
Castors and wheels — Test methods and apparatus

Roues et roulettes — Méthodes et appareillage d'essais

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ISO 22878:2004

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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.

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 22878 was prepared by Technical Committee ISO/TC 110, *Industrial trucks*, Subcommittee SC 3, *Castors and wheels*.

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Introduction

Castors and wheels are used in many applications and environments.

For many of these, specific requirements are needed. Thus the need arose for an International Standard on testing of castors and wheels suitable for users, original equipment manufacturers and testing houses.

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Castors and wheels — Test methods and apparatus

1 Scope

This International Standard specifies the test methods and apparatus to be used to check the performance of castors and wheels.

The tests to be used for specific types of castor and wheel, and the relevant acceptance criteria, values and applicability are given in ISO 22879 to ISO 22884.

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*

3 Terms, definitions and symbols ISO 22878:2004

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For the purposes of this document, the terms and definitions given in ISO 22877 apply. The symbols are listed in the individual tests, and a combined list of symbols is given in Annex A.

4 Test methods

4.1 General requirements

4.1.1 Test sequence

Tests shall be carried out in a predefined sequence to allow repeatability of testing conditions.

4.1.2 Test sample

All tests within the sequence shall be made with the same castor(s) or wheel(s), unless otherwise specified in the appropriate standard. Castors and wheels shall not be artificially cooled during testing.

4.1.3 Application of test load

The test load shall always be applied directly so that its centre of gravity lies central to the mounting plane of the castor(s), or the centre of the test frame (where required) on which the sample(s) under test are mounted (see Figures 3 and 7). Unless otherwise specified, the test load shall be a real weight.

4.1.4 Test report

Actual readings and test results of each test and indication if the test is passed or failed shall be clearly given in the test report, including the following information:

- reference to the relevant International Standard;
- type of the test machine which was used;
- details of any deviation from this International Standard;
- main features of the test sample;
- name and address of location where the test was carried out;
- date of the test.

4.2 Wheel play test

4.2.1 Objectives

This test is to determine the initial wheel play at the beginning of the test sequence, and the final wheel play at the end of the test sequence.

4.2.2 Symbols

The symbols of Table 1 shall be used.

Table 1

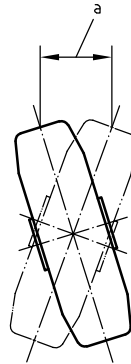
Symbol	Meaning of the symbol
d_{w1}	maximum initial wheel play
d_{w2}	maximum wheel wear play

4.2.3 Apparatus

4.2.3.1 **Device** to clamp the fork with the fitted wheel under test.

4.2.4 Procedure

The measurements shall be taken with the wheel and axle bush assembled as during test (original product). Clamp the fork of the castor rigidly in a vertical position, ensuring that the fork width is maintained and the movement of the wheel is not impaired. The wheel play shall not include any side movement of the wheel on the axle. Wheel play shall be quoted in millimetres and measured as shown in Figure 1. To determine the wear play, subtract the initial wheel play from the final wheel play.



^a Measured wheel play.

Figure 1 — Wheel play test

4.3 Swivel play test

4.3.1 Objectives

This test is to determine the initial swivel play at the beginning of the test sequence, and the final swivel play at the end of the test sequence.

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4.3.2 Symbols

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The symbols of Table 2 shall be used.

Table 2

Symbol	Meaning of the symbol
d_{S1}	maximum initial swivel play
d_{S2}	maximum swivel wear play

4.3.3 Apparatus

4.3.3.1 Lever, of at least 200 mm in length, suitable to be rigidly fixed to the mounting plane of the castor under test as in Figure 2.

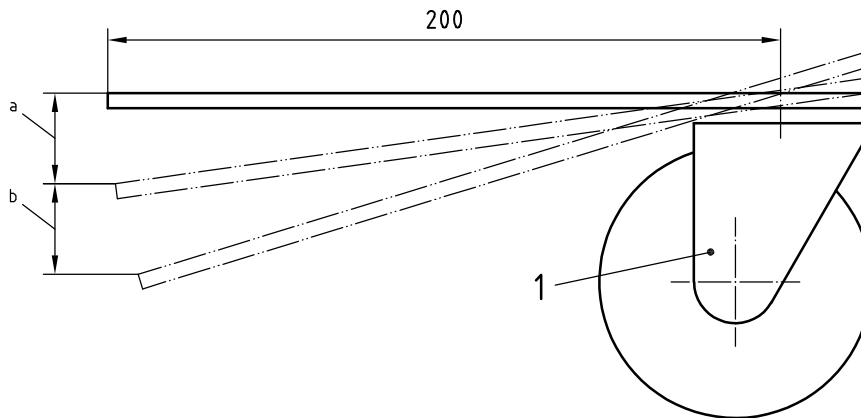
4.3.4 Procedure

The measurements shall be taken with the wheel and axle bush assembled as during test (original product). Clamp the fork of the castor rigidly in a vertical position, ensuring that the fork width is maintained and the movement of the swivel is not impaired. Make a mark on the fixed and swivelling parts of the castor. Measure the swivel play at (200 ± 2) mm from the swivel axis of the castor when

- the marks are aligned, and
- the mounting plane is rotated through $(90 \pm 5)^\circ$.

