INTERNATIONAL STANDARD

ISO 3822-4

Second edition
1997-02-01

Acoustics — Laboratory tests on noise emission from appliances and equipment used in water supply installations —

Part 4:
Mounting and operating conditions for special appliances

Acoustique — Mesurage en laboratoire du bruit émis par les robinetteries et les équipements hydrauliques utilisés dans les installations de distribution d'eau —

Partie 4: Conditions de montage et de fonctionnement des équipements spéciaux

Reference number
ISO 3822-4:1997(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 3822-4 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 3822-4:1985), which has been technically revised.

ISO 3822 consists of the following parts, under the general title *Acoustics — Laboratory tests on noise emission from appliances and equipment used in water supply installations*:

— *Part 1: Method of measurement*

— *Part 2: Mounting and operating conditions for draw-off taps and mixing valves*

— *Part 3: Mounting and operating conditions for in-line valves and appliances*

— *Part 4: Mounting and operating conditions for special appliances*

Annexes A, B, C and D form an integral part of this part of ISO 3822. Annex E is for information only.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet central@iso.ch
X.400 c=ch; a=400net; p=iso; o=isocs; s=central

Printed in Switzerland

Content

Foreword

The text of EN ISO 3822-4 :1997 has been prepared by Technical Comittee CEN/TC 126 "Acoustic properties of building components and of buildings" the secretariat of which is held by AFNOR in collaboration with the Technical Comittee ISO/TC 43 "Acoustics".

The content of this part of the European Standard EN ISO 3822 is not identical with the International Standard ISO 3822-4:1985 "Acoustics - Laboratory tests on noise emission from appliances and equipment used in water supply installations - Part 4 : Mounting and operating conditions for special appliances".

Working group CEN/TC 126/WG 3 was instructed, in May 88, to examine and take into account the comments on ISO 3822-4, following the primary questionnaire.

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 July 1997, and conflicting national standards shall be withdrawn at the latest by July 1997.

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

0 Introduction

The method of measurement for laboratory tests on noise emission from appliances and equipment used in water supply installations is specified in EN ISO 3822-1.

The mounting and operating conditions for draw-off taps and mixing valves are described in EN ISO 3822-2 whereas EN ISO 3822-3 describes the mounting and operating conditions for in-line valves and appliances.

This part of EN ISO 3822 describes the mounting and operating conditions for laboratory tests of appliances of such construction that they cannot easily be considered as draw-off or in-line appliances, e.g. water heaters, shower heads, etc.

1 Scope

This part of EN ISO 3822 specifies the mounting and operating conditions to be used for a number of appliances which cannot be regarded as draw-off or in-line valves, when measuring the noise emission resulting from water flow.

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

ISO 7/1	Pipe threads where pressure-tight joints are made on the threads - Part 1: Designation, dimensions and tolerances.
ISO 48	Vulcanised rubbers - Determination of hardness (Hardness between 30 and 85 IRHD).
ISO 49	Malleable cast iron fittings threaded to ISO 7/1.
ISO 228/1	Pipe threads where pressure-tight joints are not made on the threads - Part 1: Designation, dimensions and tolerances.
ISO 2768	Permissible machining variations in dimensions without tolerance indication.
ISO 6708	Pipe components - Definition of nominal size.
EN ISO 3822-1	Acoustics - Laboratory tests on noise emission from appliances and equipment used in water supply installations - Part 1: Method of measurement.
EN ISO 3822-2	Acoustics - Laboratory tests on noise emission from appliances and equipment used in water supply installations - Part 2: Mounting and operating conditions for draw-off taps and mixing valves.
EN ISO 3822-3	Acoustics - Laboratory tests on noise emission from appliances and equipment used in water supply installations - Part 3: Mounting and operating conditions for in-line valves and appliances.

3 Mounting and operating conditions

3.1 Connection of appliances

The test pipe shall end with a galvanised union (hot-dip zinc coated), taper seat size 1, U11 complying with ISO 49.

Special appliances, including connecting pipe, shall be connected to the union using if necessary a combination of galvanised (hot-dip zinc coated) fittings complying with ISO 49.

Changes in direction shall be accomplished by means of long sweep bends size 1 only. Reduction or enlargement of size shall only be made at the inlet connection of the appliance or connecting pipe. The combination of fittings used shall result in the appliance being mounted in the normal position of use (see figure 1).

3.2 Float-operated valves

3.2.1 General

A float-operated valve not forming part of a particular flushing unit shall be tested in a standard test cistern for which the internal dimensions are given in table 1.

Table 1 : Internal dimensions of standard test cisterns

Nominal size (DN) of the float-operated valve		Length	Height	Width
DN	Designation of thread	mm	mm	mm
10 15	3/8 1/2	400	300	125
20 25	3/4 1	1 050	540	350
NOTE : DN is the symbol for "nominal size" (see ISO 6708); the nominal size value is loosely related to the inside diameter, in millimetres, of the special appliance.				

Float-operated valves forming part of a flushing unit, e.g. a toilet flushing unit, shall be tested together with the cisterns in which they are mounted and also with the stop-valve if it forms part of the unit.

3.2.2 Mounting conditions

If the appliance is fitted with a copper connecting pipe, it shall be at least 10 diameters in length, though not more than 300 mm. If another type of connection is supplied, the connection to the test pipe shall be made, as far as possible, as in the field. When a compression fitting is used, a copper connecting pipe shall be inserted into the appliance, according to the manufacturer's instructions. There shall be no stop-valve between the appliance and the appliance connection at the end of the test pipe, unless it belongs to the unit.

The test cistern shall be fixed acoustically independent of the test wall.

3.2.3 Operating conditions

Float-operated valves shall be tested at flow pressures of 0,3 MPa and 0,5 MPa [1] , adjusted when the valve is in the fully open position and maintained during closing.

The minimum rate of filling of the cistern specified by the appropriate product standard [2], or the manufacturer, shall be adjusted at a flow pressure of 0,3 MPa.

---

[1] 1 MPa = 10 bar

[2] The appropriate EN product standard is prEN 12541 and the document CEN/TC163/WG3/GAH3N64

The sound pressure level during the steady flow phase and the closing phase of the valve shall be measured and the highest level reported.

3.3 Flushing valves

3.3.1 Mounting conditions

Flushing valves shall be connected directly to the test pipe (see 3.1). The outlet of the valve shall be connected to a hose of about 500 mm in length and of the same bore as the outlet of the flushing valve. At the end of the hose, the water shall be discharged quietly.

3.3.2 Operating conditions

Flushing valves shall be tested at flow pressures in accordance with table 2, adjusted when the valve is in the fully open position. The maximum static pressure when closed (all sizes) shall be 0,7 MPa.

Table 2 : Flow pressures for testing flushing valves

Nominal size of flushing valve DN	15		20		25		32
Flow pressure with valve fully open MPa	0,25	0,4	0,25	0,4	0,1	0,25	0,1

If the flushing valve can be site adjusted manually, it shall be adjusted to the flow rates specified by the appropriate product standard [3)], or the manufacturer. For flow pressures at which this flow-rate cannot be achieved, the measurements shall be carried out at the maximum possible flow-rate. In each case, the flow-rate used shall be stated in the test report.

