BS EN 12288:2010

BSI Standards Publication

Industrial valves — Copper alloy gate valves

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National foreword

This British Standard is the UK implementation of EN 12288:2010. It supersedes BS EN 12288:2003 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PSE/18/2, Industrial valves, steam traps, actuators and safety devices against excessive pressure - Gate, globe, diaphragm and check valves.

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

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ISBN 978 0 580 68321 3

ICS 23.060.30

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2010

Amendments issued since publication

Date	Text affected

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12288

May 2010

ICS 23.060.30

Supersedes EN 12288:2003

English Version

Industrial valves - Copper alloy gate valves

Robinetterie industrielle - Robinets-vannes en alliage de cuivre

Industriearmaturen - Schieber aus Kupferlegierungen

This European Standard was approved by CEN on 16 April 2010.

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Foreword

This document (EN 12288:2010) has been prepared by Technical Committee CEN/TC 69 “Industrial valves”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by November 2010, and conflicting national standards shall be withdrawn at the latest by November 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12288:2003

This document 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 97/23/EC.

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

This document supersedes EN 12288:2003 where the following modifications were made:

a) the normative references were updated in Clauses 2 and 3, in 4.1.1, in 4.1.4, in Table 5, in 4.2.4.3, in Tables A.1 and A.2, in Table B.1;

b) Table 5 and Table B.1 were corrected;

c) in Table ZA.1:

   1) sub-clause 4.2 was correlated to PED Annex I, section 2.1;

   2) sub-clause 4.2.3 was correlated to PED Annex I, section 2.2;

   3) correlation of sub-clause 4.2.3 to PED Annex I, section 2.2.1 was deleted;

   4) correlation of sub-clause 4.2.6 to PED Annex I, section 2.5 was deleted;

   5) correlation of Annex A to PED Annex I, section 4.2 was deleted.

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, Croatia, 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 the United Kingdom.

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1 Scope

This European Standard applies to copper alloy gate valves for general use having flanged, threaded, capillary, compression or loose nut/union body ends.

This European Standard specifies the design and performance requirements including materials, pressure/temperature ratings, dimensions, test procedures and marking.

For some specific fields of application, for example, drinking water or gas, valves to this European Standard can be used provided the requirements of the relevant performance standards are met. Approval by the relevant regulatory body may be required.

The range of nominal sizes is DN 8 to DN 500 and of nominal diameters is 8 mm to 110 mm.

The range of pressure designations covered is PN 6; PN 10; PN 16; PN 20; PN 25; PN 32; PN 40; PN 63; Class 150 and Class 300.

For the applicability of each nominal size/diameter and each pressure designation to the different types of valve end, see 4.1.

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 19:2002, *Industrial valves — Marking of metallic valves*

EN 558:2008, *Industrial valves — Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems — PN and Class designated valves*

EN 736-1, *Valves — Terminology — Part 1: Definition of types of valves*

EN 736-2, *Valves — Terminology — Part 2: Definition of components of valves*

EN 736-3, *Valves — Terminology — Part 3: Definition of terms*

EN 1057, *Copper and copper alloys — Seamless round copper tubes for water and gas in sanitary and heating applications*

EN 1092-3:2003, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 3: Copper alloy flanges*

EN 1759-3:2003, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 3: Copper alloy flanges*

EN 1982:2008, *Copper and copper alloys — Ingots and castings*

EN 12163:1998, *Copper and copper alloys — Rod for general purposes*

EN 12164:1998, *Copper and copper alloys — Rod for free machining purposes*

EN 12167:1998, *Copper and copper alloys — Profiles and rectangular bar for general purposes*

EN 12168:1998, *Copper and copper alloys — Hollow rod for free machining purposes*

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EN 12266-1:2003, *Industrial valves — Testing of valves — Part 1: Pressure tests, test procedures and acceptance criteria — Mandatory requirements*

EN 12266-2:2002, *Industrial valves — Testing of valves — Part 2: Tests, test procedures and acceptance criteria —Supplementary requirements*

EN 12420:1999, *Copper and copper alloys — Forgings"*

EN 12449, *Copper and copper alloys — Seamless, round tubes for general purposes*

EN 12516-3, *Valves — Shell design strength — Part 3: Experimental method*

EN 12570, *Industrial valves — Method for sizing the operating element*

EN ISO 228-1:2003, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

EN ISO 5210:1991, *Industrial valves — Multi-turn valve actuator attachments (ISO 5210:1991)*

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ASME B1.20.1:1983, *Pipe threads, general purpose (inch)*

3 Terms and definitions

For the purposes of this document, the terms and definitions of types of valves and components and the terms and definitions given in EN 736-1, EN 736-2 and EN 736-3 apply, together with the following terms and definitions.

