

English Version

## Sanitary appliances - Multifunction shower cabinets

Appareils sanitaires - Cabines de douche multifonctions

Sanitärausstattungsgegenstände -  
Multifunktionsduschkabinen

This European Standard was approved by CEN on 15 March 2007.

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## Foreword

This document (EN 15200:2007) has been prepared by Technical Committee CEN/TC 163 “Sanitary appliances”, the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by November 2007, and conflicting national standards shall be withdrawn at the latest by November 2007.

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



1 Scope

This standard specifies requirements and test methods for multifunction shower cabinets (subsequently referred to as unit(s)), used for domestic purposes.

This standard does not apply to shower cabinets and shower enclosures.

NOTE For the purposes of this standard the term "domestic purposes" includes use in hotels, accommodation for students and similar buildings, except when special provisions e. g. medical, are required.

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.

EN 198:1987, *Specification for finished baths for domestic purposes made of acrylic material*

EN 200, *Sanitary tapware - Single taps and combination taps (PN 10) - General technical specification*

EN 232, *Baths — Connecting dimensions*

EN 251, *Shower trays — Connecting dimensions*

EN 274-1, *Waste fittings for sanitary appliances - Part 1: Requirements*

EN 817, *Sanitary tapware — Mechanical mixers (PN 10) – General technical specifications*

EN 1111, *Sanitary tapware — Thermostatic mixing valves (PN 10) – General technical specification*

EN 1112, *Shower outlets for (PN 10) sanitary tapware*

EN 1113, *Shower hoses for (PN 10) sanitary tapware*

EN 1286, *Sanitary tapware - Low pressure mechanical mixing valves - General technical specification*

EN 1287, *Sanitary tapware - Low pressure thermostatic mixing valves - General technical specifications*

EN 1717, *Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow*

EN 12373-1, *Aluminium and aluminium alloys - Anodizing - Part 1: Method for specifying decorative and protective anodic oxidation coatings on aluminium*

EN 12764, *Sanitary appliances — Specification for whirlpool baths*

prEN 13618-1, *Hose assembly - Flexible hose assembly - Part 1: Product standard for flexible hose assembly (with or without braiding)*

prEN 13618-2, *Water supply - Hose assembly - Part 2: Semi-rigid hose assembly*

EN 13904, *Low resistance shower outlets for sanitary tapware*

EN 13905, *Low resistance shower hoses for sanitary tapware*

EN 14428:2004, *Shower enclosures — Functional requirements and test methods*



EN 20105-A02, *Textiles - Tests for colour fastness - Part A02: Grey scale for assessing change in colour (ISO 105-A02:1993)*

EN 60335-2-105, *Household and similar electrical appliances - Safety - Part 2-105: Particular requirements for multifunction shower cabinets (IEC 60335-2-105:2004)*

EN 60730-2-8, *Automatic electrical controls for household and similar use — Part 2-8: Particular requirements for electrically operated water valves, including mechanical requirements (IEC 60730-2-8:2000, modified)*

EN ISO 2409, *Paints and varnishes - Cross-cut test (ISO 2409:1992)*

EN ISO 4892-2:2006, *Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps (ISO 4892-2:2006)*

ISO 4586-2:2004, *High-pressure decorative laminates -- Sheets made from thermosetting resins -- Part 2: Determination of properties*

ISO 7892:1988, *Vertical building elements — Impact resistance tests – Impact bodies and general test procedures*

### 3 Terms and Definitions

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

#### 3.1

##### **multifunction shower cabinet**

prefabricated but not necessarily pre-assembled independent unit, comprised of a base (shower tray or bath), rigid enclosed wall(s), with or without a roof and an entry, capable of being closed to provide a watertight compartment incorporating a showering function (mixing valve, shower head etc.) and at least one other function (e.g. steam bath, hydraulic massage, UV radiation)

#### 3.2

##### **shower cabinet**

prefabricated but not necessarily pre-assembled independent unit, comprised of a base (shower tray or bath), rigid enclosed wall(s), with or without a roof and an entry, capable of being closed to provide a watertight compartment that incorporates a showering function (mixing valve, shower head etc.)

#### 3.3

##### **shower enclosure**

arrangement of fixed or hinged panel(s) and/or door(s) erected on or around a drained shower place, shower tray or bath in conjunction with one or more walls of a building to provide a water retaining area for showering

### 4 Installation and maintenance

#### 4.1 General

The units shall be supplied with detailed instructions for assembly, installation and connection to electrical and water supplies and a drainage system in accordance with the relevant national regulations, European or International Standards.

NOTE 1 National regulations may require additional measures.

NOTE 2 Multifunction shower cabinets can be fixed to the building to provide stability.

#### 4.2 Protection of drinking water quality

Appropriate backflow prevention devices complying with EN 1717 shall be provided.



NOTE National regulations may require additional measures.

4.3 Maintenance

The manufacturer shall supply instructions for maintenance. All components of the unit requiring regular maintenance and/or replacement shall be accessible after installation.

5 Requirements

5.1 Electrical and safety

Multifunction shower cabinets shall comply with EN 60335-2-105.

5.2 Dimensional deviations

Dimensions of the unit shall not deviate from the size quoted by the manufacturer by more than the values given in Table 1.

Table 1 — Permitted deviations

Dimension	Permitted deviation mm
Length, width ≤ 1 000 mm	±5
Length, width > 1 000 mm	+5 -10
Height	0 -10

5.3 Base

5.3.1 General

Base testing shall be carried out with the unit installed as recommended by the manufacturer.

5.3.2 Water Drainage

When tested in accordance with 6.1, all water shall empty from the base of the unit unless prevented by surface tension.

5.3.3 Connecting dimensions

Dimensions of the waste outlet and overflow holes shall comply with the requirements given in EN 232 or EN 251 as applicable.

Other dimensions are permissible if the manufacturer provides or recommends suitable fittings.

5.3.4 Resistance to temperature changes

When tested in accordance with 6.2, the base shall show no evidence of distortion or other defects that will impair the unit's function and these deflection shall not exceed 4 mm.

Experience has proven that bases made of any plastic material passing the tests in accordance with EN 198:1987, A.3, comply with this requirement.



5.3.5 Mechanical resistance

5.3.5.1 Deflection under load

When tested in accordance with 6.3, deflections of the base shall not be greater than the values given in Table 2 or in Table 3.

Table 2 — Permitted deflections of bath type base

Test method	Deflection of rim mm	Deflection of bottom mm	Residual deflection mm
A	1	2	-
B	2	3	-
C	4	-	0,3

Table 3 — Permitted deflections of shower tray type base

Test method	Deflection mm	Residual deflection mm
A	2	0,3
B	4	0,3

Experience has proven that bases made of any plastic material passing the tests in accordance with EN 198:1987, A.6, comply with this requirement.

5.3.5.2 Resistance to impact

When tested in accordance with 6.4, the bottom and rim of the base shall not show any evidence of distortion or other defects which will impair appearance and/or functioning.

Bases made of enamelled steel and cast iron are excluded from this test. In addition, experience has proven that bases made of any plastic material passing the tests in accordance with EN 198:1987, A.5, comply with this requirement.

5.3.5.3 Mechanical resistance of base surface

When the functional surface of the base is tested in accordance with 6.5, any scratch shall not exceed 0,1 mm or the total thickness of the top layer if this one has a thickness less than 0,1 mm.

5.4 Walls

All materials used for walls of units shall comply with the requirements of EN 14428:2004, 4.3.

5.5 Common requirements applying to base, walls and roof

5.5.1 Chemical resistance

When used as intended, any functional surface shall be resistant to household chemicals and cleansing agents recommended by the manufacturer (see clause 8).

When tested in accordance with 6.6, functional surfaces shall not show any permanent deterioration, such as stains or any other deterioration not removable with water or an abrasive agent.

### **5.5.2 Water absorption**

When tested in accordance with 6.7, any functional surface shall have a water absorption less than or equal to 0,2 mg/cm<sup>2</sup>.

### **5.5.3 Steam resistance**

When a steam function is provided, the unit shall be tested in accordance with 6.8. The unit shall not show any distortion or other defects which will impair the appearance and/or how the unit functions.

### **5.5.4 Resistance to wet and dry cycling**

When tested in accordance with 6.9, the functional surface of any material used shall not show any changes in appearance such as blisters, crazing and cracks.

### **5.5.5 Colour fastness**

#### **5.5.5.1 Resistance to UV light**

When tested in accordance with the requirements of the xenon arc lamp method of EN ISO 4892-2 for 250 h, test B with the following adjustments:

- a) irradiance 50 W/m<sup>2</sup> in the range of wave length from 290 nm to 400 nm for indoor application;
- b) black panel temperature 65 °C;
- c) relative humidity 50 %;
- d) test specimens cut from the sheet supplied to the manufacturer;
- e) spray cycle 18 min; and
- f) dry cycle 102 min.

The colour change noted on the surface of any material used which is visible after installation shall be recorded in terms of grey scale for assessing colour change as specified in EN 20105-A02. The fastness rating shall be not less than grade 3.

The xenon lamp shall only be used when its age is within the limit stated by its manufacturer to be the useful life of the lamp, or, where the useful life is not stated, is taken to be between 10 h and 600 h.

#### **5.5.5.2 Resistance to hot water**

When tested in accordance with 6.10, the colour change on the surface of any material used that is visible after installation shall be recorded in terms of grey scale for assessing colour change as specified in EN 20105-A02.

The fastness rating shall be not less than grade 3.

### **5.5.6 Resistance to scratching**

All functional surface, when tested in accordance with 6.11, shall have a scratch resistance of not less than 0,3 N.

## **5.6 Corrosion resistance**

All components shall be manufactured from corrosion-resistant materials or they shall be protected against corrosion.



All corrosion protection shall conform with the relevant requirements specified in European and International Standards.

When tested in accordance with EN ISO 2409, the minimum paint adhesion performance for powder-coated or wet-painted surfaces shall comply with a cross-cut value  $\leq 2$ .

When tested in accordance with one of the methods given in EN 12373-1, the minimum average thickness of coating on aluminium shall be of grade AA 8. In no cases shall the minimum local thickness be less than 80 % of the minimum average thickness.

## **5.7 Construction and design**

### **5.7.1 Appearance**

When examined visually, the surfaces of the unit components that are accessible during use and cleaning shall be free from sharp corners, edges and burrs.

### **5.7.2 Waste outlet drainage**

When tested in accordance with 6.12, no overflowing shall occur.

### **5.7.3 Steam outlets**

If a steam generator is provided, the steam outlet shall be designed and positioned to avoid any danger to the user when the unit is used in accordance with the manufacturer's instructions.

### **5.7.4 Pumps**

When a pump for increasing the pressure for showering is provided, the unit manufacturer's instructions shall state that any national regulation for their installation shall be followed.

### **5.7.5 Mirrors**

Mirrors shall comply with the requirements of 5.4.

When non-toughened glass mirrors are provided, they shall be safety backed.

### **5.7.6 Components**

#### **5.7.6.1 Mixing taps**

Mixing taps installed shall comply with EN 200, EN 817, EN 1111, EN 1286, EN 1287 or national regulations, as appropriate.

Differences in dimensional characteristics are allowed.

NOTE National regulations may require hydraulic requirements different from those given in the above mentioned standards.

#### **5.7.6.2 Waste fittings**

When waste fittings are not provided or recommended by the manufacturer, provisions shall be made to allow waste fittings complying with the hydraulic requirements of EN 274-1 to be used.

5.7.6.3 Shower outlets

Shower outlets shall comply with EN 1112 or EN 13904 except for the minimum flow rate for body shower outlets.

5.7.6.4 Hoses

5.7.6.4.1 Shower hoses

If provided, shower hoses intended to connect the hand showers to the mixer outlets shall comply with EN 1113 or EN 13905.

5.7.6.4.2 Water supply hoses

If provided, water supply hoses intended to withstand the static pressure of the mains shall comply with prEN 13618, both parts.

5.7.6.5 Electrically operated valves

Electrically operated valves used to control water shall comply with EN 60730-2-8.

5.8 Whirlpool

When a whirlpool system is provided, it shall comply with EN 12764.

