BRITISH STANDARD

BS EN
1452-4:2000

Incorporating
Corrigenda
Nos. 1 and 2

Plastics piping systems for water supply — Unplasticized poly (vinyl chloride) (PVC-U) —

Part 4: Valves and ancillary equipment

The European Standard EN 1452-4:1999 has the status of a British Standard

ICS 23.040.01; 23.060.01; 91.140.60

National foreword

This British Standard is the official English language version of EN 1452-4:1999. Collectively, Parts 1, 2, 3, 4 and 5 of BS EN 1452 supersede BS 3505:1986, BS 4346-1:1969 and BS 4346-2:1970. Since those British Standards are the basis of piping systems with a design life of at least 50 years, it is intended that they will be declared obsolescent, by 26 June 2001. Collectively, Parts 1 to 5 of BS EN 1452 also partially supersede BS 4346-3:1982, which will be withdrawn or amended by 26 June 2001 to exclude requirements for joints for pressure pipes for water supply. BS EN 1452-4:2000 also covers PVC-U valves and tapping saddles, for which there were no previous British Standards. A dynamic endurance test is also included.

NOTE 1 The UK Water industry has indicated that this British Standard is to be regarded as superseding the following Water Industry Specifications
WIS 4-31-06, Issue 2: March 1994 *Blue unplasticised PVC pressure pipes, integral joints and post-formed bends for cold potable water (underground use)*
WIS 4-31-07, Issue 2: March 1994 *Unplasticised PVC pressure fittings and assemblies for cold potable water (underground use)*

The UK participation in its preparation was entrusted by Technical Committee PRI/61, Plastics piping systems and components, to Subcommittee PRI/61/2, Thermoplastics piping systems and components for pressure applications, which has the responsibility to:

— aid enquirers to understand the text;

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

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

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

This British Standard, having been prepared under the direction of the Sector Committee for Materials and Chemicals, was published under the authority of the Standards Committee and comes into effect on 15 May 2000

ISBN 0 580 34882 2

Amendments issued since publication

Amd. No.	Date	Comments
11013 Corrigendum No. 1	July 2000	Indicated by a sideline
12007 Corrigendum No. 2	October 2000	Correction to National foreword supersession details

The responsible UK committtee gives the following advice concerning the selection and installation of piping systems and components conforming to this British Standard.

a) Water supply companies and other entities are obliged to use Parts 1 to 5 of this suite of European Standards, produced under EC/U mandate, if they wish to purchase PVC-U pipe systems or components within its scope.

NOTE 2 Parts 6 and 7 have each been prepared as an ENV (pre-standard), to allow further development, and their use is voluntary unless invoked contractually.

b) Attention is drawn to **6.3.2**, where the symbol and use throughout the text and figures of "*Z*-length" with an upper case "*Z*" is not covered by the definitions/symbols/abbreviations clause in this standard or in EN 1452-1:1999 and is inconsistent with that established by ISO 265-1:1988, which uses a lower case "*z*" for this purpose. Its use in this standard is consistent with the definition and use of upper case "*Z*" for this purpose in text within EN 1452-3:1999, but in the corresponding figures in EN 1452-3:1999 a lower case "*z*" is usually found.

The UK Technical Committee considers that the lower case italic "*z*" should be used consistently for the laying length (*z*-length).

c) In Table 1, since reference is made to a specific type of end cap as specified in the current edition of EN 921, the UK Technical Committee considers that the reference here and in clause **2** should be to EN 921:1994.

d) For the purposes of Tables 2, 3, 5, 6 and 7, attention is drawn to the second sentence in **6.3.2**, which states that the deviations are given for guidance; hence these are actually recommended permitted deviations and are not normative limits, which is not apparent from the contents of those tables.

e) Figures 8 and 9 both show a dimension with the symbol "*t*" for which no definition or units are given either here or in **3.2.** Generally in plastics piping standards the basic symbol "*t*" is used to signify a period of time, but in this case it would seem to relate to the solvent cementing length "*L*" specified in Table 8.

f) For the purposes of note 2 to Table 13, Figure 12 is unclear as to what sets the position of either boundary for zone "*L*" for a ring gate. It is also not clear whether the "maximum value of 50 mm" applies to the total length for inspection in respect of a diaphragm gate or to each dimension "*L*", i.e. as shown in Figure 12 is the maximum overall length for inspection 50 mm or 100 mm?

The UK Technical Committee requests opinions on whether and how clarification may be necessary to avoid differences of interpretation or conflict of results.

Cross-references

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

WARNING This British Standard, which is identical with EN 1452-4:1999, does not necessarily detail all the precautions necessary to meet the requirements of the Health and Safety at Work etc. Act 1974 and subsequent regulations. Attention should be paid to any appropriate safety precautions and the test methods should be performed only by trained personnel.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 27 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Sidelining in this document indicates the most recent changes by amendment.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1452-4

June 1999

ICS 23.060.00

English version

Plastics piping systems for water supply – Unplasticized poly(vinyl chloride) (PVC-U) – Part 4: Valves and ancillay equipment

Systèmes de canalisations en plastique pour alimentation en eau – Poly(chlorure de vinyle) non plastifié (PVC-U) – Partie 4: Robinets et équipements auxiliaires

Kunststoff-Rohrleitungssysteme für die Wasserversorgung – Weichmacherfreies Polyvinylchlorid (PVC-U) – Teil 4: Armaturen und Zubehör

This European Standard was approved by CEN on 2 July 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 1452-4:1999 E

Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 155, Plastics piping systems and ducting systems, the Secretariat of which is held by NNI. It has been prepared with the cooperation of Eureau and in liaison with CEN/TC 164, Water supply.

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 December 1999, and conflicting national standards shall be withdrawn at the latest by June 2001.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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

This standard forms part of a System Standard for plastics piping systems of a particular material for a specified application. There are a number of such System Standards.

System Standards are based on the results of the work undertaken in ISO/TC 138, Plastics pipes, fittings and valves for the transport of fluids, which is a Technical Committee of the International Organization for Standardization (ISO).

