

---

---

**Castors and wheels — Requirements for  
castors for hospital beds**

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

STANDARDSISO.COM : Click to view the full PDF of ISO 22882:2004



**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

STANDARDSISO.COM : Click to view the full PDF of ISO 22882:2004

© ISO 2004

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

## Contents

|  | Page |
|--|------|
| 1 Scope .....  | 1    |
| 2 Normative references .....   | 1    |
| 3 Terms and definitions .....  | 1    |
| 4 Dimensions and characteristics .....                                       | 1    |
| 4.1 Characteristics .....  | 1    |
| 4.2 Dimensions .....   | 2    |
| 4.3 Fixing system .....  | 3    |
| 4.4 Load capacity .....  | 3    |
| 5 Requirements for testing .....   | 3    |
| 5.1 General .....  | 3    |
| 5.2 Standard conditions .....  | 3    |
| 5.3 Initial wheel play .....   | 4    |
| 5.4 Initial swivel play .....  | 4    |
| 5.5 Electrical resistance test .....   | 5    |
| 5.6 Fatigue test for locking/braking device .....                            | 5    |
| 5.7 Efficiency check of wheel braking and/or locking device .....            | 6    |
| 5.8 Efficiency check of swivel braking and/or locking device .....           | 7    |
| 5.9 Static test .....  | 7    |
| 5.10 Dynamic test .....  | 8    |
| 5.11 Efficiency check of wheel braking and/or locking device .....           | 9    |
| 5.12 Efficiency check of swivel braking and/or locking device .....          | 9    |
| 5.13 Final wheel play .....  | 10   |
| 5.14 Final swivel play .....   | 10   |
| 6 Conformity .....   | 10   |
| 7 Marking of the product .....   | 10   |
| 7.1 Product marking .....  | 10   |
| 7.2 Marking of electrically conductive or antistatic castors or wheels ..... | 11   |
| Bibliography .....   | 12   |

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 22882 was prepared by Technical Committee ISO/TC 110, *Industrial trucks*, Subcommittee SC 3, *Castors and wheels*.

STANDARDSISO.COM : Click to view the full PDF of ISO 22882:2004

# Castors and wheels — Requirements for castors for hospital beds

## 1 Scope

This International Standard specifies the technical requirements, the appropriate dimensions and the requirements for 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 referenced documents are indispensable for the application 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 22877, *Castors and wheels — Vocabulary, symbols and multilingual terminology*

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

ISO 22881, *Castors and wheels — Requirements for use on manually propelled equipment for institutional applications*

## 3 Terms and definitions

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

## 4 Dimensions and characteristics

### 4.1 Characteristics

The characteristics of a castor are

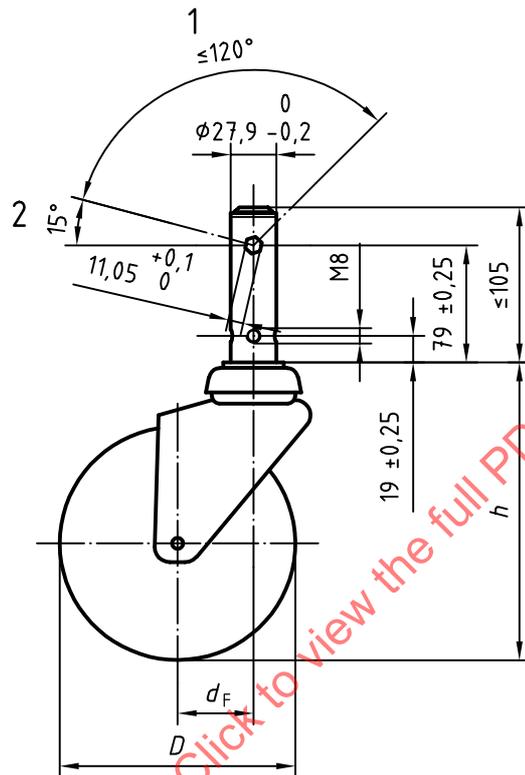
- wheel diameter,
- overall height,
- offset,
- fixing system, and
- load capacity.

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 relevant tables in ISO 22881.

