BRITISH STANDARD

BS EN
1728:2001

Domestic furniture — Seating — Test methods for the determination of strength and durability

The European Standard EN 1728:2000 has the status of a British Standard

ICS 97.140

National foreword

This British Standard is the official English language version of EN 1728:2000. It partially supersedes BS 4875-1:1985 and BS 4875-3:1985 which will be withdrawn and revised.

The UK participation in its preparation was entrusted to Technical Committee FW/2, Domestic and contract furniture, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 33 and a back cover.

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Domestic furniture - Seating - Test methods for the determination of strength and durability

Mobilier domestique - Sièges - Méthodes d'essais pour la détermination de la résistance et la durabilité de la structure

Möbel für den Wohnbereich - Sitzmöbel - Prüfverfahren zur Bestimmung der Festigkeit und Dauerhaltbarkeit

This European Standard was approved by CEN on 6 May 1999.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 207, Furniture, the Secretariat of which is held by IBN.

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of an identical text or by endorsement, at the latest by June 2001, and conflicting national standards shall be withdrawn at the latest by June 2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies test methods for determining the strength and durability of the structure of all types of indoor domestic seating for adults without regard to materials, design/construction or manufacturing processes.

Test methods for the assessment of ageing and degradation are not included. The tests are not intended to assess the durability of upholstery materials, such as upholstery filling materials and upholstery covers, nor are they intended to assess the durability of mechanisms, such as those used in convertible sofa beds and reclining and tilting chairs.

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

Not all tests are necessarily applicable to all types of seating.

The European Standard does not include any requirements. Safety requirements are specified in EN 12520.

2 References

2.1 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 to this draft European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1335-3 Office furniture - Office work chair: Part 3: Safety test methods.

ISO 48 Rubber, vulcanized of thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD).

ISO 2439 Polymeric materials, cellular flexible - Determination of hardness (indentation technique).

2.2 Informative references

EN 12520 Domestic furniture - Seating - Mechanical and structural safety requirements.

3 Definitions

For the purposes of this European Standard, the following definitions apply.

3.1 Static tests: tests consisting of heavy loads being applied a few times to ensure that the furniture has sufficient strength under the highest levels of loading that might reasonably be expected to occur

3.2 Impact tests: tests to assess the strength of the article under shock loading that might reasonably be expected to occur

3.3 Fatigue tests: tests simulating the repeated application of loads or movement of components occurring during long-term functional use

3.4 Structure: load bearing parts of furniture such as the frame, seat, back and arm supports and suspension

3.5 Leg rest: extension of the seat area intended to support the legs of the sitter. A leg rest may or may not be permanently attached to the seat

3.6 Foot rest: part intended to support the feet of the sitter. A foot rest may or may not be permanently attached to the structure of the seating

3.7 Foot rail: horizontal bar or rung intended as an occasional support for the feet or to assist getting on and off a high chair or stool. A foot rail may be a part of the structure of the underframe of a chair or stool

4 General test conditions

4.1 Preliminary preparation

Before any of the tests are commenced, the item 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 timber and the like.

The furniture shall be tested as delivered. Knock-down furniture shall be assembled according to the instructions supplied with it. If the furniture 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. Further tightening shall not take place unless specifically required by the manufacturer.

The sample for test shall be stored in indoor ambient conditions for at least one week immediately prior to testing; any deviation from this procedure shall be recorded in the test report.

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

4.2 Application of forces

The test forces in durability and static load tests shall be applied sufficiently slowly to ensure that negligible dynamic load is applied. The forces in fatigue tests shall be applied sufficiently slowly to ensure that kinetic heating does not occur.

Unless otherwise stated static loads shall be maintained for 10 s ± 2 s. Unless otherwise stated fatigue loads shall be maintained for 2 s ± 1 s.

4.3 Determination of seat and back loading points

The seat and back loading points shall be determined using the template as specified in 5.2 in the manner specified in 4.3.1 or 4.3.2. In some cases it may not be possible to determine the loading points by means of the template. In such cases, points 175 mm forward of the seat/back junction and 300 mm upward from the seat/back junction, shall be used.

If the number of seats in the article is not obvious, divide the total seat length (in mm) by 600 mm and round to the nearest whole number to determine the number of seats. Divide the total seat length into seats of equal length.

4.3.1 Chairs and settees

Position the template (5.2) with its load applied at the seat loading point on the centre-line of the seat as far towards the rear as possible. Adjust its position by pushing the back loading portion into the back, so

levering the seat portion forwards until the shape of the template correlates with that of the seat [see Figure 1a)]. In cases where the template can be settled in more than one position, the position having the smallest angle between the seat and back portions of the template shall be used. The angle shall in no cases be less than 90°. Mark the required loading positions from the template. If relevant repeat the procedures on the other seat(s).

4.3.2 Stools and benches

Set up the template (5.2) at 90° with the aid of the mark as shown in Figure 3. Place it on each seating position as shown in Figure 1a). Mark the required loading point from the template.

4.4 Determination of back angle

The angle of inclination of the back from the horizontal (∅) shall be measured by determining the slope of the straight edge of the relevant portion of the seat loading point template when it is correctly positioned [see Figure 1b)].

4.5 Tolerances

For tolerances, unless otherwise stated:

- all forces shall have an accuracy of ±5 % of the nominal force;
- all masses an accuracy of ±0,5 % of the nominal mass;
- all dimensions an accuracy of ±1,0 mm of the nominal dimension;
- all angles an accuracy of ±2°.

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

5 Test equipment and apparatus

5.1 General The tests may be applied by any suitable device because results are dependent only upon correctly applied loads and not upon the apparatus, except in the case of impact tests where the apparatus described in 5.12 and 5.13 shall be used and the arm fatigue test where the apparatus described in 5.14 shall be used.

The seat loading apparatus shall be such as not to restrain the chair from tilting rearwards nor hinder horizontal movement of the chair when the back load is applied.

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

5.2 Loading position template, (see Figure 2 and Figure 3) consisting of two shaped members fastened together by a pivot at one end. The contours of the shaped surfaces are so devised as to sink into the upholstery. For this purpose the seat loading arm shall have a total mass of 20 kg, applied through the seat loading point.

The apparatus is marked as shown in Figure 3.

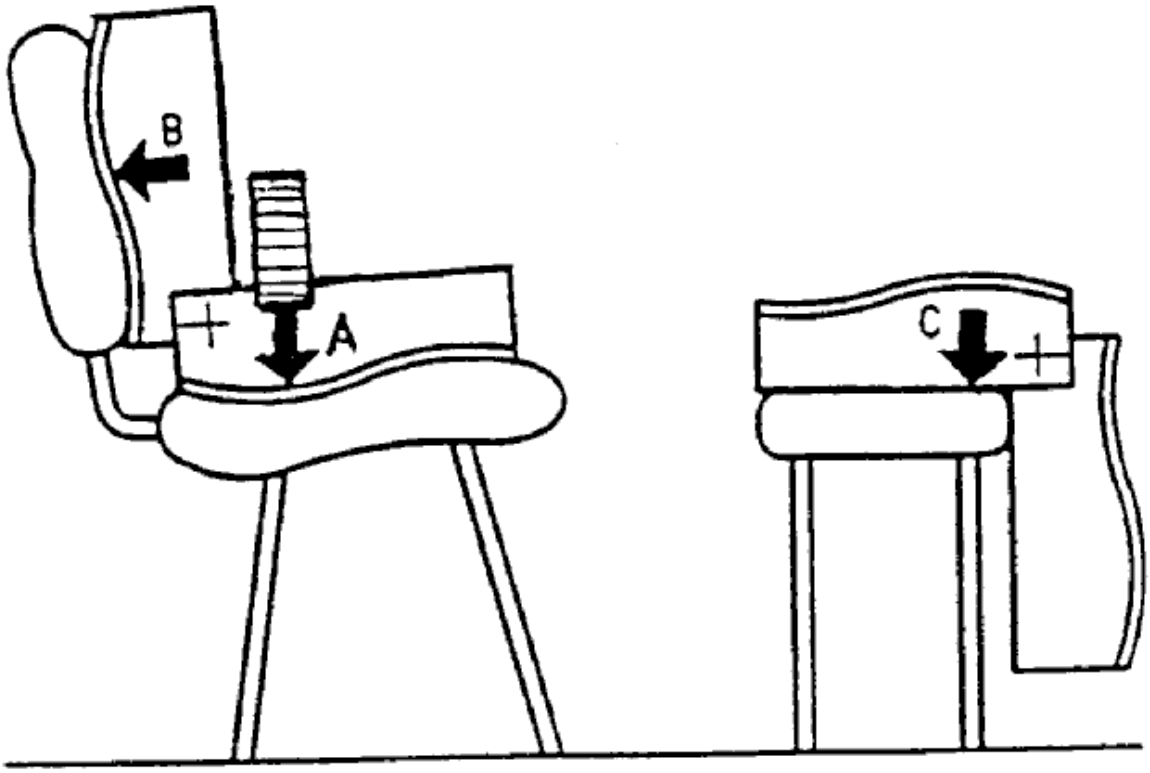


Figure 1a) — Position of loading point template

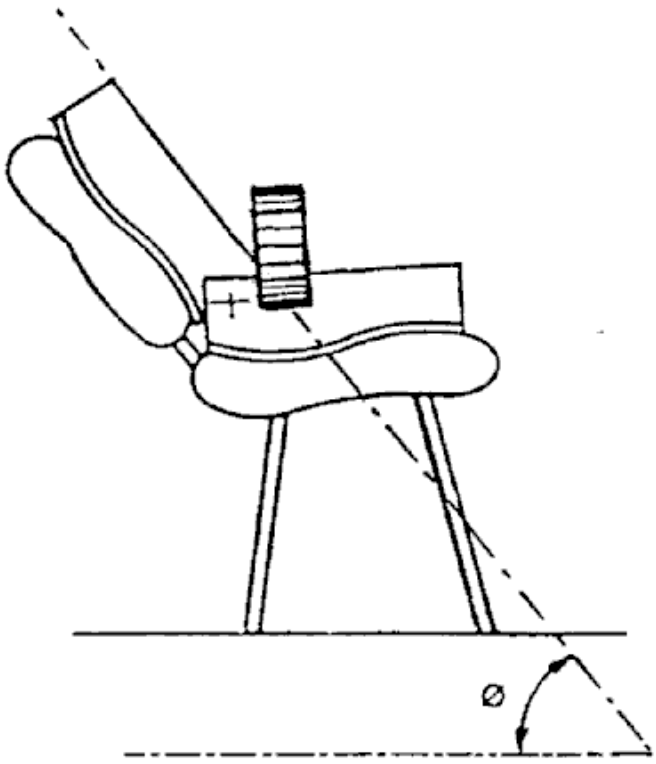
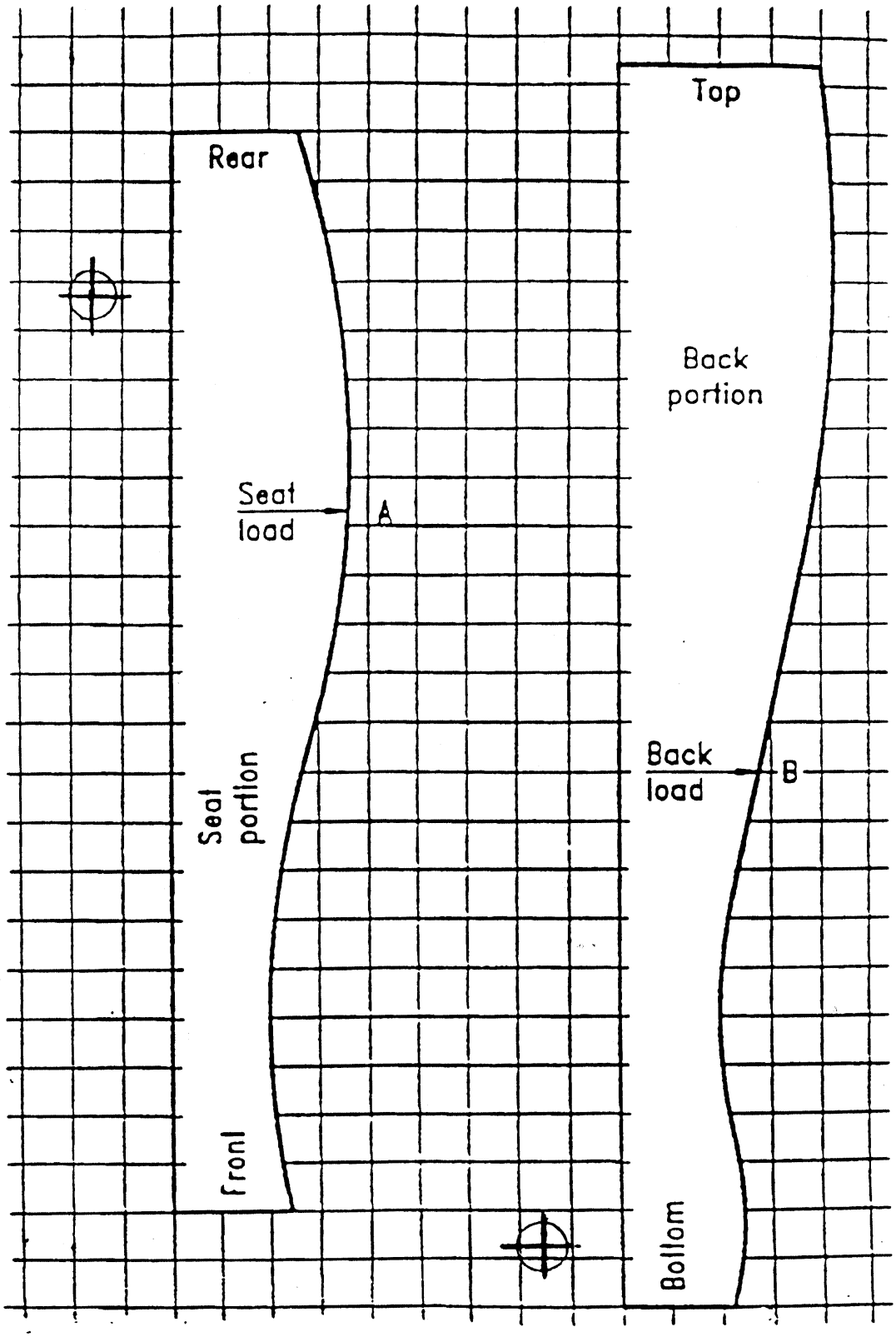