They are supported by separate standards on test methods to which references are made throughout the System Standard.

The System Standards are consistent with general standards on functional requirements and on recommended practice for installation.

EN 1452 consists of the following Parts, under the general title *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U):*

- *Part 1: General;*
- *Part 2: Pipes;*
- *Part 3: Fittings;*
- *Part 4: Valves and ancillary equipment (this standard);*
- *Part 5: Fitness for purpose of the system;*
- *Part 6: Guidance for installation (ENV);*
- *Part 7: Guidance for assessment of conformity (ENV).*

This Part of EN 1452 includes the following annexes:

- Annex A (normative): Imperial(inch)-sized valves and ancillary equipment;
- Annex B (informative): Bibliography.

At the date of publication of this standard, System Standards for piping systems of other plastics materials used for the same application are the following:

NOTE All listed System Standards have reached the Enquiry stage or are in preparation.

EN 1796, *Plastics piping systems for water supply with or without pressure — Glass-reinforced thermosetting plastics (GRP) based on polyester resin (UP);*

EN 12201, *Plastics piping systems for water supply – Polyethylene (PE).*

Introduction

The System Standard, of which this is Part 4, specifies the requirements for a piping system and its components made from unplasticized poly(vinyl chloride) (PVC-U). The piping system is intended to be used for water supply.

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the products covered by this standard:

1) this standard provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA;

2) it should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

For material, pipes and fittings, requirements and test methods are specified in Part 1, Part 2 and Part 3 of EN 1452. Characteristics for fitness for purpose (mainly for joints) are covered in Part 5. Guidance for installation is given in ENV 1452-6. ENV 1452-7 covers guidance for assessment of conformity.

This part of EN 1452 covers the characteristics of valves and ancillary equipment.

1 Scope

This part of EN 1452 specifies the characteristics of valves and ancillary equipment made from unplasticized poly(vinyl chloride) (PVC-U) for piping systems in the field of water supply.

It also specifies the test parameters for the test methods referred to in this standard.

In conjunction with Parts 1, 2, 3 and 5 of EN 1452 and ENV 1452-7 it is applicable to PVC-U valves and ancillary equipment with components of PVC-U, other plastics and non-plastics materials intended to be used for the following:

a) water mains and services buried in ground;

b) conveyance of water above ground for both outside and inside buildings;

for the supply of water under pressure at approximately 20 °C (cold water) intended for human consumption and for general purposes.

This standard is also applicable to valves and ancillaries for the conveyance of water up to and including 45 °C. For temperatures between 25 °C and 45 °C figure A.1 of EN 1452-2:1999 applies.

This standard is applicable to tapping saddles and valves of the following types:

- valves for solvent cementing;
- valves for elastomeric ring seal joints;
- valves for flanged joints.

2 Normative references

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

prEN 496, *Plastics piping and ducting systems — Plastics pipes and fittings — Measurement of dimensions and visual inspection of surfaces*

EN 578, *Plastics piping systems — Plastics pipes and fittings — Determination of the opacity*

EN 727, *Plastics piping and ducting systems — Thermoplastics pipes and fittings — Determination of Vicat softening temperature (VST)*

EN 763:1994, *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Test method for visually assessing effects of heating*

EN 802, *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings for pressure piping systems — Test method for maximum deformation by crushing*

EN 917:1997, *Plastics piping systems — Thermoplastics valves — Test methods for resistance to internal pressure and leaktightness*

EN 921, *Plastics piping systems — Thermoplastics pipes — Determination of resistance to internal pressure at constant temperature*

EN 1452-1, *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U) — Part 1: General*

EN 1452-2:1999, *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U) — Part 2: Pipes*

EN 1452-3:1999, *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U) — Part 3: Fittings*

EN 1452-5, *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U) — Part 5: Fitness for purpose of the system*

ENV 1452-7, *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U — Part 7: Guidance for the assessment of conformity*

EN 12107, *Plastics piping systems — Injection-moulded thermoplastics fittings, valves and ancillary equipment — Determination of the long-term hydrostatic strength of thermoplastics materials for injection-moulding of piping components*

EN 28233, *Thermoplastics valves — Torque — Test method (ISO 8233:1988)*

EN 28659, *Thermoplastics valves — Fatigue strength — Test method (ISO 8659:1989)*

EN ISO 12162, *Thermoplastics materials for pipes and fittings for pressure applications — Classification and designation — Overall service (design) coefficient (ISO 12162:1995)*

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO/TR 9080:1992, *Thermoplastics pipes for the transport of fluids — Methods of extrapolation of hydrostatic stress rupture data to determine the long-term hydrostatic strength of thermoplastics pipe materials*

ISO/DIS 12092:1994, *Fittings, valves and other piping system components of unplasticized poly(vinyl chloride) (PVC-U) for pipes under pressure — Resistance to internal pressure — Test method*

3 Definitions, symbols and abbreviations

For the purposes of this standard, the definitions, symbols and abbreviations given in EN 1452-1 apply.

4 Material

4.1 Valve bodies and ancillaries

4.1.1 General

The material of the valve bodies and the main components of the ancillaries which are intended to be in contact with the conveyed water shall be made from PVC-U and shall conform to EN 1452-1 and to the requirements given in 4.1.2 to 4.1.4.

4.1.2 MRS-value

The material of the valve bodies and the ancillaries shall be evaluated according to Method II of ISO/TR 9080:1992 [1)], where a pressure test is made in accordance with EN 12107 (together with EN 921), to find the LCL. The MRS-value shall be derived from the LCL and the material shall be classified by the compound manufacturer in accordance with EN ISO 12162.

Where there is available long-term experience with the effect of a change in material/compound, it is not necessary to re-evaluate the MRS. In this case the values determined with 5 test pieces at 20 °C and 60 °C during 1000 h to 5000 h shall be located on or above the 97,5 % LCL long-term characteristic curve established prior to the material/compound change.

4.1.3 Designation of injection-moulded material

The material of the valve bodies and main components of the ancillaries shall be designated as PVC-U, unless the material has an MRS of not less than 25 MPa, in which case the material shall be designated as PVC-UH.

