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Office furniture — Office work chairs — Test methods for the determination of stability, strength and durability

Mobilier de bureau — Sièges de travail de bureau — Méthodes d'essai pour la détermination de la stabilité, de la résistance et de la durabilité

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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 21015 was prepared by Technical Committee ISO/TC 136, *Furniture*.

Office furniture — Office work chairs — Test methods for the determination of stability, strength and durability

1 Scope

This International Standard specifies test methods for determining the stability, strength and durability of office work chairs. Guidance is given on the choice of forces, cycles, etc., for these tests.

The tests are designed to be applied to an article of furniture that is fully assembled and ready for use.

The dimensions in the tests are applicable to office work chairs intended for adult persons.

The tests consist of the application, to various parts of the item, of forces simulating normal functional use, as well as misuse that can reasonably be expected to occur.

The tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes.

The test results are valid only for the article tested. When the test results are intended to be applied to other similar articles, it is important that the test specimen be representative of the production model.

Tests carried out according to this International Standard are intended to demonstrate the ability of the item to give satisfactory service in its intended environment. The tests have been developed for units/components that have not been in use. However, when properly justified, they can be used for fault investigation.

Data are given for the design of seat-loading pads (Annex B) and for the design of stability-loading pad (Annex C).

This International Standard does not give any product requirements. These can be specified in a requirements document. If this is not available, possible forces and cycles are suggested in Annex A (informative). These forces and cycles can be used for adults regardless of their weight and number of working hours.

This International Standard does not specify type approval tests for chair components.

Assessment of ageing and degradation is not included. The tests are not intended to assess the durability of upholstery, i.e. filling materials and covers.

2 Normative references

The following referenced document is 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 22880:2004, *Castors and wheels — Requirements for castors for swivel chairs*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
office work chair
piece of seating furniture for one person, with a back rest, with or without arm rests, whose upper part, which includes the seat, can rotate in the horizontal plane and can be adjusted in height

NOTE Other adjustments may be included.

3.2
column
⟨office work chair⟩ component that connects the base and the seat structure

NOTE A column normally incorporates a seat-height adjustment and swivel mechanism.

3.3
locking device
device that inhibits the movement of the seat action and/or the back rest

3.4
arm-rest length
distance between vertical lines through its front and rear edges

NOTE In the case of an arm rest that is not horizontal or that is curved, the length is measured in a horizontal plane 20 mm below the highest point of the arm rest.

3.5
supporting point
castor or glide

NOTE There are two castor types as defined in ISO 22880:2004.

a) Type H: Castors with plain wheels defined as type H, hard tread. The wheel is one colour over the entire surface. These castors are suitable for carpeted floors.

b) Type W: Castors with resilient tyred wheels defined as type W, soft tread. This is of clearly different colour to the wheel centre. These castors are suitable for hard stone, wooden or tiled floors or those featuring non-textiled covering.

4 General test conditions

4.1 Preliminary preparation

The unit shall be assembled and/or configured according to the instructions supplied with it. The most adverse configuration shall be used for each test (see Table 1). For testing a range of related chair models, it is necessary to test only the worst case(s). If mounting or assembly instructions are not supplied, the mounting or assembly method shall be recorded in the test report. Fittings shall not be re-tightened unless specifically required by the manufacturer. If it is necessary to change the configuration to produce the worst case conditions, any re-tightening of the fittings shall be recorded in the test report.

Unless otherwise stated, all tests shall be carried out on the same sample.

The tests shall be carried out in indoor ambient conditions. If during a test the temperature is outside of the range of 15 °C to 25 °C, the maximum and/or minimum temperature shall be recorded in the test report.

In the case of designs not addressed in the test procedures, the test shall be carried out as far as possible as described, and deviations from the test procedure recorded in the test report.

Before beginning the testing, visually inspect the unit thoroughly. Record any defects so that they are not assumed to have been caused by the tests. Carry out measurements if specified.

4.2 Test equipment

Unless otherwise specified, the tests may be applied by any suitable device because results are dependent only upon correctly applied forces and not on the apparatus.

The equipment shall not inhibit deformation nor cause unnatural deformation of the unit/component, i.e. it shall be able to move so that it can follow the deformation of the unit/component during testing.