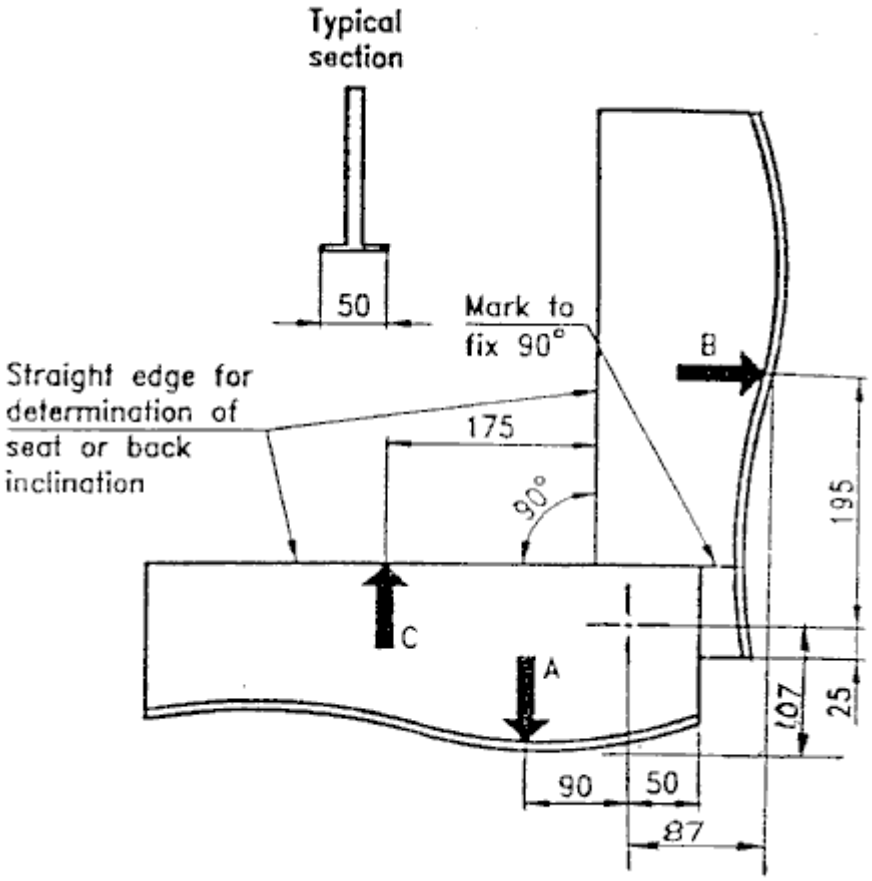
Figure 1b) — Determination of back angle (∅)



Scale: 1 square = 20 mm

Figure 2 — Loading surface curves for seat and back loading point template

All dimensions are in millimetres



A = Seat load (chairs)
B = Back load (chairs)
C = Seat load (stools)

Figure 3 — Loading point template

So that the template can be positioned easily with the two members at 90° to each other, a line is drawn on the back portion.

Loading points A and B correspond to those points on a chair being 175 mm forward of the seat and back intersection point on the seat and 300 mm upward from the seat and back intersection point on the back.

Loading point C corresponds to the point on a stool as 175 mm from one edge.

5.3 **Floor**, horizontal, flat and rigid with a smooth surface. For the drop test (6.18) a rubber mat 2 mm thick, with hardness 85 IRHD ± 5 IRHD according to ISO 48, shall be used on a concrete floor.

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

5.5 **Seat loading pad**, naturalistically shaped rigid indenter with a hard, smooth surface having overall dimensions within the limits shown in Figure 4.

Two examples are shown in Annex A.

5.6 Smaller seat loading pad, 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 5).

5.7 Back loading pad, 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 radius on all front edges (see Figure 6).

5.8 Local loading pad (i.e. for arm and leg loading tests), rigid cylindrical object 100 mm in diameter, with a flat face and a 12 mm edge radius.

5.9 Foam for use with loading pads, 25 mm thick layer of polyether foam with a hardness index according to ISO 2439, method A, of 1 100 N ± 100 N.

For the use of the foam in the seat impact test, see 6.14.

5.10 Double seat loading device, two loading pads as specified in 5.5. The distance between the pads shall be adjustable so that the centres can be sited over the seat loading positions on two adjacent seats of any size of multiple seating.

5.11 Double back loading device, two loading pads as specified in 5.7. The distance between the pads shall be adjustable so that the centres can be sited over the back loading positions on two adjacent seats of any size of multiple seating.