NOTE The terms maximum allowable pressure, PS, and test pressure, PT, defined in EU Directive 97/23/EC (PED) are equivalent to the terms allowable pressure, p_s, and test pressure, p_t, defined in EN 736-3:2008.

3.1
loose nut end
body end provided with a tailpiece which retains a loose internally threaded nut or ring for connection to the mating component

3.2
union end
body end provided with an external thread to which is attached a threaded nut or ring, which retains a tailpiece for connection to the mating component

3.3
NPS
alphanumeric designation of size for components of a pipework system, which is used for reference purposes and which comprises, for the purpose of Class designated flanges according to this standard, the letters NPS followed by a dimensionless number which is indirectly related to the physical size of the bore or outside diameter of the end connections

NOTE The number following the letters NPS does not represent a measurable value and should not be used for calculation purposes except where specified in the relevant standard. See EN ISO 6708.

[Adapted from EN 1759-3:2003]

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4 Requirements

4.1 Classification

4.1.1 Nominal sizes

The nominal sizes applicable to each type of body end shall be as specified in Tables 1 and 2.

NOTE 1 DN is applicable to flanged valves (PN designated) and loose nut/union end valves and NPS is applicable to flanged valves (Class designated). Threaded valves are normally identified by the thread size (NPS). Capillary and compression end valves are normally identified by nominal diameter expressed as the nominal outside diameter of the connecting tube or pipe. The use of DN for valves with body ends other than flanged is permitted.

NOTE 2 DN 8 is not listed in EN ISO 6708:1995 but is the commonly used equivalent nominal size for valves having size ¼ threaded ends.

NOTE 3 NPS ¼ and NPS ⅜ are not listed in EN 1759-3:2003.

Table 1 — Nominal sizes for flanged, threaded and loose nut/union end valves

Nominal size	Valve body ends				Nominal size	Valve body ends		
	Flanged		Threaded	Loose nut, union end		Flanged		Threaded
	PN	Class				PN	Class	
DN 8	-	-	¼	-	DN 100	DN 100	4	4
DN 10	DN 10	-	⅜	DN 10	DN 125	DN 125	5	-
DN 15	DN 15	½	½	DN 15	DN 150	DN 150	6	-
DN 20	DN 20	¾	¾	DN 20	DN 200	DN 200	8	-
DN 25	DN 25	1	1	DN 25	DN 250	DN 250	10	-
DN 32	DN 32	1¼	1¼	DN 32	DN 300	DN 300	12	-
DN 40	DN 40	1½	1½	DN 40	DN 350	DN 350	14	-
DN 50	DN 50	2	2	DN 50	DN 400	DN 400	16	-
DN 65	DN 65	2½	2½	-	DN 450	DN 450	18	-
DN 80	DN 80	3	3	-	DN 500	DN 500	20	-

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Table 2 — Nominal diameters for capillary and compression end valves

Nominal diameter mm	Valve body ends		Nominal diameter mm	Valve body ends	
	Capillary and compression ends for copper tubes	Compression ends for plastic pipe		Capillary and compression ends for copper tubes	Compression ends for plastic pipe
8	O	-	40	X	O
10	O	O	40,5	X	X
12	O	O	42	O	-
14	X	X	50	-	O
14,7	X	X	53,6	X	X
15	O	X	54	O	-
16	X	O	63	-	O
18	O	X	64	O	-
20	-	O	66,7	O	-
21	X	X	70	X	-
22	O	X	75	-	O
25	X	O	76,1	O	-
27,4	X	X	80	X	-
28	O	X	88,9	O	-
32	-	O	90	-	O
34	X	X	108	O	-
35	O	-	110	-	O

NOTE O = recommended European tube or pipe outside diameters.
X = other European tube or pipe outside diameters.

4.1.2 Nominal size relationships

The relationship between nominal size, DN, and body end types shall be as given in Table 3.