1) In ISO/TC 138/SC 5 a new extrapolation method is under development, which is intended to replace ISO/TR 9080.

4.1.4 Strength of injection-moulded material

When pressure tested in accordance with the procedure described in EN 12107, using injection-moulded tubular test pieces conforming to figure 1, the material shall conform to the requirements given in table 1.

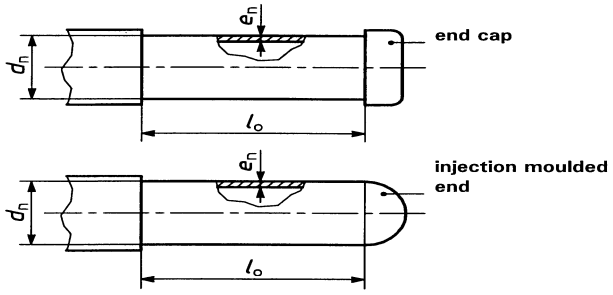


Figure 1 — Free length, l_o, of injection-moulded test pieces

Table 1 — Material characteristics

Characte-ristic	Require-ments	Test parameters		Test method
		Parameter	Value	
Long-term strength	No break during the test	Diameter Free length (see figure 1) Wall thickness Test temperature Sampling procedure Number of test pieces Circumferencial (hoop) stress Type of test Type of end caps Test period	$d_n \geq 50$ mm $l_o \geq 3\ d_n$ e_n of pipe series $6{,}3 \leq S \leq 10$ 60 °C Shall conform to ENV 1452-7 Shall conform to ENV 1452-7 10,0 MPa Water-in-water Type a) 1000 h	EN 12107 (together with EN 921)

4.2 Additional components

Additional components made from other plastics and non-plastics materials, as necessary for the construction of the PVC-U valves and ancillary equipment, shall fulfil their specific functions without preventing conformity to EN 1452-5.

5 General characteristics

5.1 Appearance

When viewed without magnification, the internal and external surfaces of valves and ancillaries shall be smooth, clean and free from scoring, cavities and other surface defects to an extent that would prevent conformity to this standard.

Each end shall be square to its axis.

5.2 Colour

The colour of injection-moulded valve bodies and ancillaries in PVC-U shall be grey throughout the wall. The colour of ancillaries made from pipe shall be grey, blue or cream throughout the wall. For above-ground application, cream ancillaries shall not be used.

5.3 Opacity

The wall of the valve shall be opaque and shall not transmit more than 0,2 % of visible light when measured in accordance with EN 578.

This requirement does not apply to cream ancillaries (see 5.2).

6 Geometrical characteristics

6.1 Measurement of dimensions

Dimensions shall be measured in accordance with prEN 496.

6.2 Nominal diameters

The nominal diameter(s), d_n, of a valve and ancillaries shall correspond to, and be designated by, the nominal outside diameter(s) of the pipe(s) for which they are designed.

6.3 Valves

6.3.1 Joint dimensions

6.3.1.1 Dimensions of sockets and spigots for solvent cement type valves

The socket dimensions of the valve shall be the same as for sockets on pipes or fittings and shall conform to EN 1452-2:1999.

The spigot length(s) shall be at least equal to the corresponding socket length(s).

6.3.1.2 Dimensions of sockets and spigots for ring seal type valves

The socket dimensions of the valve shall be the same as for pipes or fittings and conform to EN 1452-2:1999.

The spigot diameters shall conform to EN 1452-2:1999 and the spigot length(s) shall be the same as for fittings according to EN 1452-3:1999.

6.3.1.3 Mating dimensions for flange type valves

The mating dimensions of the flanges used on valves shall conform to EN 1452-3:1999.

6.3.2 Laying lengths and face-to-face lengths

Laying lengths (*Z*-lengths), or for flanged valves the face-to-face length (see 6.3.2.4), shall conform to table 2 to table 7 as applicable. The deviations are given for guidance.

6.3.2.1 Valves with plain socket ends

The laying length *Z* for a plain socket valve is the pipe-to-pipe distance when the sockets are on the same axis, as shown in figure 2.

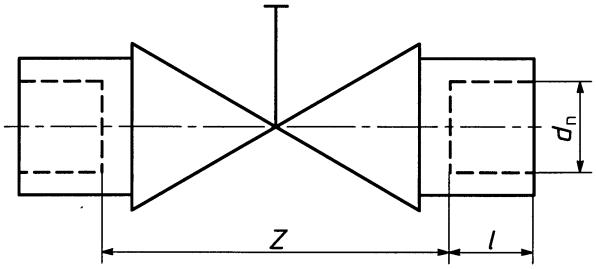


Figure 2 — Valve with plain socket ends

Table 2 — Laying lengths for valves with plain socket ends (see figure 2)

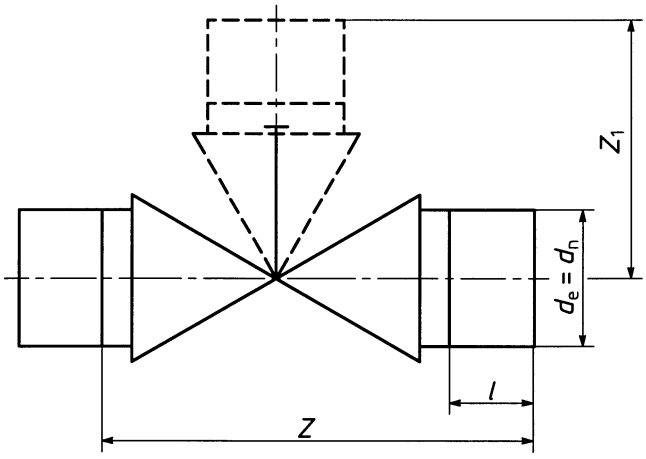
Dimensions in millimetres

Nominal inside diameter of socket [1]	Laying lengths					
	Long		Medium		Short	
d_n	*Z*	Deviation	*Z*	Deviation	*Z*	Deviation
16	85	± 5	70	± 5	45	± 5
20	90		70		50	
25	95		78		55	
32	100		85		60	
40	110		95		65	
50	120		100		75	
63	140		120		95	
75	165		145		120	
90	180	± 8	165	± 8	145	± 8
110	––		185		155	

[1] Diameters and tolerances shall conform to EN 1452-2:1999.

