BRITISH STANDARD

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12531:1999

Castors and wheels — Hospital bed castors

The European Standard EN 12531:1998 has the status of a British Standard

ICS 11.140

National foreword

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English version

Castors and wheels — Hospital bed castors

Roues et roulettes — Roulettes pour lits d'hôpitaux Räder und Rollen — Krankenbettenrollen

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 324, Castors and wheels, the Secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 1999, and conflicting national standards shall be withdrawn at the latest by March 1999

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1 Scope

This European Standard specifies the technical requirements, the appropriate dimensions and the requirements for testing.

This European Standard applies to swivel castors for hospital beds with a wheel diameter of 100 mm or more, which have a central locking device. Swivel castors may be used with the main principal dimensions.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply only to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 12526:1998, *Castors and wheels — Vocabulary, symbols and multilingual dictionary.*

EN 12527:1998, *Castors and wheels — Test methods and apparatus.*

EN 12530:1998, *Castors and wheels — Castors and wheels for manually propelled institutional applications.*

ISO 7619, *Rubber — Determination of indentation hardness by means of pocket hardness meters.*

3 Definitions

For the purpose of this European Standard, definitions and recommended symbols of EN 12526:1998 apply.

4 Dimensions

The characteristics of a castor are:

— wheel diameter (see Table 1);

— overall height (see Table 1);

— offset (see Table 1);

— fixing system (see **4.1**);

— load capacity (see **4.2**).

Dimensions listed in Table 1 and Figure 1 shall be used.

Table 1 — Principal dimensions of swivel castors for hospital beds

Dimensions in millimetres

Wheel diameter (*D*)	**Overall height** (*H*)	**Offset** (*F*)
Tolerance: ± 1 %	max.	max.
100	150	46
125	175	56
150	200	65
200	250	70
250	300	80

For dimensions of non central locking castors used in hospital beds, refer to relevant tables in EN 12530:1998.

4.1 Fixing system

The principal dimension 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;

— working angle of the hexagon hole.

4.2 Load capacity

Maximum load, in N, which can be carried by a wheel or a castor so as to fully comply to the required acceptance criteria.

5 Requirements

Testing requirements for castors and wheels are listed below. Test methods and apparatus are defined in EN 12527:1998.

5.1 Standard Conditions

5.1.1 *Environmental conditions*

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

Sample(s) shall not be artificially cooled during testing.

5.1.2 *Test sequence*

Tests, where relevant, shall be carried out in the sequence as listed in Table 2.