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Table 3 — Relationship between nominal size, DN, and body end types

Nominal size DN	Body end types					
	Flanged		Threaded	Loose nut, union end	Capillary and compression ends for copper tubes	Compression ends for plastic pipe
	PN	Class				
	Nominal size				Nominal diameter	
	DN	NPS	NPS	DN		
DN 8	8	-	¼	-	8 ; 10	10
DN 10	10	-	⅜	10	12 ; 14	12 ; 14
DN 15	15	½	½	15	14,7 ; 15 ; 16 ; 18	14,7 ; 15 ;16 ;18
DN 20	20	¾	¾	20	21 ; 22	20 ; 21 ; 22
DN 25	25	1	1	25	25 ; 27,4 ; 28	25 ; 27,4 ; 28
DN 32	32	1¼	1¼	32	34 ; 35	32 ; 34
DN 40	40	1½	1½	40	40 ; 40,5 ; 42	40 ; 40,5
DN 50	50	2	2	50	53,6 ; 54	50 ; 53,6
DN 65	65	2½	2½	-	64 ; 66,7 ; 70 ; 76,1	63 ; 75
DN 80	80	3	3	-	80 ; 88,9	90
DN 100	100	4	4	-	108	110
DN 125	125	5	-	-	-	-
DN 150	150	6	-	-	-	-
DN 200	200	8	-	-	-	-
DN 250	250	10	-	-	-	-
DN 300	300	12	-	-	-	-
DN 350	350	14	-	-	-	-
DN 400	400	16	-	-	-	-
DN 450	450	18	-	-	-	-
DN 500	500	20	-	-	-	-

4.1.3 PN and Class designations

The PN and Class designations applicable to valves having flanged, threaded and loose nut/union end body ends shall be as specified in Table 4.

NOTE 1 PN 20 and PN 32 are established PN designations for threaded end copper alloy valves and are additional to the list of PN designations given in EN 1333:2006.

Valves with capillary or compression ends are not designated by PN or Class.

NOTE 2 EN 1254-1:1998, EN 1254-2:1998, EN 1254-3:1998 and EN 1254-5:2007 which give details of the body ends for capillary and compression end valves in this European Standard, do not use the PN designation system given in EN 1333. If PN designations are allocated to capillary or compression end valves, it is the responsibility of the manufacturer to provide information on any pressure and/or temperature limitations in service.

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Table 4 — PN and Class designations

Body ends	PN 6	PN 10	PN 16	PN 20	PN 25	PN 32	PN 40	PN 63	Class 150	Class 300
Flanged	X	X	X	-	X	-	X	-	X	X
Threaded	-	X	X	X	X	X	X	X	-	-
Loose nut Union end	-	X	X	-	-	-	-	-	-	-

4.1.4 Valve series

Two series of valves are specified, series A for flanged and threaded end valves and series B for flanged, threaded, capillary, compression and loose nut/union end valves.

Series A valves have the shell components constructed from the restricted range of copper-aluminium and copper-tin alloys (see Table A.1) specified in EN 1092-3 and EN 1759-3, and are suitable for the pressure/temperature ratings given in these two flange standards. Additional copper-aluminium and copper-tin alloys are specified in Table A.1 for series A valves and the pressure/temperature ratings for valves in these materials are the same as given in EN 1092-3 and EN 1759-3.

Series B valves have the shell components constructed from copper-zinc-lead or complex copper-zinc alloys (see Table A.2) and have a lower allowable temperature than series A valves.

4.2 Design

4.2.1 General

Valves shall be properly designed incorporating appropriate safety margins and taking all relevant operating factors into account in order to ensure that they will be safe throughout their intended life. The construction details shall be the responsibility of the manufacturer.

4.2.2 Materials

The materials of construction of the valve shall be in accordance with Annex A.

4.2.3 Pressure/temperature ratings

Ratings shall be in accordance with Annex B.

4.2.4 Dimensions

4.2.4.1 Body ends

Body ends or the tailpiece of a valve with union end shall be selected from Table 5.

NOTE Valves may be supplied having body ends, which are a combination of any of the types given in Table 5.

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Table 5 — Body ends

Type	Designation	Dimensions in accordance with
Flanged	PN	EN 1092-3
	Class	EN 1759-3
Threaded	*R*c	ISO 7-1
	*R*p	
	R	
	G [a]	EN ISO 228-1
	NPT	ASME B1.20.1
Capillary	For copper tube [b c]	[d]
Compression	For copper tube [b c]	[e]
	For plastic pipe	[f]
Loose nut, Union end	[g]	[g]

[a] See 4.2.4.2.

