

Industrial valves — Steel gate valves

The European Standard EN 1984:2000 has the status of a
British Standard

ICS 23.060.30

National foreword

This British Standard is the official English language version of EN 1984:2000. It supersedes BS 5157:1989 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee PSE/7, Valves to Subcommittee PSE/7/1, Valves — Basic standards, 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.

Cross-references

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

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 15 and a back cover.

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Industrial valves - Steel gate valves

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Industriearmaturen - Schieber aus Stahl

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

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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by July 2000, and conflicting national standards shall be withdrawn at the latest by July 2000.

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).

For the relationship with EU Directive(s), see informative annex ZA, which is an integral part of this standard.

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

1 Scope

This European Standard specifies the requirements for steel gate valves which are wrought, cast or fabricated with end connections flanged, butt welding, socket welding or threaded.

This standard is applicable to steel gate valves mainly used for industrial and general purpose applications. However they can be used for other applications provided the requirements of the relevant performance standards are met.

The ranges of nominal sizes covered is:

DN8; DN10; DN12; DN15; DN20; DN25; DN32; DN40; DN50; DN65; DN80; DN100; DN125; DN150; DN200; DN250; DN300; DN350; DN400; DN450; DN500; DN600; DN700; DN750; DN800; DN900; DN1000

DN750 is used for Class designated valves only.

DN8 and DN12 are not used for flanged end connections.

Socket welding end valves and threaded end valves are limited to the range DN8 to DN65.

The range of pressure designations covered is:

a) for flanged valves

b)
PN10; PN16; PN25; PN40; PN63; PN100

Class 150; Class 300; Class 600

c) for butt welding end valves

d)
PN10, PN16, PN25, PN40, PN63, PN100

Class 150, Class 300, Class 600

e) for socket welding end valves and threaded end valves

f)
PN10; PN16; PN25; PN40; PN63; PN100

Class 600; Class 800

The progress of work of the various standards referred to in the normative references can require revision of this standard.

NOTE 1 Socket welding end and threaded end valves are not normally manufactured with the pressure designations PN10, PN16, PN25 and PN40.

NOTE 2 Class 800 is an intermediate class designation widely used for socket welding and threaded end valves.

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 revision to 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.

EN 287-1, *Approval testing of welders — Fusion welding — Part 1: Steels*

EN 288-1, *Specification and qualification of welding procedures for metallic materials – Part 1: General rules for fusion welding*

EN 558-1, *Industrial valves — Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems — Part 1: PN-designated valves*

EN 558-2, *Industrial valves — Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems — Part 2: 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 1418, *Welding personnel — Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials*

EN 10045-1, *Metallic materials — Charpy impact tests — Part 1: Test Method*

EN 12760, *Valves — Socket welding ends for steel valves*

EN 12982, *Industrial valves — End-to-end and centre-to-end dimensions for butt welding end valves*

EN 12627, *Industrial valves — Butt welding ends for steel valves*

prEN 19:1996, *Industrial valves — Marking*

prEN 1092-1:1997, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories - PN designated — Part 1: Steel flanges*

prEN 1503-1: 1994, *Valves — Materials for bodies, bonnets and covers — Part 1: Steels specified in European Standards*

prEN 1503-2: 1994, *Valves — Materials for bodies, bonnets and covers — Part 1: Steels other than those specified in European Standards*

prEN 12266-1:1999, *Industrial valves — Testing of valves — Part 1: Tests, test procedures and acceptance criteria*

prEN 12266-2:1999, *Industrial valves — Testing of valves — Part 2: Supplementary tests, test procedures and acceptance criteria*

prEN 12516-3:1999, *Industrial valves — Shell design strength — Part 3: Experimental Method*

prEN 12570:1996, *Industrial valves — Permissible manual forces for operation of valves*

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

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

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

ASME B1.20-1, *Pipe Threads, General Purpose (Inch)*

NOTE European Standard EN 1984 supports some of the essential requirements of the Pressure Equipment Directive 97/23/EC. The essential requirements covered are listed in annex ZA (informative). It should be noted that this standard is not self sufficient and should be used with the normative references listed herein. Reference should also be made to annex ZA in the relevant normative reference.

3 Definitions

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

4 Requirements

4.1 Design

4.1.1 Materials

4.1.1.1 The body, bonnet and cover materials shall be selected from those listed in prEN 1503-1:1994 and prEN 1503-2:1994.

4.1.1.2 All the internal parts in contact with the fluid shall be made of a material whose corrosion resistance to the fluid being carried is at least equal to the body and bonnet material.

4.1.1.3 Trim materials shall have a chemical composition and mechanical properties which ensure the mechanical integrity of the valve.