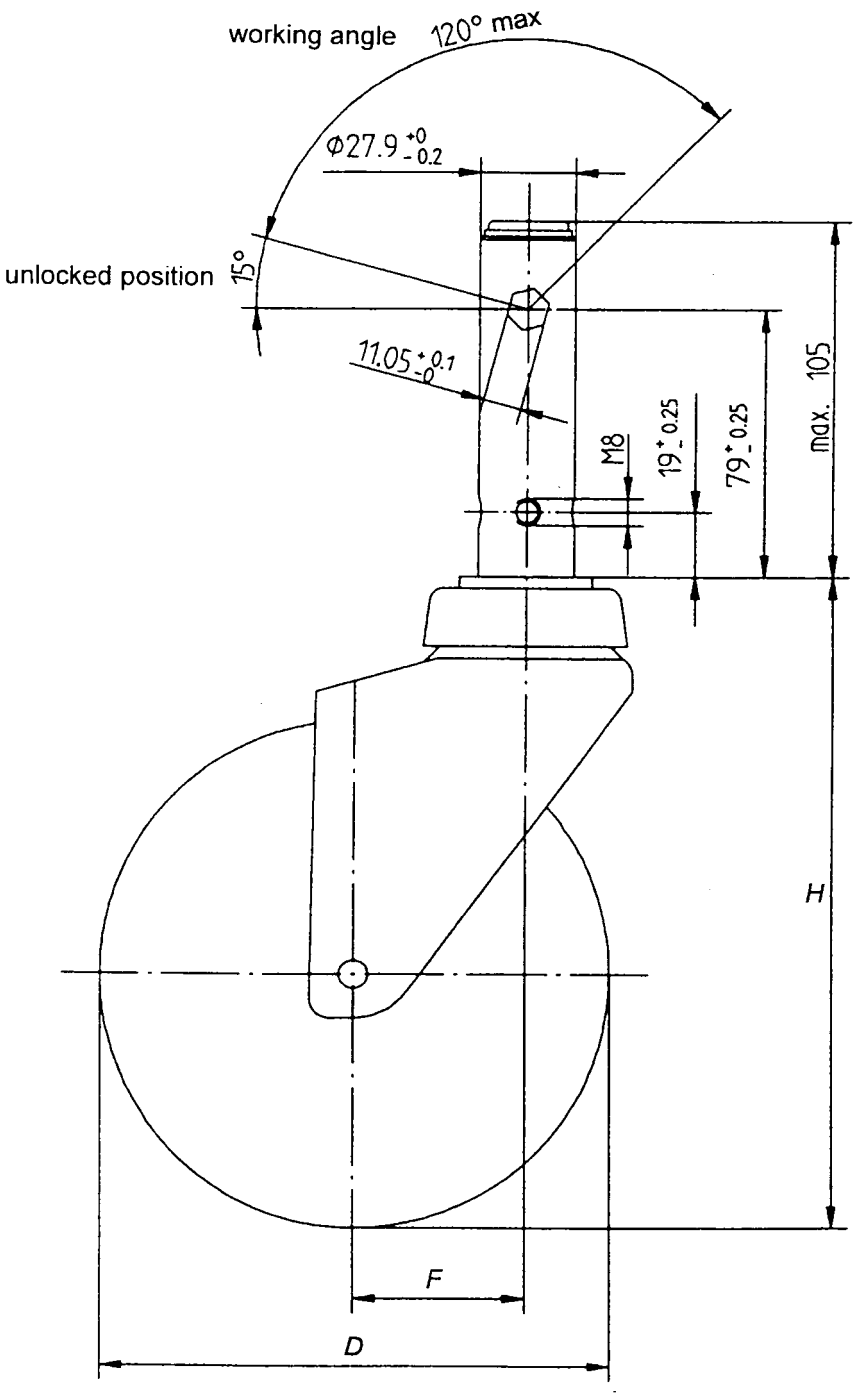

Figure 1 — Principal dimensions of the central locking fixing

Table 2 — Test sequence for castor types

Reference	Test sequence	Castor types	Test procedures reference
5.2	Initial wheel play	All	**4.2**
5.3	Initial swivel play	Swivel castors with or without accessories	**4.3**
5.4	Electrical resistance	Castors electrically conductive	**4.4**
5.5	Fatigue test for locking/braking devices	Castors with a central locking/braking device	**4.5**
5.6	Efficiency check of wheel braking and/or locking device	Castors with a central locking/braking device	**4.6**
5.7	Efficiency check of swivel braking and/or locking device	Castors with a central locking/braking device	**4.7**
5.8	Static test	All	**4.9**
5.9	Dynamic test	All	**4.8**
5.10	Efficiency check of wheel braking and/or locking device	Castors with a central locking/braking device	**4.6**
5.11	Efficiency check of swivel braking and/or locking device	Castors with a central locking/braking device	**4.7**
5.12	Final wheel play	All	**4.2**
5.13	Final swivel play	Swivel castors with or without accessories	**4.3**

5.2 Initial wheel play

5.2.1 *Test objectives, apparatus and procedures*

Detailed in **4.2** of EN 12527:1998.

5.2.2 *Acceptance criteria*

The measured initial wheel play shall not exceed the value (W_1) in Table 3.

Table 3 — Initial wheel play

Dimensions in millimetres

Wheel diameter (D)	Maximum initial wheel play (W_1)
100	0,50
125	0,62
150	0,75
200	1,00
250	1,25

5.3 Initial swivel play

5.3.1 *Test objectives, apparatus and procedures*

Detailed in **4.3** of EN 12527:1998.

5.3.2 *Tolerances*

The tolerances are:

— of the swivel play: lever of 200 mm use to measure the play: ± 2 mm;

— angle of rotation of swivelling by 90°: $\pm 5°$.

5.3.3 *Acceptance criteria*

The measured initial swivel play shall not exceed the value (S_1).

Symbol	Value	Description
S_1	4 mm	maximum initial swivel play

5.4 Electrical resistance test

5.4.1 *Test objectives, apparatus and procedures*

Detailed in **4.4** of EN 12527:1998.

5.4.2 *Test values*

The test values are listed below.

Symbol	Value	Description
L_1	variable	load capacity
L_{17}	10 % of L_1	test load
R	variable	measured electrical resistance

5.4.3 *Tolerances*

The tolerances are:

Symbol	Tolerance	
	Unit	Acceptable
L_1	N	$^{+2}_{0}$ %
L_{17}	N	$^{+2}_{0}$ %

5.4.4 *Acceptance criteria*

The resistance R of the sample tested shall be:

— conductive castor(s) or wheel(s): $R \leq 10^4\ \Omega$;

— antistatic castor(s) or wheel(s): $10^5 \leq R \leq 10^7\ \Omega$.

5.5 Fatigue test for locking/braking device

5.5.1 *Test objectives, apparatus and procedures*

Detailed in **4.5** of EN 12527:1998.

5.5.2 *Test values*

The test values are listed below.

Symbol	Value	Description
E_1	10 000	number of locking actions
E_2	10	cycles per min
L_3	800 N	minimum load

5.5.3 *Tolerances*

The tolerances are:

Symbol	Tolerance	
	Unit	Acceptable
E_1		$^{+1}_{0}$ %
E_2	cycles/min	$^{0}_{-2}$

5.5.4 *Acceptance criteria*

The test is passed if there is no wear and/or permanent deformation which adversely affects the performance of the sample.

5.6 Efficiency check of wheel braking and/or locking device

5.6.1 *Test objectives, apparatus and procedures*

Detailed in **4.6** of EN 12527:1998.