[b] Tube in accordance with EN 1057.

[c] When valves are required for use with copper or copper alloy tubes to EN 12449, and where dimensions differ from those in EN 1057, the dimensions of the body ends shall be agreed between the purchaser and the manufacturer.

[d] EN 1254-1 or EN 1254-5 may be used.

[e] EN 1254-2 may be used.

[f] EN 1254-3 may be used.

[g] Designation and dimensions of loose nut/union ends shall be the responsibility of the manufacturer.

4.2.4.2 Type G threads

Body ends with type G internal parallel threads shall have smooth end sealing faces at 90° to the thread axis with a minimum outside diameter D and other dimensions in accordance with Figure 1 and Table 6.

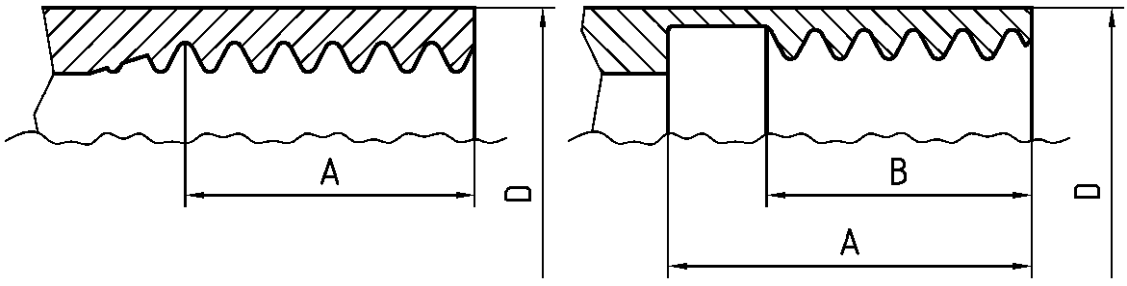

Figure 1 — Type G threaded ends

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Table 6 — Minimum dimensions for type G parallel threads

Dimensions in millimetres

Dimension	Thread size										
	¼	⅜	½	¾	1	1¼	1½	2	2½	3	4
A	11,0	11,4	15,0	16,3	19,1	21,4	21,4	25,7	30,2	33,3	39,3
B	7,0	7,0	9,0	10,0	11,5	13,5	13,5	17,0	18,5	21,0	26,0
D	18,0	22,0	26,0	32,0	39,0	49,0	55,0	68,0	85,0	98,0	126,0

4.2.4.3 Face-to-face dimensions

Flanged end valves shall have face-to-face dimensions in accordance with EN 558 and selected from the basic series given in Table 7.

Table 7 — Basic series of face-to-face dimensions for flanged valves

Basic series	PN 6	PN 10	PN 16	PN 25	PN 40	Class 150	Class 300
3	X	X	X	-	-	X	-
7	X	X	X	X	X	X	X
14	X	X	X	-	-	-	-
18	X	X	X	X	X	X	X
47	-	-	X	X	X	-	-

4.2.4.4 End-to-end dimensions

End-to-end dimensions for threaded, capillary, compression and loose nut/union end valves shall be the responsibility of the manufacturer.

4.2.5 Operation

4.2.5.1 Operating device

All valves shall be provided by the manufacturer with one of the following operating devices:

a) handwheel, chainwheel or crank;

b) key;

NOTE For valves which incorporate a shield around the stem, the quantity of keys supplied is determined by the manufacturer.

c) lever;

d) gearbox or actuator.

4.2.5.2 Actuator mounting flange

Valves shall be provided with a mounting flange in accordance with EN ISO 5210 when specified by the purchaser.

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4.2.5.3 Operating direction

Manually operated valves, except for lever operated valves, shall be closed by rotating the operating device in a clockwise direction when facing the operating device, unless anti-clockwise closing is specified by the purchaser.

4.2.6 Auxiliary connections

Provision of shell tappings for auxiliary connections is not required unless specified by the purchaser. The thread of any shell tapping shall be selected from and be in accordance with Table 5. If a means of sealing the shell tapping is provided, it shall be suitable for the full pressure/temperature rating of the valve.

4.3 Functional characteristics

4.3.1 Shell design strength

The design strength of the pressure containing shell of the valve shall take account of the loadings appropriate to its intended use and operating conditions; in particular, internal pressure, operating temperatures, and other factors such as static pressure and mass of contents in operating and test conditions, attached pipeline stresses, erosion and degradation mechanisms (e.g. corrosion, creep, fatigue).