All loading pads shall be capable of pivoting in relation to the direction of the applied force. The pivot point shall be as close as practically possible to the load surface.

4.3 Application of forces

The forces in the static-load tests shall be applied sufficiently slowly to ensure that negligible dynamic force is applied. Each force shall be maintained for not less than 10 s and not more than 15 s.

The forces in durability tests shall be applied at a rate to ensure that excessive heating does not occur. Each force shall be maintained for (2 ± 1) s.

The forces may be applied using masses.

4.4 Tolerances

Unless otherwise stated, the following tolerances are applicable:

a) Forces: ± 5 % of the nominal force;

b) Masses: ± 1 % of the nominal mass;

c) Dimensions: ± 5 mm of the nominal dimension on soft surfaces;
± 1 mm of the nominal dimension on all other surfaces;

d) Angles: ± 2° of the nominal angle.

The accuracy for the positioning of loading pads shall be ± 5 mm.

4.5 Sequence of testing

All applicable tests shall be carried out on the same sample and in the sequence that the clauses are numbered in this International Standard.

4.6 Inspection and assessment of results

After completion of each test, inspect the unit again. Record any changes including the following:

a) fracture of any component or joint;

b) loosening, which can be demonstrated by hand pressure, of any joint intended to be rigid;

c) deformation or wear of any part or component such that its function is impaired;

d) loosening of any means of fixing components to the unit;

e) changes that can affect stability.

Table 1 — Positioning of chair components

Clause	Test	Seat height	Seat	Back rest in height	Back rest in depth	Tilt stiffness adjustment	Castors and base	Arm rest	Foot rest
7.1.1	Front edge overturning	highest position	foremost position	highest position	foremost position	maximum tension	most likely to cause overturning	most likely to cause overturning	—
7.1.2	Forwards overturning	highest position	foremost position	highest position	foremost position	maximum tension	most likely to cause overturning	most likely to cause overturning	—
7.1.3	Forwards overturning for chairs with foot rest	highest position	foremost position	lowest position	foremost position	maximum tension	most likely to cause overturning	most likely to cause overturning	most likely to cause overturning
7.1.4	Sideways overturning for chairs without arm rests	highest position	foremost position	highest position	foremost position	maximum tension	most likely to cause overturning	—	—
7.1.5	Sideways overturning for chairs with arm rests	highest position	foremost position	highest position	foremost position	maximum tension	most likely to cause overturning	most likely to cause overturning	—
7.1.6	Rearwards overturning of chairs without back-rest inclination	highest position	rearmost position	highest position	rearmost position	minimum tension	most likely to cause overturning	most likely to cause overturning	—
7.1.7	Rearwards overturning of chairs with back-rest inclination	highest position	rearmost position	highest position	rearmost position	minimum tension	most likely to cause overturning	most likely to cause overturning	—
7.2.1	Seat front-edge static-load test	highest position	foremost position	—	—	—	—	—	—
7.2.2	Combined seat and back static-load test	highest position	most adverse position	highest position	rearmost position	mid range	least likely to cause overturning	—	—
7.2.3	Arm-rest downward static-load test – central	lowest position	horizontal	—	—	—	—	most likely to cause failure	—
7.2.4	Arm-rest downward static-load test – front	lowest position	horizontal	—	—	—	—	highest, foremost position	—
7.2.5	Arm-rest sideways static-load test	lowest position	horizontal	—	—	—	—	highest, widest position	—
7.2.6	Foot-rest static-load test	—	—	—	—	—	least likely to cause overturning	—	highest position
7.3.1	Seat and back durability	highest position	horizontal and foremost	highest position	most likely to cause failure	mid range	90° to the base arm	—	—
7.3.2	Arm-rest durability	lowest position	horizontal	—	—	maximum tension	—	highest, widest position	—
7.3.3	Swivel test	highest position	horizontal, foremost position	highest position	rearmost position	—	—	—	—
7.3.4	Foot-rest durability	—	—	—	—	—	least likely to cause overturning	—	lowest position
7.3.5	Castor and chair-base durability	lowest position	horizontal	—	—	—	—	—	—