The trim comprises the following:

- a) stem;
- b) obturator seat;
- c) body seat;
- d) backseat (for valves DN50 and above, when fitted).

4.1.1.4 Stems shall be manufactured from forged, drawn or rolled material. They shall have a minimum corrosion resistance equivalent to a 13 % chromium content ferritic steel.

4.1.2 Pressure/temperature ratings

4.1.2.1 The pressure/temperature ratings shall be as specified in a procedure¹⁾, which is currently being written, for the particular body/bonnet material group.

4.1.2.2 The pressure temperature ratings applicable to Class 800 socket welding and threaded end valves shall be the Class 600 rating for the applicable material group multiplied by the ratio of 800/600.

4.1.2.3 Restrictions of temperature and pressure below those specified in **4.1.2.1** and **4.1.2.2**, for example, those imposed by soft seals, special trims and bellows seal, shall be indicated on the valve (see **8.1.2**).

4.1.2.4 For temperatures below the lowest temperature shown in the pressure/temperature rating tables in a procedure²⁾, which is currently being written, the service pressure shall be no greater than the pressure corresponding to the lowest temperature in the rating tables. The use of valves at lower temperatures than shown in the rating tables is permitted providing the bending rupture energy of the body, bonnet and cover material measured on three 10 mm x 10 mm specimens in accordance with EN 10045-1 shall be no less than an average of 27 J at a temperature no higher than the lowest scheduled operating temperature.

4.1.3 Dimensions

4.1.3.1 Face-to-face and end-to-end dimensions

Face-to-face dimensions for PN designated flanged end valves shall be in accordance with EN 558-1. Face-to-face dimensions of Class designated flanged end valves shall be in accordance with EN 558-2.

The end-to-end dimensions of butt welding end valves shall be in accordance with EN 12982.

The end-to-end dimensions of threaded and socket welding end valves is the choice of the manufacturer.

1) See for example prEN 12516-1.

2) See for example prEN 12516-1.

4.1.3.2 Body end

4.1.3.2.1 Flanged ends shall comply with requirements of prEN 1092-1:1997 for PN designated flanges or with a written procedure³⁾, for Class designated flanges.

Flanged ends shall be cast or forged integral with the body except that flanges may be attached by welding in accordance with 4.1.6. A full penetration butt weld shall be used for the attachment of flanges by welding on sizes larger than DN50.

4.1.3.2.2 Butt welding end profiles shall be in accordance with EN 12627.

4.1.3.2.3 Socket welding end dimensions shall be in accordance with EN 12760. The minimum thickness of the pressure retaining material shall be in accordance with some written procedures⁴⁾, which are currently being written.

4.1.3.2.4 Threaded ends shall be of the internal form in accordance with Type Rc and Rp to ISO 7-1 or Type G to ISO 228-1 or Type NPT to ASME B1.20-1.

4.1.3.3 Body end port inside diameter

The body end port shall be circular. For unlined valves the body end port inside diameter shall be not less than the nominal inside diameter specified in Table 1.

3) See for example prEN 1759-1.

4) See for example prEN 12516-1 and prEN 12516-2.

Table 1 – Nominal inside diameter of the body end port

Dimensions in millimeters

DN	PN10	PN16	Class 150	PN25	PN40	Class 300	PN63	PN100	Class 600	Class 800
8	8	8	6	8	8	6	8	6	6	6
10	10	10	9	10	10	9	10	9	9	9
12	12	12	12	12	12	12	12	11	11	11
15	15	15	13	13	13	13	13	13	13	12
20	20	20	19	19	19	19	19	19	19	18
25	25	25	25	25	25	25	25	25	25	23
32	31	31	31	31	31	31	31	31	31	30
40	40	40	38	38	38	38	38	38	38	36
50	50	50	50	50	50	50	50	50	50	46
65	63	63	63	63	63	63	63	63	63	60
80	78	78	76	76	76	76	76	76	76	-
100	100	100	101	100	100	101	100	100	101	-
125	125	125	127	125	125	127	125	125	127	-
150	150	150	152	150	150	152	150	150	152	-
200	200	200	203	200	200	203	200	199	199	-
250	250	250	254	250	250	254	250	247	247	-
300	300	300	304	300	300	304	300	298	298	-
350	343	343	336	336	336	336	336	327	327	-
400	394	394	387	387	387	387	384	375	375	-
450	445	445	438	438	432	432	429	419	419	-
500	495	495	488	488	483	483	479	463	463	-
600	597	597	590	590	584	584	579	558	558	-
700	695	695	692	692	686	686	678	648	648	-
750	746	746	743	743	737	737	728	695	695	-
800	800	793	788	788	786	786	776	741	741	-
900	900	889	889	889	884	884	873	835	835	-
1000	1000	991	991	991	983	983	971	928	928	-

4.1.4 Operation

4.1.4.1 Stem operating thread

The operating thread of the stem shall be of the outside screw type unless otherwise specified by the customer.