5.9 Stability

When tested in accordance with 6.13, the unit shall show no functional deterioration which could result in injury to the user.

5.10 Endurance of doors

When tested in accordance with EN 14428:2004, 5.5 the doors shall show no functional deterioration. Additionally, at the end of the test the doors shall comply with the requirements of 5.13.

5.11 Seats

When any seat is tested in accordance with 6.14, the unit shall be free from any permanent deformation or other defects that will impair the appearance and/or how the unit functions.

5.12 Grab handles

When any grab handle is tested in accordance with 6.15, the unit shall be free from any permanent deformation or other defects that will impair the appearance and/or how the unit functions.

The installation instructions shall indicate how and where any grab handles shall be fitted if they are not pre-fitted by the manufacturer.

5.13 Watertightness

5.13.1 Cabinet watertightness

When tested as described in EN 14428:2004, 5.7 and additionally in accordance with 6.16, the unit shall show no visible leakage of water.

NOTE A few small drops of water on the outside of the water retaining area are acceptable.



### 5.13.2 Piping watertightness

Piping system consisting of pressurised (section 1) and non-pressurised (section 2) sections. Section 1 begins at the connection to the water supply and ends at the last on/off control, e.g. mechanical or electrical valve. Section 2 begins after the last on/off control of section 1 and ends at the outlet, e.g. shower outlet.

If a whirlpool system is provided, it shall comply with EN 12764.

When tested in accordance with 6.17, there shall be no visible evidence of leakage or other damage.

## 5.14 Steam system

### 5.14.1 Temperature increase

The capacity of the steam generator shall be directly related to the volume of the unit and the ambient temperature of the place of installation.

When a heating system is provided tested in accordance with 6.18, an increase of 20 K shall be reached within a period of 25 min after switching it on.

### 5.14.2 Temperature distribution

When a heating system is provided and is tested in accordance with 6.18, the maximum temperature deviation at any of the measuring points shall be no greater than 5 °C.

## 6 Test methods

### 6.1 Water Drainage

- a) Install the base horizontally in accordance with the manufacturer's instructions.
- b) Use tap water coloured so that it contrasts the colour of the base.
- c) Pour no less than 4 l of the water as evenly as possible over the bottom of the base.
- d) Visually inspect and verify compliance with the requirements of 5.3.2. Water remaining due to surface tension is permitted.

### 6.2 Resistance to temperature changes

#### 6.2.1 Test apparatus:

- a) water supply of cold and hot water;
- b) pipe with a nominal diameter of 22 mm;
- c) thermometer for measuring from 0 °C to 100 °C, with an accuracy of  $\pm 1$  °C at measured values;
- d) flow meter with an accuracy of  $\pm 10$  %;
- e) dial gauge with an accuracy of  $\pm 0,1$  mm;
- f) shower handset.



## 6.2.2 Procedure (the base is submitted successively to test A and test B)

### 6.2.2.1 Bath type base

#### 6.2.2.1.1 Test A

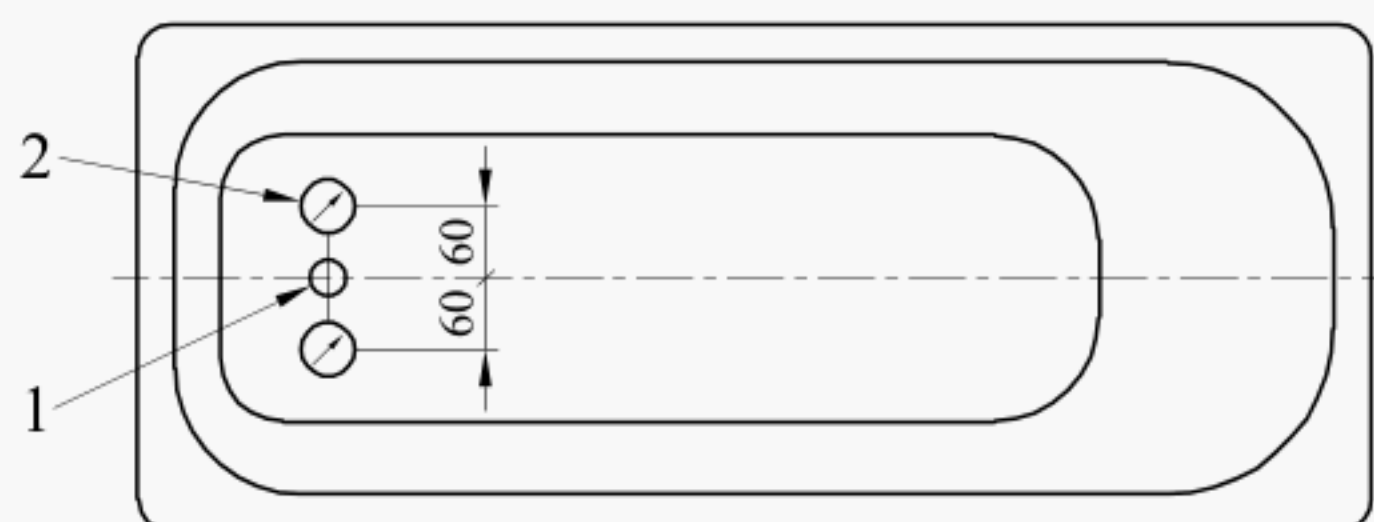
- a) Discharge  $(50 \pm 1)$  l of water through the pipe positioned not more than 125 mm above the spillover level of the base so that the water impinges on the side wall closest to the waste outlet hole in a position where a supply fitting is likely to discharge with the waste outlet open. The temperature of water at the outlet pipe shall be  $(90 \pm 2)$  °C and the flow rate into the base shall be 0,32 l/s.
- b) Discharge immediately afterwards  $(100 \pm 2)$  l of water with a temperature of  $(12 \pm 3)$  °C at the same flow rate through the same pipe at the same position, but with the waste outlet closed.
- c) Leave the water in the base for  $10^{+1}_0$  min, after which the waste outlet is opened allowing the water to drain off.

#### 6.2.2.1.2 Test B

- a) Position the dial gauge on the underside of the base 60 mm from the axis of the waste outlet hole on one or other side of the waste outlet hole on a line at 90° to the axis of the internal bathing/showering area of the base (see Figure 1).
- b) Discharge water through the pipe positioned no more than 125 mm above the spillover level of the base so that the water impinges on the side wall nearest to the waste outlet hole in a position where a supply fitting is likely to discharge with the waste outlet closed. The water shall fill the base to a height no less than 250 mm above the waste outlet level. The water temperature at the outlet of the pipe shall be  $(75 \pm 2)$  °C and the flow rate into the base shall be 0,32 l/s.
- c) Leave the water in the base for  $10^{+1}_0$  min after which the waste outlet is opened to allow the water to drain off.
- d) Afterwards, immediately add the same volume of cold water of  $(12 \pm 3)$  °C at the same flow rate through the same pipe in the same position with the waste outlet closed.
- e) Leave the water in the base for  $10^{+1}_0$  min after which the waste outlet is opened to allow the water to drain off.
- f) Repeat this procedure 100 times without interruption.
- g) Check any deflection shown by the dial gauge until constant values are reached and are at least over the first 10 cycles. Record the maximum value.
- h) After the last cycle apply over the surface using a sponge or paint brush, a solution of eosine in water of 100 g/l to which is added 1 cm<sup>3</sup>/l of liquid detergent. Leave for  $5^{+1}_0$  min, then remove the eosine from the surface by cleaning with a damp cloth.
- i) Check any adverse changes in appearance and for the presence of traces of eosine by visual examination.



Dimensions in millimetres

**Key**

- 1 Waste outlet hole
- 2 Gauge

**Figure 1 — Position of the gauge****6.2.2.2 Shower tray type base****6.2.2.2.1 Test A**

- a) Position the shower handset 1 m above the bottom of the base so that the water spray impinges on the edge and at least half of the base bottom.
- b) Discharge  $(50 \pm 1)$  l of water at  $(90 \pm 2)$  °C with a flow rate of 0,15 l/s into the base with the waste outlet hole open.
- c) Afterwards, immediately discharge, with the shower handset in the same position,  $(50 \pm 1)$  l of water with at  $(12 \pm 3)$  °C and the same flow rate as before with the waste outlet open.

**6.2.2.2.2 Test B**

- a) Position the dial gauge on the underside of the base 60 mm from the axis of the waste outlet hole on one or the other side of the waste outlet hole on a line at 90 ° to the axis of the showering area of the base (see Figure 5).
- b) By means of the shower handset positioned as in the test A discharge  $(90 \pm 1)$  l of water at  $(75 \pm 2)$  °C and with a flow rate of 0,15 l/s with the waste outlet open.
- c) Afterwards, Immediately discharge the same quantity of cold water at  $(12 \pm 3)$  °C and with the same flow rate as before with the waste outlet open.
- d) Repeat this procedure 100 times without interruption.
- e) Check the deflection shown by the dial gauge until constant values are reached and at least over the first 10 cycles. Record the maximum value.
- f) After the last cycle, apply all over the surface using a sponge or paint brush, a solution of eosine in water of 100 g/l to which is added 1 cm<sup>3</sup>/l of liquid detergent. Leave for  $5^{+1}_0$  min, then remove the eosine from the surface by cleaning with a damp cloth.
- g) Check any adverse changes in appearance and for any eosine by visual examination.

## 6.3 Deflections under load

### 6.3.1 General

These tests are intended to simulate the effect of loads on different parts of the base similar to those that can occur when the base is in use. The tests described are based on a rectangular shaped base. Bases of other shapes shall meet the requirements of Table 2 or Table 3 with loads and dial gauges positioned at the nearest equivalent point.

### 6.3.2 Test apparatus

- a) six reinforced cloth bags with dimensions of 500 mm x 200 mm, filled with lead shot, iron shot or sand of  $(25 \pm 0,25)$  kg mass each or twelve bags of  $(12,5 \pm 0,25)$  kg mass of the same size;
- b) five dial gauges with an accuracy of 0,1 mm.

### 6.3.3 Preloading

Before carrying out deflection tests, load the base as described in test A and leave for  $30^{+1}_0$  min. Remove the bags, wait  $15^{+1}_0$  min, then perform the sequence of tests A-B-C (see 6.3.4.1) or A-B (see 6.3.4.2) as relevant, allowing no less than 10 min between each test.