All dimensions are in millimetres

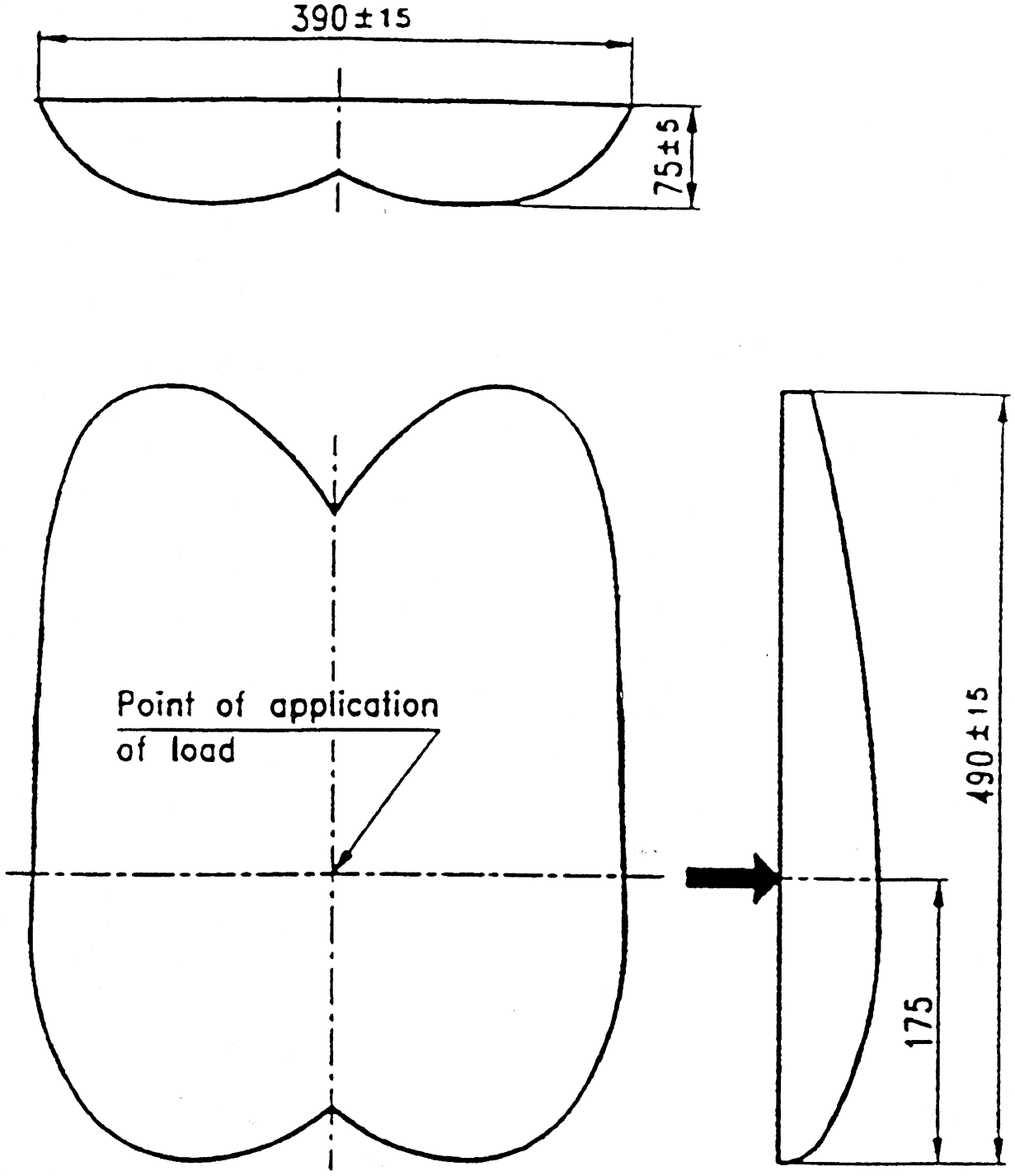


Figure 4 — Seat loading pad — Overall dimensions

All dimensions are in millimetres

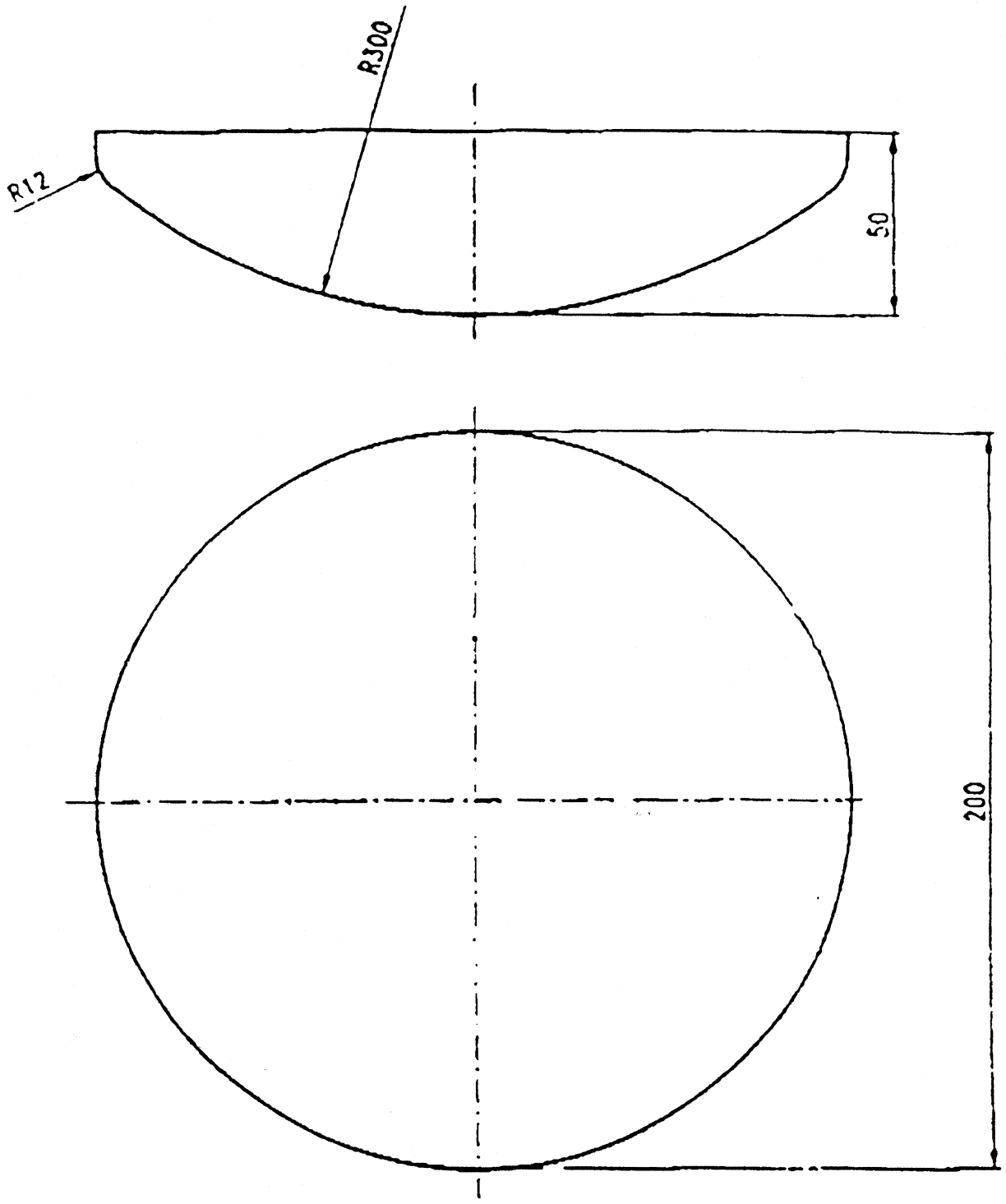


Figure 5 — Smaller seat loading pad

All dimensions are in millimetres

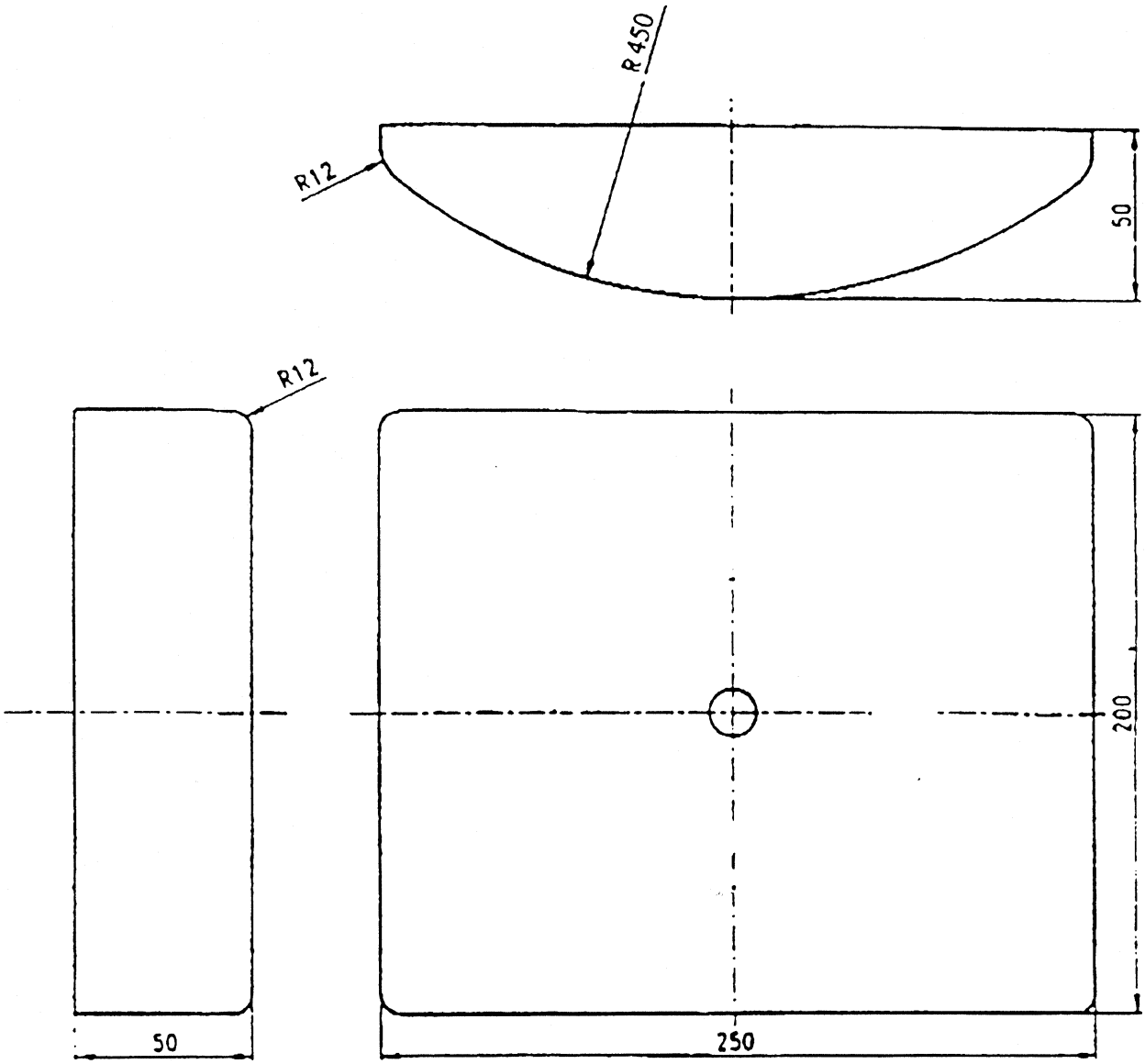


Figure 6 — Back loading pad

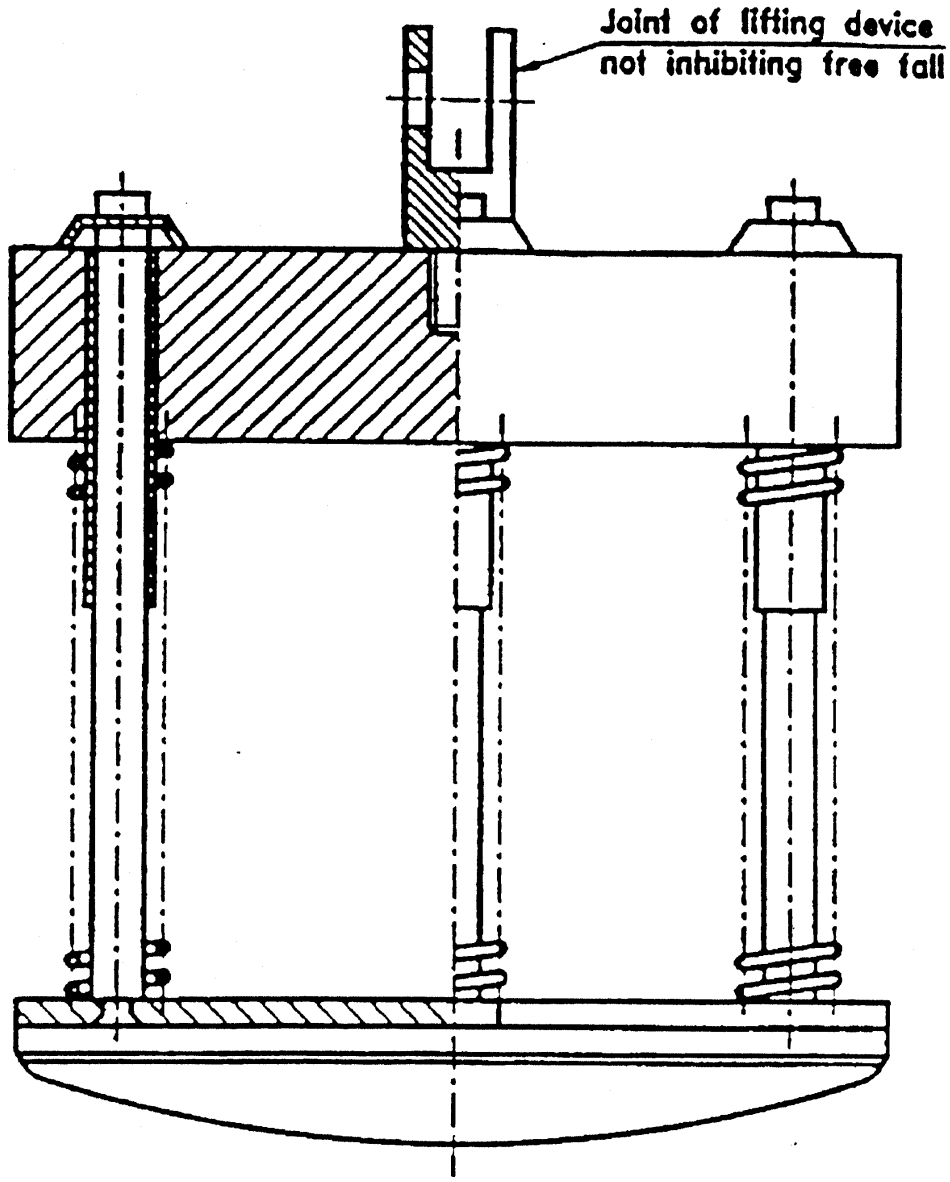


Figure 7 — Impactor

5.12 Seat impactor

5.12.1 The seat impactor is shown in Figure 7.

5.12.2 Circular body, 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 kg ± 0,1 kg and the whole apparatus, including mass, springs and striking surface, shall have a mass of 25 kg ± 0,1 kg.

5.12.3 Springs, which shall be such that the combined spring system has a nominal spring rate of 6,9 N/mm ± 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 N± 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.

5.12.4 Striking surface, shall be 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.

5.13 Impact hammer, cylindrical pendulum head having a mass of 6,5 kg, supported from a pivot by a cold drawn seamless steel tube of 38 mm in diameter and with a wall thickness of 2,0 mm. The distance between the pivot and the centre of gravity of the pendulum head shall be 1 m. The pendulum arm shall be pivoted by a low friction bearing. (See Figure 9.)

5.14 Arm fatigue test apparatus, apparatus capable of applying a cyclic load simultaneously to both arms of a seat. The loads shall be applied through an arm loading device constructed as shown in Figure 8 or through the arm loading device specified in EN 1335-3.

The apparatus shall be capable of applying the test loads at varying angles to the vertical by means of low friction pivots which can be adjusted both vertically and horizontally in relation to the arms of the seats and then locked in position (see Figure 13).