The sound pressure level during the steady-flow phase and the closing phase of the valve shall be measured and the highest level reported.

3.4 Water Heating Appliances

3.4.1 General

Testing of complete water heaters of all types is only necessary when the heater incorporates a device which influences the flow rate or pressure of the water.

3.4.2 Mounting conditions

Water heating appliances shall be connected to the test pipe using a connecting pipe of the same nominal bore as the appliance inlet connection. This connecting pipe shall have a length at least equal to 10 times its nominal bore, but shall not be longer than 500 mm. The appliance shall be rigidly mounted on a wall other than the test wall, or on a frame.

[3)] The appropriate EN product standard is EN 816

3.4.3 Operating conditions

Water heating appliances shall be tested with water at a temperature not higher than 25 °C
The tests specified in 3.4.3.1; 3.4.3.2; 3.4.3.3; 3.4.3.4 shall be carried out at flow pressures of 0,3 MPa and 0,5 MPa. Additional tests are necessary in some cases when flow adjusters are incorporated into the appliance.

Stop valves incorporated into the appliance shall be fully open unless they are intended to be used as flow adjusters.

3.4.3.1 Cistern type storage water heaters

Float operated valves used in cistern type water heaters shall be tested in accordance with 3.2.

3.4.3.2 Storage water heaters of the closed type

a) If the water heater incorporates an integral draw-off tap or mixing valve, it shall be tested in accordance with EN ISO 3822-2, including requirements for flow adjusters.

b) Water heaters without an integral draw-off tap or mixing valve, but incorporating some device which influences the flow rate or pressure of the water, such as a flow adjuster, shall be tested with an adjustable low-noise flow resistance (see example given in EN ISO 3822-3) connected to the outlet. The adjustable low-noise flow resistance shall be set so that at a flow pressure of 0,3 MPa the maximum flow rate is in accordance with table 1 of EN ISO 3822-3 for the size of the heater inlet, or outlet, whichever is the smaller. If this flow rate cannot be achieved the test shall be carried out at the maximum possible flow rate.

During the test the adjustable low-noise flow resistance shall be adjusted from the maximum setting specified above down to zero flow rate. The sound pressure level shall be measured during this procedure, and the highest level reported.

If the water heater incorporates a flow adjuster which can be manually set, the setting shall be in accordance with clause 4.1.5 of EN ISO 3822-2. Flow adjusters with a fixed setting or automatic function shall be left as supplied.

3.4.3.3 Instantaneous water heaters of the closed type

a) If the water heater incorporates an integral draw-off tap or mixing valve, it shall be tested in accordance with EN ISO 3822-2, including requirements for flow adjusters.

If the water heater uses a flow adjuster, or other supplementary flow control, as a temperature selector, tests shall be carried out at both maximum and minimum settings. Checks shall also be made for any greater sound pressure level at intermediate settings.

b) Water heaters without an integral draw-off tap or mixing valve shall be tested with an adjustable low-noise flow resistance (see example given in EN ISO 3822-3) connected to the outlet. The adjustable low-noise flow resistance shall be set so that at a flow pressure of 0,3 MPa the maximum flow rate is a value, in litres per second, equal to 1/120 of the nominal heating power, expressed in kilowatts, of the water heater. If this flow rate cannot be achieved the test shall be carried out at the maximum possible flow rate.

During the test the adjustable low-noise flow resistance shall be adjusted from the maximum setting specified above down to zero flow rate. The sound pressure level shall be measured during this procedure and the highest level reported.

If the water heater incorporates a flow adjuster which can be manually set, it shall be set to the maximum possible flow rate. Flow adjusters with a fixed setting or automatic function shall be left as supplied.

If the water heater uses a flow adjuster, or other supplementary flow control, as a temperature selector, tests shall be carried out at both maximum and minimum settings. Checks shall also be made for any greater sound pressure level at intermediate settings.

Before repeating the test at a flow pressure of 0,5 MPa the adjustable low-noise flow resistance shall be reset, at a flow pressure of 0,3 MPa, to the flow rate specified above. Then increase the flow pressure to 0,5 MPa.

3.4.3.4 Water heaters of the overflow (open outlet) type - both storage and instantaneous

a) If the water heater incorporates an integral draw-off tap or mixing valve, it shall be tested in accordance with EN ISO 3822-2, including requirements for flow adjusters.

If the water heater is supplied with a removable outlet accessory such as a shower hose, shower head, flow straightener etc., the test shall be carried out with this in place. Otherwise nothing shall be connected to the heater outlet during the test.

If the water heater uses a flow adjuster, or other supplementary flow control, as a temperature selector, tests shall be carried out at both maximum and minimum settings. Checks shall also be made for any greater sound pressure level at intermediate settings.

b) Water heaters without an integral draw-off tap or mixing valve, but incorporating some device which influences the flow rate or pressure of the water such as a flow adjuster, shall be tested as they are.

If the water heater is supplied with a removable outlet accessory such as a shower hose, shower head, flow straightener etc., the test shall be carried out with this in place. Otherwise nothing shall be connected to the heater outlet during the test.

If the water heater incorporates a flow adjuster which can be manually set, it shall be set to the maximum possible flow rate. Flow adjusters with a fixed setting or automatic function shall be left as supplied.

If the water heater uses a flow adjuster, or other supplementary flow control, as a temperature selector, tests shall be carried out at both maximum and minimum settings. Checks shall also be made for any greater sound pressure level at intermediate settings.

3.5 Mixing valves for instantaneous heaters of the closed type

3.5.1 Mounting conditions

Both inlets of the mixing valve shall be connected to the test pipe in accordance with clause 3.5 of EN ISO 3822-2.

3.5.2 Operating conditions

3.5.2.1 The cold water side shall be tested in accordance with clauses 4.1, (excluding 4.1.5), and 4.2 of EN ISO 3822-2, with the temperature setting in the extreme cold position. If the mixing valve incorporates a flow adjuster in the cold inlet, it shall be left as supplied.

3.5.2.2 The hot water side shall be tested in accordance with clauses 4.1, (excluding 4.1.5), and 4.2 of EN ISO 3822-2, with the temperature setting in the extreme hot position.

When testing the hot water side the flow adjuster shall be set at a flow pressure of 0,3 MPa with the mixing valve flow control fully open in the hot position so that the maximum flow rate, expressed in litres per second, through the hot side of the valve is equal to 1/120 of the nominal heating power, expressed in kilowatts, of the heater with which the mixing valve is expected to be used. Where the mixing valve is to be used with heaters of various heating powers the tests shall be carried out with the flow adjuster set according to both the maximum and minimum nominal heating power. Flow adjusters with a fixed setting or automatic function shall be left as supplied.

Before repeating the test at a flow pressure of 0,5 MPa the flow adjuster shall be set at a flow pressure of 0,3 MPa to the flow rate specified above. Then increase the flow pressure to 0,5 MPa.