### 6.3.4 Procedure

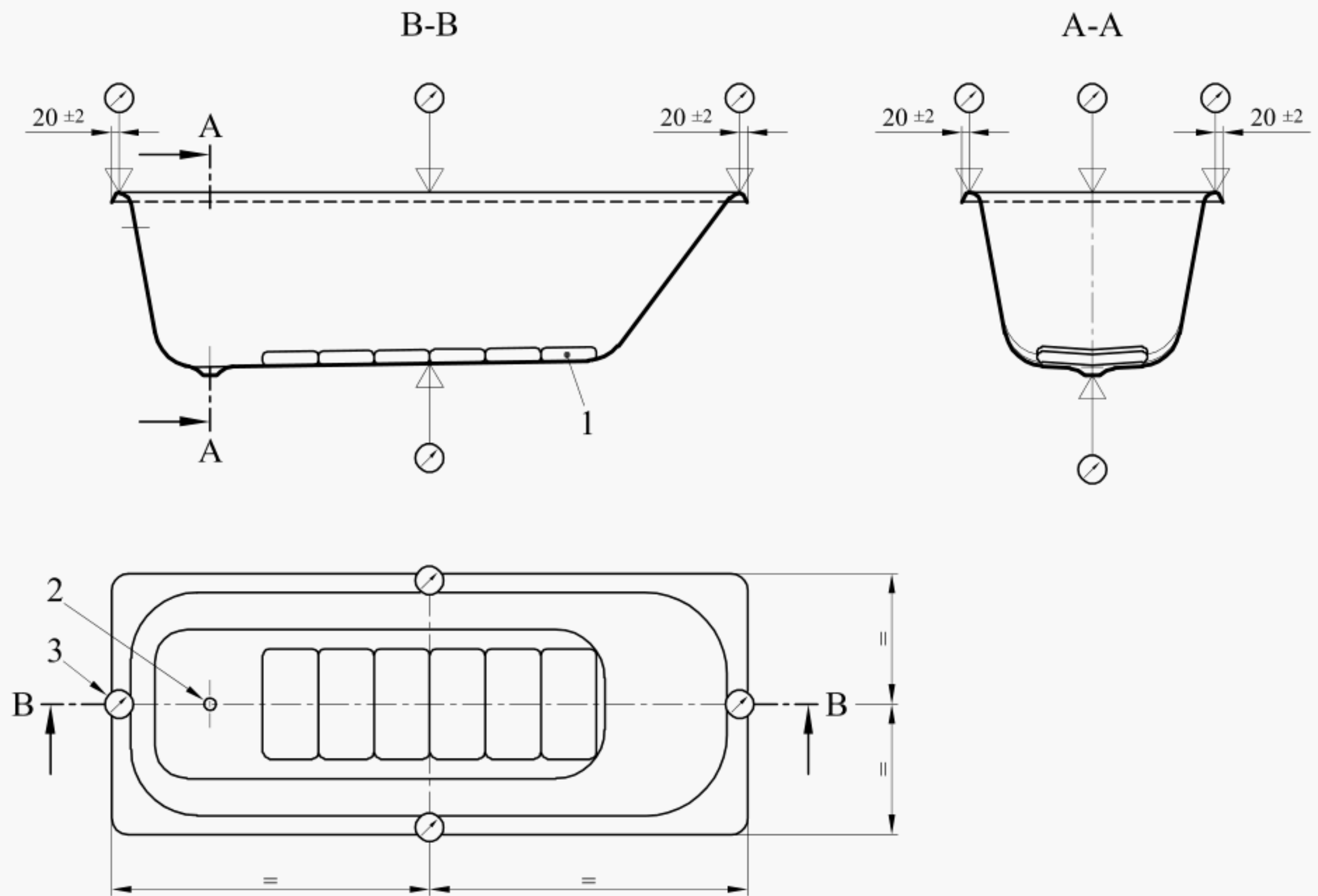
#### 6.3.4.1 Bath type base

##### 6.3.4.1.1 Test A: Deflection of the rims and bottom due to a distributed load on the bottom

- a) Install the base of the unit according to the manufacturer's instructions and set up five dial gauges at the measuring points indicated in Figure 2 so that the base is not influenced by the load applied.
- b) Note the initial reading of the dial gauges.
- c) Place the bags carefully on the bottom of the base as shown in Figure 2. If twelve bags are used, they shall occupy the same surface area as the six bags.
- d) After  $5^{+0,5}_0$  min note the final readings of the dial gauges and calculate the deflections of the rims and the bottom of the base as the differences between the final and the initial readings of the dial gauges.
- e) Record the calculated deflections.



Dimensions in millimetres



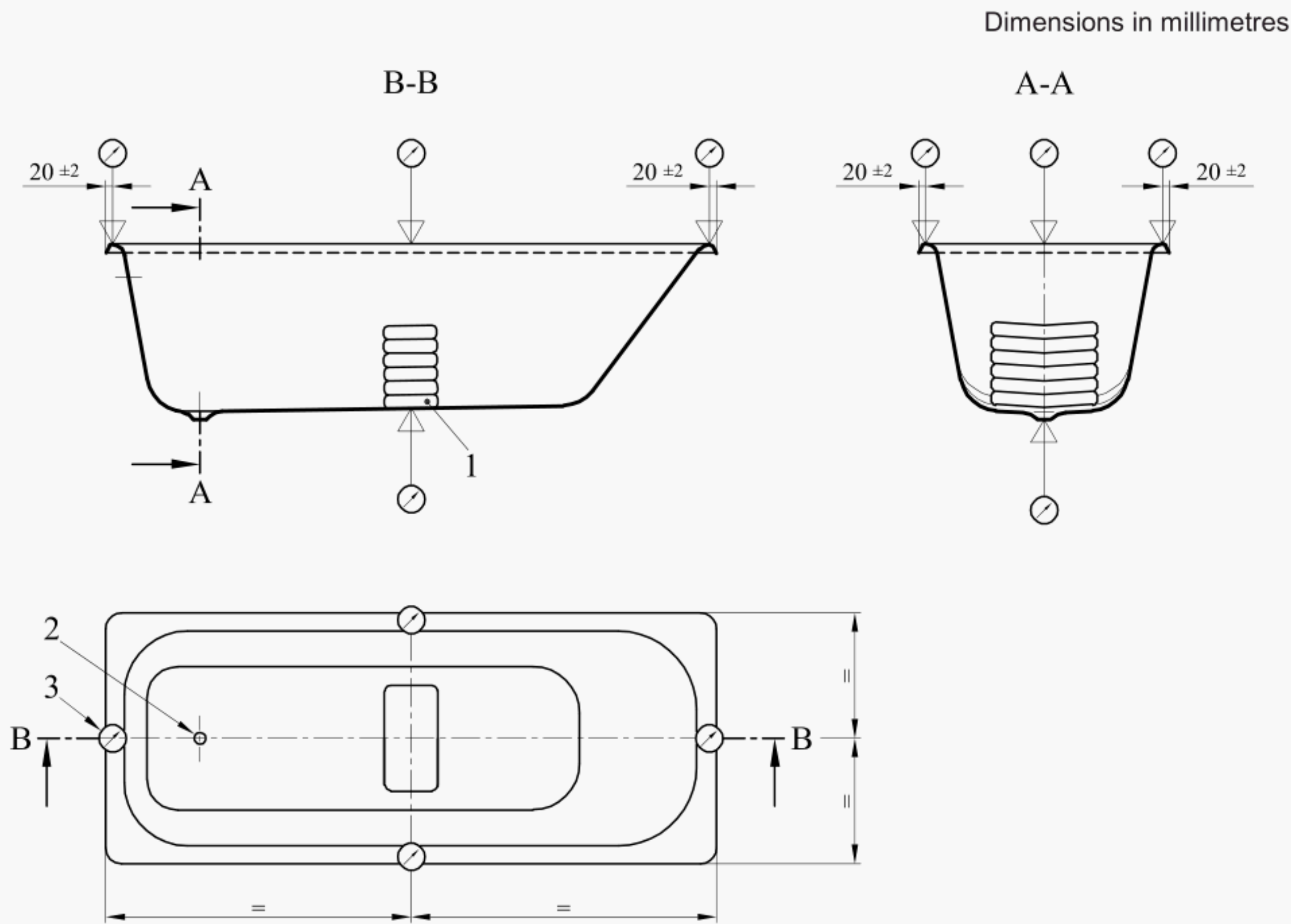
#### Key

- 1 Six bags each of mass 25 kg (alternatively 12 bags each of mass 12,5 kg)
- 2 Waste outlet hole
- 3 Gauge

**Figure 2 — Deflection test A**

#### 6.3.4.1.2 Test B: Deflection of the rims and bottom due to a concentrated load on the bottom

- a) Set the dial gauges as shown in Figure 3 and note the initial readings.
- b) Place the bags carefully in a pile in the centre of the bottom of the base so that the major axis of the bags coincides with the minor axis of the bottom as shown in Figure 3. If twelve bags are used, they shall occupy the same surface area as the six bags.
- c) After  $5^{+0,5}_0$  min note the final readings of the dial gauges and calculate the deflections of the rims and the bottom of the base as the difference between the final and the initial readings of the dial gauges.
- d) Record the calculated deflections.



**Key**

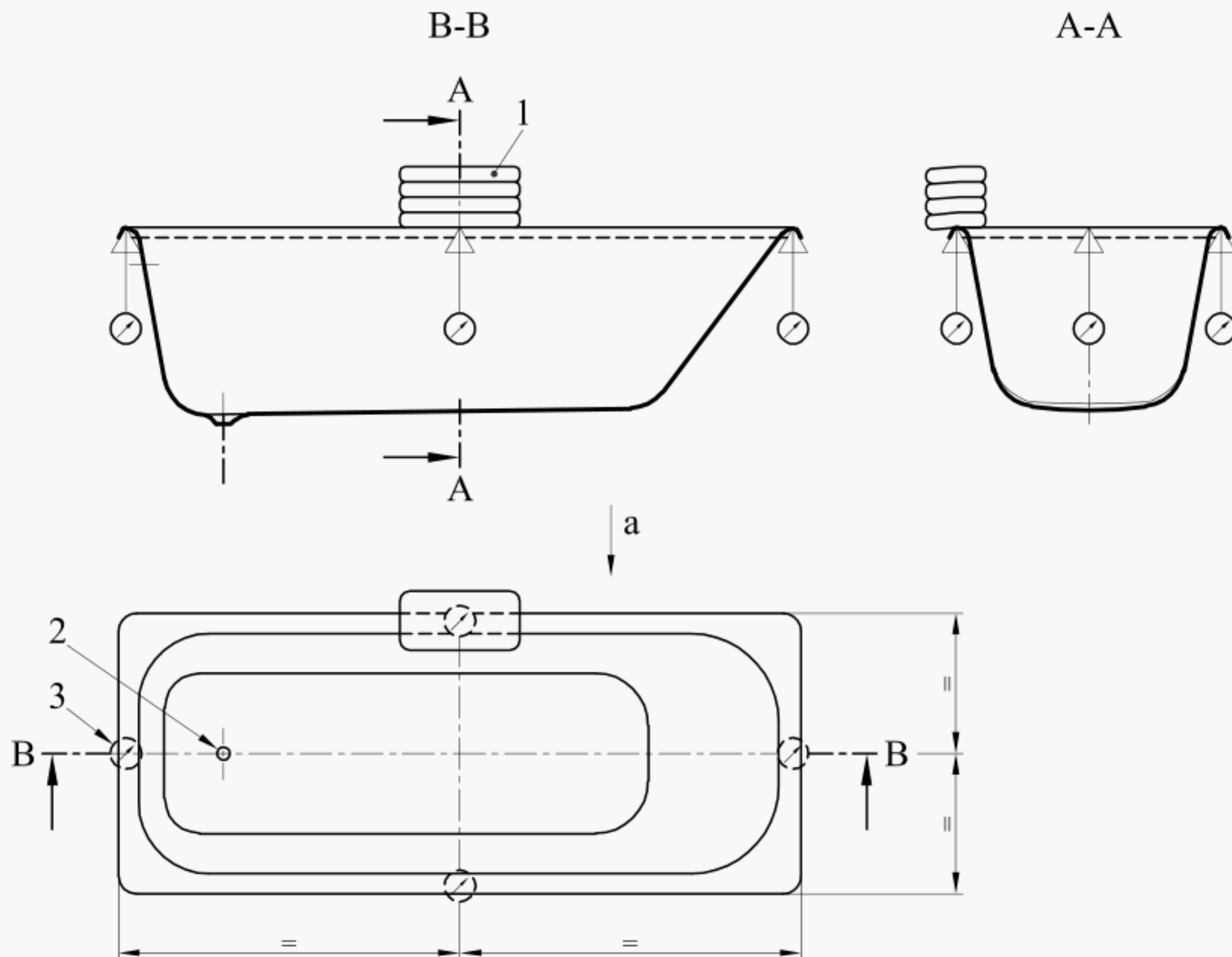
- 1 Six bags each of mass 25 kg (alternatively 12 bags each of mass 12,5 kg)
- 2 Waste outlet hole
- 3 Gauge

**Figure 3 — Deflection test B**

**6.3.4.1.3 Test C: Deflection of the rim of the entry side due to a load on it**

- a) Set the four dial gauges on the rim as shown in Figure 4 and note the initial readings.
- b) Place the bags carefully in the configuration shown in Figure 4, on the entry side of the base so that the major axis of each bag coincides with the longitudinal axis of the rim. If eight bags are used, they shall occupy the same area as the four bags.
- c) After  $5^{+0,5}_0$  min note the intermediate readings of the dial gauges. Calculate the deflections of the rims as the difference between the intermediate and the initial readings of the dial gauges.
- d) Remove the bags and after  $10^{+1}_0$  min note the final readings of the dial gauges. Calculate the residual deflections of the rims as the difference between the final and the initial readings of the dial gauges.
- e) Record the calculated deflections.



