INTERNATIONAL STANDARD

ISO 9098-2

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Bunk beds for domestic use — Safety requirements and tests —

Part 2: Test methods

Lits superposés pour usage domestique — Spécifications de sécurité et essais —

Partie 2: Méthodes d'essai

INTERNATIONAL ISO

Reference number
ISO 9098-2:1994(E)

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.

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.

International Standard ISO 9098-2 was prepared by Technical Committee ISO/TC 136, *Furniture*, Subcommittee SC 1, *Test methods*.

ISO 9098 consists of the following parts, under the general title *Bunk beds for domestic use — Safety requirements and tests*:

— *Part 1: Safety requirements*

— *Part 2: Test methods*

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Bunk beds for domestic use — Safety requirements and tests —

Part 2:
Test methods

1 Scope

This part of ISO 9098 specifies test methods to assess the safety of bunk beds for domestic use. It is in particular intended to minimize the risk of accidents happening to children. Only the sleeping function is considered.

This part of ISO 9098 also applies to single beds for use at a height of the bed base of 800 mm or more above floor level, irrespective of the use to which the space below is put.

The tests are designed to be applied to a free-standing bunk bed that is fully assembled and ready for use.

The tests consist of the application, to various parts of the bunk bed, of loads or forces simulating normal functional use, as well as misuse that can reasonably be expected to occur. They are designed to evaluate properties without regard to materials, design and construction, or manufacturing processes.

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

In the case of designs not covered by the test procedures, the test needs to be carried out as far as possible as described, and a list made of the deviations from the test procedure.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9098. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9098 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 554:1976, *Standard atmospheres for conditioning and/or testing — Specifications.*

ISO 2439:1980, *Polymeric materials, cellular flexible — Determination of hardness (indentation technique).*

ISO 9098-1:1994, *Bunk beds for domestic use — Safety requirements and tests — Part 1: Safety requirements.*

3 General test requirements

For tolerances, all forces shall have an accuracy of ± 5 %, all masses an accuracy of ± 0,5 % and all dimensions an accuracy of ± 0,5 mm.

Before any of the tests described in this part of ISO 9098 are commenced, the bed shall be old enough to ensure that it has developed its full strength. At least four weeks in normal indoor conditions shall have elapsed between manufacture and testing in the case of glued joints in wood, etc.

Immediately before testing, the bed shall be stored for at least one week in a standardized atmosphere at a temperature of (23 ± 2) °C and a relative humidity of (50 ± 5) % in accordance with ISO 554.

The bed shall be tested as delivered. If of knock-down type, it shall be assembled according to instructions supplied with the bed. If the bed can be assembled or combined in different ways, the most adverse combination shall be used for each test.

Knock-down fittings shall be tightened before testing.

The tests shall be carried out on the same specimen and in the same order as listed in this part of ISO 9098.

4 Test equipment

The test forces may, unless otherwise stated, be applied by any suitable device because results are dependent only upon correctly applied forces and loads, and not upon the apparatus.

4.1 Measuring cones, made of plastics or other hard, smooth material mounted on a force-measuring device (see figure 1). These cones shall be used with the diameters 25 mm, 60 mm and 75 mm.

4.2 Bed base impacter (see figure 2).

4.2.1 Circular body, approximately 200 mm in diameter separated from the striking surface by helical compression springs and free to move relative to it on a line perpendicular to the plane of the central area of the striking surface.

The body and associated parts minus the springs shall have a mass of (17 ± 0,1) kg and the whole apparatus, including mass, springs and striking surface, shall have a mass of (25 ± 0,1) kg.