All dimensions are in millimetres

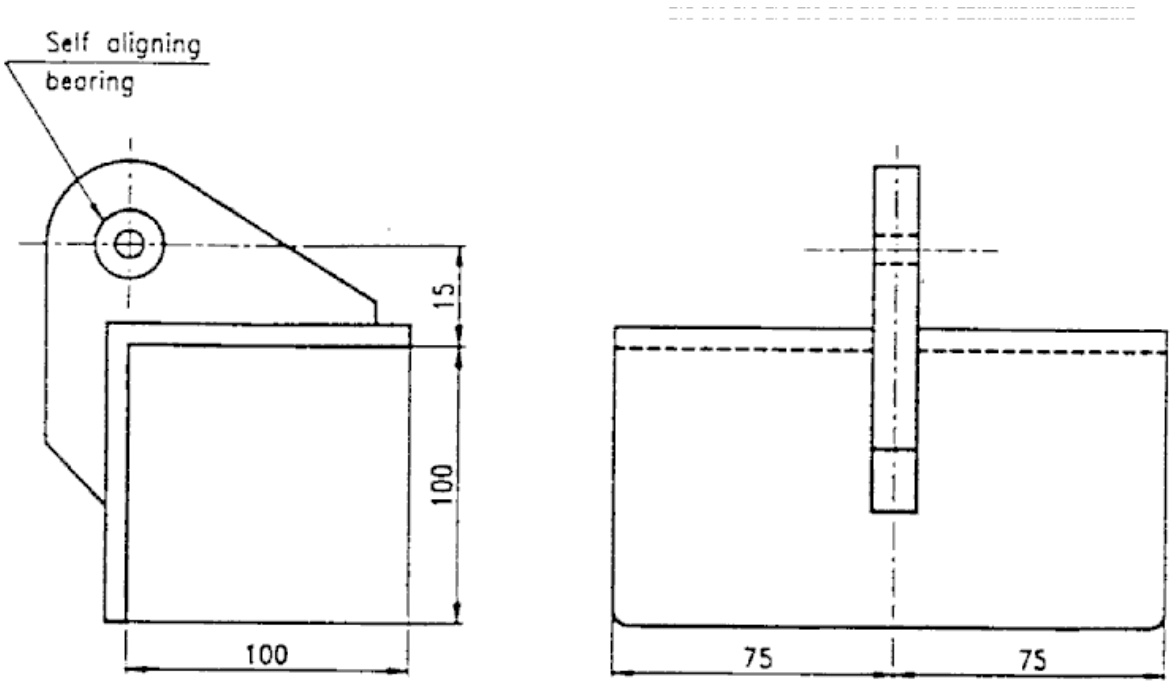
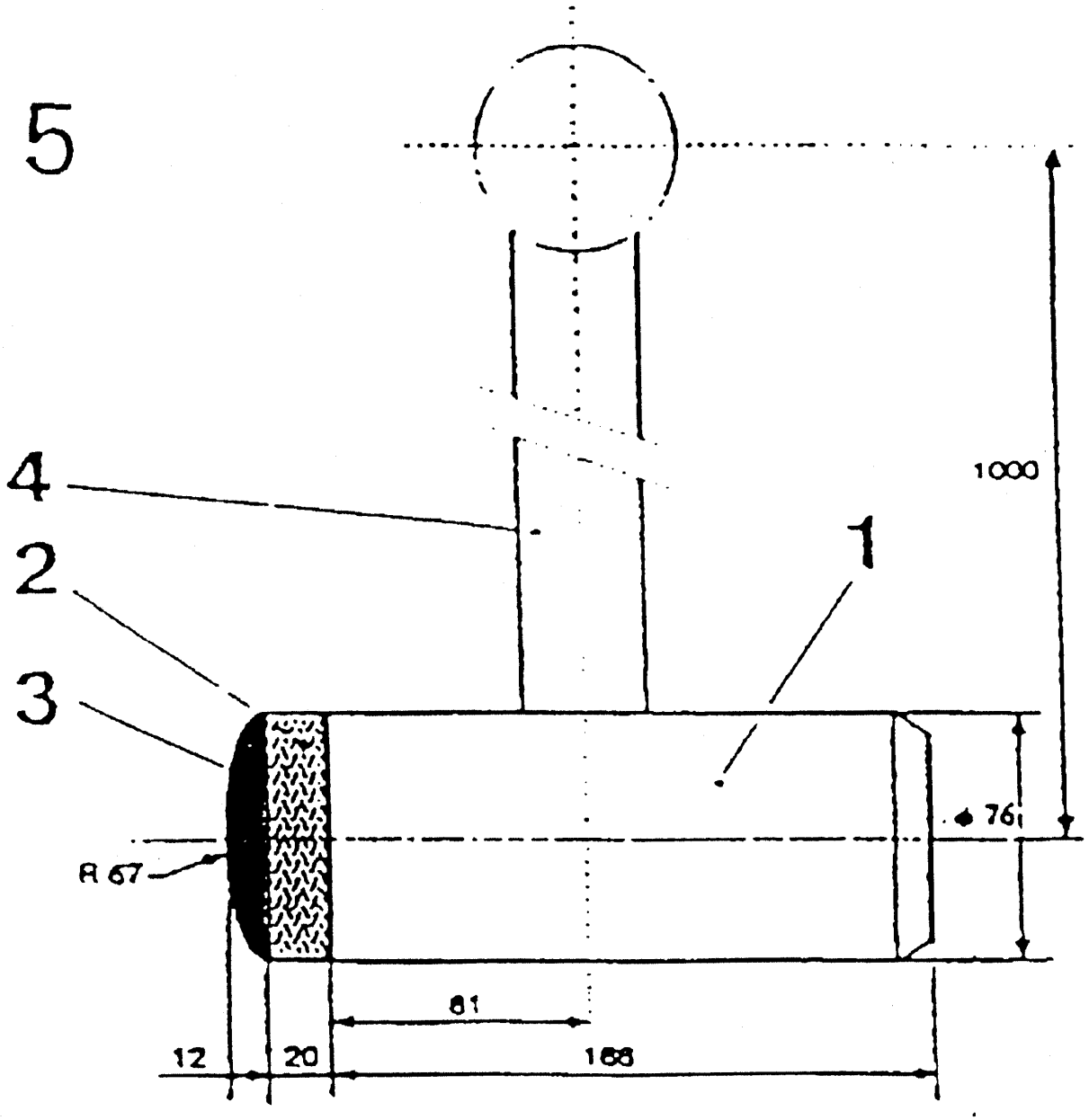


Figure 8 — Arm fatigue test — Arm loading device

All dimensions are in millimetres



1 Pendulum head, steel mass 6,4 kg

2 Hard wood

3 Rubber 50 IRHD

4 Pendulum arm, length 950; high tensile steel tube ∅ 38 × 2; mass 2 kg ± 0,2 kg

5 Height adjustment

Mass of assembly 1 + 2 + 3 = 6,5 kg ± 0,07 kg.

Figure 9 — Impact hammer

6 Test procedures

6.1 General

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

Except in the case of test 6.15 a layer of foam (5.9) shall be positioned between the loading pads and the test structure.

6.2 Seat and back static load test

6.2.1 The seat and back static load test is shown in Figure 10.

All adjustable backs shall be set in their most upright position. Seating with adjustable backs that cannot be raised to an angle of inclination of more than 70° to the horizontal shall be tested as specified in 6.3.1 or 6.3.2.

Position the seat loading pad (5.5) or double seat loading device (5.10) at the seat loading position(s) determined by the loading position template (4.3). Using the seat loading pad or the double seat loading pad, carry out the test at the following positions:

a) on the seat of an article with a single seat;
b) simultaneously on both positions for articles with two seats;
c) simultaneously on one end position and the centre position for articles with three seats;
d) simultaneously on two adjacent end positions followed by two adjacent centre positions for articles with four seats or more.

During the test, load the seat(s) that are not being tested with 750 N applied at the seat loading position. The load(s) may consist of 75 kg mass(es).

Prevent the article from moving rearwards by placing stops behind the rear legs, feet or castors. If the article has a back, position the centres of the back loading pad(s) [single (5.7) or double back loading device (5.11)], either at the back loading position as determined by the loading position template or at 100 mm below the top of the back, whichever is the lower.

Apply the specified downward force (W) per pad to the seats [see a), b), c), d) above].

With the force maintained, apply the appropriate back force per pad, perpendicular to the back when fully loaded.

If the article tends to overturn, reduce the back force to a magnitude that just prevents rearwards overturning. The back static force shall not be reduced below 410 N. If the article tends to overbalance at this force, the force applied to the seat shall be increased until this tendency ceases.

Report the force used.

Remove the back load and then the seat load.

Repeat for 10 cycles.

When this test is applied to a stool or bench without a backrest, or with a very low back, apply the rearward force horizontally to the front edge of the seat.

Regardless of the shape of the seat for stools with rectangular underframes, apply the force perpendicular to each of two adjacent sides in turn, half the number of applications of the force being applied to each side. For stools with triangular underframes, apply the force along each of any two median lines in turn.

When this test is applied to a chair fitted with a spring rocking action base or tilting mechanism that has a tension adjustment, increase the tension so that the least possible rocking/tilting movement is obtained during the test.

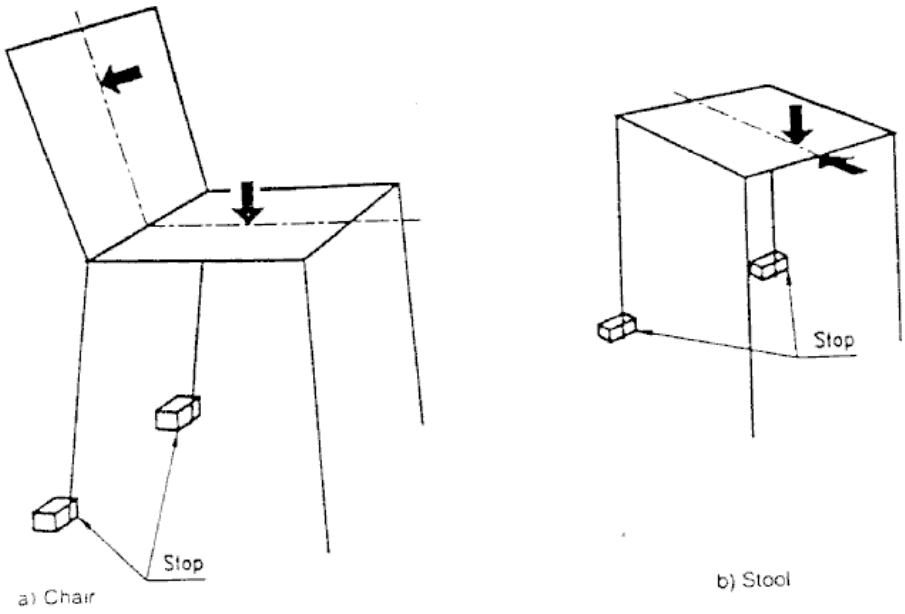


Figure 10 — Seat and back static load test

6.2.2 Seat front edge static load

Repeat the seat static load procedure on a point, 80 mm back from the front edge of the structure using the seat load only. Apply the load at the most adverse position on the seat centre-line or as near one side of the seat as possible, but not less than 80 mm from that edge of the structure.

6.3 Additional seat and back static load test for tilting chairs, reclining chairs and loungers

One of the following additional tests are required for seating with backs which are not always upright (i.e. chairs with backs that may have of an angle of inclination of 70°* or less to the horizontal, see 4.4).
(*See 6.3.1.)

6.3.1 Additional static load test for tilting chairs and intermediate reclining chairs

All seating having a minimum back inclination Ø [see Figure 1b)] of 55° or more to the horizontal shall be additionally tested as described in 6.1 except that the chair shall be set so that the loads are applied when the value of Ø is minimum ($Ø_{min}$). The seat load shall be $W \cdot \mathrm{Sin} \cdot (Ø_{min})$ and the back load shall be $\left[\left(\frac{Ø_{min}}{60°}\right) - 0{,}166\,6\right] W \cdot \mathrm{Cos} \cdot Ø_{min}$, (see note), (where W = specified seat load, see 6.2). Ø is in degrees.