The larger of these two values shall be taken. Swivel play shall be quoted in millimetres and measured as in Figure 2. To determine the swivel wear play, subtract the initial swivel play from the final swivel play.

Dimensions in millimetres



Key

- 1 fork of castor (clamped)
- a Initial swivel play (the maximum of this value is d_{s1}).
- b Swivel wear play (the maximum of this value is d_{s2}).

Figure 2 — Swivel play test

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4.4 Electrical resistance test

4.4.1 Objectives

This test is to measure the electrical resistance of the sample. [ISO 22878:2004](https://standards.itech.ai/standards/iso-22878-2004/sist/66d12e55-c8b9-45ba-9f49-b73c4d57d432/iso-22878-2004)

4.4.2 Symbols

The symbols of Table 3 shall be used.

Table 3

Symbol	Meaning of the symbol
F_{17}	test load
R	electrical resistance

4.4.3 Apparatus

4.4.3.1 Instrument, having a nominal open circuit voltage of 500 V d.c., preferably an insulation tester (ohm meter), or any suitable instrument known to give comparable results.

The instrument shall be sufficiently accurate to determine the resistance within 10 % and shall not dissipate more than 3 W in the product.

The resistance values obtained will vary with the applied voltage, and errors may occur when low test voltages are involved. In case of dispute, the voltage applied to the product shall be not less than 40 V, except where this conflicts with the requirement not to dissipate more than 3 W in the test piece.

4.4.4 Procedure

The wheel(s) shall be perfectly clean and dry. Place the castor and/or wheel on a metal plate that is insulated from the floor and from the apparatus. A piece of wet blotting paper of the size of the contact area may be added between the metal plate and the castor if furniture castors or swivel chair castors are tested. Keep the tread in contact with the metal plate by applying a load F_{17} on the castor or wheel as specified in 4.1.3. Using the insulation tester, measure the resistance between the mounting plane of the castor or axle of the wheel and the metal plate. It is necessary to take three readings each with a different part of the tread in contact with the metal plate.

4.5 Fatigue test for braking and/or locking device

4.5.1 Objectives

This test is to determine if there is any wear and/or permanent deformation that would adversely affect the performance of the braking and/or locking device. This test is not applicable to braking and/or locking devices based on a threaded mechanism.

4.5.2 Symbols

The symbols of Table 4 shall be used.

Table 4

Symbol	Meaning of the symbol
n_E	number of locking actions
f_E	frequency of locking actions
F_3	test load

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4.5.3 Apparatus

4.5.3.1 Test apparatus to simulate as effectively as possible what happens when the braking and/or locking device is operated and released with the castor stationary.

4.5.4 Procedure

Place the castor loaded with F_3 in the test apparatus. Carry out the braking/locking actions in accordance with n_E and f_E .

4.6 Efficiency check of wheel braking and/or locking device

4.6.1 Objectives

This test is to determine the performance of the wheel braking and/or locking device. It is recommended that this test should follow test in 4.5, where applicable.

4.6.2 Symbols

The symbols of Table 5 shall be used.

Table 5

Symbol	Meaning of the symbol
F_{11}	test load
F_{K1}	horizontal traction force

4.6.3 Apparatus

4.6.3.1 Low friction device that allows either

- linear movement, or
- circular movement.

4.6.3.2 Force measuring device.

4.6.3.3 Pulling device to pull force equal to F_{K1} .

4.6.3.4 Time measuring instrument.

An example of test apparatus is given in Figure 3.

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4.6.4 Procedure

Place the castor on a horizontal smooth steel surface, clean from visible dirt. Engage the braking and/or locking device. Apply a load F_{11} to the mounting plane of the castor. Then gradually apply a horizontal tractive force (F_{K1}) in line with the running direction of the wheel. The force F_{K1} shall be applied for (10^{+2}_0) s then released. Gradually apply the force F_{K1} once more for (10^{+2}_0) s and monitor if the wheel revolves around its axle. Repeat the above procedure applying the force in the opposite direction. If during the application of the force F_{K1} the wheel skids on the floor, change the material of the test surface in order to have a higher grip, then repeat the test.

4.7 Efficiency check of swivel braking and/or locking device

4.7.1 Objectives

This test is to determine the performance of the swivel braking and/or locking device. It is recommended that this test should follow test in 4.5.