**Key**

- 1 Four bags each of mass 25 kg (alternatively 8 bags each of mass 12,5 kg)
- 2 Waste outlet hole
- 3 Gauge
- a Side of entry

**Figure 4 — Deflection test C****6.3.4.2 Shower tray type base****6.3.4.2.1 Test A: Deflection of the rim and bottom due to a concentrated load on the bottom**

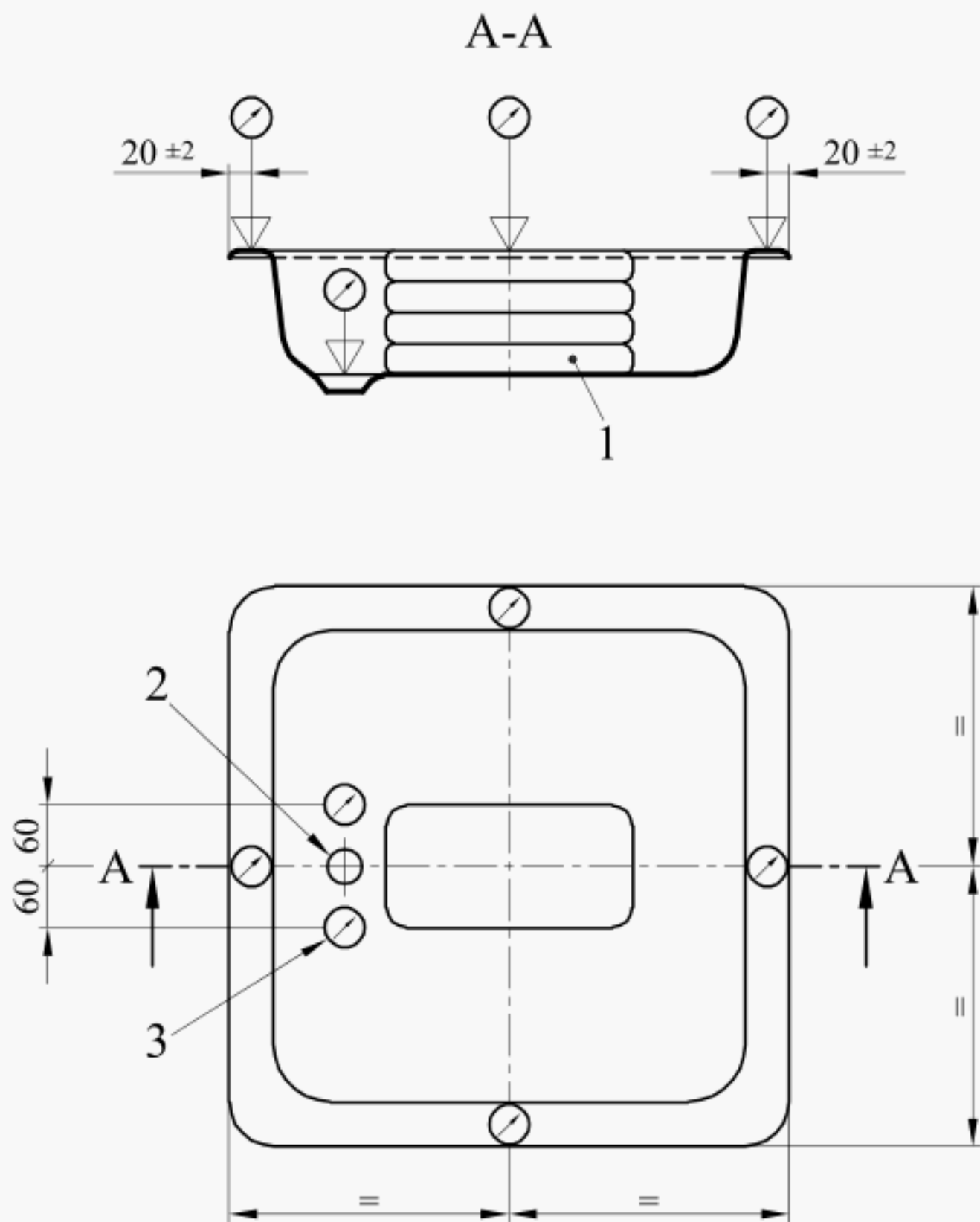
- a) Install the base of the unit in accordance with the manufacturer's instructions and set up five dial gauges at the measuring points indicated in Figure 5 so that the unit is not influenced by the load applied. If the waste outlet hole is in the middle of the base, the dial gauges shall be positioned on the underside of the base.

**NOTE** The dial gauge on the bottom of the base can be on one or other side of the waste outlet hole on a line at 90° to the axis of the base (see Figure 5).

- b) Note the initial reading of the dial gauges.
- c) Place the bags carefully on the bottom of the base as shown in Figure 5. If eight bags are used, they shall occupy the same surface area as the four bags.
- d) After  $5^{+1}_0$  min note the intermediate readings of the dial gauges and calculate the deflections of the rims and the bottom of the base as the difference between the intermediate and the initial readings of the dial gauges.

- e) Remove the bags and after  $10^{+1}_0$  min note the final readings of the dial gauges. Calculate the residual deflections of the rims and the bottom of the base as difference between the final and the initial readings of the dial gauges.
- f) Record the calculated deflections.

Dimensions in millimetres



Key

- 1 Four bags each of mass 25 kg (alternatively 8 bags each of mass 12,5 kg)
- 2 Waste outlet hole
- 3 Gauge

Figure 5 — Deflection test A

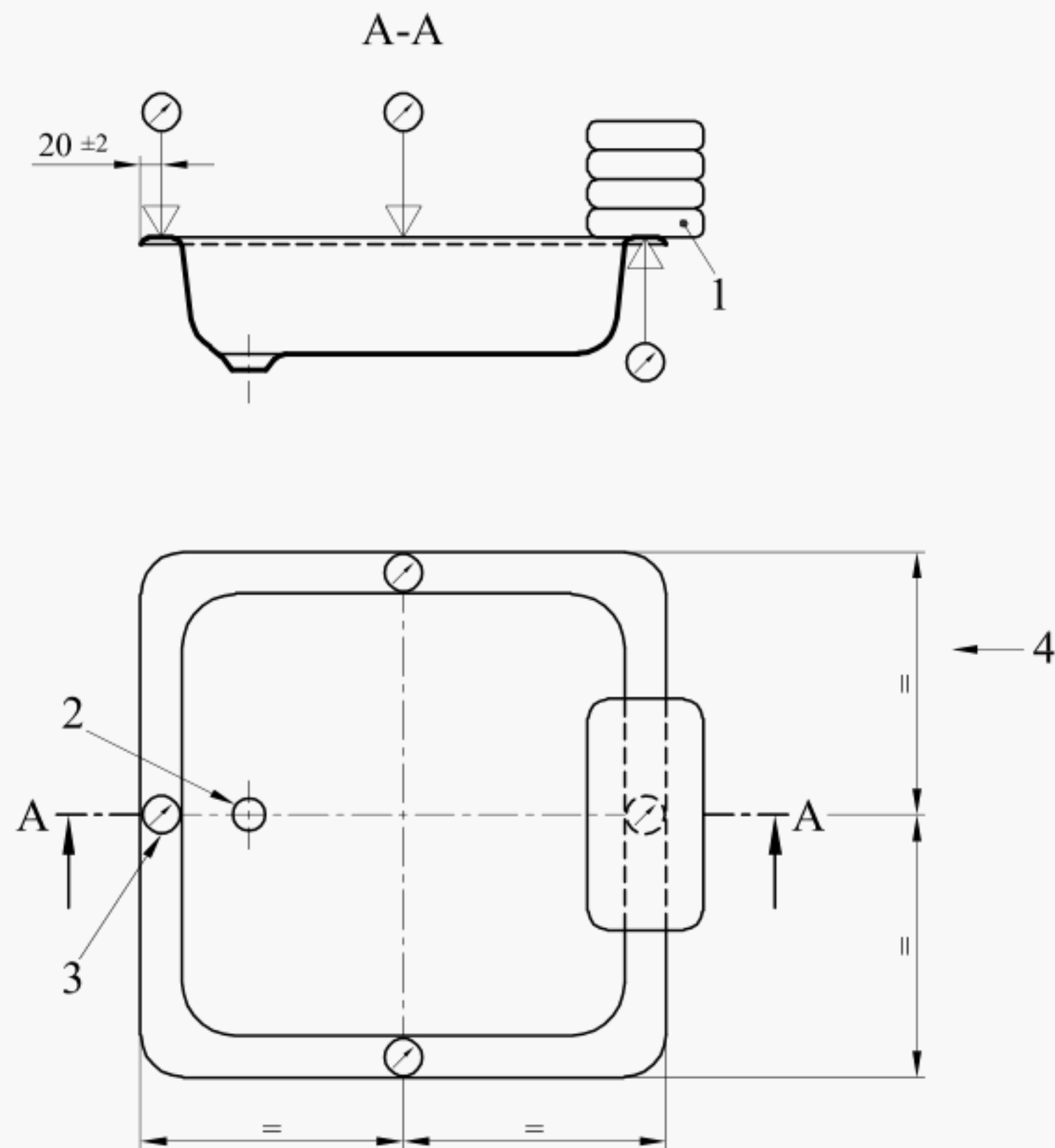
6.3.4.2.2 Test B: Deflection of the rim of the entry side due to a load on it

- a) Set the four dial gauges on the rim as shown in Figure 6 and note the initial readings.
- b) Place the bags carefully in the configuration shown in Figure 6, on the entry side of the base so that the major axis of each bag coincides with the longitudinal axis of the rim itself. If eight bags are used, they shall occupy the same area as the four bags.
- c) After  $5^{+1}_0$  min note the intermediate readings of the dial gauges. Calculate the deflections of the rims as the difference between the intermediate and the initial readings of the dial gauges.
- d) Remove the bags and after  $10^{+1}_0$  min note the final readings of the dial gauges. Calculate the residual deflections of the rims as the difference between the final and the initial readings of the dial gauges.



e) Record the calculated deflections.

Dimensions in millimetres



### Key

- 1 Four bags each of mass 25 kg (alternatively 8 bags each of mass 12,5 kg)
- 2 Waste outlet hole
- 3 Gauge
- 4 Side of entry

**Figure 6 — Deflection test B**

## 6.4 Resistance to impact

#### 6.4.1 Test apparatus

- Tubes of  $(0,75 \pm 0,01)$  m and  $(1,00 \pm 0,01)$  m with an inner diameter of  $(55 \pm 5)$  mm;
- ball made of stainless steel with a mass of  $(200 \pm 5)$  g and a diameter of 37 mm.

### 6.4.2 Procedure

#### 6.4.2.1 Bath type base (the base is submitted to test A and test B).

#### 6.4.2.1.1 Test A

- a) Clamp the tube of 1 m length vertically so that it is maintained at 1 mm above the flat surface of the bottom of the base.

- b) Drop the ball through the tube on the bottom of the base.
- c) Carry out this test at the centre and each end of the flat surface of the bottom of the base.
- d) Visually examine the surface of the bottom and the underside of the base.

#### **6.4.2.1.2 Test B**

- a) Clamp the tube 0,75 m length vertically so that it is maintained at 1 mm above the flat surface of the rim of the base.
- b) Drop the ball through the tube on the rim of the base.
- c) Repeat this test at two other points on the flat surface of the rim of the base.
- d) Visually examine the surface and the underside of the rim of the base.