5.6.2 *Test values*

The test values are listed below.

Symbol	Value	Description
L_1	variable	load capacity as test load
K_1	40 % of L_1	horizontal tractive force

5.6.3 *Tolerances*

The tolerances are:

Symbol	Tolerance	
	Unit	Acceptable
L_1	N	$^{+2}_{0}$ %
K_1	N	$^{+4}_{0}$ %

The tolerance of the time of application of load (10 s) is: $^{+2}_{0}$ s.

5.6.4 *Acceptance criteria*

No revolving movement around its axis is allowed when the force K_1 is applied.

5.7 Efficiency check of swivel braking and/or locking device

5.7.1 *Test objectives, apparatus and procedures*

Detailed in **4.7** of EN 12527:1998.

5.7.2 *Test values*

The test values are listed below.

Symbol	Value	Description
L_1	variable	load capacity as test load
K_2	40 % of L_1	horizontal tractive force

5.7.3 *Tolerances*

The tolerances are:

Symbol	Tolerance	
	Unit	Acceptable
L_1	N	$^{+2}_{0}$ %
K_2	N	$^{+4}_{0}$ %

The tolerance of the time of application of load K_2 (10 s) is: $^{+2}_{0}$ s.

5.7.4 *Acceptance criteria*

No swivelling movement is detected during the second application of the force K_2.

5.8 Static test

5.8.1 *Test objectives, apparatus and procedures*

Detailed in **4.9** of EN 12527:1998.

5.8.2 *Test values*

The test values are listed below.

Symbol	Value	Description
L_1	variable	load capacity as test load
y_1	3	load factor
y_2	1 h	time of application of load
y_3	24 h	elapsed time prior to inspection

5.8.3 *Tolerances*

The tolerances are:

Symbol	Tolerance	
	Unit	Acceptable
L_1	N	$^{+2}_{0}$ %
y_2	h	$^{+15}_{0}$ min
y_3	h	$\pm$1 h

5.8.4 *Acceptance criteria*

The test is passed if there is no permanent deformation of the sample, which adversely affects its performance.

5.9 Dynamic test

5.9.1 *Test objectives, apparatus and procedures*

Detailed in **4.8** of EN 12527:1998.

5.9.2 *Test values*

The test values are listed below.

Symbol	Value	Description
L_1	variable	load capacity as test load
v_1	1,1 m/s (4 km/h)	average speed
v_2	1,1 m/s (4 km/h)	speed at impact
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
c	1 to 3 m	distance between obstacles
n	1 000	number of obstacles
r_1	30 000	number of wheel revolutions
z_1	3 min	running period
z_2	max. 1 min	pause period
D	variable	wheel diameter

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

5.9.3 *Tolerances*

The tolerances are:

Symbol	Tolerance	
	Unit	Acceptable
L_1	N	$^{+2}_{0}$ %
v_1	m/s	$^{+5}_{0}$ %
v_2	m/s	$^{+5}_{0}$ %
h_1	mm	$^{0}_{-5}$ %
n		$^{+1}_{0}$ %
r_1		$^{+1}_{0}$ %
z_1	min	±10 s
z_2	min	±10 s

The tolerances are:

— of the obstacle width (100 mm): ±2 mm;

— of the angle of obstacles to line of motion of 45°: ±3°.

5.9.4 *Acceptance criteria*

The test is passed if there is no permanent deformation of the sample, which 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.

5.10 Efficiency check of wheel braking and/or locking device

Repeat test **5.6**.

5.11 Efficiency check of swivel braking and/or locking device

Repeat test **5.7**.

5.12 Final wheel play

5.12.1 *Test objectives, apparatus and procedures*

Detailed in **4.2** of EN 12527:1998.

5.12.2 *Acceptance criteria*

The wheel wear play shall not exceed the value W_2 detailed in Table 4.

Table 4 — Wheel wear play

Dimensions in millimetres

Wheel diameter (D)	Maximum wheel wear play (W_2)
100	0,50
125	0,62
150/160	0,75
200	1,00
250	1,25

5.13 Final swivel play

5.13.1 *Test objectives, apparatus and procedures*

Detailed in **4.3** of EN 12527:1998.

5.13.2 *Tolerances*

The tolerances are:

— of the swivel play: lever of 200 mm use to measure the play: ±2 mm;

— angle of rotation of swivelling by 90°: ±5°.

5.13.3 *Acceptance criteria*

The swivel wear play shall not exceed the value S_2 listed below.

Symbol	Value	Description
S_2	4 mm	maximum swivel wear play

6 Conformity

The manufacturer declares on request by a certificate of conformity that the castors are in accordance with the requirements as stated in this document.

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

7 Marking of the product

7.1 Product marking

All the products shall be permanently and visibly marked with a name and/or trade mark of the manufacturer.

7.2 Marking of electrically conductive castor(s) or wheel(s)

All products shall bear on their outer surface a clearly visible yellow mark, and where appropriate and possible should include the word “antistatic”.

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