6.3.2.2 Valves with plain spigot ends

For spigot end valves, the laying length shall be equal to the total length of valve, as shown in figure 3.



NOTE The centre-to-face length Z_1 of a three-way valve equals 0,5Z.

Figure 3 — Valve with plain spigot ends

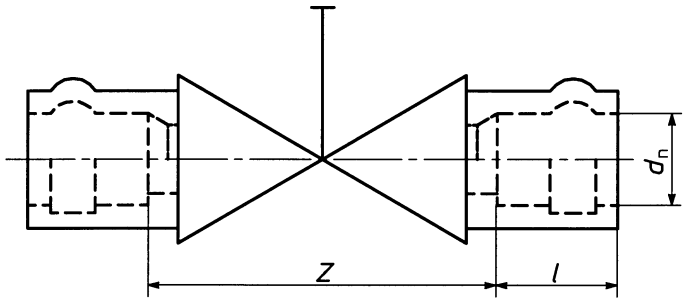
Table 3 — Laying lengths for valves with plain spigot ends (see figure 3)

Dimensions in millimetres

Spigot diameter [1] $d_e = d_n$	Laying lengths			
	Long		Short	
	Z	Deviation	Z	Deviation
16	114	± 2	80	± 2
20	124		90	
25	144		102	
32	154		116	
40	174		136	
50	194		154	
63	224		182	
75	284	± 3		
90	300			
110	340			
125	390			
140	390			
160	470			

[1] Equal to nominal outside diameter d_n. Diameters and tolerances shall conform to EN 1452-2:1999.

6.3.2.3 Valves with ring seal type sockets



NOTE $l = c + m + 0{,}05d_n$ to conform to EN 1452-2:1999

Figure 4 — Valve with ring seal type sockets

Table 4 — Laying lengths for valves with ring seal type sockets (see figure 4)

Dimensions in millimetres

Nominal inside diameter of socket d_n	Laying length [1] Z_{min}
63	55
75	65
90	80
110	95
160	140
[1] Z_{min} is calculated using the equation $Z_{min} = 0{,}9d_n$ and rounding the result to the next smaller 5 mm.	

6.3.2.4 Valves for flanged joints

For flanged valves the laying length shall be equal to the face-to-face length (see figure 5 to figure 7).

6.3.2.4.1 Gate valves

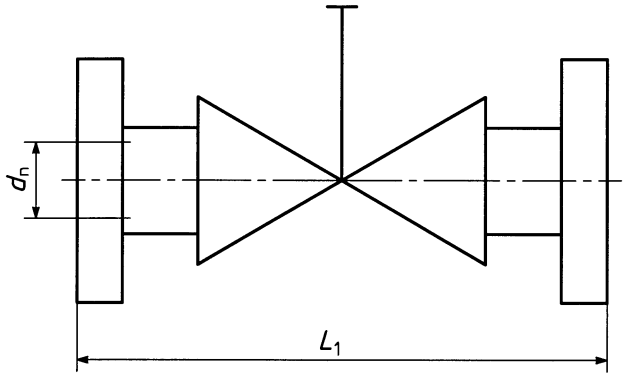


Figure 5 — Gate valve

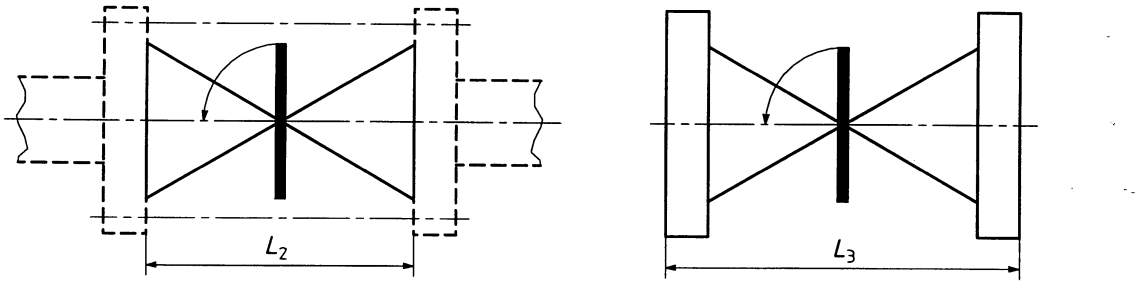
Table 5 — Face-to-face lengths for gate valves (see figure 5)

Dimensions in millimetres

Nominal outside diameter of pipe d_n	Nominal size of flange [1] DN	Face-to-face lengths L_1			
		Short [2]	Deviation	Long [3]	Deviation
50	40	165	± 2	240	± 2
63	50	178		250	± 3
75	65	190		270	
90	80	203		280	
110	100	229		300	
140	125	254	± 3	325	
160	150	267		350	
225	200	292		400	
280	250	330		450	
315	300	356		500	

1) Conforming to ISO 2536.
2) Conforming to table 2 of ISO 5752:1982.
3) Conforming to table 3 of ISO 5752:1982.