#### **6.4.2.2 Shower tray base**

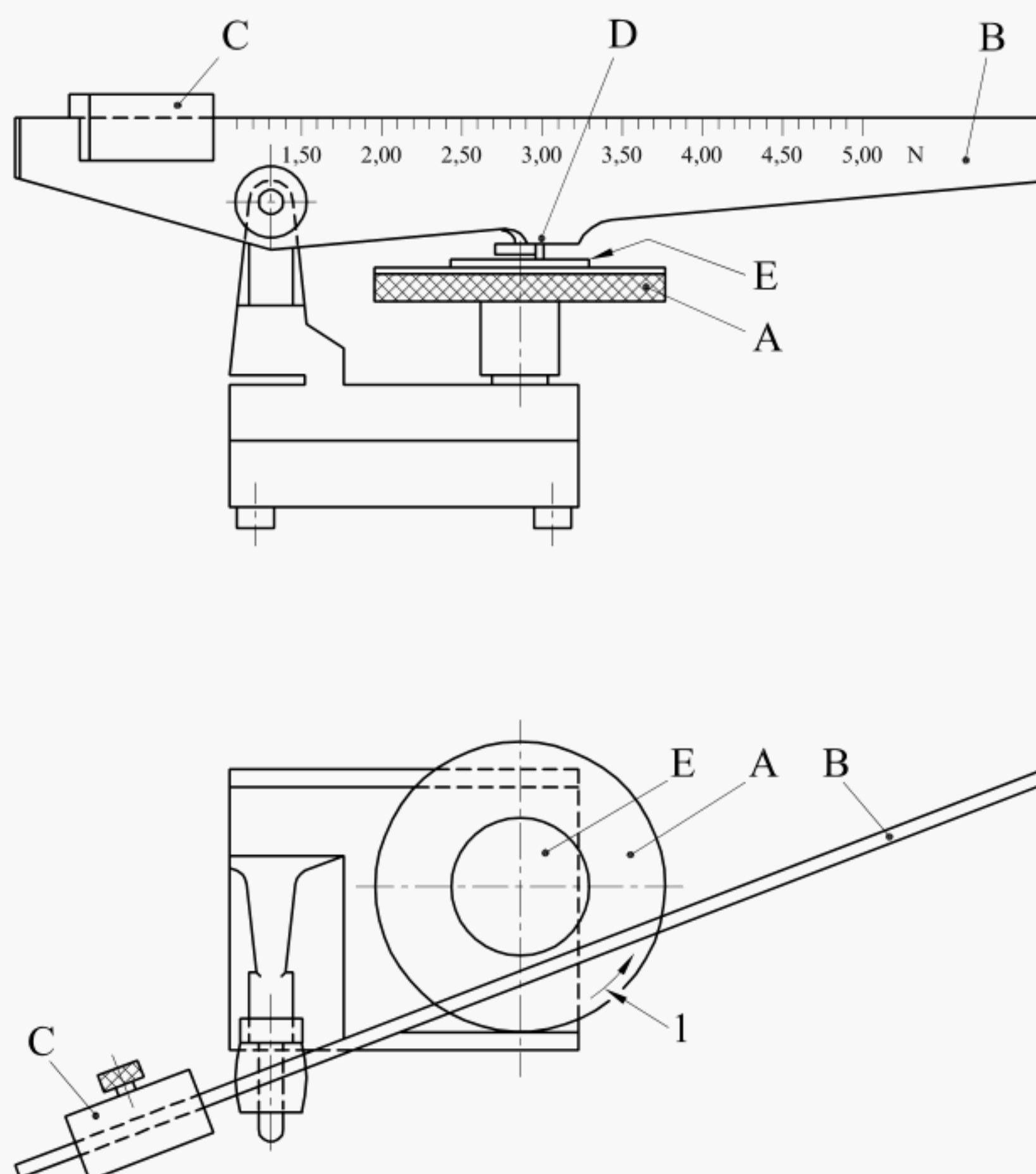
- a) Clamp the tube 1 m length vertically so that it is maintained at 1 mm above the bottom (or rim) of the base.
- b) Drop the ball through the tube once at each test point.
- c) Carry out this test twice on the flat surface of the bottom of the base as far apart as possible and, if the base has a rim, twice on the rim.
- d) Visually examine the surface of the bottom and the underside of the base and the surface and the underside of any rim that is tested.

### **6.5 Mechanical resistance of base surface**

#### **6.5.1 Test apparatus**

- a) scratch testing apparatus as described in ISO 4586-2:2004, 14.2.1 (see Figure 7);
- b) microscope or similar measuring device capable of measuring to an accuracy of  $\pm 5 \mu\text{m}$ .





#### Key

- 1 rotating direction
- A supporting turntable
- B arm
- C means to apply the force
- D scratching point
- E locking disc

**Figure 7 — Scratching apparatus**

#### 6.5.2 Test specimen

The test specimen shall be taken from the bottom of the base and shall be as flat as possible, with geometry and dimension as defined in ISO 4586-2:2004, 14.4.

The test specimen shall be preconditioned at  $(23 \pm 2) ^\circ\text{C}$  and a relative humidity of  $(50 \pm 5) \%$  for 24 h.

#### 6.5.3 Procedure

- a) Adjust the height of the arm (B) so that it is horizontal when the diamond point rests on the test specimen.
- b) Place the arm (B) in a vertical position.

- c) Fix the test specimen with the locking disc (E) and secure it correctly to avoid any slipping.
- d) Lower the arm (B) and place the diamond point in contact with the test specimen taking care to avoid any impact.
- e) Apply a force of  $(10 \pm 0,1)$  N.
- f) Start rotating the turntable (A) to produce a scratch of 3 cm to 4 cm long.
- g) Remove the specimen from the turntable and make a cut through the scratch.
- h) Measure the depth of the scratch and the thickness of the top layer (if relevant) using the microscope.

6.6 Chemical resistance

6.6.1 Test apparatus and chemicals

- a) chemicals/reagents

The list of chemicals is given in Table 4. Each solution shall be prepared immediately before use with deionised water, and applied at a temperature of  $(23 \pm 5)$  °C.

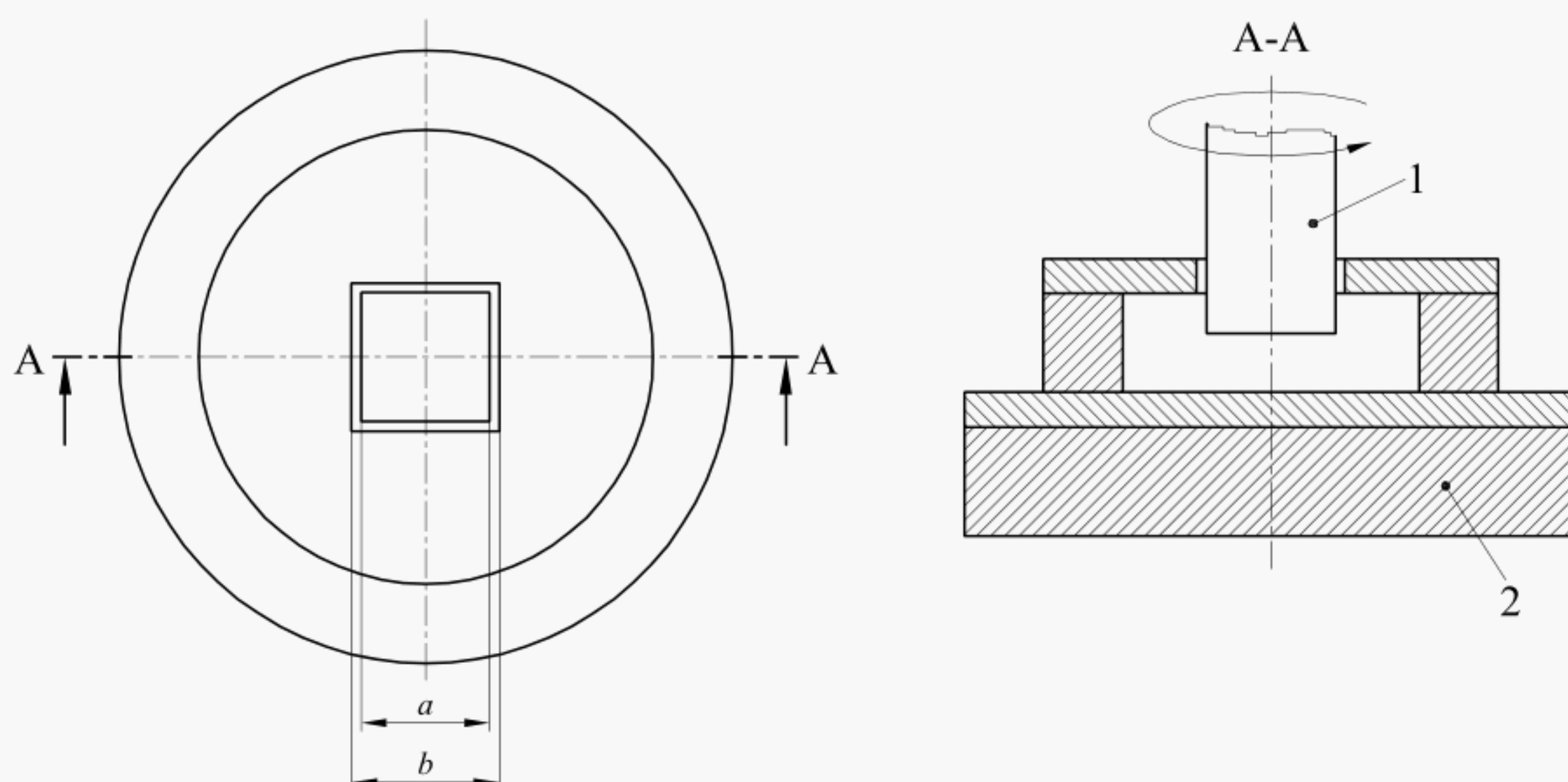
Table 4 — Chemicals

Family	Product
Acids	Acetic acid (CH <sub>3</sub> COOH), 10 % V/V
Alkalines	Sodium hydroxide (NaOH), 10 % m/m
Alcohols	Ethanol (C <sub>2</sub> H <sub>5</sub> OH), 70 % V/V
Bleaches	Sodium hypochlorite (NaOCl), 5 % active chlorine (Cl <sub>2</sub> ) <sup>a)</sup>
Staining agents	Methylene blue 1% m/m
<sup>a)</sup> Given bleach may be replaced by sodium percarbonate (2Na <sub>2</sub> CO <sub>3</sub> · 3H <sub>2</sub> O <sub>2</sub> ) prepared as follows: Dissolve 1 g of a commercial available powdery bleach based on sodium percarbonate containing 15 % to 30 % of the active component in 100 ml of deionised water at room temperature.	

- b) borosilicate watch glasses: 40 mm nominal diameter;
- c) pipettes;
- d) cleaning device (see Figure 8): This device consists of a synthetic flexible open cell foam disc 75 mm in diameter and 15 mm in thickness. This appliance is driven by a square axle which loosely fits into the device. Any rotating device having a mass of  $(1\,000 \pm 50)$  g shall be used;
- e) 12 h-alumina (suspension of aluminium oxide in water)<sup>1)</sup>.

1) A suitable product is available form MERCK Eurolab-Prolabo, 54 rue Roger Salengro, 94126 Fortenay sous Bois CEDEX, France, as DURMAX™ under product description N° 20993. This information is given for the convenience of users of this standard and does not constitute an endorsement by CEN of these products.



**Key**

- 1 Square axle  $a = b - 1$  mm
- 2 Foam

**Figure 8 — Cleaning device****6.6.2 Test specimen**

Care shall be taken to obtain suitable (as flat as possible) specimens from different parts of the unit.

**6.6.3 Procedure**

- a) Select a test area.
- b) Use each test area only for one reagent. Clean the test area thoroughly with hot soapy water and then dry with a clean dry cloth.
- c) At each of the test areas provided for, deposit a drop of the test solution. Cover the drop with a watch glass concave face downwards. The drop size shall be such that it is completely covered by the watch glass. Allow the selected chemical to act for a time of  $(120 \pm 5)$  min at  $(23 \pm 5) ^\circ\text{C}$  with the test area protected from the sun.
- d) Thoroughly rinse the test areas with deionised water and visually check for any adverse changes in appearance. If deterioration is detected, dip the foam disc in deionised water and place it on the surface to be cleaned, and rotate it at  $60 \text{ min}^{-1}$ . Clean for 30 r.
- e) Rinse with deionised water and visually examine the test areas. If any deterioration persists, repeat the cleaning process with 12 h alumina and re-examine the test area.

NOTE Exact test area;

whether or not the reagent causes a stain or deterioration when inspected with a naked eye at 60 cm, and, illuminated by cool neon light of 150 lx at the surface of the sample;

whether or not such stain or deterioration is removed, and if so with water or abrasive agent.