5 Test apparatus

5.1 Test surface

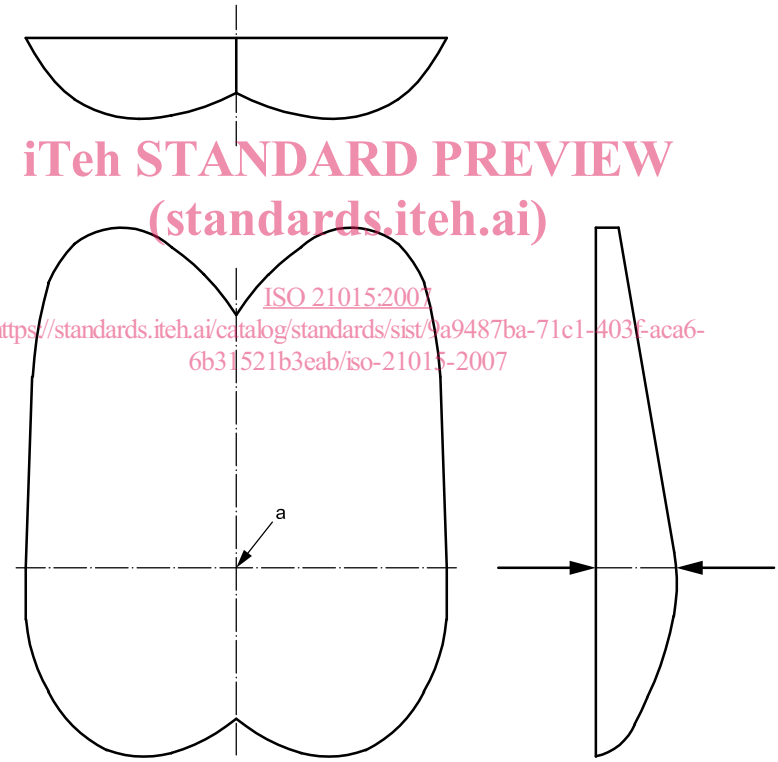
The test surface shall be rigid, horizontal and flat.

5.2 Stops

Stops are devices to prevent the chair from sliding or rolling but not overturning, They shall be 3 mm high for stability tests and 12 mm high for all other tests, except in cases where the design of the chair or the test method necessitates the use of higher stops, in which case the lowest that prevents the chair from sliding or rolling shall be used.

5.3 Seat-loading pad

The seat-loading pad is a naturalistically shaped rigid indenter with a hard, smooth surface (see Figure 1). In principle, this loading pad is for use in loading points A (6.1) and C (6.3). See Figure 7. For details of the design, see Annex B.



a Loading point.

Figure 1 — Seat-loading pad

5.4 Smaller seat-loading pad

The smaller seat-loading pad is a rigid, circular object 200 mm in diameter, the face of which has a convex spherical curvature of 300 mm radius with a 12 mm blend radius between the face and the side. (See Figure 2). In principle, this loading pad shall be used in loading points D (6.4), G (6.7), F (6.6) and J (6.9). See Figure 7.

Dimensions in millimetres

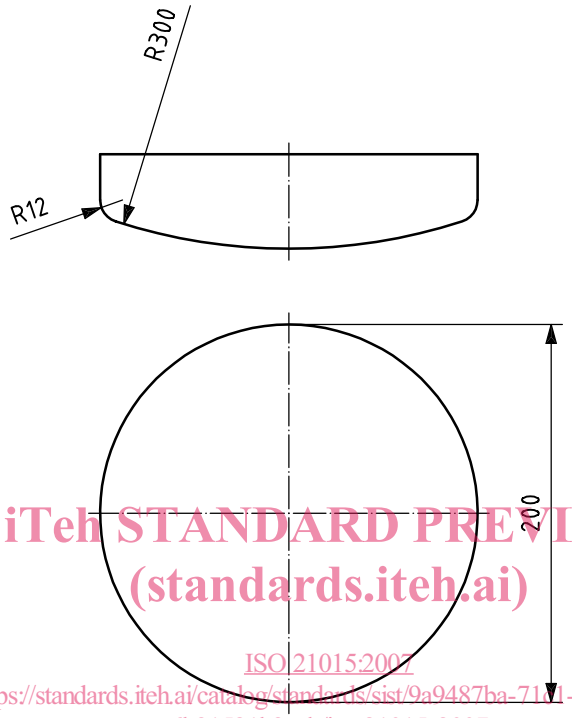


Figure 2 — Smaller seat-loading pad

5.5 Local loading pad

The local loading pad is a rigid, circular object 100 mm in diameter, with a flat face and a 12 mm blend radius between the face and the side.