The shell design strength shall be such that no leakage or structural failure occurs when the shell is subjected to an internal pressure of 2,5 times the maximum allowable pressure at 20 °C. Additionally there shall be no leakage from seals at pressures equal to or below 1,1 times the maximum allowable pressure at 20 °C.

The shell design strength shall be based on either:

a) a calculation design method supplemented if necessary by an experimental design method in accordance with EN 12516-3; or

b) an experimental design method in accordance with EN 12516-3 without calculation, for those valves having the product of maximum allowable pressure at 20 °C, times DN which is less than 3 000 bar.

4.3.2 Obturator design strength

For valves intended for use on certain applications, e.g. end of line service, the manufacturer shall ensure that the obturator design strength is such that when tested in accordance with EN 12266-2:2002, Test P20, there is no visually detectable leakage through the obturator. This requirement shall apply to the obturator when tested on each side successively.

4.3.3 Shell tightness

There shall be no visually detectable leakage through the pressure containing walls of the valve when tested with a liquid in accordance with EN 12266-1:2003, Test P11.

4.3.4 Seat tightness

The allowable rate for the seat tightness test specified in EN 12266-1 shall be:

a) metallic seated valves:

   1) sizes up to DN 100, NPS 4 or 80 mm: rate A;

   2) sizes greater than DN 100, NPS 4 or 80 mm: rate B;

b) resilient seated valves:

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1) all sizes: Rate A.

NOTE For metallic seated valves in sizes greater than DN 100, NPS 4 or 80 mm the manufacturer has the option to specify a lower leakage rate, i.e. Rate A.

4.3.5 Flow characteristics

Valves shall be clearway valves as defined in EN 736-3.

For valves with integral seats the nominal inside diameter of the body end port shall be as given in Tables 8 and 9.

For valves with separate body seat rings, the nominal inside diameter of the body end port shall be not less than 85 % of values given in Table 8.

Table 8 — Nominal inside diameter for flanged, threaded and loose nut/union end valves

Valve body ends				Nominal inside diameter mm	Valve body ends			Nominal inside diameter mm
Flanged		Threaded	Loose nut, Union end		Flanged		Threaded	
PN	Class				PN	Class		
-	-	¼	-	6,0	DN 100	4	4	100
DN 10	-	⅜	DN 10	9,0	DN 125	5	-	122
DN 15	½	½	DN 15	12,5	DN 150	6	-	147
DN 20	¾	¾	DN 20	19,0	DN 200	8	-	196
DN 25	1	1	DN 25	24,0	DN 250	10	-	246
DN 32	1¼	1¼	DN 32	31,5	DN 300	12	-	296
DN 40	1½	1½	DN 40	38,0	DN 350	14	-	346
DN 50	2	2	DN 50	49,0	DN 400	16	-	396
DN 65	2½	2½	-	62,0	DN 450	18	-	445
DN 80	3	3	-	74,0	DN 500	20	-	495

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Table 9 — Nominal inside diameter for capillary and compression end valves

Nominal diameter		Nominal inside diameter mm	Nominal diameter		Nominal inside diameter mm
Capillary and compression ends for copper tubes	Compression ends for plastic pipe		Capillary and compression ends for copper tubes	Compression ends for plastic pipe	
8	-	6,0	40	40	35,0
10	10	7,0	40,5 ; 42	40,5	36,0
12	12	9,0	53,6 ; 54	53,6	47,0
14	14	10,0	64	63	55,0
14,7 ; 15	14,7 ; 15	11,0	66,7	-	57,0
16	16	12,0	70	-	60,0
18	18	14,0	76,1	75	65,0
21 ; 22	20 ; 21 ; 22	18,0	80	-	68,0
25	25	21,0	88,9	90	76,0
27,4 ; 28	27,4 ; 28	23,0	108	110	92,0
34 ; 35	32 ; 34	29,0	-	-	-

4.3.6 Sizing the operating element

For handwheel and lever operated valves the minimum size of the handwheel or lever shall be determined in accordance with EN 12570. The handwheel or lever size shall be selected such that the valve can be operated when the line pressure is equal to the maximum allowable pressure at 20 °C and can be seated or unseated against a differential pressure of not less than the maximum allowable pressure at 20 °C.

When specified by the purchaser, it is permitted to use a lower fluid pressure than the maximum allowable pressure at 20 °C, for the determination of handwheel or lever size.