NOTE: These values are only correct for a ratio of back load to seat load of:

$$\text{back load} = 0{,}347\,W \quad \left(\text{i.e. } \frac{330\,W}{950}\right)$$

6.3.2 Additional static load test for fully reclining chairs

All seating having a minimum back inclination of 55° or less to the horizontal shall be additionally tested as described in 6.3.1, except that the seat load shall be 0,75 *W* and the back load shall be 0,75 $W \cdot \mathrm{Cos} \cdot Ø_{min}$, (where *W* = specified seat load, see 6.2).

6.4 Foot rail/foot rest and leg rest static load test

Apply the specified downward force to the seat at the seat loading point.

Using the smaller seat loading pad (5.6) or the local loading pad (5.8) apply the specified force 80 mm in from the periphery of a foot rest or leg rest or on the centre-line of a foot rail at any point likely to cause failure. Apply the force for a total of 10 times.

If the article tends to overturn, reduce the force to a magnitude that just prevents overturning. Report the actual force used.

6.5 Arm and wing sideways static load test

Apply an outward force as specified to each arm of the unit simultaneously at the point along the arms most likely to cause failure, but not less than 100 mm from either end of the arm structure, (see Figure 11). Apply the forces 10 times, using the local loading pad (5.8). If the chair has wings, i.e. two side pieces at the top of an armchair against which the head may be rested, repeat the test on both wings.

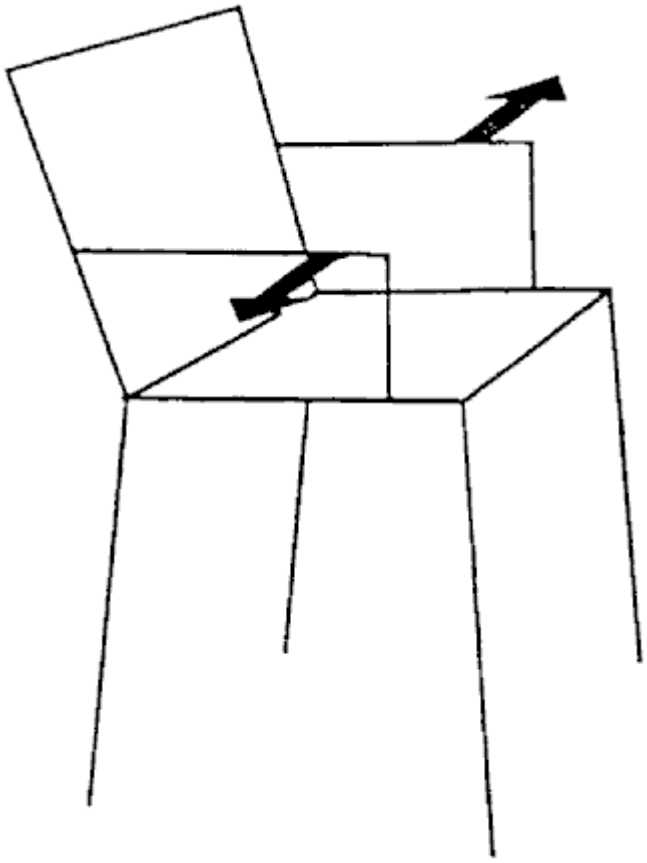


Figure 11 — Arm and wing sideways static load test

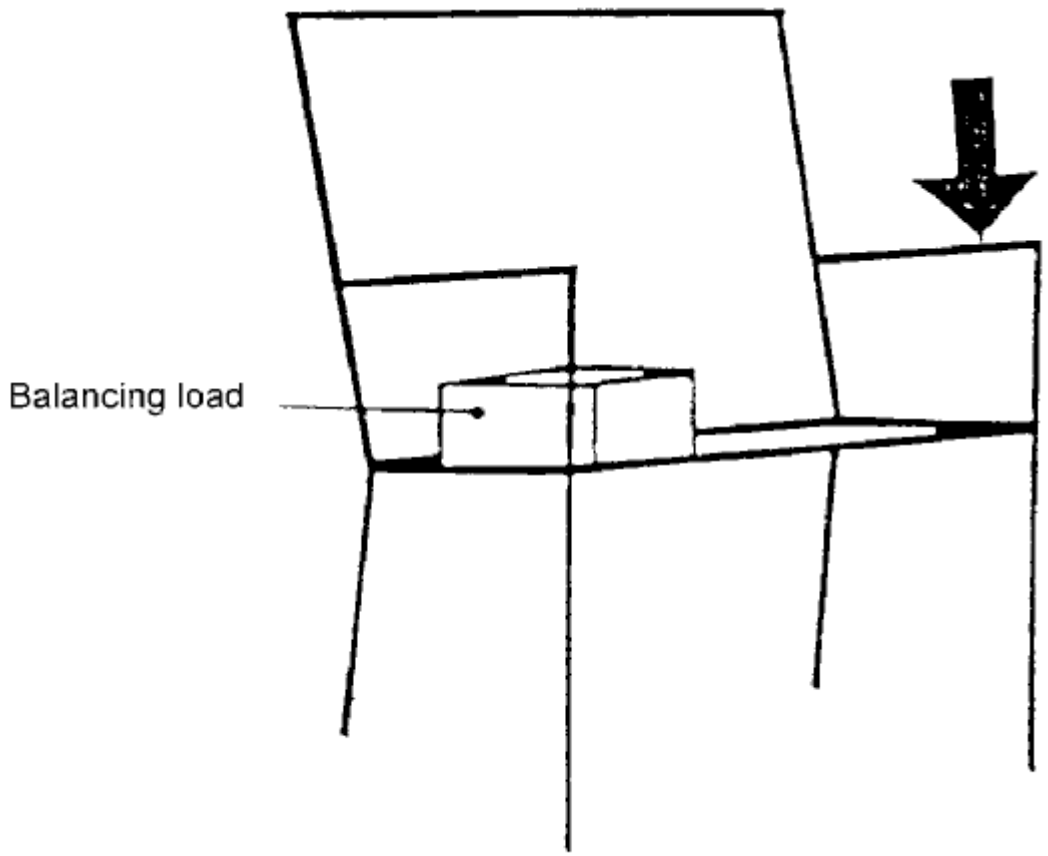


Figure 12 — Arm downward static load test

6.6 Arm downwards static load test

Apply the specified vertical force 10 times at the points along one arm most likely to cause failure (see Figure 12), but not less than 100 mm from either end of the arm structure.

Apply the load through the smaller seat loading pad (5.6) or the local loading pad (5.8).

If the chair overbalances, apply a load on the side of the seat opposite to the arm under test large enough to prevent the chair from overbalancing.

6.7 Combined seat and back fatigue test

For chairs with adjustable back angles, see 6.9.

Carry out the test at one position or consecutively at two positions as specified in a), b), or c) below:

a) on one seat for articles with one or two seats;

b) on one end seat and the centre seat and back for articles with three seats;

c) on one end seat and one of the centre pair of seats and backs for articles with four seats or more.

During the test, load the seat(s) that are not being tested with 750 N applied at the seat loading point. The load may consist of 75 kg mass(es).

Position the seat loading pad (5.5) at the seat loading position determined by the loading position template (4.3).

Position the centre of the back loading pad (5.7), either at the back loading position as determined by the loading position template or at 100 mm below the top of the back, whichever is the lower. Prevent the article from moving rearwards by placing stops behind the rear feet or castors.

Apply the specified force (*F*) to the seat loading pad [see a), b), c) and d) above].

With this force maintained, apply the specified back force perpendicular to the back when under load.

Remove both loads, first the back then the seat. This constitutes one cycle.

Apply the loads for the specified number of cycles.

If the article tends to overturn, reduce the back force to a magnitude that just prevents rearwards overturning. Report the actual force used.

When this test is applied to a stool or bench without a back rest, or with a very low back, apply the rearward force horizontally to the front edge of the bench.

NOTE: For a simplified test procedure the seat and back fatigue test may be performed by carrying out the seat fatigue test followed by the back fatigue test with a static load on the seat.

6.8 Seat front edge fatigue test

Apply the vertical seat fatigue load specified using the local loading pad (5.8) alternately on two points each 80 mm from the front edge of the seat structure and as near as possible to either side of the seat but not less than 80 mm from the edges.

For articles with more than one seating position, the test shall be carried out as above on one end seat and then on intermediate seats as specified in 6.7 but with the fatigue load applied on the centre-line of the front edge.

If the article tends to overturn reduce the force to a magnitude that just prevents overturning. Report the actual force used.

6.9 Seat and back fatigue test for tilting chairs, reclining chairs and loungers

One of the following tests are required for seating with backs which can have an angle of inclination of 70°* or less to the horizontal, (see 4.4).
(*See 6.9.1.)

When the back has an upright position (i.e. angle of inclination Ø can be greater than 70°) half the number of combined seat and back fatigue test cycles shall be carried out in the most upright position. The remaining half of the fatigue cycles shall be applied using the appropriate test procedure (see 6.9.1 or 6.9.2) with the chair adjusted so that the angle of inclination Ø is as small as possible.

When the back has no upright position the full number of fatigue cycles shall be carried out as specified below in 6.9.1 or 6.9.2.

6.9.1 Fatigue test for tilting chairs and intermediate reclining chairs

All seats having a minimum back inclination (Ø) of 55° or more to the horizontal shall be fatigue tested as described in 6.7 except that the chair shall be set so that the loads are applied when the angle of inclination Ø is minimum ($Ø_{min}$). The seat load shall be $F \cdot \text{Sin}$ ($Ø_{min}$) and the back load shall be $\left[\left(\frac{Ø_{min}}{60°}\right) - 0{,}166\,6\right] F \cdot \text{Cos} \cdot Ø_{min}$, (see note), (where F = specified seat load, see 6.7). Ø is in degrees.

For the appropriate distribution of numbers of cycles, see 6.9.

NOTE: These values are only correct for a ratio of back load to seat load of:

$$\text{back load} = 0{,}347\ F \quad \left(\text{i.e. } \frac{330\ F}{950}\right)$$

6.9.2 Fatigue test for fully reclining chairs

All seats having a minimum back inclination of 55° or less to the horizontal shall be fatigue tested as described in 6.7 except that the chair shall be set so that the loads are applied when the angle of inclination Ø is minimum ($Ø_{min}$). The seat load shall be 0,75 F (see 6.7 for F) and the back load shall be 0,75 $F \cdot \text{Cos}(Ø_{min})$. For the appropriate distribution of numbers of cycles, see 6.9.

6.10 Arm fatigue test

Place the chair on the test floor with stops against the outside of the feet, castors or glides (so as not to prevent inward deflection of the legs under the arm load). The test loads shall be applied simultaneously on two points, 100 mm behind the front edge of the arm rests.

Using the apparatus specified in (5.14) apply a load of 10 N. With this load applied adjust the apparatus so that the load is applied at an angle of 10°± 1° to the vertical and the distance between the friction pivots and the horizontal surface of the arm loading devices is 600 mm ± 10 mm, (see Figure 13). With the apparatus set as above apply the specified load for the required number of cycles to both arms simultaneously for seating with only one seat and to one arm only for seating with more than one seat.

6.11 Leg rest fatigue

Seating equipped with a leg rest (3.5) shall be tested as described in 6.8 except that the loading points shall be 600 mm forward of the seat loading point.