5.6 Back-loading pad

The back-loading pad is a rigid rectangular object 200 mm high and 250 mm wide, the face of which is curved across the width of the pad with a convex cylindrical curvature of 450 mm radius and with a 12 mm blend radius between the face and the sides. (See Figure 3).

Dimensions in millimetres

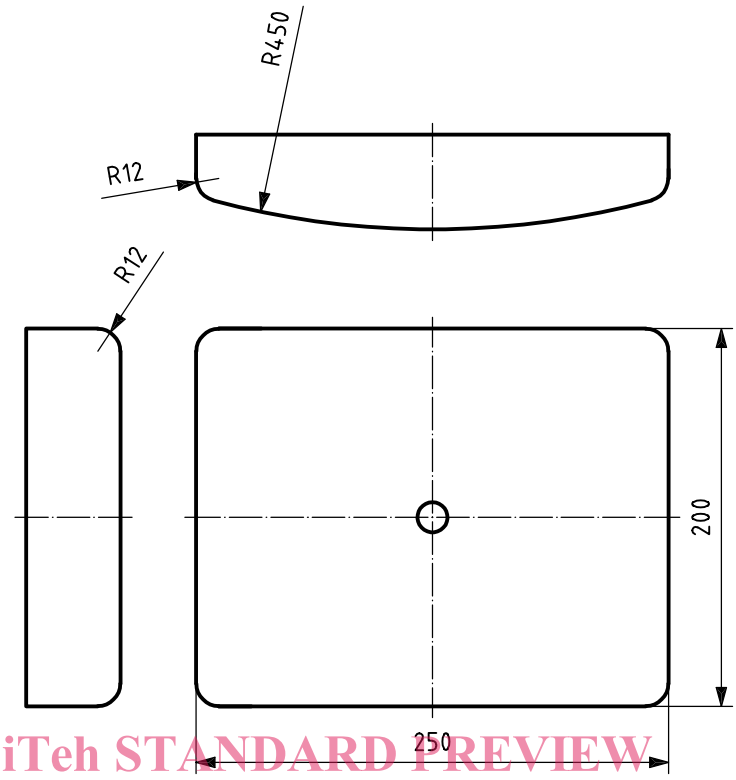
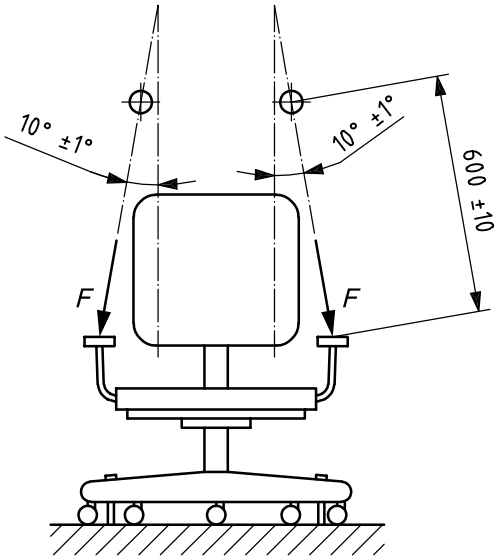


Figure 3 — Back-loading pad

5.7 Arm-rest durability test apparatus

An apparatus capable of applying a cyclic force simultaneously to both arm rests. The forces shall be applied through an arm-rest loading device, which functions in principle as shown in Figure 4.

Dimensions in millimetres



Key

F loading point

Figure 4 — Arm-rest test principle

The apparatus shall be capable of applying the forces at varying angles to the vertical. It shall be adjustable both vertically and horizontally and set as specified in 7.3.2. The apparatus shall be capable of freely following the deformation of the arm rests during testing (see Figure 5). The length of the loading pad shall be 100 mm with the force acting through the centre of its length.