3.6 Mixing valves for overflow (open outlet) type water heaters

3.6.1 Mixing valves for overflow (open outlet) type storage water heaters

3.6.1.1 Mounting conditions

Mixing valves for overflow (open outlet) type storage water heaters shall have their inlet connected directly to the test pipe (see 3.1). In place of the heater tank or vessel, a by-pass shall be used. This by-pass shall be constructed of any suitable material and in such a way that additional noise production is unlikely and with the least practicable influence on flow rate. The bore of the by-pass tube throughout its length shall be not less than the nominal bore of the connections for the heater.

3.6.1.2 Operating conditions

Generally the mixing valve shall be tested in accordance with clauses 4.1, (excluding 4.1.3), and 4.3 of EN ISO 3822-2. Mixing valves having a blending device for temperature adjustment downstream of the flow control shall be tested in accordance with clause 4.2 of EN ISO 3822-2, with the temperature adjustment device in the cold position. Then operate the temperature adjustment device over its full range of adjustment, with the flow control fully open, to determine the maximum sound pressure level.

Mixing valves with more than one outlet (for example bath and shower mixing valves) shall be tested separately for each outlet.

If the mixing valve is supplied with a removable outlet accessory such as a shower hose, shower head, flow straightener etc., the test shall be carried out with this in place. Otherwise nothing shall be connected to the mixing valve outlet during the test.

3.6.2 Mixing valves for overflow (open outlet) type instantaneous water heaters

3.6.2.1 Mounting conditions

Mixing valves for overflow (open outlet) type instantaneous water heaters shall be mounted according to 3.6.1.1.

3.6.2.2 Operating conditions

The mixing valve shall be tested in accordance with clauses 4.1, (excluding 4.1.3, 4.1.5), and 4.3 of EN ISO 3822-2. Mixing valves having a blending device for temperature adjustment downstream of the flow control shall be tested in accordance with clause 4.2 of EN ISO 3822-2, with the temperature adjustment device in the cold position. Then operate the temperature adjustment device over its full range of adjustment, with the flow control fully open, to determine the maximum sound pressure level.

Flow adjusters incorporated into the mixing valve to limit the maximum flow of hot water shall be set at a flow pressure of 0,3 MPa with the mixing valve flow control fully open in the hot position so that the maximum flow rate, expressed in litres per second, through the hot side of the valve is equal to 1/120 of the nominal heating power, expressed in kilowatts, of the heater with which the mixing valve is expected to be used. Where the mixing valve is to be used with heaters of various heating powers the tests shall be carried out with the flow adjuster set according to both the maximum and minimum nominal heating power. Flow adjusters with a fixed setting or automatic function shall be left as supplied.

If the mixing valve is supplied with a removable outlet accessory such as a shower hose, shower head, flow straightener etc., the test shall be carried out with this in place. Otherwise nothing shall be connected to the mixing valve outlet during the test.

3.7 Fittings for the connection of household equipment

Fittings for the connection of household equipment (washing machines, dish-washers, etc.,) shall be tested as in-line valves (see EN ISO 3822-3) or as draw-off taps (see EN ISO 3822-2), as applicable.

3.8 Outlet fittings

3.8.1 Mounting conditions

Shower handsets shall be connected to the test pipe using the arrangement shown in annex D.

Shower heads shall be connected to the test pipe using a straight pipe of length 300 mm and of the same nominal bore as the shower head connection.

Other outlet fittings such as aerators, diverters, ball joints, flow controls, anti-backsiphonage valves, etc., shall be connected directly to the test pipe (see 3.1) using an adaptor complying with annex C.

3.8.2 Operating conditions

The sound pressure levels of outlet fittings shall be measured at flow pressures of 0,3 MPa and 0,5 MPa and the flow rates shall be recorded.

Outlet fittings such as ball joints, diverters, flow controls, anti-backsiphonage valves etc., which do not incorporate an atmospheric discharge accessory such as an aerator, shower head or handset, etc., shall be tested with a low-noise flow resistance, complying with annex A, connected to their outlet using, if necessary, an adaptor complying with annex B.

Diverters and spouts with diverters and/or flow controls shall always be tested with a low-noise flow resistance connected in place of any interchangeable atmospheric discharge accessory, as described above. Otherwise, when several outlet fittings are supplied assembled into a single unit, for example a flow control and/or ball joint with an aerator or shower head, they shall be tested as one outlet fitting.

Flow controls without atmospheric discharge accessory shall always be tested with a Class A low-noise flow resistance complying with annex A.

Adjustable outlet fittings shall be tested in the position giving the maximum sound pressure level. Diverters shall be tested in all positions of normal use.

4 Test report

The test report shall include the following information:

a) the information required by EN ISO 3822-1 ;

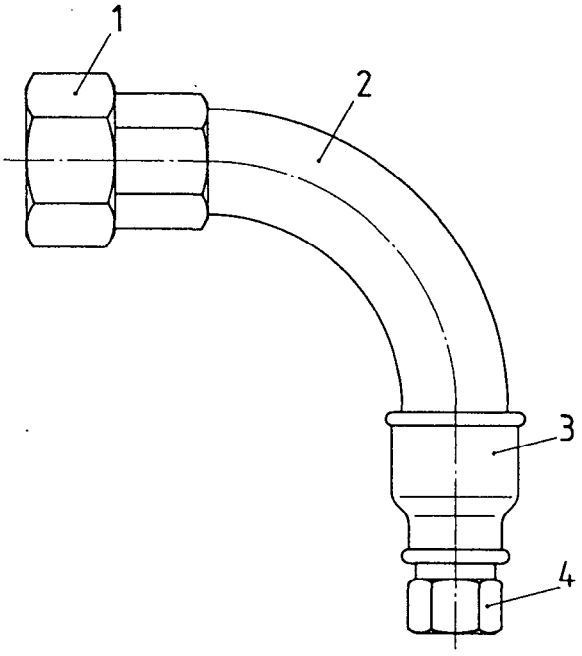
b) the mounting of the appliance tested ;

c) the flow pressures and flow-rates used, the outlet used and the maximum sound pressure levels obtained ;

d) a description and/or drawing of the appliance tested, including the type, nominal size, manufacturer and manufacturer's number ;

e) the number of the clauses in this part of EN 23822 relevant to the appliance and in accordance with which the tests were carried out, together with descriptions of any peculiarities observed ;

f) for float-operated valves, a description of the cistern used and the stop-valve, if any.



1 Union, taper seat 1, U11, complying with the requirements of ISO 49, galvanised
2 Long sweep bend 1, G8, complying with the requirements of ISO 49, galvanised
3 Socket M2, 1 x 3/4, complying with the requirements of ISO 49, galvanised
4 Adaptor, brass, complying with the requirements of annex C

Figure 1 : Example of device for connecting outlet fittings to the horizontal test pipe

Annex A (normative)

Low-noise flow resistances with calibrated flow rate

A.1 General

Two types of flow resistance are standardised. The details of each type are given in A.2 and A.3 respectively.

The appliance sound pressure level L_{ap} of the flow resistances shall be less than 10 dB at a flow pressure of 0,3 MPa.

Permissible machining variations in dimensions without tolerance indication shall be in accordance with those specified for the medium series in ISO 2768.

A.2 Tubular type flow resistances

Tubular type flow resistances shall comply with the appropriate requirements of figures A.1 to A.4 and table A.1.

The body and tubes shall be made from brass.