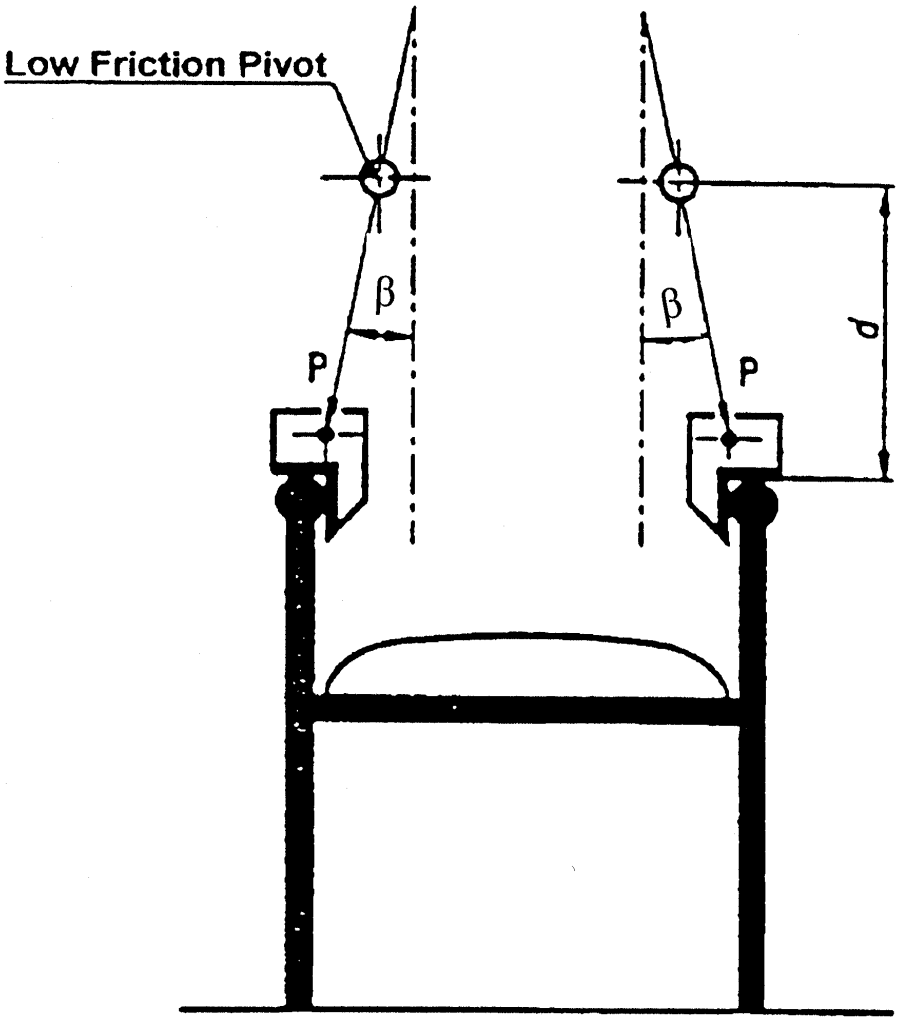
Seating equipped with a leg rest which is only extended when the chair is reclined shall not be fatigue tested.

Foot rests shall not be fatigue tested.

6.12 Leg forward static load test

Apply the specified seat load at the seat loading position determined by the loading position template, (4.3).

Prevent the unit from movement by stops against the front legs. Apply a horizontal force centrally to the rear of the seat at seat level in a forward direction, [see Figure 14a)], by means of the local loading pad (5.8). For stools with only three legs, one front foot and one other foot shall be restrained.



when $P = 10$ N
$\beta = 10° \pm 1°$
$d = 600$ mm ± 10 mm

Figure 13 — Arm fatigue test

If the article tends to overbalance, before the specified load is reached reduce the load to a magnitude that just prevents forward overbalancing, and record the actual force used.

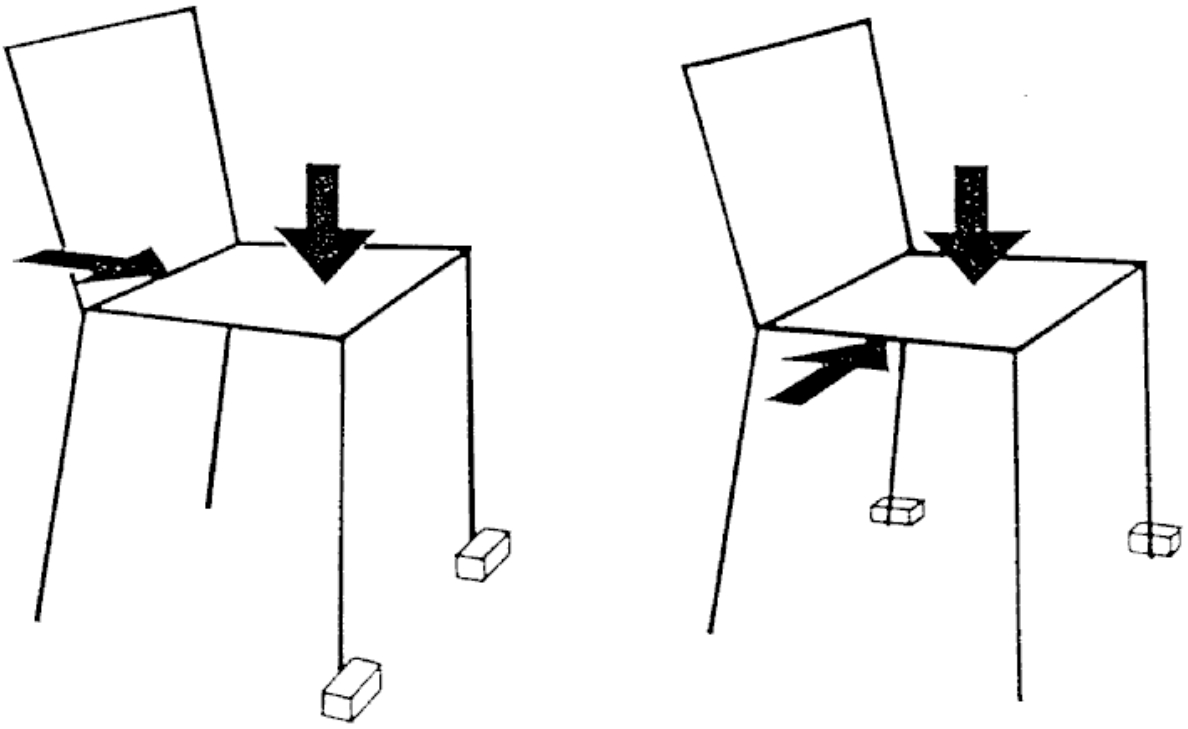
Apply the horizontal forward load 10 times.

NOTE 1: Leg tests are applicable to chairs and stools with legs or pedestals, except for chairs with swivel actions. There are no rearward leg loading tests because proof of strength when subjected to them will have been demonstrated by the back static load test (6.2).

NOTE 2: Similarly, the leg tests are not required for stools without backrests and without an obvious front and rear, because proof of the strength of the stool when subjected to them will have been demonstrated by the back static load test (6.2).

NOTE 3: For stools with backrests and those with seats shaped so that the front and rear of the stool are obvious, the leg tests should be applied as for chairs. Where such a stool has only three legs, one foot on

the fore and aft centre-line of the stool and one other foot shall be provided with stops in the leg forward static load test.



a) Leg forward b) Leg sideways

Figure 14 — Leg static load test

6.13 Leg sideways static load test

Carry out this test in the same manner as the leg forward static load test except that a pair of one front and one rear foot shall be restrained from movement. Apply the vertical seat load specified at a suitable position across the seat but not more than 150 mm from the unloaded edge of the seat. Apply a horizontal force centrally to the side at seat level towards the restrained feet 10 times, [see Figure 14b)]. The maximum force shall be that specified.

If the article tends to overbalance with the vertical seat load in its furthermost position from the unloaded edge, reduce the horizontal force to a magnitude that just prevents sideways overbalancing and record the actual force used.

NOTE 1: Leg tests are applicable to chairs and stools with legs or pedestals, except for chairs with swivel actions.

NOTE 2: Similarly, the leg tests are not required for stools without backrests and without an obvious front and rear, because proof of the strength of the stool when subjected to them will have been demonstrated by the back static load test (6.2).

NOTE 3: For stools with backrests and those with seats shaped so that the front and rear of the stool are obvious, the leg tests should be applied as for chairs. Where such a stool has only three legs, one foot on

the transverse centre-line of the stool and one other foot shall be provided with stops in the leg sideways static load test.

6.14 Diagonal static base load test

This test is only applicable to seating with no legs at all (e.g. chairs with castors or glides, which are attached directly to the seat structure).

Apply simultaneously two opposing forces of the magnitudes specified to one pair of diagonally opposite corners of the article. Apply these forces to the structure as close to the floor as possible in an inward direction 10 times. (See Figure 15.)

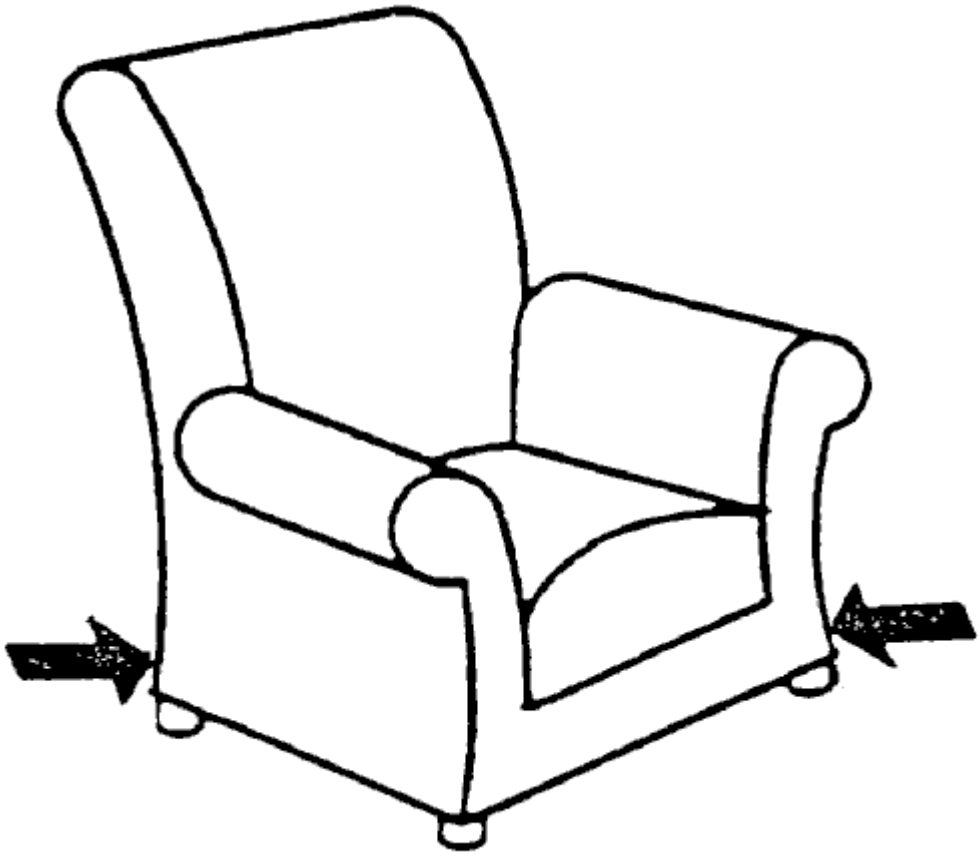


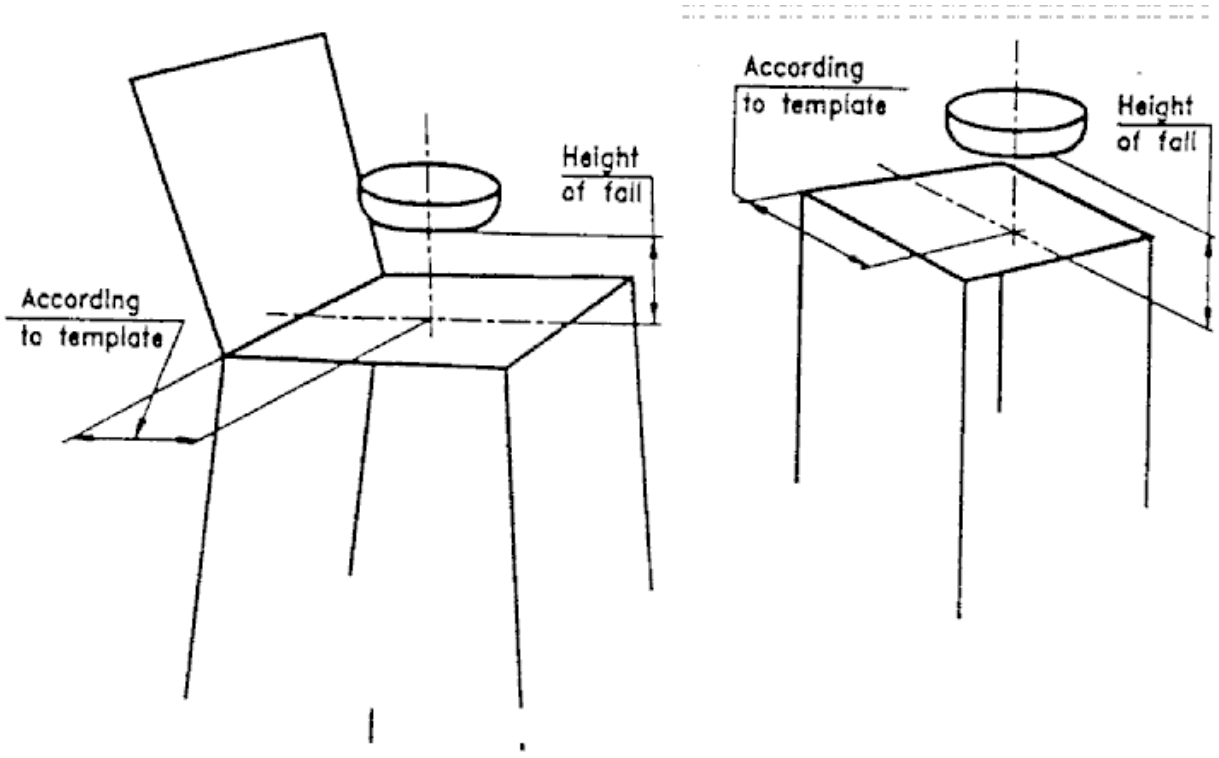
Figure 15 — Diagonal base static load test