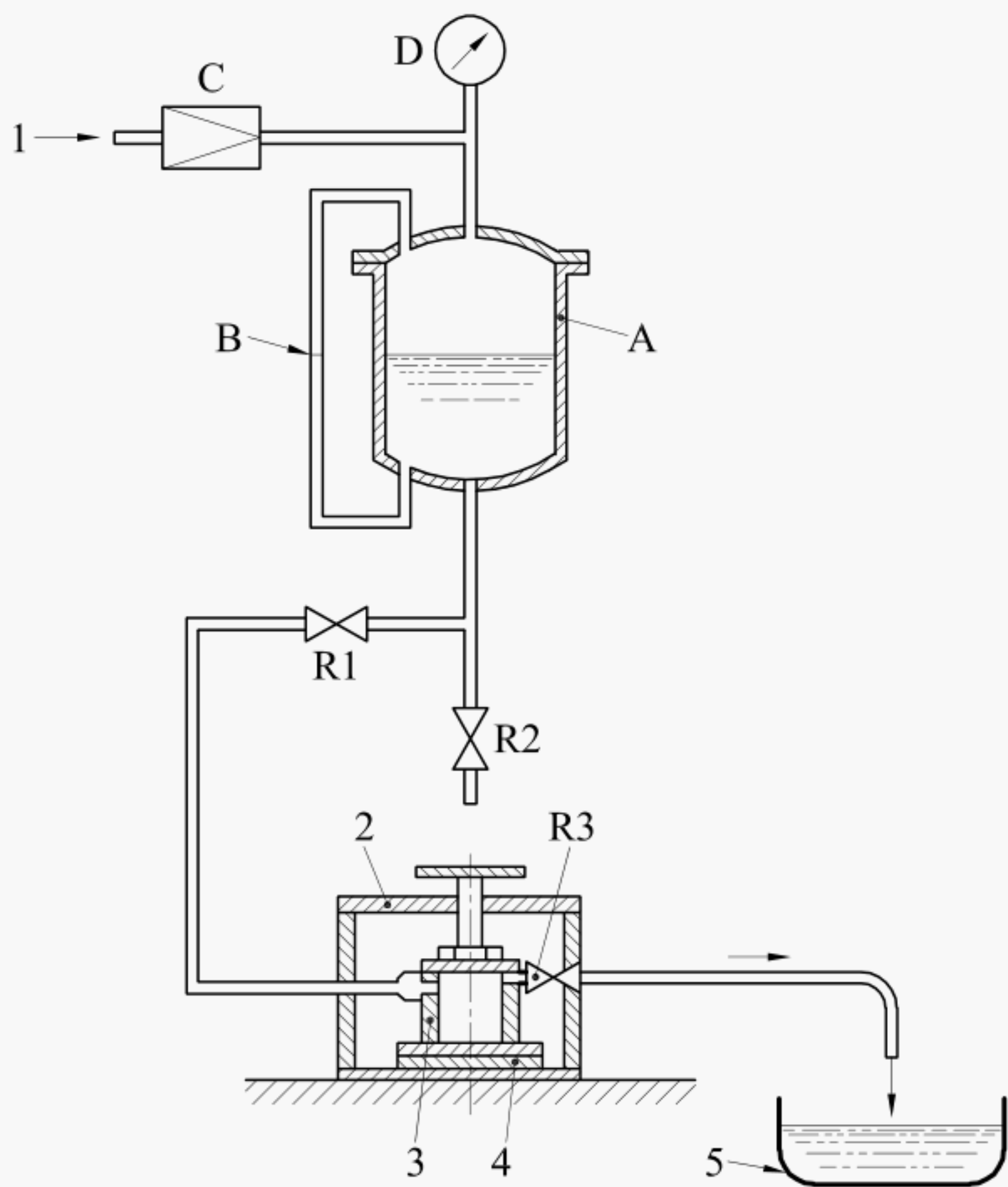
6.7 Water absorption

6.7.1 Principle

This method consists of measuring the mass of water absorbed by a test piece in contact with a column of water under a fixed pressure for a given period.

6.7.2 Test apparatus

- a) Device for exerting pressure (see Figure 9): This device is comprised of a tank (A) with a level indicator (B) to check the height of the water in the tank, a compressed air pressure regulator valve (C), and a pressure gauge (D). The lower part of the tank has a tube and a valve (R2) so that the tank can be emptied and filled. On this tube a branch connection tube with a valve is mounted which connects the filling and pressuring device with the cell;



<b>Key</b>	
A	Constant pressure tank
B	Level indicator
C	Pressure regulator
D	Pressure gauge R1, R2, R3 Valves
1	Compressed air
2	Clamp
3	Cell
4	Test piece
5	Discharge tank

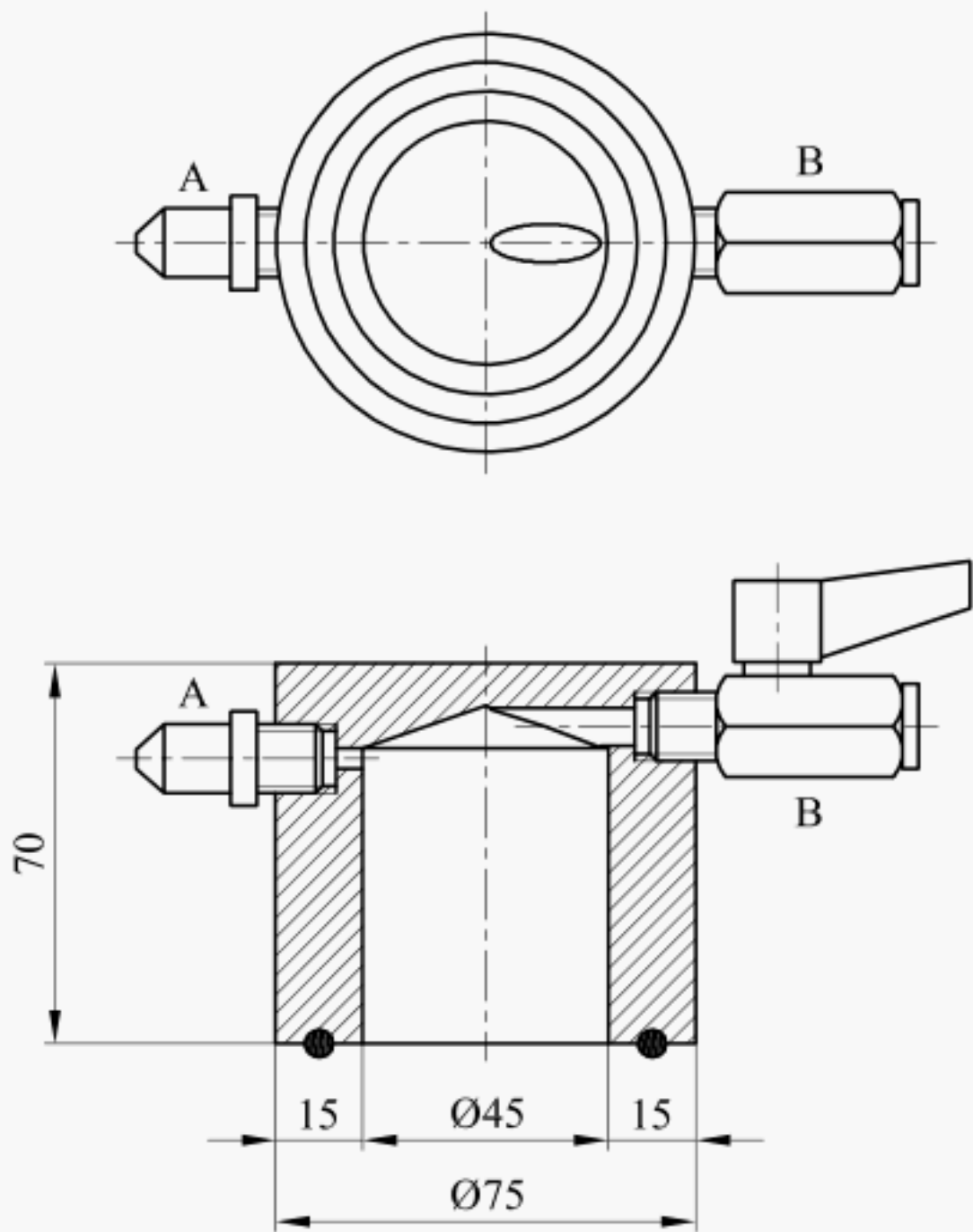
Figure 9 — Water absorption

- b) cell comprised of an aluminium body in the shape of a bell (see Figure 9): The part in contact with the test piece has an O-ring seal if the test piece is flat. If this is not the case, the O-ring seal is replaced by an 'X' profiled glued joint. The dimensions of the cell are given in Figure 10. On the upper part and



exactly opposite each other are a tube connecting the cell with the filling device and a drain valve (R3). This valve is left open while the cell is being filled with water enabling air to escape;

Dimensions in millimetres



**Key**

- A tube for connection with filling device
- B drain valve

**Figure 10 — Cell**

- c) clamp comprised of a frame made of rigid panels 10 mm thick (see Figure 11): On the top of the clamp is a handle with a screw at its end with a shoulder so that the cell/test piece unit can be locked to ensure it is properly sealed;

Dimensions in millimetres

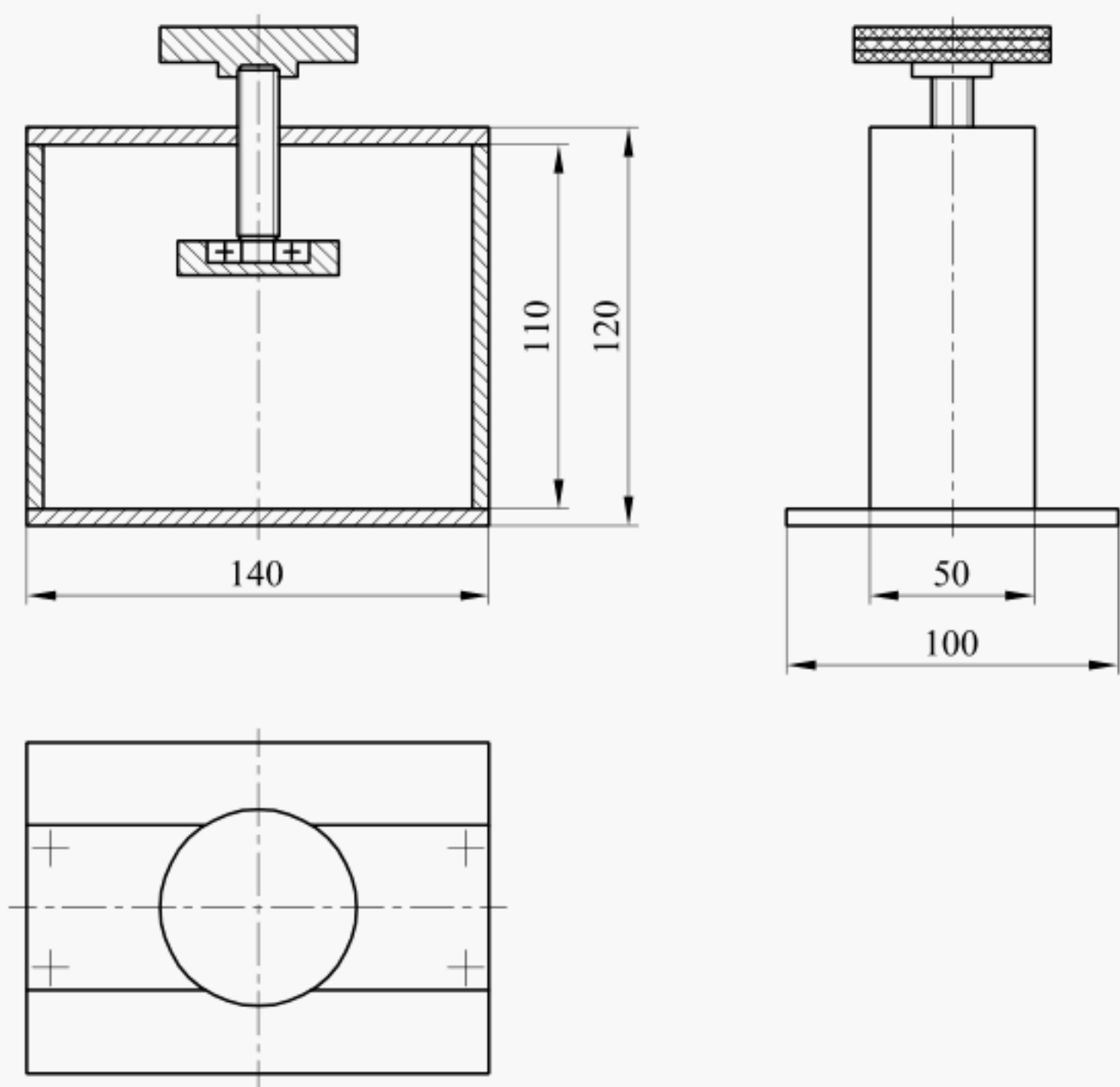


Figure 11 — Clamp

- d) chronometer with an accuracy of  $\pm 1$  s;
- e) balance with an accuracy of  $\pm 0,001$  g;
- f) desiccator.

