
5.9	Static test	All	4.9
5.10	Dynamic test	All	4.8
5.11	Efficiency check of wheel braking and/or locking device	Castors with a central locking/braking device	4.6
5.12	Efficiency check of swivel braking and/or locking device	Castors with a central locking/braking device	4.7
5.13	Final wheel play	All	4.2
5.14	Final wheel play	Swivel castors with or without accessories	4.3

5.3 Initial wheel play

5.3.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.2.

5.3.2 Acceptance criteria

The measured initial wheel play shall not exceed the value (d_{W1}) given in [Table 3](#).

Table 3

Dimensions in millimetres

Wheel diameter D	Maximum initial wheel play d_{W1}
100	0,50
125	0,62
150	0,75
200	1,00
250	1,25

5.4 Initial swivel play

5.4.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.3.

5.4.2 Acceptance criteria

The measured initial swivel play shall not exceed the value (d_{S1}) given in [Table 4](#).

Table 4

Symbol	Value	Description
d_{S1}	4 mm	Maximum initial swivel play

5.5 Electrical resistance test

5.5.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.4.

5.5.2 Test values

The test values shall be as listed in [Table 5](#).

Table 5

Symbol	Value	Description
$F_{\max}$	Variable	Load capacity
F_{17}	10 % of $F_{\max}$	Test load
R	Variable	Electrical resistance

5.5.3 Tolerances

The tolerances shall be as shown in [Table 6](#).

Table 6

Symbol	Unit	Tolerance	
		Acceptable	Unit
F_{17}	N	$\begin{matrix} +2\% \\ 0 \end{matrix}$	N

5.5.4 Acceptance criteria

The resistance R of the sample tested shall be as follows:

- $R \leq 10^5 \Omega$ for conductive castors or wheels;
- $10^5 \Omega < R \leq 10^7 \Omega$ for antistatic castors or wheels.

5.6 Fatigue test for locking/braking device

5.6.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.5.

5.6.2 Test values

The test values shall be as listed in [Table 7](#).

Table 7

Symbol	Value	Description
n_E	10 000	Number of locking actions
f_E	10 cycles/min	Frequency of locking actions
F_3	800 N	Test load

5.6.3 Tolerances

The tolerances shall be as shown in [Table 8](#).

Table 8

Symbol	Unit	Tolerance	
		Acceptable	Unit
n_E	—	$\begin{matrix} +1\% \\ 0 \end{matrix}$	—
f_E	cycles/min	$\begin{matrix} 0 \\ -2 \end{matrix}$	cycles/min
F_3	N	$\begin{matrix} +2\% \\ 0 \end{matrix}$	N

5.6.4 Acceptance criteria

There shall be no wear and/or permanent deformation that adversely affect the performance of the sample.

5.7 Efficiency check of wheel braking and/or locking device

5.7.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.6.

5.7.2 Test values

The test values shall be as listed in [Table 9](#).

Table 9

Symbol	Value	Description
$F_{\max}$	Variable	Load capacity
F_{11}	Equal to $F_{\max}$	Test load
F_{K1}	40 % of $F_{\max}$	Horizontal tractive force

5.7.3 Tolerances

The tolerances shall be as shown in [Table 10](#).

Table 10

Symbol	Unit	Tolerance	
		Acceptable	Unit
F_{11}	N	+2 % 0	N
F_{K1}	N	+4 % 0	N

5.7.4 Acceptance criteria

The wheel shall have no revolving movement around its axis during the second application of the force F_{K1} .

5.8 Efficiency check of swivel braking and/or locking device

5.8.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.7.

5.8.2 Test values

The test values shall be as listed in [Table 11](#).

Table 11

Symbol	Value	Description
$F_{\max}$	Variable	Load capacity
F_{11}	Equal to $F_{\max}$	Test load
F_{K2}	40 % of $F_{\max}$	Horizontal tractive force

5.8.3 Tolerances

The tolerances shall be as shown in [Table 12](#).

Table 12

Symbol	Unit	Tolerance	
		Acceptable	Unit
F_{11}	N	+2 % 0	N
F_{K2}	N	+4 % 0	N

5.8.4 Acceptance criteria

No swivelling movement shall be detected during the second application of the force F_{K2} .

5.9 Static test

5.9.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.9.

5.9.2 Test values

The test values shall be as listed in [Table 13](#).

Table 13

Symbol	Value	Description
$F_{\max}$	Variable	Load capacity
y_1	3	Load factor
F_6	$F_{\max} \times y_1$	Test load
t_{y1}	1 h	Time of application of the load
t_{y2}	24 h	Time elapsed prior to inspection

5.9.3 Tolerances

The tolerances shall be as shown in [Table 14](#).

Table 14

Symbol	Unit	Tolerance	
		Acceptable	Unit
F_6	N	$\begin{smallmatrix} +2\% \\ 0 \end{smallmatrix}$	N
t_{y1}	h	$\begin{smallmatrix} +15 \\ 0 \end{smallmatrix}$	min
t_{y2}	h	± 1	h

5.9.4 Acceptance criteria

There shall be no permanent deformation of the sample that adversely affects its performance.

5.10 Dynamic test

5.10.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.8.

5.10.2 Test values

The test values shall be as listed in [Table 15](#).

Table 15

Symbol	Value	Description
$F_{\max}$	Variable	Load capacity
v_1	1,1 m/s (4 km/h)	Average speed of running period
v_2	1,1 m/s (4 km/h)	Speed at impact with obstacles
h_1	Height of obstacles for wheels with — tread hardness ≥ 90 Shore A: 2,5 % of D — tread hardness < 90 Shore A: 5,0 % of D	Height of obstacles
d_c	1 m to 3 m	Distance between obstacles
n	1 000	Number of obstacles
n_{r1}	30 000	Number of wheel revolutions
t_{z1}	3 min	Running period
t_{z2}	1 min	Pause
D	Variable	Wheel diameter

The actual wheel diameter shall be measured prior to commencement and on completion of the test to establish wear.

5.10.3 Tolerances

The tolerances shall be as shown in [Table 16](#).