Rubber having a hardness of 75 ± 5 IRHD in accordance ISO 48, shall be used for the seal.

Dimensions in millimetres

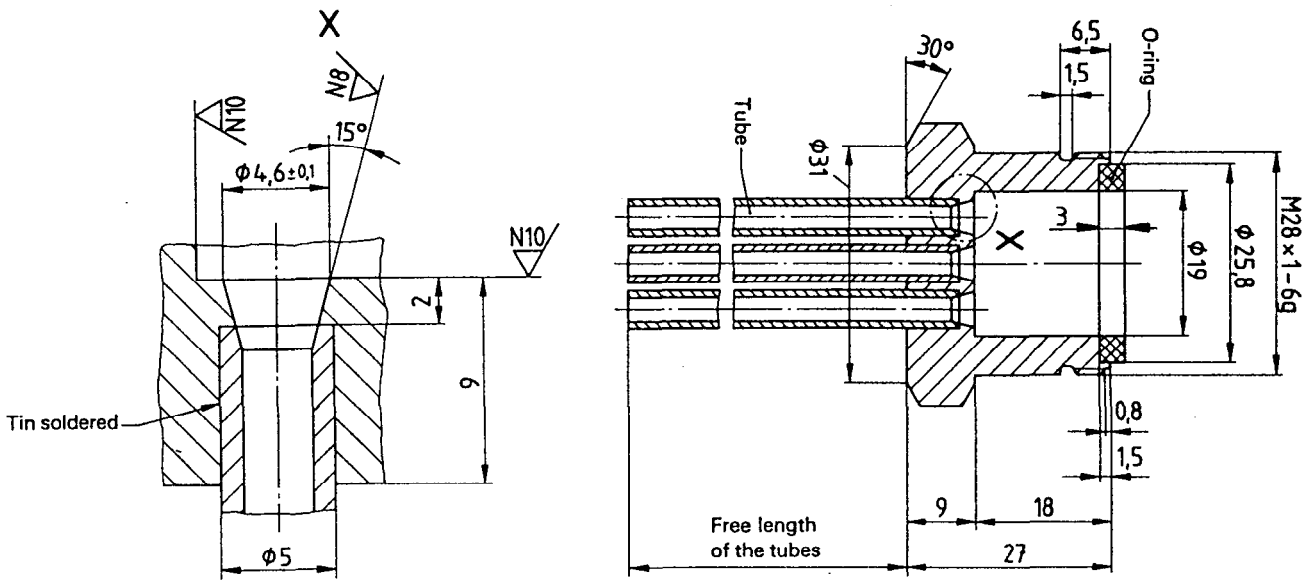


Figure A1 : Tubular type flow resistance with calibrated flow rate

Table A.1: Particulars of tubular type flow resistances

Designation	Flow class	Flow rate l/s	Tube		
			Approximate free length mm	Number	Arrangement as figure
R25	Class A	0,25	450	3	A.2
R33	Class S	0,33	300	3	A.2
R42	Class B	0,42	450	5	A.3
R50	Class C	0,50	300	5	A.3
R63	Class D	0,63	350	6	A.4

A.3 Strainer type flow resistances

Strainer type flow resistances shall comply with the appropriate requirements of figures A.5 to A.9 and tables A.2 to A.4.

Table A.2: Particulars of strainer type flow resistances

Designation	Flow class	Flow rate l/s	Arrangement as figure
Z	Z	0,15	A.5; A.6
A	A	0,25	A.5; A.6
S	S	0,33	A.5; A.6
B	B	0,42	A.5; A.6; A.7
C	C	0,50	A.5; A.6; A.7
D	D	0,63	A.7