5 Test procedures

5.1 Production pressure testing

Every valve shall be subject to shell strength, shell tightness and seat tightness tests in accordance with EN 12266-1:2003, Tests P10, P11 and P12 respectively as given in Table 10.

For valves intended for certain applications, e.g. end of line service, an obturator strength test in accordance with EN 12266-2:2002, Test P20 shall be carried out.

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Table 10 — Production pressure tests

Test in accordance with EN 12266-1 or EN 12266-2	Test medium	Series A and B	Series B only [a]	
		All PN All Class	PN 6 to PN 40 Class 150	
		All sizes	up to DN 50	DN 65 to DN 200
Shell strength P10	Liquid	X	-	X
Shell tightness P11	Liquid	X [b]	-	X [b]
	Gas	-	X	-
Seat tightness P12	Liquid	X	-	-
	Gas	-	X	X
Obturator strength P20	Liquid	X [c]	-	-

NOTE X indicates test required.

\- indicates test not required or not permitted.

[a] Optional production pressure tests for series B valves having the PN/Class and sizes indicated.

[b] This test will also simultaneously satisfy the requirements for shell strength Test P10.

[c] When intended for certain applications (see 5.1).

5.2 Applicability of gas tests

Before the gas tests specified in Table 10 are undertaken, the manufacturer shall have previously subjected a production sample of the valve model and size to:

a) the shell design strength test as defined in 4.3.1 and EN 12516-3; and

b) a seat tightness test with a liquid in accordance with EN 12266-1:2003, Test P12.

5.3 Test durations

Test durations shall be in accordance with EN 12266-1 except that for the alternative gas tests on series B valves, the minimum duration may be reduced to 5 s for nominal sizes up to DN 100, NPS 4 or 80 mm and to 15 s for nominal sizes greater than DN 100 or NPS 4 or 80 mm.

6 Declaration of compliance

The manufacturer shall declare compliance to this European Standard by marking the valve with the number of this European Standard.

7 Designation

Gate valves in accordance with this European Standard shall be designated as follows:

a) gate valve;

b) EN 12288;

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c) DN..... (or other size designation as appropriate - see 4.1.1);

d) PN..... (or Class.....as appropriate - see 4.1.3);

e) valve series (A or B as appropriate - see 4.1.4);

f) material (symbol for shell material - see 4.2.2 and Tables A.1 and A.2);

g) body ends (see 4.2.4.1 and Table 5);

h) FTF series (for flanged valves only - see 4.2.4.3 and Table 7);

i) restrictions of maximum allowable temperature – see B.2.

NOTE Additional information should be supplied by the manufacturer where this relates to permissible options or additional requirements stated in this European Standard.

EXAMPLE OF DESIGNATION

A flanged gate valve to EN 12288, DN 65, PN 16 series A, material CuAl10Fe2-C, Face-to-face series 14.

8 Marking and preparation for storage and transportation

8.1 Required markings

8.1.1 Mandatory markings

- Gate valves in accordance with this European Standard shall be marked as follows:

- Items 1 to 4 inclusive in EN 19:2002, Table 1 except that item 3 may be omitted on certain valves, see 8.1.4.

a) For capillary and compression end valves the nominal size marking shall be on the body of the valve or on the end fittings, e.g. on the soldering bushes or compression nuts.

8.1.2 Supplementary markings

All valves shall be marked with the following supplementary markings which may be added to the body markings or placed elsewhere on the valve:

a) item 7 from EN 19:2002, Table 1, maximum allowable temperature, for valves with a temperature limitation, see B.2;

b) a reference comprising:

1) EN 12288;

2) the letter A or B to denote the valve series;

3) the letters NM to denote non-metallic body or obturator seating material, if fitted.

EXAMPLES EN 12288/A, EN 12288/B/NM

8.1.3 Other markings

For industrial valves conforming to the requirements of the EU Directive(s) stated in Annex ZA, additional markings in accordance with 5.10 and 5.18 of EN 19:2002 are required.

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8.1.4 Omission of markings

The body material designation (item 3 in EN 19:2002, Table 1) may be omitted from the following sizes of valves:

a) PN designated flanged valves: smaller than DN 50;

b) Class designated flanged valves and threaded valves: smaller than NPS 2;

c) Capillary and compression end valves: all sizes.