6.3.2.4.2 Butterfly valves



a) Face-to-face body for flanged joints

b) Double flanged

Figure 6 — Butterfly valves

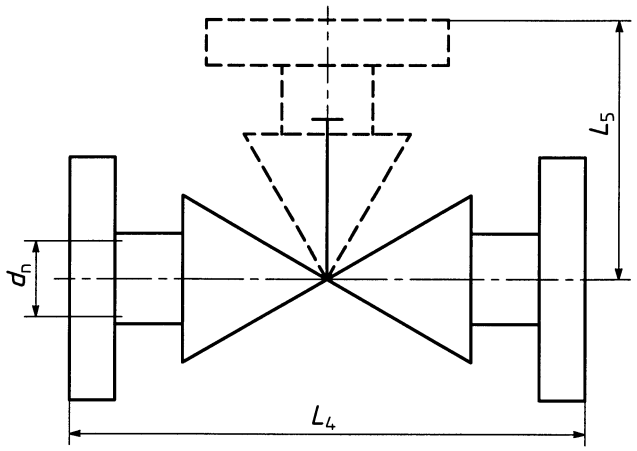
Table 6 — Face-to-face lengths for butterfly valves (see figure 6)

Dimensions in millimetres

Nominal outside diameter of pipe	Nominal size of flange [1]	Face-to-face lengths				
		Flangeless (faces) for flange adaptors [2]			Double flanged	
d_n	DN	Short L_2	Medium L_2	Long L_2	Short [3] L_3	Deviation
50	40	33	33	33	106	± 2
63	50	43	43	43	108	
75	65	46	46	46	112	
90	80	46	49	64	114	
110	100	52	56	64	127	
140	125	56	64	70	140	
160	150	56	70	76	140	
225	200	60	71	89	152	
280	250	68	76	114	165	
315	300	78	83	114	178	

[1] Conforming to ISO 2536.
[2] L_2 conforming to table 5 of ISO 5752:1982 and table 2 of ISO 7508:1985.
[3] L_3 conforming to table 4 of ISO 5752:1982 and table 2 of ISO 7508:1985.

6.3.2.4.3 Plug, ball and diaphragm valves



NOTE The centre-to-face length L_5 of a three-way valve equals $0{,}5L_4$.

Figure 7 — Plug, ball and diaphragm valves

Table 7 — Plug, ball and diaphragm valves (see figure 7)

Dimensions in millimetres

Nominal outside diameter of pipe	Nominal size of flange [1]	Face-to-face length	
d_n	DN	L_4 [2]	Deviation
16	10	130	± 2
20	15	130	
25	20	150	
32	25	160	
40	32	180	
50	40	200	
63	50	230	
75	65	290	± 3
90	80	310	
110	100	350	
125	100/125	400	
140	125	400	
160	150	480	

[1] Conforming to ISO 2536.
[2] L_4 conforming to tables 6 and 7 of ISO 5752:1982 and table 1 of ISO 7508:1985.

6.4 Ancillary equipment: Tapping saddles

Tapping saddles, with or without a shut-off device, shall be fixed on the water supply mains by solvent cementing or mechanical fixing with elastomeric sealing. Typical tapping saddles are shown in figure 8 to figure 11. Their dimensions shall conform to table 8. Other designs are allowed.

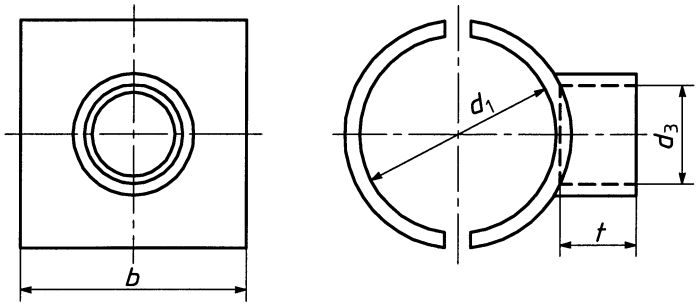


Figure 8 — Socket saddle with solvent cement type socket

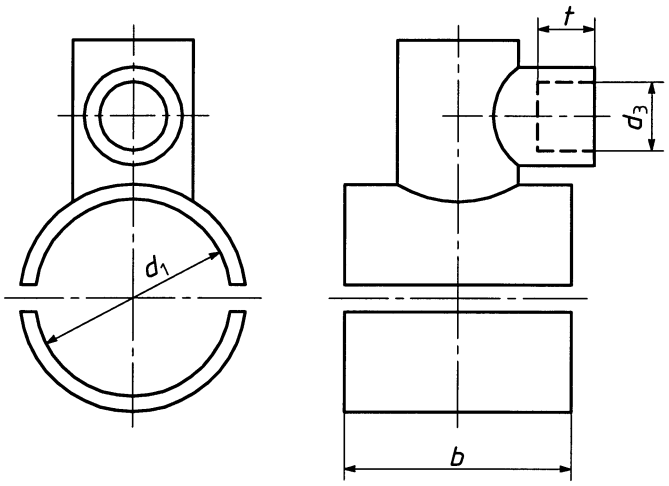


Figure 9 — Tee saddle with parallel, solvent cement type socket

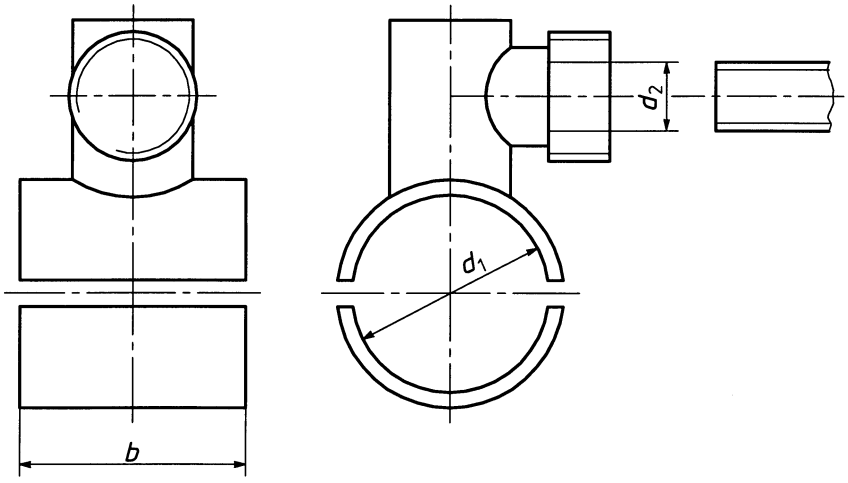


Figure 10 — Tee saddle with right-angled, mechanical joint

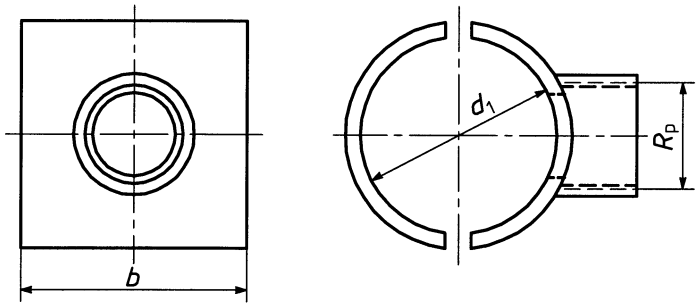


Figure 11 — Socket saddle with internally threaded socket

Table 8 — Tapping saddle dimensions (see figure 8 to figure 11)