Dimensions in millimetres

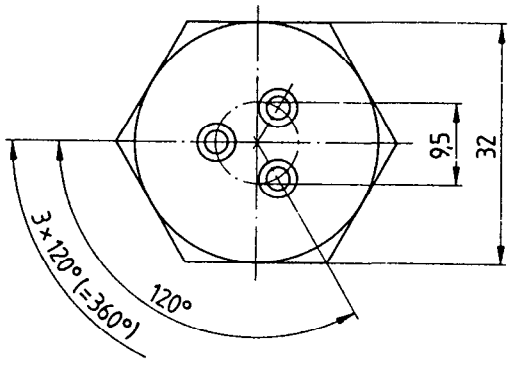


Figure A.2 : Arrangement of the tubes for resistances R25 and R33

Dimensions in millimetres

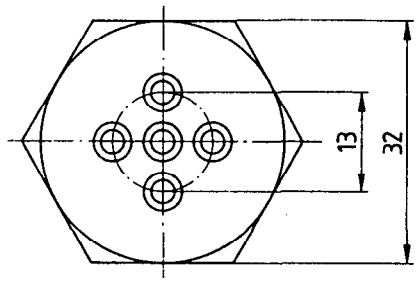


Figure A.3: Arrangements of the tubes for resistances R42 and R50

Dimensions in millimetres

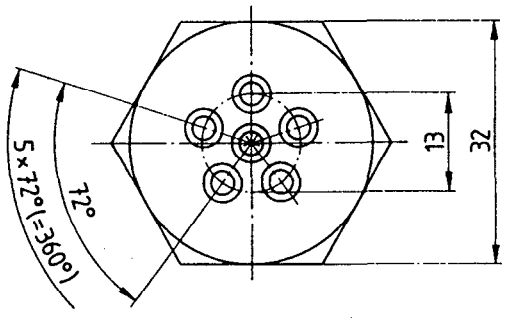


Figure A.4: Arrangement of the tubes for resistance R63

Dimensions in millimetres

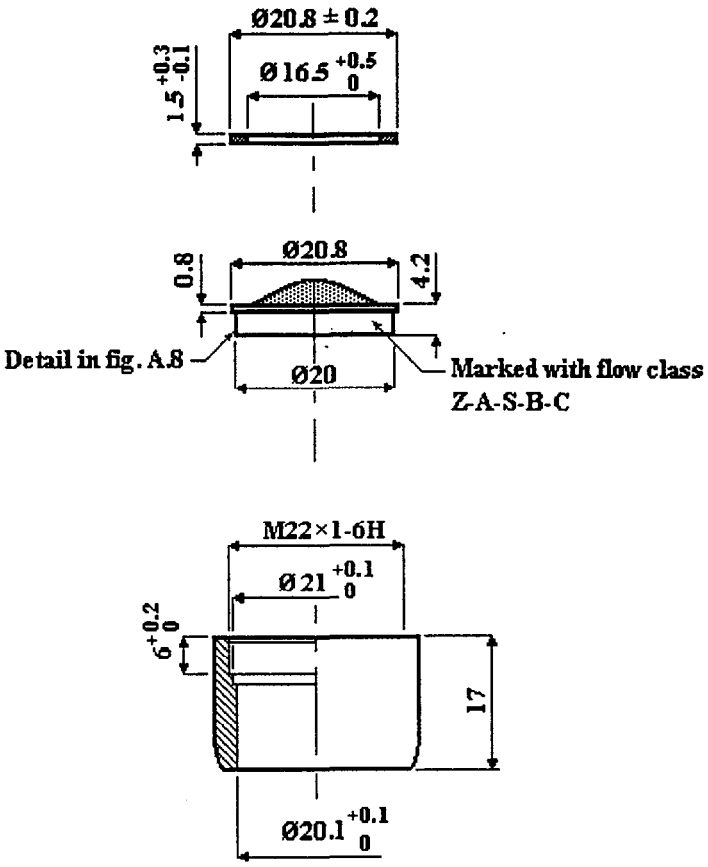


Figure A.5: Strainer type flow resistance with internal thread M22 x 1 - 6H

Dimensions in millimetres

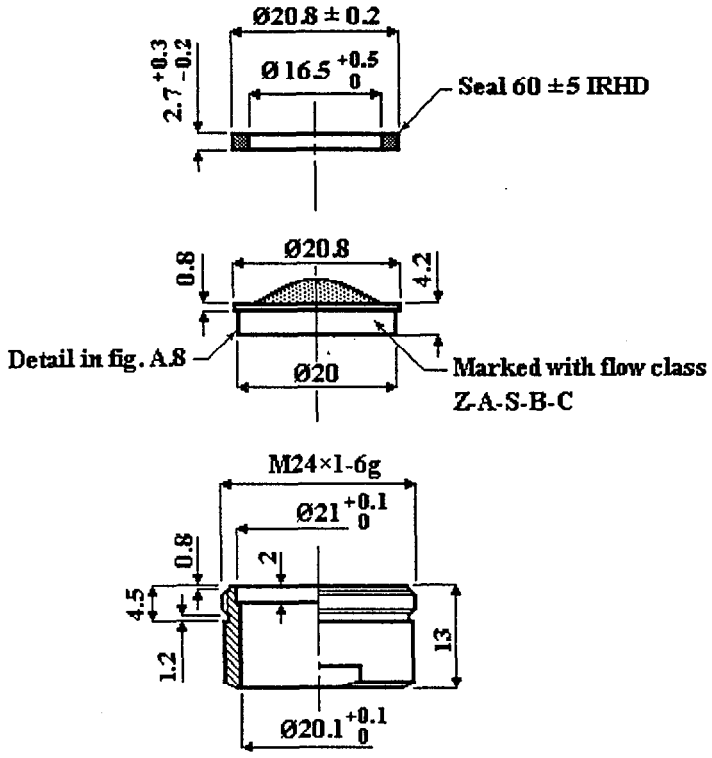


Figure A.6: Strainer type flow resistance with external thread M24 x 1 - 6g

Dimensions in millimetres

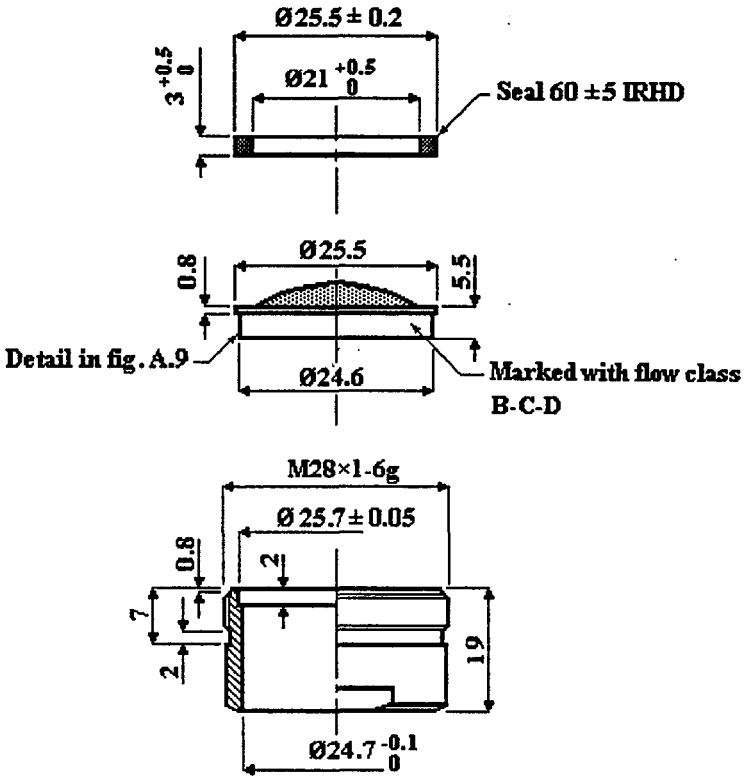


Figure A.7: Strainer type flow resistance with external thread M28 x 1 - 6g

Dimensions in millimetres

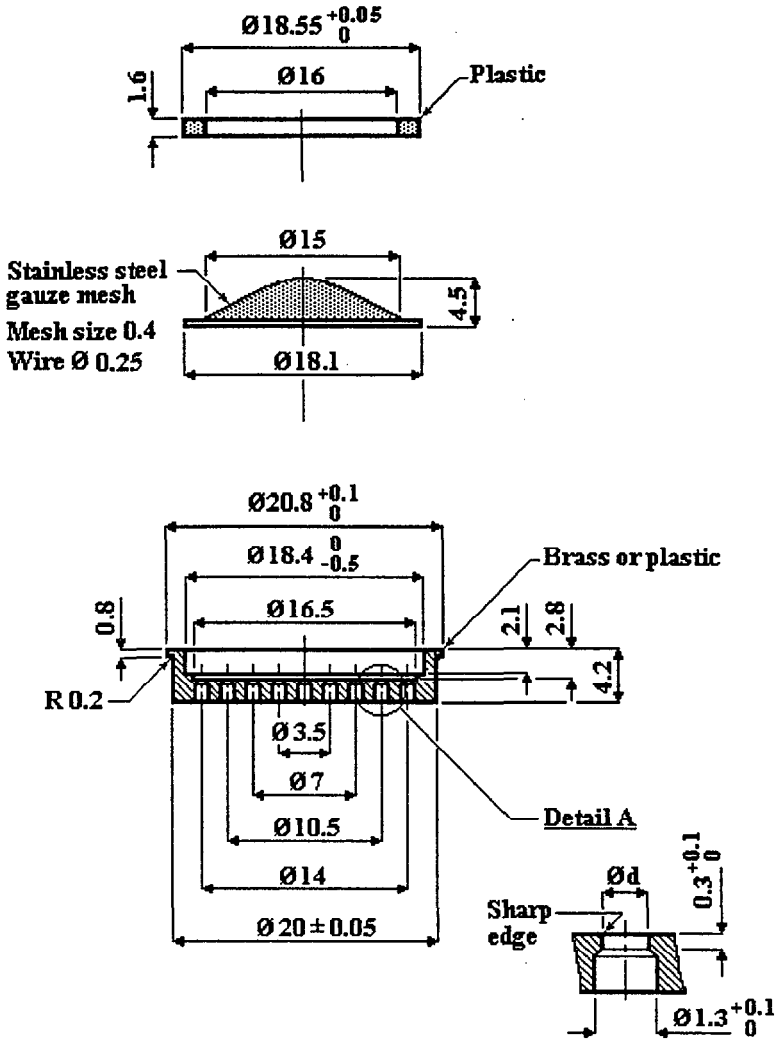


Figure A.8: Restrictor details for flow resistances in figures A.5 and A.6

Table A.3: Details of holes in restrictor in figure A.8

Dimensions in millimetres

Flow class	Z	A	S	B	C
Number of holes in centre	1	1	1	0	1
Number of holes on pitch circle Ø 3,5	0	0	0	6	3
Number of holes on pitch circle Ø 7	0	12	4	0	12
Number of holes on pitch circle Ø 10,5	9	0	9	18	18
Number of holes on pitch circle Ø 14	12	24	24	24	24
Total number of holes	22	37	38	48	58
Diameter of holes	0,7	0,7	0,8	0,8	0,8