Dimensions in millimetres

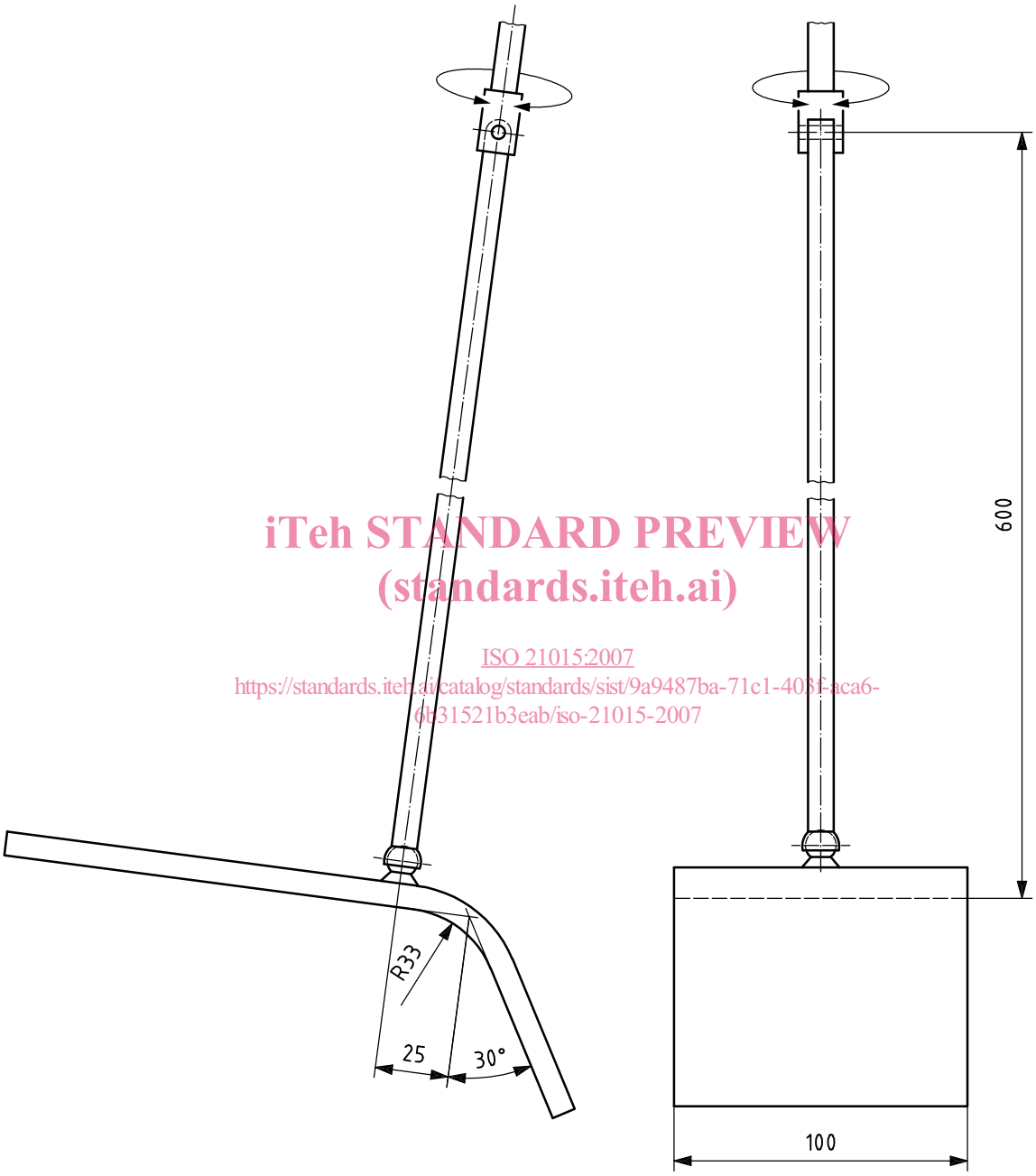


Figure 5 — Example of arm-rest loading pad

5.8 Strap

A 50 mm wide strap capable of bearing a mass as specified in 7.1.1 and Annex A.