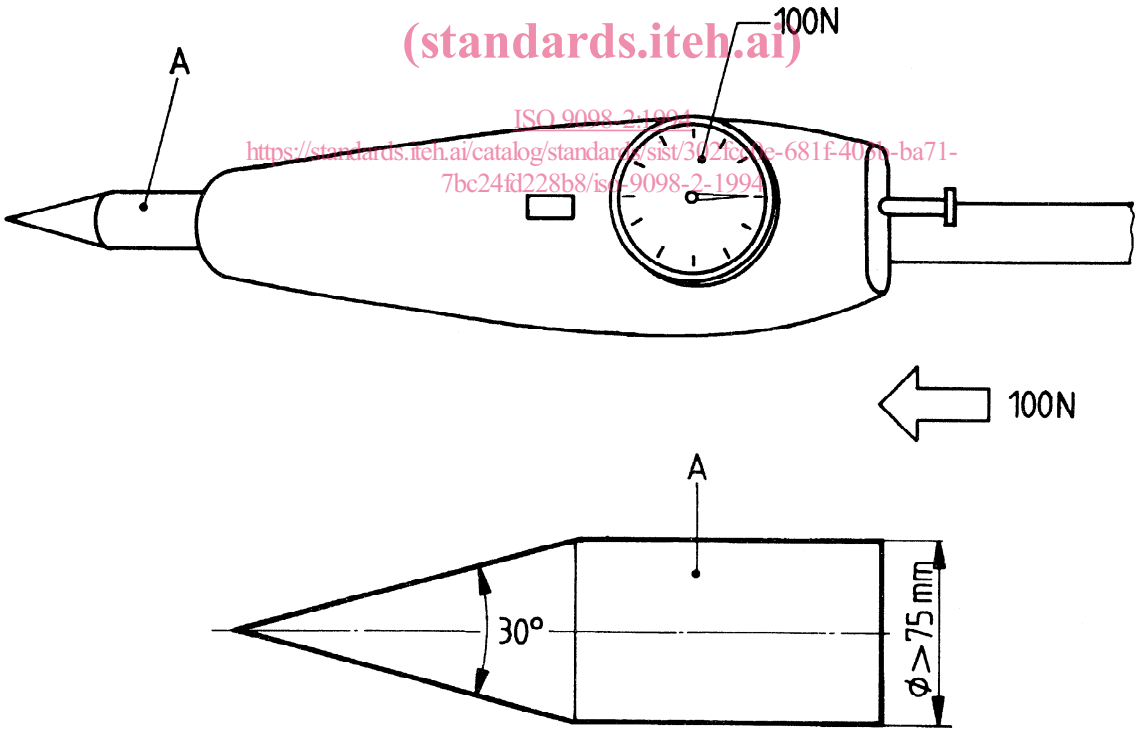

Figure 1 — Example of measuring cone

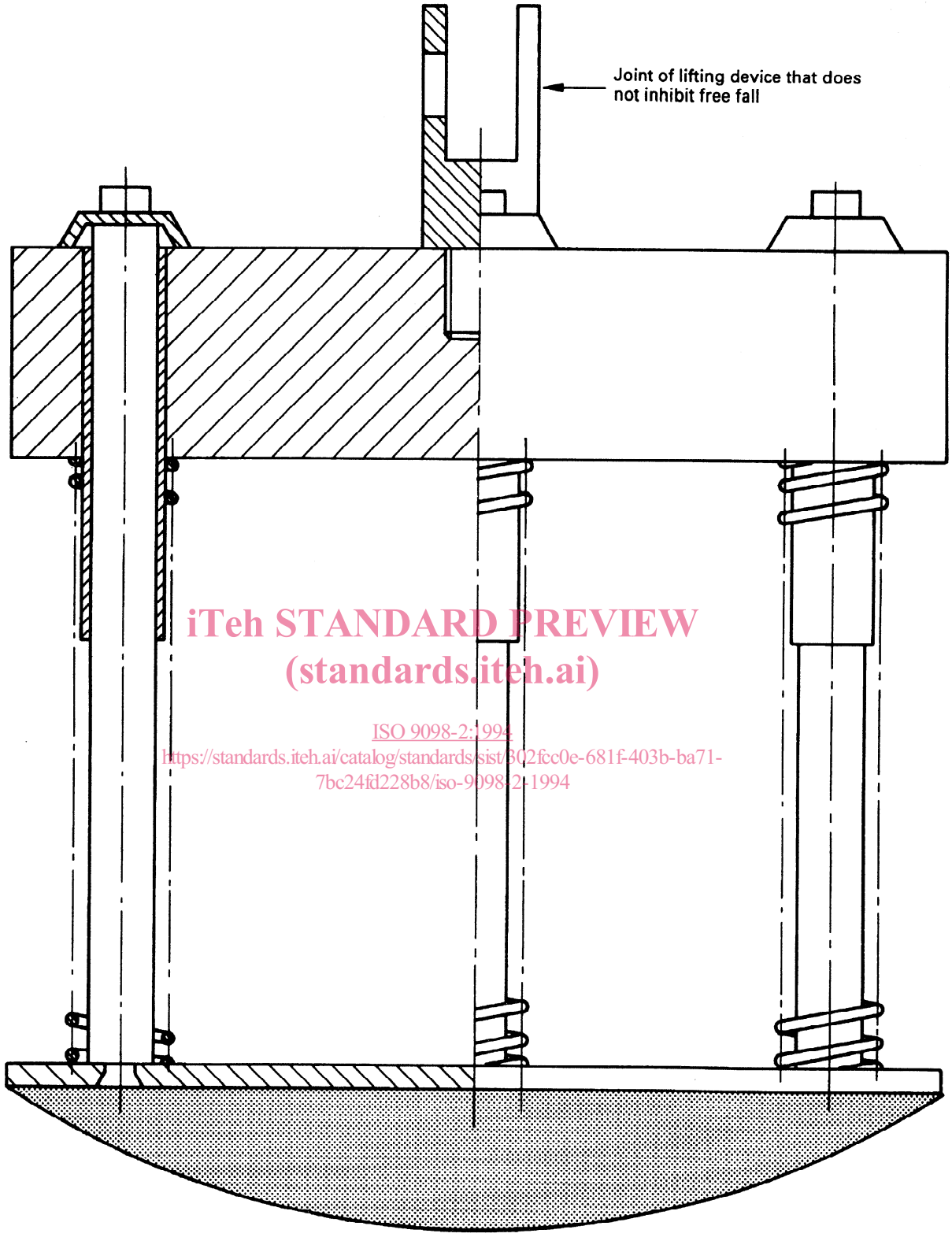

Figure 2 — Bed base impacter

4.2.2 Springs, which shall be such that the combined spring system has a nominal spring rate of (6,9 ± 1) N/mm and the total friction resistance of the moving parts is between 0,25 N and 0,45 N.

The spring system shall be compressed to an initial load of (1 040 ± 5) N (measured statically) and the amount of spring compression movement available from the initial compression point to the point where the springs become fully closed shall be not less than 60 mm.

4.2.3 Striking surface, approximately flat leather pad containing fine dry sand.

4.3 Loading pad, 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 front edge radius (see figure 3).

Dimensions in millimetres

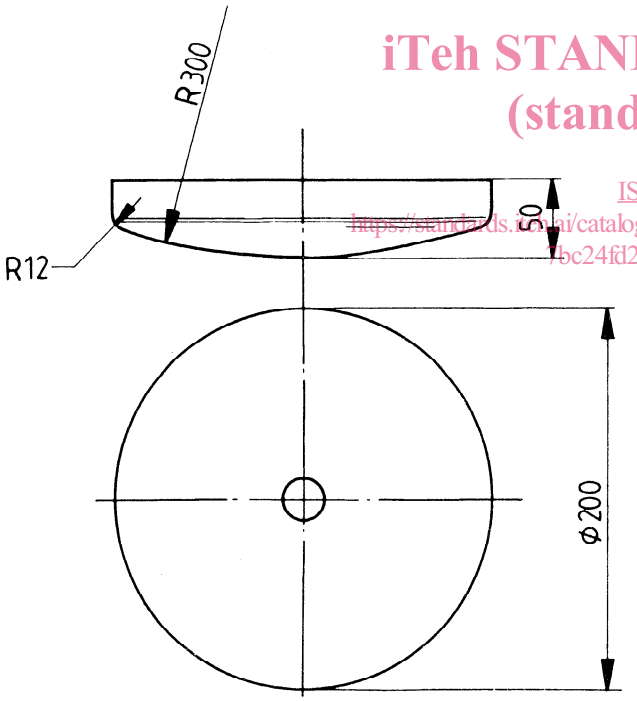

Figure 3 — Details of loading pad

4.4 Test mattress, a soft polyether foam sheet with a thickness of 100 mm, a bulk density of (30 ± 2) kg/m^3 and an indentation hardness index of (170 ± 20) A 40, in accordance with ISO 2439, with dimensions approximately the same as those of the bed base tested. The test mattress shall not have any cover.

The same part of the test mattress should not be reused within 2 h and the mattress should be replaced after 20 tests.