Dimensions in millimetres

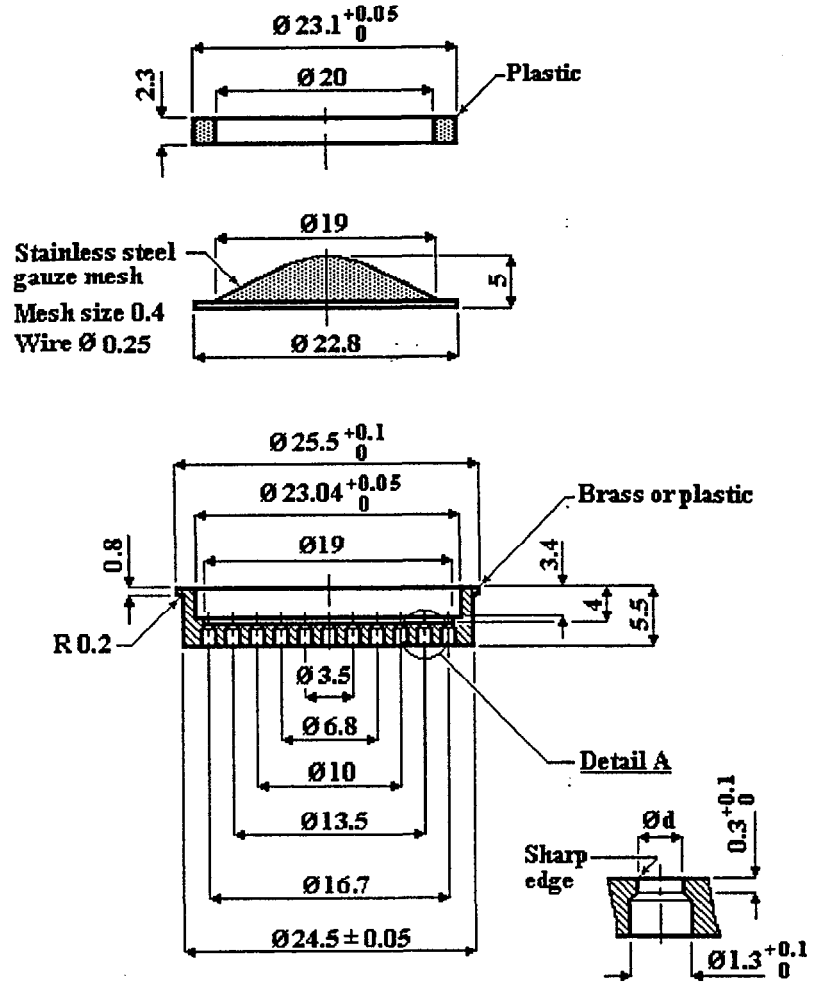


Figure A.9: Restrictor details for flow resistance in figure A.7

Table A.4: Details of holes in restrictor in figure A.9

Dimensions in millimetres

Flow class	B	C	D
Number of holes in centre	1	1	0
Number of holes on pitch circle Ø 3,5	3	0	6
Number of holes on pitch circle Ø 6,8	8	6	8
Number of holes on pitch circle Ø 10	9	9	18
Number of holes on pitch circle Ø 13,5	18	18	18
Number of holes on pitch circle Ø 16,7	24	24	24
Total number of holes	63	58	74
Diameter of holes	0,7	0,8	0,8

Annex B (normative)

Adaptors for the connection of low-noise flow resistances with calibrated flow rate

Adaptors shall comply with figure B.1 and table B.1, or figure B.2 and table B.2.

The adaptors shall be made of brass. Permissible machining variations in dimensions without tolerance indication shall be in accordance with those specified for the medium series in ISO 2768.

Rubber having a hardness of 75 ± 5 IRHD, in accordance with ISO 48 shall be used for the seals shown in figures B.1 and B.2.

Dimensions in millimetres

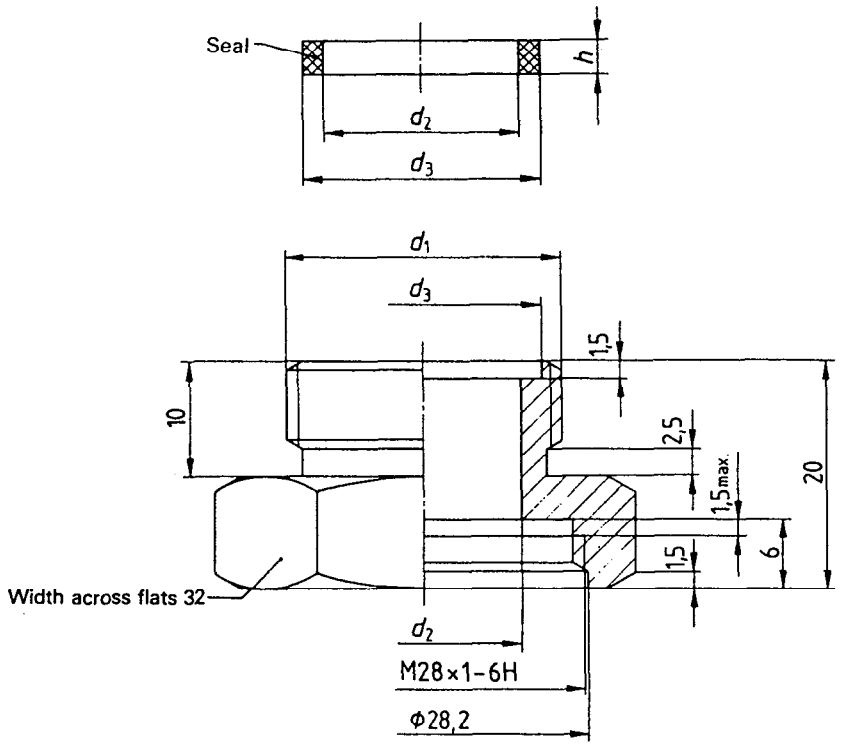


Figure B.1: Adaptor with external thread (A1) for the connection of low-noise flow resistances with calibrated flow rate

Table B.1: Dimensions of adaptors with external thread (A1)

Dimensions in millimetres

Designation	Dimensions			
	d_1	d_2	d_3	h
Adaptor A1 - M24 x 1	M24 x 1 - 6g	17	20,8	3
Adaptor A1 - G1/2B	ISO 228 - G1/2B	13	18	3,5
Adaptor A1 - G3/4B	ISO 228 - G3/4B	19	23,5	4,5