4.1.4.2 Operating device

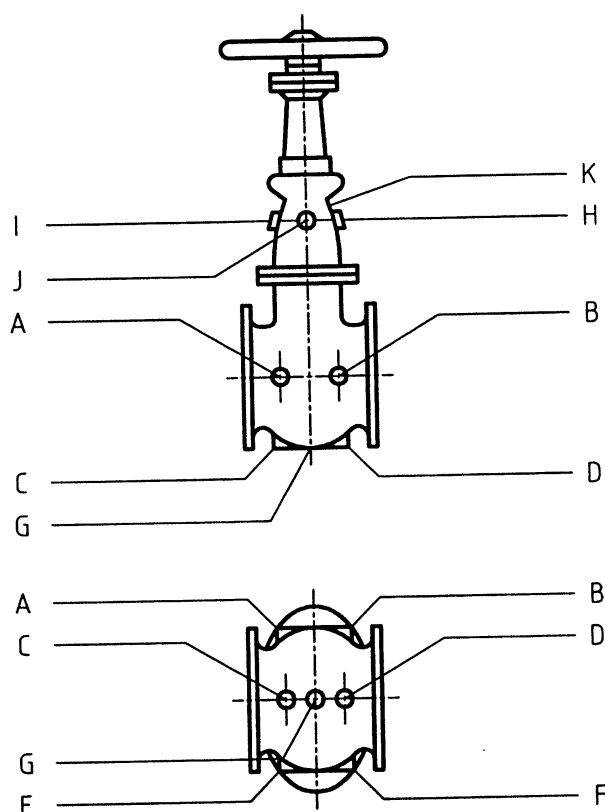
Unless otherwise specified by the customer the valve shall be supplied with a handwheel. If the valve is to be operated by an actuator then the valve/actuator attachment shall be in accordance with EN ISO 5210.

4.1.4.3 Operating direction

The valve shall be closed by turning the handwheel in a clockwise direction when viewed from above the handwheel. Marking of the handwheel shall be in accordance with prEN 19:1996.

4.1.5 Auxiliary connections

4.1.5.1 When auxiliary connections are required they shall be designated by the letters as indicated in figure 1.



NOTE Auxiliary connection K is opposite J and on the same side as E and F

Figure 1 - Location of auxiliary connections

4.1.5.2 When auxiliary connections are required they shall be in accordance with Table 2.

Screwed connections shall have internal threads of the forms specified in 4.1.3.2.4 and socket weld connections shall be in accordance with EN 12760.

Table 2 - Sizes of auxiliary connections

Valve nominal size	Auxiliary connection size
$50 \leq DN \leq 100$	DN15
$125 \leq DN \leq 200$	DN20
$250 \leq DN \leq 600$	DN25
$650 \leq DN$	DN40

4.1.6 Permanent joining

4.1.6.1 Welding

Welding as part of the valve shell shall be carried out to approved welding procedures to EN 288-1. Welders shall be approved to EN 287-1 and welding operators shall be approved to EN 1418.

4.1.6.2 Non-destructive tests

Non-destructive test requirements of welded joints which are part of the valve shell shall be detailed in the approved welding procedure.

4.1.6.3 Heat treatment

Heat treatment requirements of welded joints which are part of the valve shell shall be detailed in the approved welding procedure.

4.2 Functional characteristics

4.2.1 Shell design strength

The minimum body and bonnet wall thickness, the body/bonnet joint and bonnet bolting shall be determined in accordance with some written procedures⁵⁾.

It will be equally acceptable to verify the design strength of the valve shell by carrying out an elevated pressure test in accordance with the requirements of prEN 12516-3:1999.

4.2.2 Flow characteristics

The seat bore shall be either full bore, clearway or reduced bore. When the gate valve is fully open no internal part shall significantly influence the flow of fluid. It is permissible for any lugs required to facilitate the fitting of seat rings to intrude into the bore of a full bore or reduced bore valve.

4.2.3 Seat leakage

The allowable rate for the seat leakage test specified in prEN 12266-1:1999 shall be:

- elastomeric or polymeric seating — Rate A;
- other seatings — Rate B

The allowable rate for the back seat leakage test specified in prEN 12266-2:1999 shall be Rate C.