4.5 Test load, a mass of 75 kg distributed over an area of approximately 300 mm × 300 mm or a diameter of approximately 340 mm.

4.6 Stops to prevent the bed from sliding but not from tilting, no higher than 12 mm except in cases where the design of the bed necessitates the use of higher stops, in which case the lowest that will prevent the bed from moving shall be used.

4.7 Floor surface that is horizontal and flat.

4.8 Tread impacter as shown in figure 8.

5 Test procedures

5.1 Assembly and inspection before test

Assemble the bed in accordance with the manufacturer's instructions. Prior to the test, inspect the bed visually for defects.

5.2 Inspection of workmanship

Inspect the specimen to determine whether exposed edges, screws, bolts, zips and other fittings are rounded or chamfered, and free of burr and sharp edges.

5.3 Measuring clearance between side slats and between bed base and sides (safety barriers)

Check all gaps specified in ISO 9098-1, as follows:

ISO 9098-1:1994, subclause	Loaded/unloaded	Test equipment
4.3	loaded	60 mm and 75 mm cones
	unloaded	appropriate gauges
4.5	loaded	25 mm cone
4.6	loaded	60 mm and 75 mm cones
	unloaded	appropriate gauges

For gaps smaller than 25 mm and from 60 mm to 75 mm, one of the measuring cones (4.1) shall be used.