6.15 Seat impact test

Place one layer of foam (5.9) on the seat. Determine the height of fall from the position of the impactor when it is resting on the surface of that layer of foam (5.9).

Place a second layer of foam (5.9) between the striking surface and the chair seat for the test. Allow the seat impactor (see 5.12) to fall freely from the height specified onto the seat loading position, (see Figure 16), as specified by the loading position template (4.3). Repeat this test 10 times. Repeat also at any other position considered likely to cause failure.

For articles with more than one seating position apply the test to one end seat and an intermediate seating position.



a) chair b) stool

Figure 16 — Seat impact test

6.16 Back impact test

Place the article with its front feet restrained by stops from moving forward. Strike the structure of the centre of the top outside of the back with the impact hammer (5.13) for a total of 10 times, [see Figure 17a)]. Drop the impact hammer through the height (or angle) specified at the following back positions:

a) on the centre of an article with one seat;

b) at both positions for articles with two seats;

c) at one end position and one centre position for articles with three seats;

d) at one end position and one centre position for articles with four seats.

When the article has no back strike the centre of the seat rear edge.

If a stool or bench has no easily determined rear edge, apply the test in the direction most likely to cause failure, [see Figure 17b)].

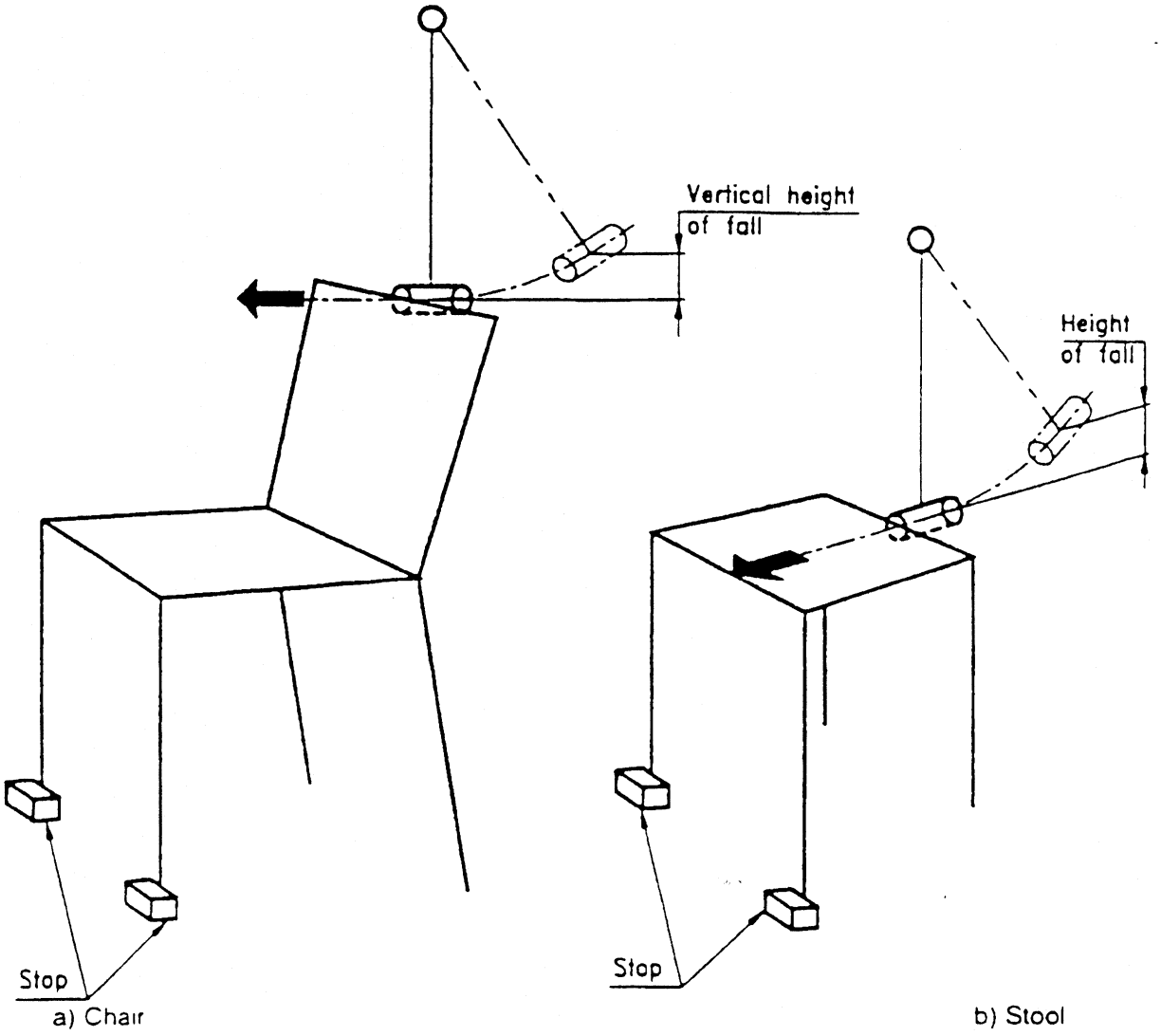


Figure 17 — Back impact test

6.17 Arm impact test

Carry out the test in the same manner as the back impact test (6.16) except that the impact shall be applied in an inward direction to the outside face of one arm at the position most likely to cause a failure with the stops appropriately positioned, (see Figure 18).

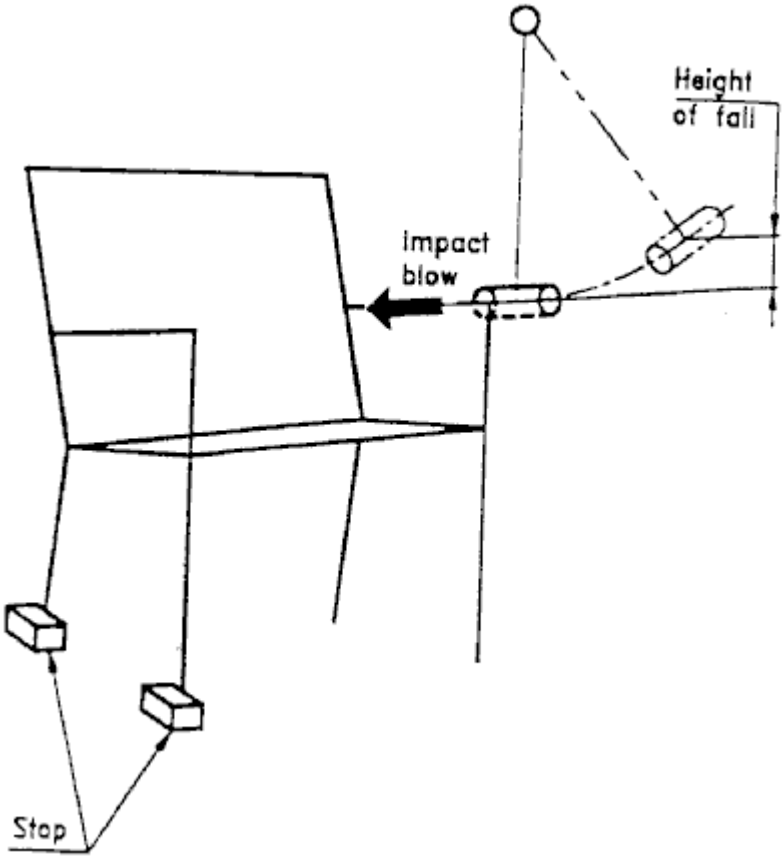


Figure 18 — Arm impact test

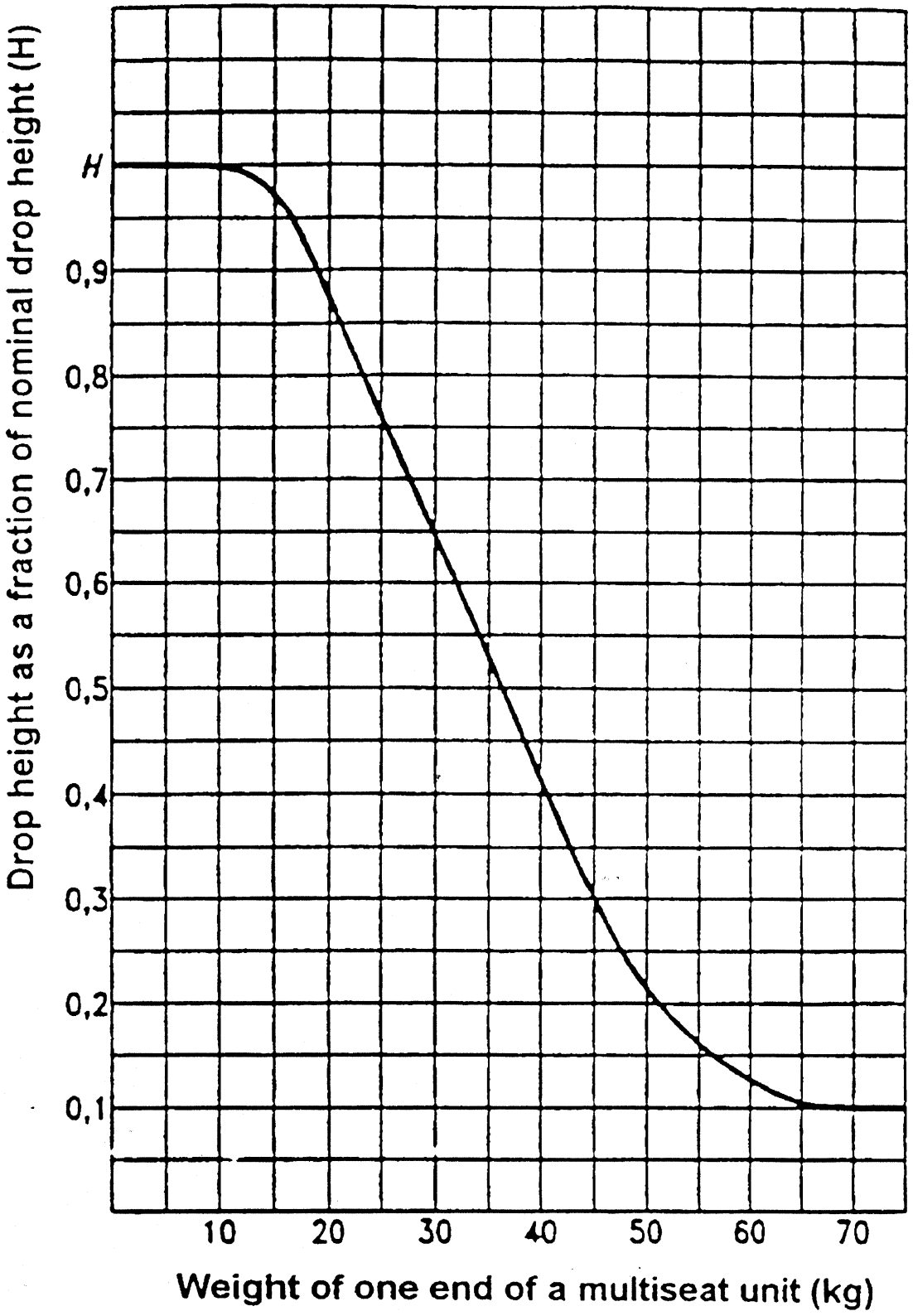


Figure 19 — Drop test height/weight graph

6.18 Drop test

Measure at the right and left hand side of the article the effective weight transferred to the feet (e.g. with scales) and determine the drop height according to the curve shown in Figure 19.