Dimensions in millimetres

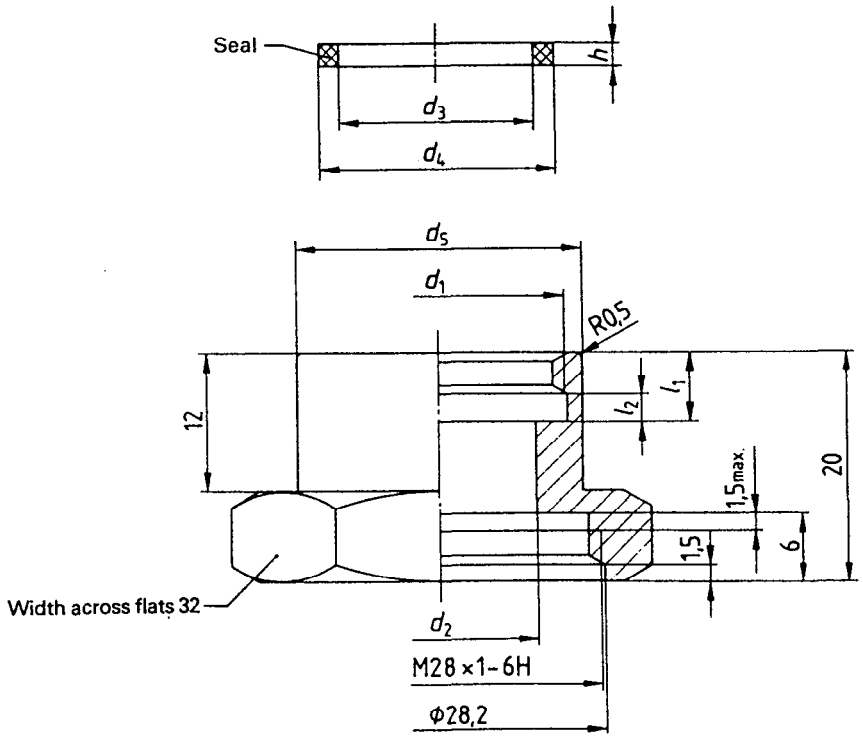


Figure B.2: Adaptor with internal thread (A2) for the connection of low-noise flow resistances with calibrated flow rate

Table B.2: Dimensions of adaptors with internal thread (A2)

Dimensions in millimetres

Designation	Dimensions							
	d_1	d_2	d_3	d_4	d_5	l_1	l_2	h
Adaptor A2 - M22 × 1	M22 × 1 - 6H	17	17	20,8	25	6	2,5	2
Adaptor A2 - G1/2	ISO 228 - G1/2	15,5	15,5	21	25	9	2,5	2
Adaptor A2 - G3/4	ISO 228 - G3/4	19	19	26,5	30	10	3,5	3

Annex C (normative)

Adaptors for the connection of outlet fittings

Adaptors shall comply with figure C.1 and table C.1, or figure C.2 and table C.2.

The adaptors shall be made of brass. Permissible machining variations in dimensions without tolerance indication shall be in accordance with those specified for the medium series in ISO 2768.

Dimensions in millimetres

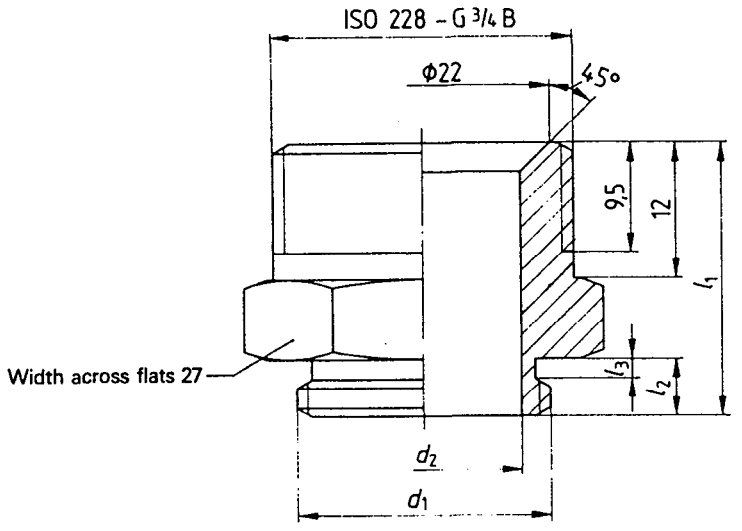


Figure C.1: Adaptor with external thread (A3) for the connection of outlet fittings

Table C.1: Dimensions of adaptors with external thread (A3)

Dimensions in millimetres

Designation	Dimensions				
	d_1	d_2	l_1	l_2	l_3
Adaptor A3 - M22 x 1	M22 x 1 - 6g	17	24	5	1,7
Adaptor A3 - G1/2B	ISO 228 - G1/2B	15	29	10	2,5
Adaptor A3 - G3/4B	ISO 228 - G3/4B	17	29	10	2,5

Dimensions in millimetres

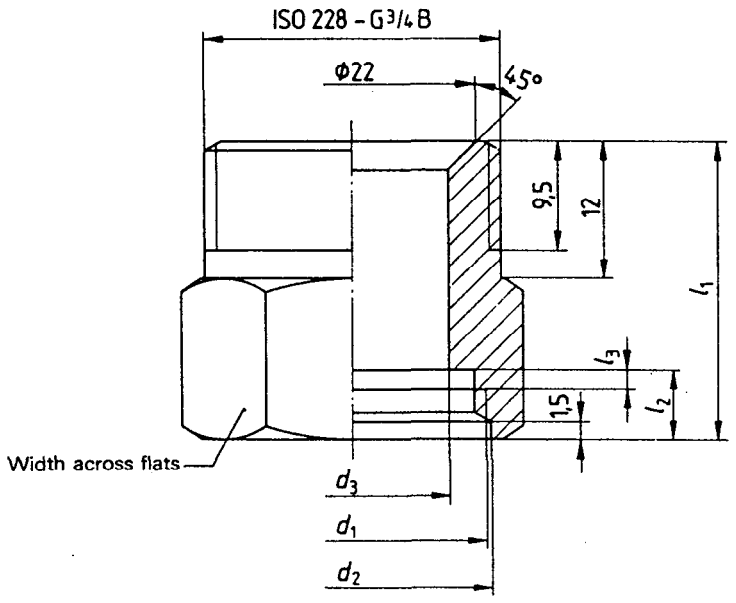


Figure C.2: Adaptor with internal thread (A4) for the connection of outlet fittings

Table C.2: Dimensions of adaptors with internal thread (A4)

Dimensions in millimetres

Designation	Dimensions						Width across flats
	d_1	d_2	d_3	l_1	l_2	l_3	
Adaptor A4 - M24 x 1	M24 x 1 - 6H	24,5	17	26	6	1,7	27
Adaptor A4 - M28 x 1	M28 x 1 - 6H	28,5	17	26	6	1,7	30
Adaptor A4 - G1/2	ISO 228 - G1/2	21,5	15	29	8	2,5	27
Adaptor A4 - G3/4	ISO 228 - G3/4	27	17	29	8	2,5	30

Annex D (normative)

Arrangement for testing shower handsets

The arrangement shall be in accordance with figure D.1. The two ends of the connecting hose are identical. One end is connected to the test pipe (see 3.1), the other is connected to the shower handset using, if necessary, an adaptor complying with annex C.