8.2 Preparation for storage and transportation

8.2.1 Protection

Each valve shall be drained of test fluid and suitably protected in preparation for storage and transportation.

8.2.2 Obturator position

Valves with non-metallic seating surfaces shall have the obturator in the partially open position when the valves are delivered.

Valves with metallic seating surfaces should have the obturator in the closed position when the valves are delivered.

8.2.3 Body ends

Body ends shall be protected to exclude foreign matter during storage and transportation.

NOTE Suitable protection may be in the form of plugs, plastic caps, perforated plastic bags, cartons or boxes.

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Annex A
(normative)

Materials

The material of the shell and trim components, with the exception of non-metallic seating and sealing components shall be selected from Table A.1 for series A valves and from Tables A.1 or A.2 for series B valves.

The materials of non-metallic seating and sealing components and the material of body end components not in contact with the service fluid are the responsibility of the manufacturer.

Soldering alloys containing lead and brazing alloys containing cadmium are not permitted in the construction or installation of valves used for water for human consumption.

NOTE The use of materials or combinations of materials which may be subject to galvanic (electrolytic) corrosion in service should be avoided.

Table A.1 — Materials for manufacture of series A and series B valves

Component	Form	Standard	Alloy designation	
			Symbol	Number
Body Bonnet	Casting	EN 1982	CuAl10Fe2-C CuAl10Fe5Ni5-C CuSn5Zn5Pb5-C CuSn7Zn2Pb3-C CuSn7Zn4Pb7-C CuSn6Zn4Pb2-C	CC331G CC333G CC491K CC492K CC493K CC498K
Obturator Obturator seat ring Body seat ring	Casting	EN 1982	Alloy designations specified for body and bonnet	
	Bar	EN 12163 EN 12167	CuSn6 CuSn8	CW452K CW453K
	[a]	Nickel-copper alloys having 30% Nickel minimum		
	[a]	Stainless steels of the 13% chromium and 18/8 chromium/nickel types		
Stem Stem bushing	Casting	EN 1982	Alloy designations specified for body and bonnet	
	Forging	EN 12420 [b]	CuAl6Si2Fe CuAl10Ni5Fe4 CuSn6 CuSn8 CuZn25Al5Fe2Mn2Pb	CW301G CW307G CW452K CW453K CW705R
	Bar	EN 12163 [c] EN 12164 [c]	CuZn39Mn1AlPbSi CuZn39Sn1 CuZn40Mn1Pb1AlFeSn1	CW718R CW719R CW721R
	[a]	Stainless steels of the 13% chromium and 18/8 Chromium/nickel types		

NOTE In Table A.1, only alloy numbers CC331G, CC333G, CC491K, CC492K and CC498K are specified in EN 1092-3:2003 and EN 1759-3:2003 as being suitable for use with valve bodies having integral flanges.

[a] Form not specified.

[b] Not all alloy designations listed are available in this European Standard.

[c] Not all alloy designations listed are available in both these European Standards.

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Table A.2 — Materials for manufacture of series B valves

Component	Form	Standard	Alloy designation	
			Symbol	Number
Body Bonnet	Casting	EN 1982	CuZn33Pb2Si-C CuZn39Pb1Al-C	CC751S CC754S
Obturator	Forging	EN 12420 [b]	CuZn36Pb2As CuZn39Pb3 CuZn40Pb2 CuZn32Pb2AsFeSi	CW602N CW614N CW617N CW709R
Obturator Seat ring Body seat ring Stem [a] Stem bushing [a]	Bar	EN 12163 [c] EN 12164 [c] EN 12167 [c] EN 12168 [c]		

NOTE In Table A.2, none of the alloys given are specified in EN 1092-3:2003 and EN 1759-3:2003 as being suitable for use with valve bodies having integral flanges.

[a] Material in casting form not to be used for this component.

[b] Not all alloy designations listed are available in this European Standard.

[c] Not all alloy designations listed are available in all these European Standards.

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Annex B
(normative)

Pressure/temperature ratings

B.1 Valves with metallic body seats and obturator seats

Ratings shall be as referenced in Table B.1, column 5.