Lift the article at one end/side and allow it to fall freely from the specified height so that the feet or castors strike the floor, (see Figure 20). Carry out the test five times.

Repeat the test five times on the other end of the article.

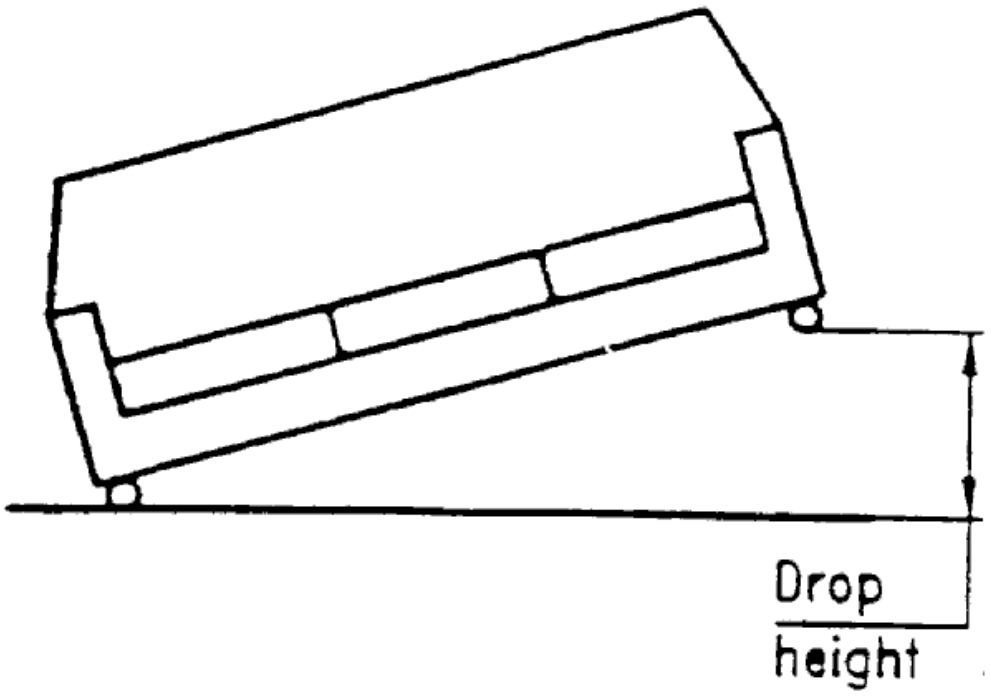


Figure 20 — Drop test

7 Test report

The test report shall include at test the following information:

a) a reference to this European Standard;

b) the piece of furniture tested (relevant data) and details of any defects before testing;

c) the test results;

d) details of any deviations from this European Standard;

e) the name and address of the test facility;

f) the date of test;

g) any variation from the temperature range specified in 4.1.

Annex A — Seat loading pad data (normative)

The seat loading pad specified in clause (5.5) of this European Standard currently exists in two versions.

1. Machined in hardwood, as shown in Figure A.1.

2. Moulded from fibre glass, as shown in Figure A.2.

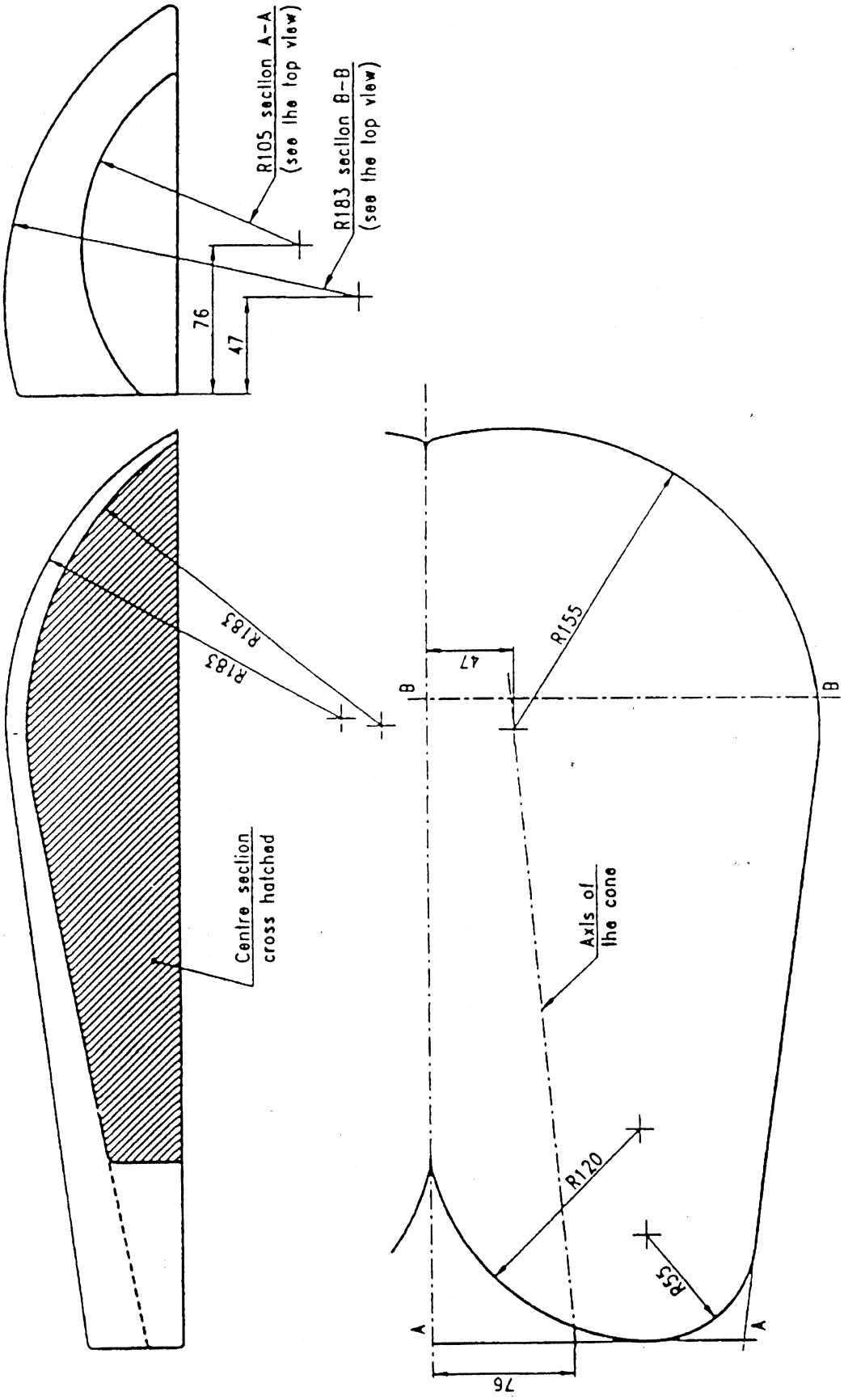


Figure A.1 — Seat loading pad geometry — Hardwood construction

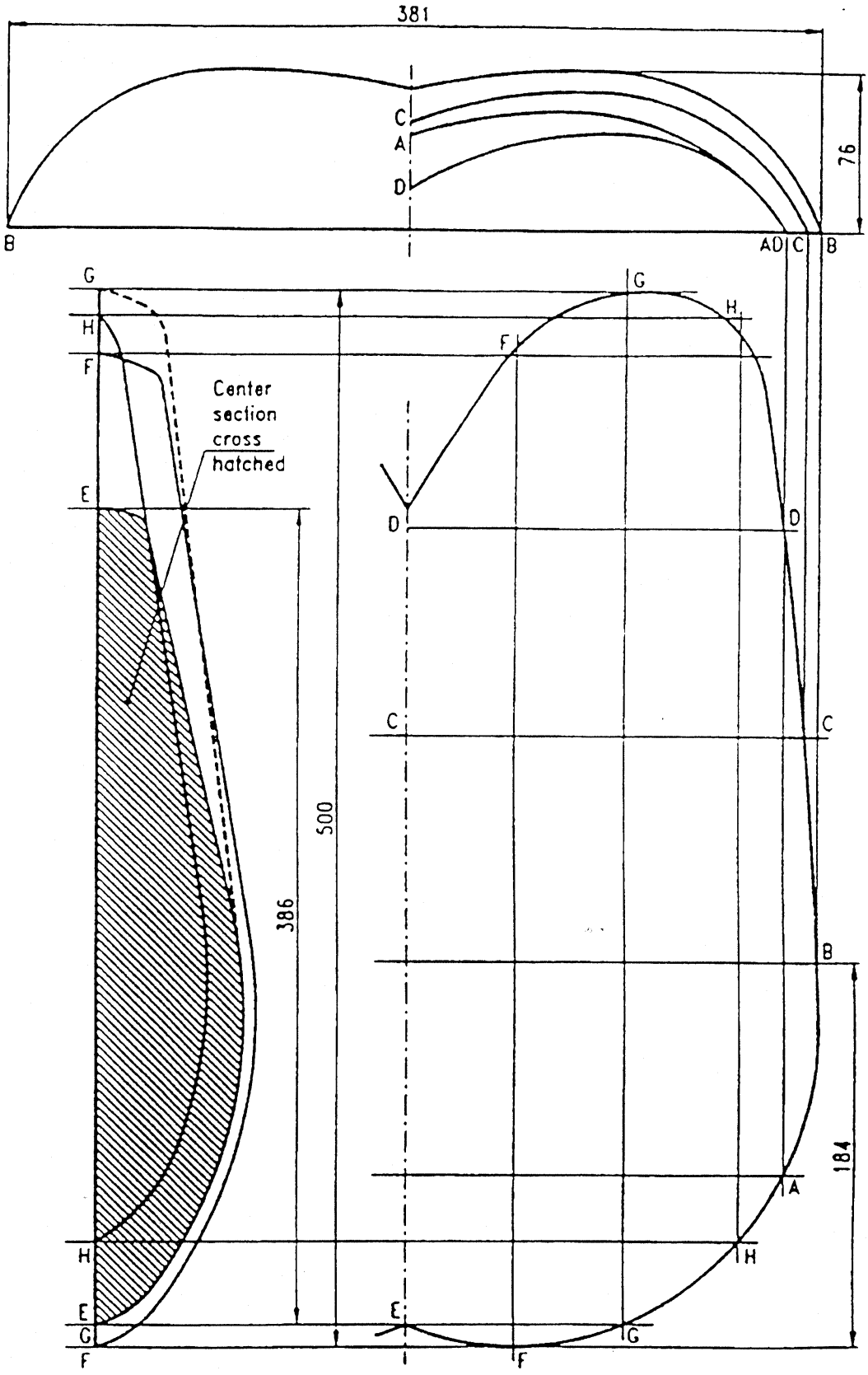


Figure A.2 — Seat loading pad geometry — Moulded fibre glass construction

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