4.2.4 Permissible manual operating forces

The maximum allowable rim force which an operator can be assumed to be capable of applying to the handwheel should not exceed the values given in prEN 12570:1996. The handwheel size shall be selected assuming this force, such that the valve can be operated when the differential pressure across the obturator is equal to the allowable pressure at 20 °C. When specified by the customer it is permitted to use a lower differential pressure than the allowable pressure at 20 °C.

5 Test procedures

5.1 Each valve shall be pressure tested by the manufacturer prior to despatch in accordance with prEN 12266-1:1999.

5) For example, under the reference of prEN 12516-1 and/or prEN 12516-2.

5.2 Additional tests of finished valves can also be carried out to the requirements of prEN 12266-2:1999. The customer shall specify which tests are required except that test F21 shall not be applied to steel gate valves.

6 Declaration of compliance

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

7 Designation

Gate valves complying with this standard shall be designated by the following elements in the same order:

- “Gate valve”
- “EN 1984”
- Body end type, i.e. flanged, threaded, socket welding or butt welding
- Symbol “DN” and the number
- Pressure designation
- Material of the body and bonnet
- For flanged valves the face-to-face dimensions basic series
- Restrictions of allowable service temperature or pressure (see **4.1.2.3**).

8 Marking and preparation for storage and transportation

8.1 Marking

8.1.1 Marking shall be in accordance with prEN 19:1996

For valves equal to or smaller than nominal size DN50, thread size 2 where, due to the physical size of the valve, it is not practical to apply the mandatory markings as specified in prEN 19:1996, items 1, 2 and 4 may be omitted provided they are shown on the identification plate.

The sequence of omissions shall be:

- a) nominal size (item 1);
- b) manufacturer’s name or trademark (item 4);
- c) pressure designation (item 2).

8.1.2 The following supplementary markings shall be marked on the valve:

- a) Item 11;
- b) items 7 and 9 to meet the requirements of **4.1.2.3**;
- c) item 8 for threaded end valves;
- d) item 10;
- e) item 15 for lined valves;

f) item 12 the melt identification on the relevant shell component;

g) item 18.

8.2 Preparation for storage and transportation

Each valve shall be drained of any test liquid. The body ends shall be covered to prevent the introduction of foreign materials and moisture. In the case of polymeric or elastomeric seated valves the seatings shall also be protected from ultra violet light.

Flange covers, when provided, shall extend over the entire gasket face. The weld profile of butt welding end valves shall be suitably protected to prevent mechanical damage or corrosion to the machined profile.

Polymeric or elastomeric seated valves shall be delivered such that the seating material is not in compression. All other valves shall be delivered with the obturator in the closed position.

Annex A (informative)

Information to be supplied by the customer

The following information should be provided in the enquiry and/or order:

- a) this standard, i.e. EN 1984;
- b) body end connection, i.e. flange, butt welding, socket welding or threaded (see **4.1.3.2**);
- c) the nominal valve size (see clause **1**);
- d) the pressure designation (see clause **1**);
- e) the material of the body, bonnet and cover (see **4.1.1.1**);
- f) for flanged end valves, the basic series number of the face-to-face dimensions (see **4.1.3.1**);
- g) for threaded valves the thread type (see **4.1.3.2.4**);
- h) if the operating thread should be of inside screw type or if both inside and outside screw types are acceptable (see **4.1.4.1**);
- i) the type of operating device if not a handwheel (see **4.1.4.2**);
- j) the designation of the auxiliary connections (see **4.1.5.1**) and the size and type (see **4.1.5.2**);
- k) the differential pressure across the obturator if less than the allowable at 20 °C for the particular pressure designation (see **4.2.4**);
- l) if a clearway seat bore is required (see **4.2.2**);
- m) if special trim is required (see **4.1.1.3**).

Annex ZA (informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

This European standard has been prepared under a mandate given to CEN by the EU and EFTA and supports essential requirements of EU Directive 97/23/EC (PED).

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

The following clauses of this standard are likely to support requirements of Directive 97/23/EC.

Table ZA.1 - Clauses of this European Standard addressing Essential Requirements of EU Directive 97/23/EC.

Clause	Nature of requirement	Annex 1 of PED Essential Safety Requirements
4	General Design	2.1
8.1.2 f)	Traceability	3.1.5
8.1.2	Marking and labelling	3.3

Compliance with the clauses of this standard and the other normative references in clause 2 above provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

Bibliography

- [1] prEN 1759-1 WI [074006], Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories – Class designated – Part 1: Steel flanges, NPS ½ to 24
- [2] prEN 12516-1 WI [069082], Industrial valves – Shell design strength – Part 1: Tabulation method for steel valves
- [3] prEN 12516-2 WI [069083], Industrial valves – Shell design strength – Part 2: Calculation method for steel valves

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