Dimensions in millimetres



- Key**
- 1 working angle
  - 2 unlocked position

Figure 1 — Principal dimensions of the central locking fixing system

Table 1

Dimensions in millimetres

| Wheel diameter <sup>a</sup> | Overall height <sup>b</sup> | Offset <sup>b</sup>  |
|-----------------------------|-----------------------------|----------------------|
| <i>D</i>                    | <i>h</i>                    | <i>d<sub>F</sub></i> |
| 100                         | 150                         | 46                   |
| 125                         | 175                         | 56                   |
| 150                         | 200                         | 65                   |
| 200                         | 250                         | 70                   |
| 250                         | 300                         | 80                   |

<sup>a</sup> Tolerance ± 1 %.

<sup>b</sup> Maximum.

### 4.3 Fixing system

The principal dimensions of the fixing system with the central locking are

- 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, and
- 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 International Standard | Test sequence  | Castor types                                  | Test procedures given in ISO 22878:2004, subclause |
|--|--|---|--|
| 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 devices                 | 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 swivel 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<br><i>D</i> | Maximum initial wheel play<br>$d_{W1}$ |
|----------------------------|--|
| 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

- $R \leq 10^5 \Omega$  for conductive castors or wheels, and
- $10^5 \Omega < R \leq 10^7 \Omega$  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       |
| $n_E$  | —          | +1 %<br>0  | —          |
| $f_E$  | cycles/min | 0<br>-2    | cycles/min |
| $F_3$  | N          | +2 %<br>0  | N          |

5.6.4 Acceptance criteria

There shall be no wear and/or permanent deformation that adversely affects 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 %<br>0  | N    |
| $F_{K1}$ | N    | +4 %<br>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 %<br>0  | N    |
| $F_{K2}$ | N    | +4 %<br>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    | $\begin{matrix} +2\% \\ 0 \end{matrix}$ | N    |
| $t_{y1}$ | h    | $\begin{matrix} +15 \\ 0 \end{matrix}$  | min  |
| $t_{y2}$ | h    | $\pm 1$                                 | 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<br>— tread hardness $\geq 90$ Shore A: 2,5 % of $D$<br>— 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.

Table 16

| Symbol   | Unit | Tolerance  |      |
|----------|------|------------|------|
|          |      | Acceptable | Unit |
| $v_1$    | m/s  | +5 %<br>0  | m/s  |
| $v_2$    | m/s  | +5 %<br>0  | m/s  |
| $h_1$    | mm   | 0<br>-5 %  | mm   |
| $n$      | —    | +1 %<br>0  | —    |
| $n_{r1}$ | —    | +1 %<br>0  | —    |
| $t_{z1}$ | min  | $\pm 10$   | s    |

### 5.10.4 Acceptance criteria

There shall be no permanent deformation of the sample that adversely affects its performance. The reduction of the wheel diameter shall not exceed 2 % of the measured diameter at the commencement of the test sequence.

### 5.11 Efficiency check of wheel braking and/or locking device

Repeat test 5.7.

### 5.12 Efficiency check of swivel braking and/or locking device

Repeat test 5.8.

### 5.13 Final wheel play

#### 5.13.1 Test objectives, apparatus and procedures

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

#### 5.13.2 Acceptance criteria

The wheel wear play shall not exceed the value  $d_{W2}$  given in Table 17.

**Table 17**

Dimensions in millimetres

| Wheel diameter<br>$D$ | Maximum wheel wear play<br>$d_{W2}$ |
|-----------------------|-------------------------------------|
| 100                   | 0,50                                |
| 125                   | 0,62                                |
| 150/160               | 0,75                                |
| 200                   | 1,00                                |
| 250                   | 1,25                                |

### 5.14 Final swivel play

#### 5.14.1 Test objectives, apparatus and procedures

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

#### 5.14.2 Acceptance criteria

The swivel wear play shall not exceed the value  $d_{S2}$  listed in Table 18.

**Table 18**

| Symbol   | Value | Description              |
|----------|-------|--------------------------|
| $d_{S2}$ | 4 mm  | maximum swivel wear play |

## 6 Conformity

On request, the manufacturer shall declare by a certificate of conformity that the castors are in accordance with the requirements as stated in this International Standard.

The type of testing machine shall be stated in the conformity document.