Detail specification of the component parts of the hose assembly shall comply with figures D.2 and D.3, and table D.1.

Dimensions in millimetres

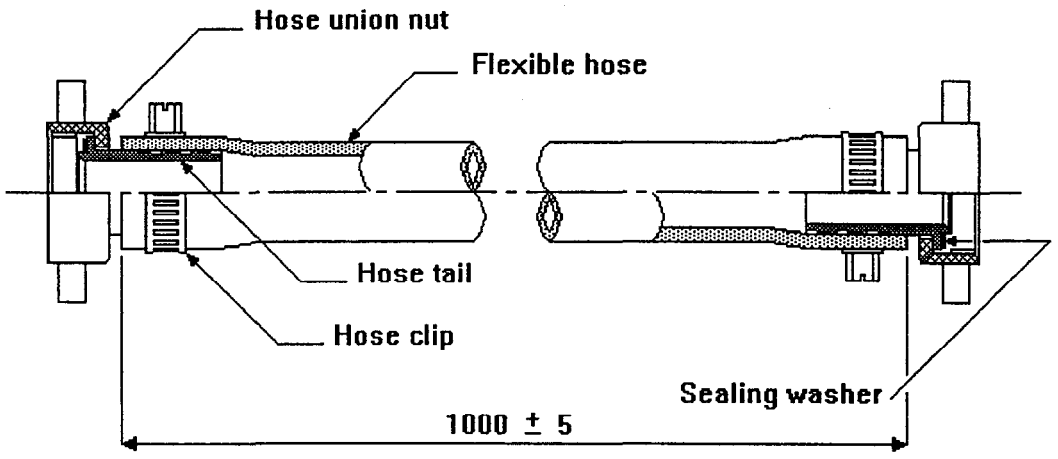


Figure D.1: Connecting hose for testing shower handsets.

Dimensions in millimetres

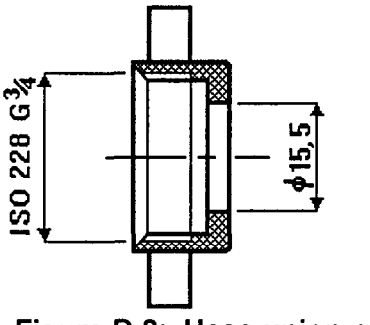


Figure D.2: Hose union nut

Dimensions in millimetres

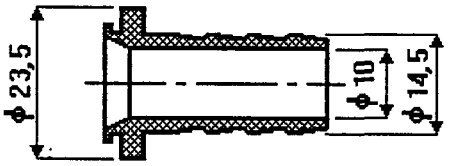


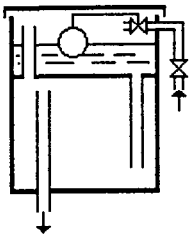
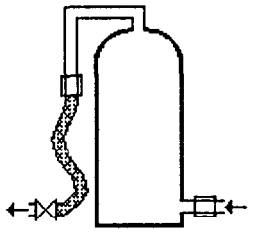
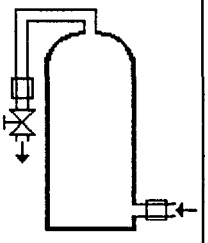
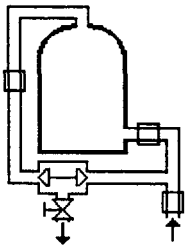
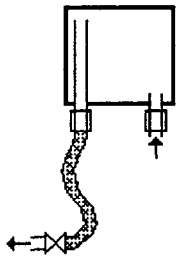
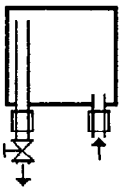
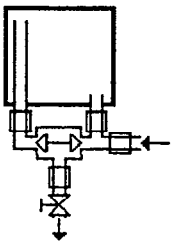
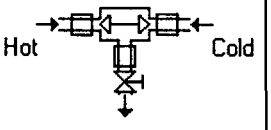
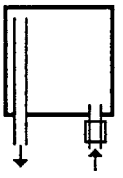
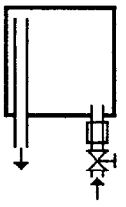
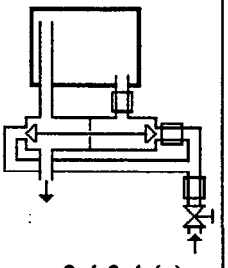
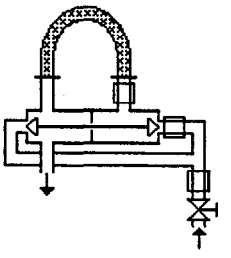
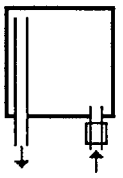
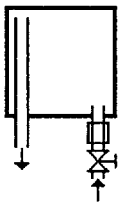
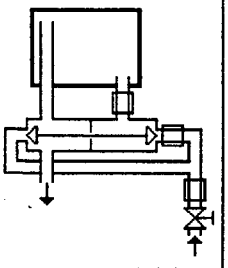
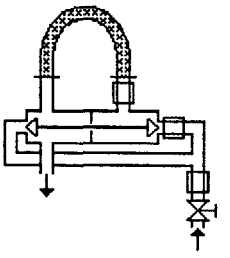
Figure D.3: Hose tail

Table D.1: Detail specification of hose assembly components

Component	Size	Material
Flexible hose	Bore 13 ± 0,5 mm Wall thickness 3 ± 0,3 mm Length 1000 ± 5 mm	PVC of hardness 80 ± 5 IRHD
Hose tail	DN 15 (1/2)	Brass
Hose union nut	To fit hose tail, threaded G 3/4	Brass
Sealing washer	Outside diameter 24 mm Inside diameter 17 mm Thickness 2,5 mm	Synthetic rubber of hardness 70 ± 5 IRHD
Hoseclip	Diameter 12 to 22 mm	-

Annex E (informative)

Summary of water heater types and test configurations.

Heater type	Heater alone	With integral draw-off tap	With integral mixing valve	Mixing valve alone
Cistern type storage water heater	 see 3.4.3.1; 3.2	Not applicable	Not applicable	Not applicable
Closed type storage water heater	 see 3.4.3.2 (b)	 see 3.4.3.2 (a)	 see 3.4.3.2 (a)	Not applicable
Closed type instantaneous water heater	 see 3.4.3.3 (b)	 see 3.4.3.3 (a)	 see 3.4.3.3 (a)	 see 3.5.2.1; 3.5.2.2
Overflow type storage water heater	 see 3.4.3.4 (b)	 see 3.4.3.4 (a)	 see 3.4.3.4 (a)	 see 3.6.1.2
Overflow type instantaneous water heater	 see 3.4.3.4 (b)	 see 3.4.3.4 (a)	 see 3.4.3.4 (a)	 see 3.6.2.2

Key : = possible positions of flow adjuster. = flow control. = other valve.

ICS 17.140.20; 91.140.60

Descriptors: acoustics, water supply, equipment, sanitary appliances, noise (sound), airborne sound, tests, acoustic tests, laboratory tests, testing conditions, acoustic measurements.

Price based on 24 pages