Table B.1 — Pressure / temperature ratings

Valve series	Body ends	Designation	Shell material [a]	Pressure/temperature ratings in accordance with
A	Flanged	All PN	CC331G CC333G [b] CC491K CC492K CC493K CC498K	EN 1092-3
		All Class		EN 1759-3
	Threaded	PN 10 ; PN 16 ; PN 25 ; PN40		EN 1092-3
		PN 20 ; PN 32 ; PN 63		Table B.2
B	Flanged	All PN	CC751S CC754S CW602N CW614N CW617N CW709R	Table B.3
		Class 150		
	Threaded	All PN		
	Capillary	-		[c]
	Compression for copper tube	-		[d]
	Compression for plastic pipe	-		[e]
	Loose nut Union end	[f]		[f]

[a] Materials listed in this column for series A valves can also be used for series B valves.
[b] Manufacturer to confirm suitability of valves in alloy CC333G for use at temperatures between 260 °C and 350 °C.
[c] EN 1254-1 may be used.
[d] EN 1254-2 may be used.
[e] EN 1254-3 may be used.
[f] Manufacturer's responsibility.

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Table B.2 — Pressure/temperature ratings for series A valves with threaded ends in PN 20, PN 32 and PN 63

Temperature °C	Maximum allowable pressure bar [a]		
	PN 20	**PN 32**	**PN 63**
-10 to 66	20,0	32,0	63,0
100	20,0	32,0	63,0
120	20,0	32,0	58,5
150	20,0	31,4	51,7
170	20,0	29,3	47,2
180	20,0	27,5	45,0
200	17,3	23,0	40,4
220	14,5	19,6	35,9
250	10,4	15,5	29,2
260	9,0	14,0	26,9
NOTE Intermediate values may be interpolated.			
[a] 1 bar = 10^5 Pascal.			

Table B.3 — Pressure / temperature ratings for series B valves with flanged or threaded ends

Temperature °C	Maximum allowable pressure bar [a]									
	Body ends	PN 10	PN 16	PN 20	PN 25	PN 32	PN 40	PN 63	Class 150	Class 150 [b]
	Flanged	X	X	-	X	-	X	-	X	X
	Threaded	X	X	X	X	X	X	X	-	-
-10 to 66		10,0	16,0	20,0	25,0	32,0	40,0	63,0	15,5	14,0
100		10,0	16,0	20,0	25,0	32,0	40,0	63,0	14,3	14,0
120		7,5	13,5	17,2	21,8	28,3	36,0	51,9	13,4	13,4
150		3,5	9,5	13,0	16,5	22,8	30,0	49,5	12,4	-
170		-	7,0	10,3	12,8	19,2	26,0	42,5	11,6	-
180		-	-	9,0	11,3	17,4	24,0	41,0	11,2	-
186		-	-	-	10,5	16,2	22,8	39,3	11,1	-
198		-	-	-	-	14,0	20,4	35,9	-	-
200		-	-	-	-	-	20,0	35.4	-	-
NOTE 1 Intermediate values may be interpolated. NOTE 2 PN designated flanged end valves: nominal valve sizes larger than DN 250 are limited to a maximum temperature of 120 °C.										
[a] 1 bar = 10^5 Pascal. [b] Ratings for nominal sizes DN 350 (NPS 14) and larger.										

B.2 Valves with non-metallic obturator seats and/or body seats

Ratings shall be as detailed in B.1 except that the maximum allowable temperature will be limited to the maximum temperature of the non-metallic seat material.

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Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 97/23/EC (PED).

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this European Standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and EC Directive 97/23/EC

Clause(s)/sub-clause(s) of this European Standard	Nature of requirement	Essential Safety Requirements Annex I of Directive 97/23/EC (PED)
4.2	Design, general	2.1
4.2.3	Design for adequate strength	2.2
8.1	Marking and labelling	3.3

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

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Bibliography

[1] EN 1254-1, *Copper and copper alloys — Plumbing fittings — Part 1: Fittings with ends for capillary soldering or capillary brazing to copper tubes*

[2] EN 1254-2, *Copper and copper alloys — Plumbing fittings — Part 2: Fittings with compression ends for use with copper tubes*

[3] EN 1254-3, *Copper and copper alloys — Plumbing fittings — Part 3: Fittings with compression ends for use with plastics pipes*

[4] prEN 1254-5:2007[1)], *Copper and copper alloys — Plumbing fittings — Part 5: Fittings with short ends for capillary brazing to copper tubes*

[5] EN 1333:2006, *Flanges and their joints — Pipework components — Definition and selection of PN*

[6] EN ISO 6708:1995, *Pipework components — Definition and selection of DN (nominal size) (ISO 6708:1995)*

1) To be published.

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