Dimensions in millimetres

Water supply mains		Outlet connection			
Nominal outside diameter of pipe	**Inside diameter of saddle**	**Nominal outside diameter of connecting pipe**	**Solvent cementing socket mean inside diameter [1)]**	**Solvent cementing length**	**Internal pipe thread [2)]**
d_n	d_1	d_2	d_3	L	R_p
32	32	20 25	20 25	16 19	½ ¾
40	40	20 25 32	20 25 32	16 19 22	½ ¾ 1
50	50	20 25 32	20 25 32	16 19 22	½ ¾ 1
63	63	20 25 32 40 50	20 25 32 40 50	16 19 22 26 31	½ ¾ 1 1 ¼ 1 ½
75	75	20 25 32 40 50	20 25 32 40 50	16 19 22 26 31	½ ¾ 1 1 ¼ 1 ½
90	90	20 25 32 40 50	20 25 32 40 50	16 19 22 26 31	½ ¾ 1 1 ¼ 1 ½
110	110	20 25 32 40 50 63	20 25 32 40 50 63	16 19 22 26 31 38	½ ¾ 1 1 ¼ 1 ½ 2
125	125	32 50 63	32 50 63	22 31 38	1 1 ½ 2
140	140	25 32 50 63	25 32 50 63	19 22 31 38	¾ 1 1 ½ 2

Continued

Table 8 (concluded)

Dimensions in millimetres

Water supply mains		Outlet connection			
Nominal outside diameter of pipe d_n	**Inside diameter of saddle** d_1	**Nominal outside diameter of connecting pipe** d_2	**Solvent cementing socket mean inside diameter** [1] d_3	**Solvent cementing length** L	**Internal pipe thread** [2] R_p
160	160	20 25 32 40 50 63	20 25 32 40 50 63	16 19 22 26 31 38	½ ¾ 1 1 ¼ 1 ½ 2
200	200	20 25 32 40 50 63 90	20 25 32 40 50 63 90	16 19 22 26 31 38 51	½ ¾ 1 1 ¼ 1 ½ 2 3
225	225	32 40 50 63 90	32 40 50 63 90	22 26 31 38 51	1 1 ¼ 1 ½ 2 3
250	250	20 25 32 40 50	20 25 32 40 50	16 19 22 26 31	½ ¾ 1 1 ¼ 1 ½
315	315	20 25 32 40 50	20 25 32 40 50	16 19 22 26 31	½ ¾ 1 1 ¼ 1 ½

[1] For diameters d_3, the tolerance is $^{+0,3}_{0}$ mm.

[2] Jointing pipe thread R_p shall conform to ISO 7-1.

7 Classification and operating conditions

7.1 Classification

Valves and tapping saddles shall be classified according to their nominal pressure PN and the series S of the connecting pipe for which they are designed. The nominal pressure PN of the valves and the tapping saddles shall be related to their material design stress, σ_s, using as a basis, the relationship used for pipes, i.e.:

$$[\mathrm{PN}] \triangleq \frac{10\sigma_s}{[\mathrm{S}]}$$

where:

σ_s = 12,5 MPa for PVC-UH material with MRS $\geq$ 25 MPa

σ_s = 10,0 MPa for PVC-U material with MRS $<$ 25 MPa.

7.2 Determination of the allowable operating pressure PFA for water up to 45 °C

The allowable operating pressure PFA for temperatures up to 20 °C shall be equal to the nominal pressure PN.

To determine the allowable operating pressure PFA for temperatures between 25 °C and 45 °C a supplementary derating factor, f_T, shall be applied to the nominal pressure as follows:

$[\mathrm{PFA}] = f_T \times [\mathrm{PN}]$

This factor is given in figure A.1 of EN 1452-2:1999.

8 Mechanical characteristics

8.1 Resistance to internal pressure of valve bodies

Valve bodies or ancillary equipment, where hydrostatic pressure can be applied, shall be tested in accordance with the procedure given in EN 917:1997 using test equipment conforming to ISO/DIS 12092:1994 and the test parameters given in table 9, where the test pressures are related to the PN of the valve or ancillary equipment and shall conform to table 9.

Table 9 — Resistance of valve bodies to internal pressure

Characteristic	Requirements	Test pieces 1)		Test parameters					Test method
		Type	Nominal diameter mm	Temperature °C	Pressure for PVC-U bar 2) 3)	Pressure for PVC-UH bar 2) 3)	Test period h	Type of test	
Internal pressure	No break during the test period	Injection-moulded valve bodies	$d_n < 160$	20	4,2 × [PN]		1	Water-in-water	Method A of EN 917: 1997 (with ISO/DIS 12092: 1994)
					3,2 × [PN]		1000		
		Injection-moulded valve bodies	$d_n \geq 160$	20	4,2 × [PN]	3,36×[PN]	1		
					3,2 × [PN]	2,56×[PN]	1000		

1) For sampling procedure and number of test pieces see ENV 1452-7.

2) The test pressure p, shall be determined using the following equation:

$$p = \frac{(\text{Test stress})}{(\text{Design stress})} \times [\text{PN}]$$

where

- the test stress shall be 42 MPa at 1 h and 32 MPa at 1000 h;
- the design stress shall be 10 MPa with the exception of injection-moulded PVC-UH valve bodies with $d_n \geq 160$, for which the design stress shall be 12,5 MPa.