6.7.3 Test specimen

Three test pieces as flat as possible shall be taken from different parts of the unit.

The test pieces shall have dimensions of 100 mm x 100 mm or -Ø 100 mm.

Dry the test pieces at  $(50 \pm 2)$  °C for 24 h and leave them to cool in the desiccator until they once again reach ambient temperature

6.7.4 Procedure

Carry out the test on the face of the specimen that is usually in contact with water. Test each specimen on the same day.

- a) Weigh each test piece and record the mass  $m_0$ ;
- b) Close the valve R1;
- c) Fill tank A three-quarters full with demineralised or distilled water at room temperature;
- d) Close valve R2;



- e) Using the pressure regulator, set the pressure in the tank A at  $(0,5 \pm 0,01)$  MPa;
- f) Position the cell (which is connected to tank A) on the test piece and tightly lock the cell/test piece using the clamp;
- g) Open valve R3;
- h) Open valve R1 slightly;
- i) As soon as water leaves via the drain tube close valve R3 and start the timer;
- j) Fully open valve R1 and check that the pressure is correctly set;
- k) Wait 5 min;
- l) Close valve R1;
- m) Open valve R3;
- n) Turn the clamp/cell unit (still locked) upside-down, undo the clamp locking screw and let the water drain off;
- o) Keeping the unit upside-down, take the test piece out and wipe using a chamois leather or a dry lint-free cloth (this procedure prevents the drops remaining on the surface in contact with the cell, from flowing onto the sides of the test piece);
- p) Weigh the test piece and record the mass  $m_1$ ;
- q) Determine for each test piece the mass of water absorbed as  $m_1 - m_0$ ;
- r) Calculate the arithmetic mean of the mass of water absorbed for the three test pieces.

## 6.8 Steam resistance

- a) Install the unit in accordance with the manufacturer's instructions.
- b) Set the steam generator at the maximum power.
- c) Let the steam generator run for the maximum duration fixed by the manufacturer. When a time-switch is not provided, interrupt the steam generation after 1 h.
- d) Let the unit cool at room temperature, then repeat the cycle until the total steam generation time reaches 150 h.
- e) After the last cycle brush over the surface with a solution of eosine (100 g/l in water) to which is added 1 cm<sup>3</sup>/l of liquid detergent using a soft sponge or paint brush.
- f) Leave the solution for  $(5 \pm 1)$  min then remove from the surface by wiping with a clean soft dampened cloth and visually check for any adverse changes in appearance and for the presence of traces of eosine.

## 6.9 Resistance to wet and dry cycling

### 6.9.1 Test apparatus

- a) suitable specimen carrier;
- b) suitable open container;



- c) oven with an accuracy  $\pm 1$  °C.

### **6.9.2 Test specimens**

The specimens tested shall be obtained from the materials used for the different parts of the unit before any forming or reinforcement, cutting pieces with an area of 100 cm<sup>2</sup>.

Prior to commencing the test examine the functional surface of the specimen and mark any surface defect.

### **6.9.3 Procedure**

- a) Place the maximum number of test specimens vertically in a suitable carrier and place the carrier in a suitable open container. The carrier shall be arranged to avoid any contact between one test specimen and another.
- b) Pour boiling water into the container. The container shall be sized so that water covers the specimens completely.
- c) Leave the specimens in the water for  $(8 \pm 0,25)$  h whilst allowing them to cool to room temperature.
- d) Remove the specimens from the water, wipe the surfaces with a soft dampened cloth and place the specimen into an oven for  $(16 \pm 0,5)$  h at  $(50 \pm 2)$  °C. When placing the specimens in the oven ensure they do not touch the oven walls or each other.
- e) Repeat this cycle twenty times using the same test specimens. In the event that the test procedure is interrupted, e.g. over the week end, leave the specimens in the oven at  $(50 \pm 2)$  °C.
- f) After twenty cycles brush over the functional surface of each test specimen with a solution of 100 g eosine in 1 l of water to which is added 1 cm<sup>3</sup>/l of liquid detergent, using a soft sponge or a paint brush.
- g) Leave the solution for  $(5 \pm 1)$  min then remove from the surface by wiping with a clean soft dampened cloth and visually check for any adverse changes in appearance (blisters, crazing, cracks etc.) and for the presence of traces of eosine. Ignore the 3 mm width along each side to exclude any influence caused by the cut edges.

## **6.10 Colour fastness to hot water**

### **6.10.1 Apparatus**

- a) suitable specimen carrier;
- b) thermostatically controlled container.

### **6.10.2 Test specimens**

The specimens to be tested shall be obtained from the different parts of the unit cutting pieces with an approximate dimensions of 100 mm x 25 mm.

### **6.10.3 Procedure**

- a) Place the specimen in a suitable carrier.
- b) Immerse the specimen in water maintained at  $(60 \pm 2)$  °C for 30 min, remove and allow to drain and dry out in air for 30 min.
- c) Repeat the cycle 100 times without interruption.



- d) Allow 48 h for the specimen to dry out before it is compared with the area from which it was cut.
- e) Colour fastness of the specimen shall be recorded in terms of the grey scale for assessing colour change as specified in EN 20105 - A02.

## 6.11 Resistance to scratching

### 6.11.1 Principle

The minimum load applied to a diamond scratching point of defined geometry, which produces a continuous surface scratch visible to the naked eye, corrected if necessary, is the resistance to scratching of the functional surface under test.

NOTE In cases when the functional surface is curved with a small radius, the original sheet may be tested from which the functional surface is produced.

This minimum load is determined by applying successively decreasing loads to the diamond point and examining the scratches produced.

### 6.11.2 Test apparatus

A scratch testing apparatus as described in ISO 4586-2:2004, 14.2.1 (see Figure 7).

### 6.11.3 Test specimen

Cut three specimens, of the shape and dimensions shown in ISO 4586-2:2004, 14.4 from a sheet used for manufacturing the unit. Wipe the surface of each specimen using cotton fabric impregnated with a solvent such as an alcohol/water mixture. It is important that, once cleaned, the surface to be tested is not touched.

The test specimen shall be preconditioned at  $(23 \pm 2) ^\circ\text{C}$  and at a relative humidity of  $(50 \pm 5) \%$  for 24 h.

### 6.11.4 Procedure

#### 6.11.4.1 General

- a) Make sure that the test rig with the test apparatus is positioned horizontally.
- b) Adjust the height of the arm (B) so that it is horizontal when the diamond point rests on the specimen.

#### 6.11.4.2 Determination of the value

- a) Start the test with a load of 0,3 N. Place the arm (B) into a vertical position
- b) Fix the first specimen with the locking disk (E) and secure it correctly to avoid any slipping.
- c) Lower the arm (B) and place the diamond point in contact with the specimen, taking care to avoid any impact.
- d) Start rotating the turntable counterclockwise for one complete revolution at a uniform rotational frequency of  $(5 \pm 1) \text{ min}^{-1}$ .
- e) Stop the turntable and unlock the specimen.
- f) Repeat this procedure for the other two specimens.

#### 6.11.4.3 Final inspection

- a) Place the scratched samples in a standard atmosphere as specified in 6.5.3 before final inspection.

- b) Clean the surface of the specimen.
- c) With the mask in place on the surface of the specimen, place specimen and mask on the viewing point in the viewing enclosure with one aperture of the mask in the 12 o'clock position.
- d) Tilt at any angle, without rotating the specimen or mask, and observe each aperture in turn with the naked eye, corrected if necessary.

#### **6.11.5 Expression of results**

If, after 24 h of specimen storage in the standard conditions, there are no visible signs of scratching, or there are only a few marks visible in the viewing mask on at least two samples, the test requirements are satisfied.

### **6.12 Waste outlet drainage**

#### **6.12.1 Test apparatus**

- a) water supply;
- b) water pressure measuring device with an accuracy of  $\pm 5 \%$ ;
- c) flow rate measuring device with an accuracy of  $\pm 10 \%$ .

#### **6.12.2 Procedure**

- a) Install the unit in accordance with manufacturer's instructions ensuring that the drainage piping connected to the waste fitting is capable of taking the maximum wastewater flow indicated by the manufacturer.
- b) Supply the unit at the maximum water pressure recommended by the manufacturer.
- c) Fully open the water function giving the maximum inflow and leave it fully open for 10 min with the waste outlet open.
- d) Check whether any overflow occurs.

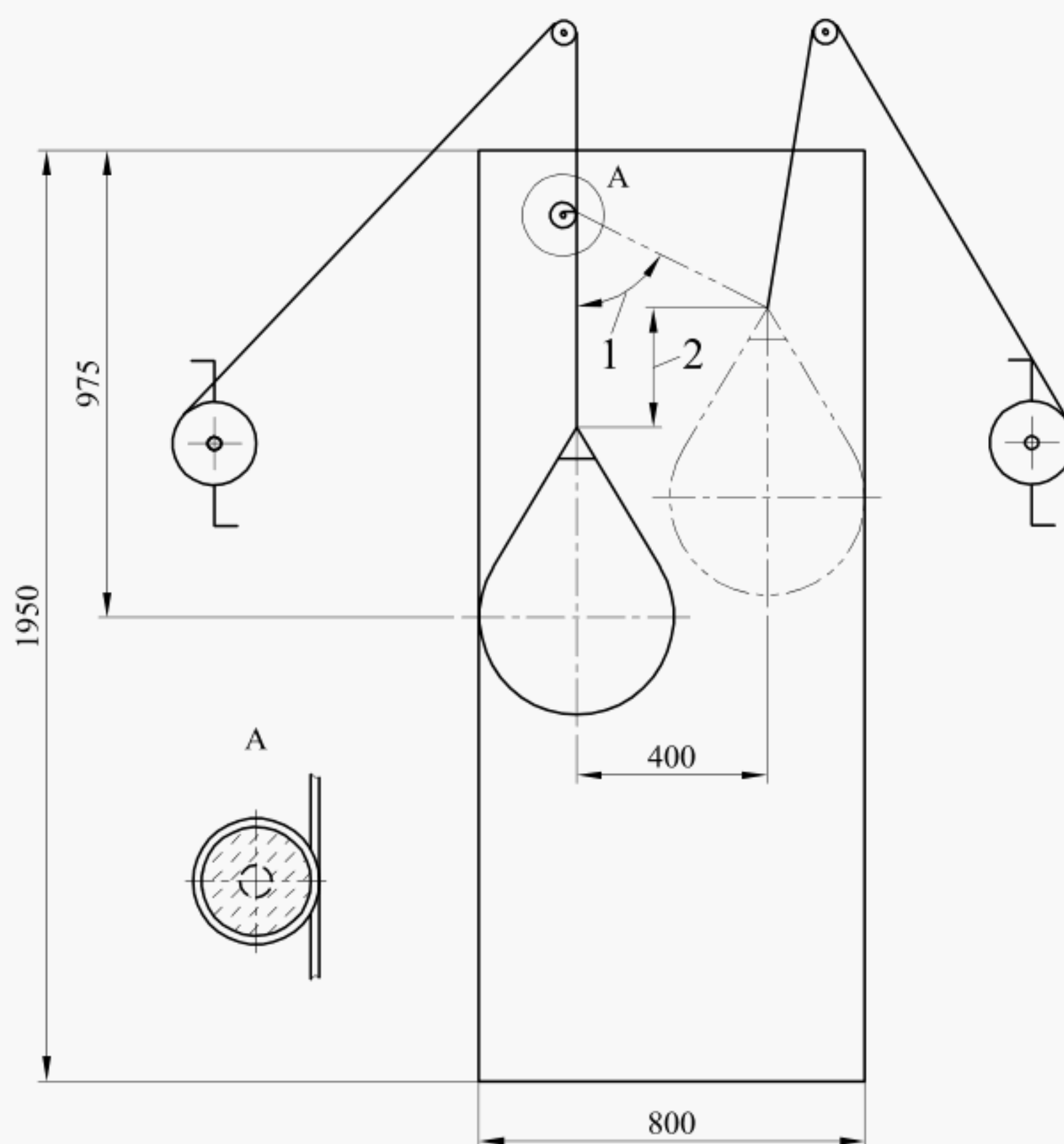
### **6.13 Stability**

#### **6.13.1 Test apparatus**

- a) suitable test rig (see Figure 12);
- b) impact body as specified in ISO 7892:1988, 3.3;
- c) angle measuring device with an accuracy of  $\pm 2 \%$ .



Dimensions in millimetres

**Key**

- A Wound cable
- 1 Angle
- 2 Falling height  $h$  according to Table 5

**Figure 12 — Stability test arrangement****6.13.2 Procedure**

- a) Install the unit in accordance with manufacturer's instructions. If a roof is provided, do not install it.
- b) Carry out the test as described in ISO 7892:1988, 4.5 with the impact body falling inside the unit with the energy specified in Table 5. The impact body shall hit each enclosing wall and/or door on its geometric centre (see Figure 12). If the unit dimensions do not allow the necessary drop height to reach the maximum energy given in Table 5, perform the test with the maximum of  $65^\circ$  for angle  $\alpha$ .

Table 5 — Energy for stability test

Dimension of the unit mm	Energy to be applied J	Falling height of impact body <i>h</i> cm
≤ 600	63	13
≤ 700	94	19
≤ 800	125	25
> 800	135	28

- c) Repeat the test with the impact body falling outside the unit with an energy of 135 J. The impact body shall hit each enclosing wall and/or door on its geometric centre.
- d) Check for any functional deterioration that could result in injury of the user.

If the roof or any other part of the cabinet prevents testing the unit as shown in Figure 12, the manufacturer may build an alternative structure which allows the test to be carried out. The alternative structure shall not add to the strength of the unit but will allow the energies given in Table 5 to be applied. The impact body shall be as described in 6.13.1

NOTE Safe breakage of mirrors does not constitute a failure.

6.14 Seats

6.14.1 Test apparatus

Six reinforced cloth bags 500 mm x 200 mm, filled with lead shot, iron shot or sand of (25 ± 0,25) kg mass each or twelve bags of (12,5 ± 0,25) kg mass of the same size.

6.14.2 Procedure

- a) Install the unit in accordance with the manufacturer's instructions.
- b) Place the bags in a pile on the seating position, ensuring stability of the pile by any appropriate means if necessary. If twelve bags are used, they shall occupy the same surface area as the six bags. If the manufacturer declares in his instruction that the unit is designed for more than one person, load the seating position with 150 kg per person.
- c) Leave the seat loaded for (10 ±1) min.
- d) Remove the bags and visually check the relevant part of the unit for compliance with 5.11.

6.15 Grab handles

6.15.1 Test apparatus

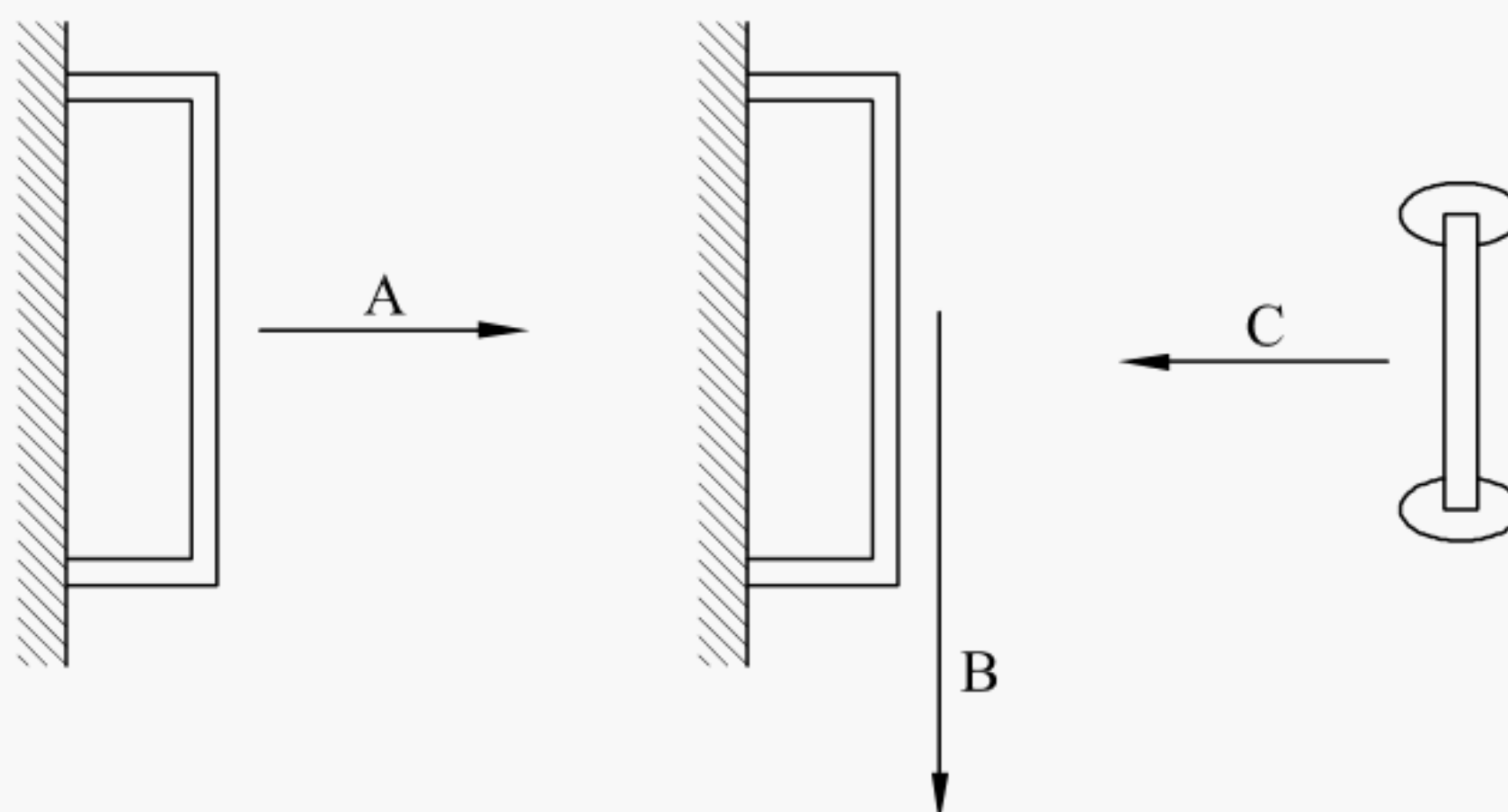
Suitable means to apply a force of 250 N and 1 100 N.

6.15.2 Procedure

- a) Install the unit in accordance with the manufacturer's instructions.
- b) Apply 250 N in the centre of the grab handle in direction A for (5 ± 1) min (see Figure 13).
- c) Apply 1 100 N in direction B for (5 ± 1) min (see Figure 13).



- d) Apply 250 N in the centre of the grab handle in direction C for  $(5 \pm 1)$  min (see Figure 13).
- e) After each application of the force, visually check the relevant part of the unit for compliance with 5.12.



**Key**

A, B, C direction of forces (see 6.5.2)

**Figure 13 - Direction of forces for grab handle test**

## 6.16 Unit watertightness test

### 6.16.1 Principle

The test is related to additional water functions provided in the unit, other than the main shower head.

### 6.16.2 Test apparatus

- a) water supply;
- b) water pressure measuring device with an accuracy of  $\pm 5$  %;
- c) thermometer with an accuracy of  $\pm 1$  °C.

### 6.16.3 Procedure

- a) Install the unit in accordance with manufacturer's instructions.
- b) Supply the unit at the recommended maximum pressure condition indicated in the manufacturer's instructions, with water at  $(38 \pm 2)$  °C.
- c) Select the water function most likely to cause leakage of the enclosing walls (e.g. vertical body massage, neck massage, waterfall etc.).
- d) Direct the flow towards joints in the enclosing walls (when the adjustment range allows this).
- e) Set the flow adjustment device to the maximum flow position.
- f) Let the water function run for  $5^{+0,5}_{-0}$  min and check the compliance with 5.13.1.

## **6.17 Piping leaktightness**

### **6.17.1 Test apparatus**

- a) water supply capable of providing the pressures and temperatures specified below;
- b) water pressure measuring device with an accuracy of  $\pm 5 \%$ ;
- c) thermometer with an accuracy of  $\pm 1 \text{ }^{\circ}\text{C}$ .

### **6.17.2 Procedure**

#### **6.17.2.1 Pressurised section (section 1)**

- a) Install the unit in accordance with the manufacturer's instructions, ensuring that the piping system remains accessible and visible.
- b) Connect the unit to the water supply which shall be capable of providing a static pressure 1,6 times the maximum operating pressure as defined by the manufacturer.
- c) Subject the pipework to the water supply pressure for  $60^{+10}_{-0}$  seconds whilst continually visually checking the piping for compliance with 5.13.2.

#### **6.17.2.2 Non-pressurised section (section 2)**

- a) Adjust the water pressure at the inlet at 0,6 MPa under flow condition.
- b) Select one of the water functions of the unit and adjust the water at  $60 \text{ }^{\circ}\text{C}$ .
- c) Set the flow adjuster at the maximum opening.
- d) Let the water function run for  $(5 \pm 0,5) \text{ min}$ .
- e) Repeat the procedure for each water function provided.
- f) Visually inspect piping associated with each water function and check for compliance with 5.13.2.

## **6.18 Steam heating system**

### **6.18.1 Test apparatus**

- a) Temperature measuring device with an accuracy of  $\pm 1 \text{ }^{\circ}\text{C}$ ;
- b) temperature controlled room at  $(20^{+5}_{-0}) \text{ }^{\circ}\text{C}$  within 2 m of the shower cabinet under test.

### **6.18.2 Procedure**

- a) Install the unit in accordance with the manufacturer's instructions.
- b) Using appropriate supports, place along the longitudinal axis of the unit (on the geometric centre of the base) four temperature sensors at 50 cm, 80 cm, 120 cm and 150 cm from the bottom.
- c) Set the steam generator at the maximum power.
- d) Record the initial temperature readings of the four sensors.



- e) Let the steam generator run and record the temperature readings of the four sensors after 25 min after switching-on and calculate the arithmetic mean of the temperature readings to determine the temperature increase.
- f) Calculate the maximum deviation between the temperature readings after 30 min to determine the temperature distribution.

## 7 Marking

Each unit shall be marked with the following information which shall be applied in a durable manner and be accessible or visible after installation:

- a) manufacturer's name and/or trade mark;
- b) date or serial number of assembly of unit;
- c) number of this European Standard (EN 15200).

## 8 Manufacturer's instructions

Each unit shall be supplied with instructions covering installation, use, care and maintenance. Such instructions shall contain guidance on the following:

- a) mechanical assembly and installation;
- b) connection to the water supply in accordance with national regulations;
- c) water outlet flow at maximum operating pressure conditions (e. g. in l/min);
- d) suitable range of water supply pressures and temperatures;
- e) connection to the electrical mains in accordance with national regulations;
- f) access information for components which require regular maintenance;
- g) instruction for use;
- h) recommended cleansing agents and specific instructions to their use.