All other gaps shall be measured with appropriate gauges.

When carrying out the cone test press the cone into the gap with a force of 100 N. Note whether or not the cone can pass through the gap.

After removal of the force, measure the residual deflection of all components which have been loaded by the cones.

5.4 Strength tests

5.4.1 Positioning of bed

Position the bed on the floor with all legs against stops (4.6).

5.4.2 Static load of safety barriers

Apply a vertical force upwards and a horizontal force both outwards and inwards as specified in ISO 9098-1:1994, subclause 4.3, separately to the centre and to one end of each side. Apply it 10 times at each position.

The loading point shall be 50 mm below the top edge of the structure at each position. The load duration shall be 30 s.

Apply a vertical force of 1 000 N downwards 10 times each for 30 s at the side which appears the weakest. The loading point for applying the force shall be at the top of the safety barrier located 250 mm from the intersection point of the centrelines of the adjacent side and end slats.

Record any fracture or deformation or any other damage.

5.4.3 Upwards and downwards static loads on bed base

Place the test mattress (4.4) flat on the bed base.

Apply a vertical force of 1 000 N downwards using the loading pad shown in figure 3. Apply the load 10 times at any point on the bed base where failure is considered likely to occur.

Apply a vertical force of 500 N upwards for four periods of 30 s, using the loading pad shown in figure 3. The point of application shall be the most adverse position.

5.4.4 Impact load of bed base

Place the test mattress (4.4) flat on the bed base.

The impacts shall be made at the following positions (see figure 4):

a) the centre of the bed base (point a);

b) one-third along the longitudinal axis from the middle (point b);

c) the point opposite b (point c);

d) a point 200 mm in, measured from the adjacent edges (point d);

e) any place where the bed base appears weakest.

Drop the impacter (4.2) 10 times from a distance of 180 mm above the bed base onto the test mattress at each of the selected positions of impact (see figure 4). The impacter shall be permitted to fall freely but guided by a guide rail.

Remove the test mattress and examine the specimen to determine if parts of the bed base are broken or if the base has loosened from its fastenings.

This test should be carried out both at the upper and the lower bed if the constructions differ.

5.4.5 Durability test on bed base

Place the test mattress (4.4) flat on the bed base.

Apply a vertical force of 1 000 N downwards using the loading pad (4.3). Apply the load 10 000 times at each of the two positions shown in figure 5 at a rate of not more than 24 loads per minute.

Dimensions in millimetres

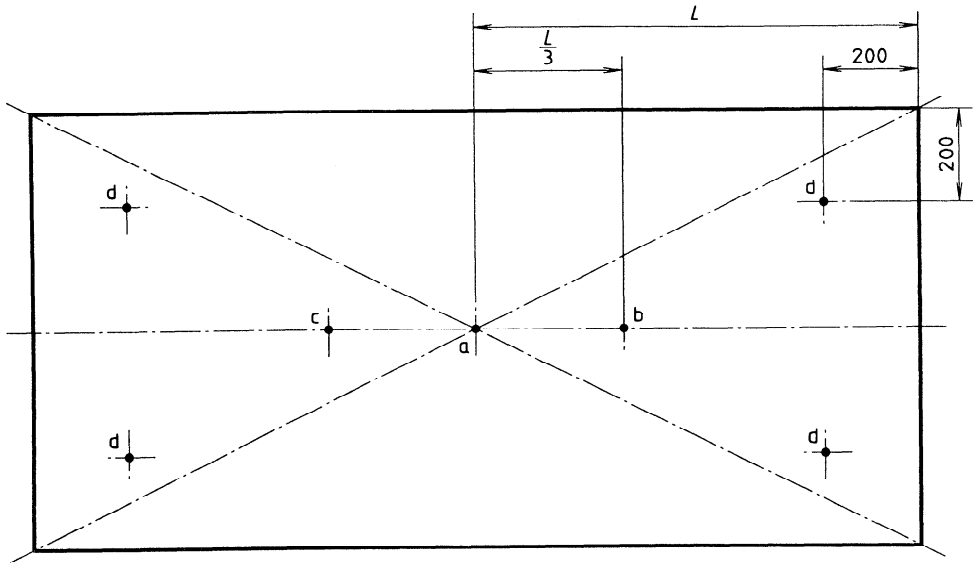

Figure 4 — Position of impacts

Dimensions in millimetres

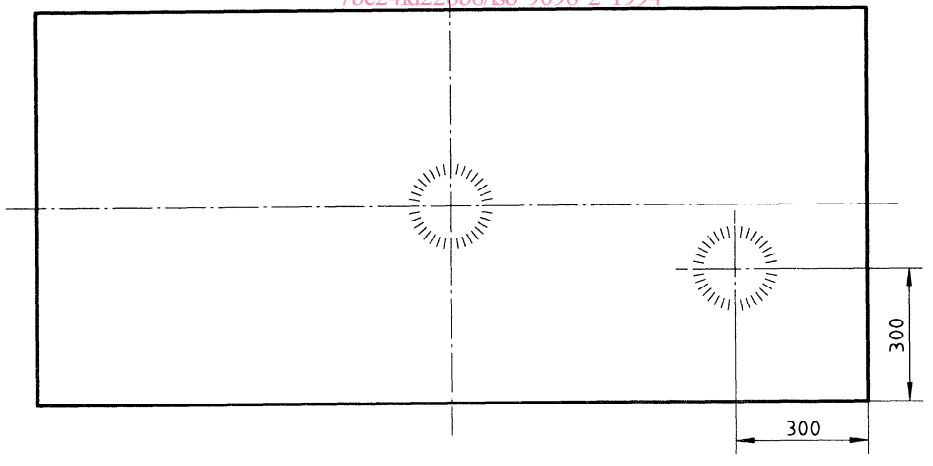

Figure 5 — Position of loadings

5.5 Durability test of frame and fastenings

Position the test load (4.5) at the centre of the base of the upper bed.

The points for applying the test force (A-B-C-D in figure 6) are located at 50 mm from the centre of the junction at the height of the upper bed base.

Apply an alternating force of 300 N for 10 000 cycles (see figure 6) at each point in the order A - B - C - D or A - B followed by C - D, at a rate of not more than 24 loads per minute.

Apply the forces in each direction as specified in ISO 9098-1. After the applications, examine the frame and fastenings and note if they have been damaged in any way or detached, and check the function of the fastenings.

5.6 Ladder

5.6.1 Attachment and deflection

Position the bed on the floor with all legs against stops (4.6).

The vertical components of the ladder shall not be blocked.

Apply a 1 000 N load vertically downwards to the centre of the middle tread or, in a case of an equal number, 500 N to each of the two middle treads.

Apply horizontal static loads as specified in ISO 9098-1 in the order shown in figure 7, one after the other. The load duration shall be 60 s.

The loads shall be applied to the vertical slats at the height of the top tread or if this is not possible just above the top tread (the uppermost horizontal ladder component).

Examine the attachments for deflection as specified in ISO 9098-1:1994, subclause 4.6.1.

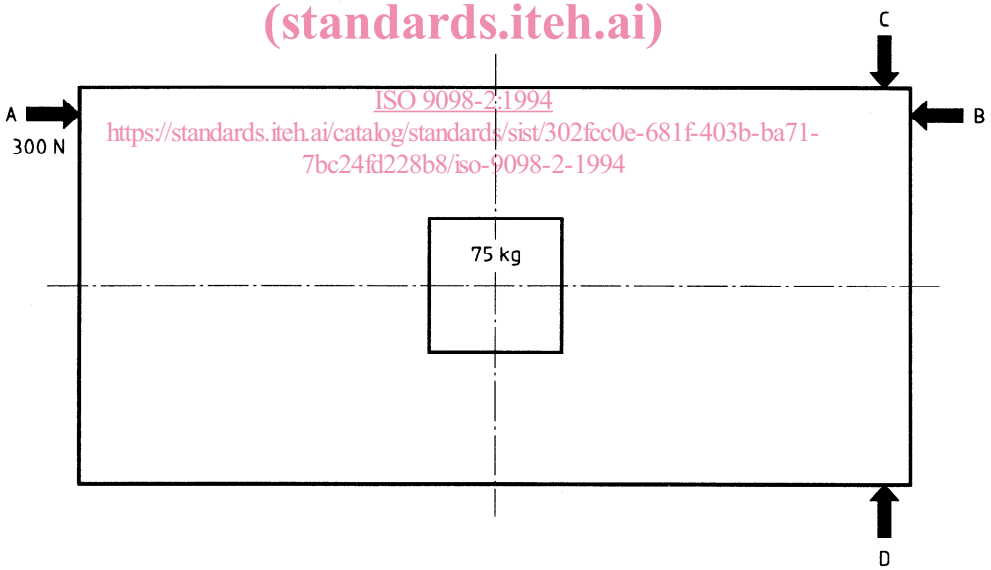

Figure 6 — Application of load and forces