3) Where a mould, previously used to manufacture a valve body of a selected nominal pressure PN for type PVC-U material, is subsequently used to manufacture a valve body from type PVC-UH material, then the nominal pressure of that valve body can be increased by a factor of 1,25. Alternatively if the nominal pressure is retained at its original value, then the original test pressure for type PVC-U material shall be maintained.

8.2 Crushing test

When injection-moulded parts of valves and tapping saddles, on which hydraulic pressure cannot be applied, are tested in accordance with EN 802, the tested parts shall not shatter when they undergo a deformation of 20 %.

The period between manufacture and testing, t_1, and the conditioning period, t_2, shall be not less than 30 min. The closure speed of the press plates shall be (50 ± 5) mm/min.

8.3 Endurance properties

When tested in accordance with EN 28659 using the parameters indicated in table 10, the valve shall conform to the requirements given in table 10.

NOTE The test method given in EN 28659, specifies a fatigue strength test to confirm the ability of valves to withstand prolonged use in plastics piping systems for water supply, with repeated opening and closure.

Table 10 — Endurance properties

Characteristic	Requirement [1)]	Test parameters		Test method
		Parameter	Value	
Endurance	No leakage or fracture during test period	Fluid inside Internal pressure Flow velocity Tightening of gland package Ambient temperature Number of test pieces Duration	Water Equal to PN 1 m/s Allowed (15 ± 5)°C to (25 ± 5)°C Shall conform to ENV 1452-7 1000 cycles	EN 28659
1) Directly after this endurance test the test piece shall be tested in accordance with 8.4.2.				

8.4 Functional properties

8.4.1 Operating torque

When tested in accordance with EN 28233, before and after endurance testing in accordance with 8.3, the closing and opening torque shall not exceed the value given in table 11, which values are related to the applicable lever-arm length.

Table 11 — Test requirements for torque

Operative lever-arm length (mm)	50	63	80	100	125	160	200	250	315	400	500	630	800	1000
Torque (Nm)	6	9	13	18	25	38	54	75	110	160	200	450	580	720

8.4.2 Seat and packing test

When tested before and after the assembly testing in accordance with EN 1452-5 at both ambient temperature and 40 °C, using the parameters indicated in table 12, the valve shall conform to the requirement given in table 12.

When tested after endurance testing in accordance with 8.3, using the parameters indicated in table 12, the valve shall conform to the requirement given in table 12.

Table 12 — Conditions for seat and packing test

Characte-ristic	Requirement	Test parameters		Test method
		Parameter	Value	
Seat leaktightness: valve closed	No leakage during the test period	Fluid inside Fluid outside Internal pressure	Water Air 1,5 × [PN] [1)]	Method B of EN 917: 1997
Packing leaktightness: valve open		Conditioning period Ambient temperature Test period	1 h (15 ± 5)°C to (25 ± 5)°C 1 min	
1) Maximum test pressure: ([PN] + 5) bar.				

9 Physical characteristics

When tested in accordance with the test methods as specified in table 13 using the indicated parameters, the injection-moulded PVC-U components, such as valve bodies and tapping saddles, shall have physical characteristics conforming to the requirements given in table 13.

Table 13 — Physical characteristics

Characteristic	Requirements	Test parameters		Test method
		Parameter	Value	
Vicat softening temperature (VST)	≥ 74 °C	Shall conform to EN 727		EN 727
Effects of heating	The injection-moulded component shall not show any blisters or signs of weld-line splitting. [1)] No surface damage in the area of any injection point shall penetrate deeper than 30 % of the wall thickness at that point. The remaining sound wall thickness shall be at least 70 %. Outside the area of any injection point no surface damage shall occur. [2)]	Test temperature: Test period for: $e \leq$ 3 mm 3 mm < $e \leq$ 10 mm 10 mm < $e \leq$ 20 mm 20 mm < $e \leq$ 30 mm 30 mm < $e \leq$ 40 mm 40 mm < e Sampling procedure: Number of test pieces:	150 ± 2 °C 15 min 30 min 60 min 140 min 220 min 240 min Shall conform to ENV 1452-7 Shall conform to ENV 1452-7	Method A of EN 763:1994, (Air oven) [3)]

1) The weld-line is likely to become more pronounced, but this should not be taken as a sign of weld-line opening.

2) For sprue-gating, the area of the injection point shall be calculated using a radius $R = 0{,}3d_n$ with a maximum value of 50 mm. For cylindrical components moulded by end-gating techniques, e.g. ring or diaphragm methods, the gating area shall be a cylindrical portion with a length of $L = 0{,}3d_n$ with a maximum value of 50 mm (see figure 12). Any cracks or delamination in the wall of the cylindrical component adjacent to the injection area, parallel to the axis of the cylindrical component, shall not penetrate in the axial direction more than 20 % of the length L defined in this note.

3) When tested in accordance with EN 763:1994 and after removal from the hot air oven the injection-moulded component shall be cut as follows, using a razor sharp blade, over its full length and the exposed surfaces shall be examined.

The number of cuts on each moulding tested shall be as follows:

a) for cylindrical component of d_n up to and including 160 mm: not less than two cuts equally spaced around the periphery of the mouth of each socket or spigot of the component;

b) for cylindrical component of d_n greater than 160 mm: not less than four cuts equally spaced around the periphery of the mouth of each socket or spigot of the component.

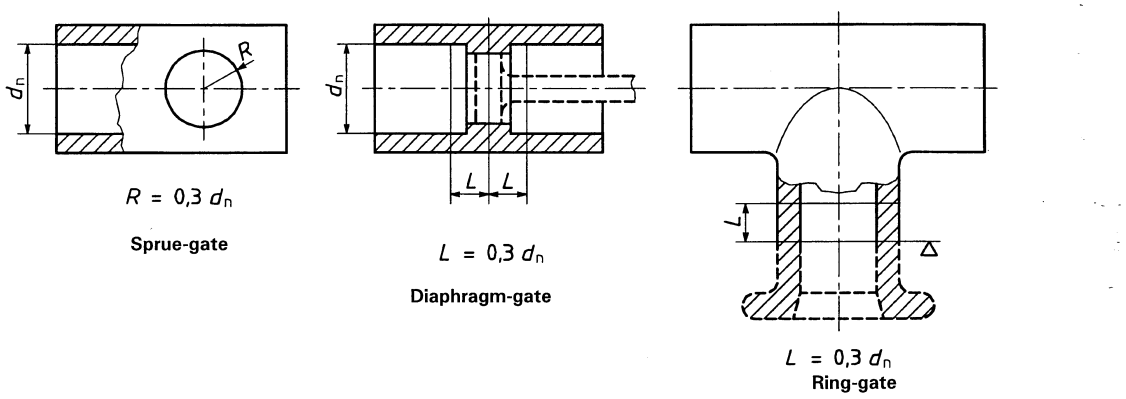


Figure 12 — Injection gating areas

10 Chemical characteristics

The chemical characteristics shall conform to those required for pipes by EN 1452-2:1999.

11 Sealing rings

Sealing rings shall conform to EN 1452-2:1999.

12 Adhesives

Adhesives shall conform to EN 1452-2:1999.

13 Performance requirements

When valves and ancillary equipment conforming to this standard are jointed to each other or to components conforming to other parts of EN 1452, the valve assemblies, ancillaries and their joints shall conform to EN 1452-5.

14 Marking

14.1 General

14.1.1 Unless otherwise stated in table 14 the marking elements shall be either:

- printed or formed directly on the product; or
- put on a plate/label attached to the body of the assembled product;

in such a way that after storage, weathering, handling and installation, e.g. in accordance with ENV 1452-6, legibility is maintained during the use of the products.

NOTE The manufacturer is not responsible for marking being illegible due to actions caused by installation and use such as painting, scratching, covering of the components or using detergents on the product.

14.1.2 Marking shall not initiate cracks or other types of defects which would impair conformity to the requirements of this standard.

14.1.3 If printing is used the colour of the printed information shall differ from the basic colour of the product.

14.1.4 The size of the marking shall be such that the marking is legible without magnification.

14.2 Minimum required marking

The minimum required marking shall conform to table 14.

Table 14 — Minimum required marking on valves and tapping saddles

Aspects	Mark or symbol
– Number of the System Standard [1)] – Manufacturer's name and/or trade mark – Nominal diameter d_n – Material – Nominal pressure PN [2) 3)] – Nominal diameter of flange DN [4)] – Manufacturer's information [2) 5)]	EN 1452 xyz e.g. 63 e.g. PVC-UH e.g. PN 16 e.g. DN 80 e.g. 93.66

1) This information may either be marked directly on the product or on a plate/label attached to the product or on the packaging.
2) For nominal diameters $d_n \leq 32$ mm note 1) applies.
3) The marking of the pipe series S may be included, e.g. PN 16/S 8.
4) For flanged valves only.
5) For providing traceability the following details shall be given:

a) the production period, year, in figures or in code;

b) a name or code for the production site if the manufacturer is producing in different sites, nationally and/or internationally.

14.3 Additional marking

14.3.1 Valves and tapping saddles conforming to this standard, which conform also to other standard(s), may be additionally marked with the minimum required marking in accordance with this/these other standard(s) in which case note 1) of table 14 applies.

14.3.2 Valves and tapping saddles conforming to this standard, which are third party certified may be marked accordingly.

NOTE Attention is drawn to the possible need to include CE marking when required for legislative purposes.

Annex A
(normative)

Imperial (inch)-sized valves and ancillary equipment

A.1 General

All clauses contained within the main text of this standard shall apply with the following exceptions. Only those clauses are described hereafter, for which the contents differ from the main text.

A.2 Nominal sizes and pressure classes

A.2.1 Nominal Sizes

In place of 6.2, the following shall apply. The nominal size(s) of a valve and ancillary shall correspond to and be designated by the nominal size(s) of the pipe(s) for which they are designed.

A.2.2 Pressure classes

Valves and ancillaries shall be classified according to the following nominal pressures, as applicable:

PN 9, PN 12 and PN 15.

A.3 Geometrical characteristics

For the purposes of 6.3, the following shall apply.

A.3.1 Dimensions of sockets and spigots for solvent cement type valves

The socket dimensions of the valve shall be the same as for pipes and fittings conforming to annex B in EN 1452-2:1999.

A.3.2 Dimensions of sockets and spigots for sealing ring type valves

The socket dimensions of the valve shall be the same as for pipes and fittings conforming to annex B in EN 1452-2:1999.

A.3.3 Mating dimensions for flange type valves

The mating dimensions of flanges used on valves shall conform to annex A in EN 1452-3:1999.

A.3.4 Laying lengths

For imperial-sized valves 6.3.2 does not apply.

A.4 Ancillary equipment

For imperial-sized ancillaries 6.4 does not apply.

A.5 Mechanical characteristics

For the purposes of 8.1 (Resistance of valve bodies to internal pressure) Table A.1 shall apply in place of table 9.

Table A.1 — Resistance of valve bodies to internal pressure

Characteristic	Requirement	Type of test piece	Test parameters				Test method
			Temp. °C	Pressure bars	Test period h	Type of test	
Internal pressure	No failure during the test period	Injection-moulded valve bodies	20	3,36 × [PN]	1	Water-in-water	Method A of EN 917:1997 together with ISO/DIS 12092: 1994
				2,56 × [PN]	1000		

NOTE The values given in note 2) to table 9 in this standard do not apply.

Annex B
(informative)

Bibliography

ENV 1452-6, *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U) — Part 6: Guidance for installation*

ISO 2536, *Unplasticized polyvinyl chloride (PVC) pressure pipes and fittings, metric series — Dimensions of flanges*

ISO 5752:1982, *Metal valves for use in flanged pipe systems — Face-to-face and centre-to-face dimensions*

ISO 7508:1985, *Unplasticized polyvinyl chloride (PVC) valves for pipes under pressure — Basic dimensions; Metric series*

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001. Standards are also available from the BSI website at http://www.bsi-global.com.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001. Further information about BSI is available on the BSI website at http://www.bsi-global.com.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL