BRITISH STANDARD

BS EN 1984:2010

# Industrial valves — Steel gate valves

ICS 23.060.30



BSI
British Standards

# National foreword

This British Standard is the UK implementation of EN 1984:2010. It supersedes BS EN 1984:2000 which is withdrawn.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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EUROPEAN STANDARD

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**EN 1984**

May 2010

ICS 23.060.30

Supersedes EN 1984:2000

English Version

# Industrial valves - Steel gate valves

Robinetterie industrielle - Robinets-vannes en acier

Industriearmaturen - Schieber aus Stahl

This European Standard was approved by CEN on 9 April 2010.

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**Management Centre: Avenue Marnix 17, B-1000 Brussels**

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# Foreword

This document (EN 1984:2010) 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of an identical text or by endorsement, at the latest by November 2010, and conflicting national standards shall be withdrawn at the latest by November 2010.

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This document supersedes EN 1984:2000.

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.

1) The normative references were updated in Clauses 2, 4, 5, 8.

2) The Bibliography was deleted;

3) In Table ZA.1, sub-clauses 4.2.3 and 5.1 were correlated to PED Annex I, sections 3.2.2 and 7.4;

4) In Table ZA.1, sub-clause 4.1 was correlated to PED Annex I, section 2.1.

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## 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 European 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:

DN 8; DN 10; DN 12; DN 15; DN 20; DN 25; DN 32; DN 40; DN 50; DN 65; DN 80; DN 100; DN 125; DN 150; DN 200; DN 250; DN 300; DN 350; DN 400; DN 450; DN 500; DN 600; DN 700; DN 750; DN 800; DN 900; DN 1000.

DN 750 is used for Class designated valves only.

DN 8 and DN 12 are not used for flanged end connections.

Socket welding end valves and threaded end valves are limited to the range DN 8 to DN 65.

The range of pressure designations covered is:

a) for flanged valves

   1) PN 10; PN 16; PN 25; PN 40; PN 63; PN 100

   2) Class 150; Class 300; Class 600

b) for butt welding end valves

   1) PN 10, PN 16, PN 25, PN 40, PN 63, PN 100

   2) Class 150, Class 300, Class 600

c) for socket welding end valves and threaded end valves

   1) PN 10; PN 16; PN 25; PN 40; PN 63; PN 100

   2) Class 600; Class 800

NOTE 1 Socket welding end and threaded end valves are not normally manufactured with the pressure designations PN 10, PN 16, PN 25 and PN 40.

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

## 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, *Industrial valves — Marking of metallic valves*

EN 287-1, *Qualification test of welders — Fusion welding — Part 1: Steels*

EN 558, *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 736-1:1995, *Valves — Terminology — Part 1: Definition of types of valves*

EN 736-2:1997, *Valves — Terminology — Part 2: Definition of components of valves*

EN 736-3:2008, *Valves — Terminology — Part 3: Definition of terms*

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

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 1759-1, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 1: Steel flanges, NPS ½ to 24*

EN 10045-1, *Metallic materials — Charpy impact test — Part 1: Test method*

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

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

EN 12516-1, *Industrial valves — Shell design strength — Part 1: Tabulation method for steel valve shells*

EN 12516-2, *Industrial valves — Shell design strength — Part 2: Calculation method for steel valve shells*

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

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

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

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

EN ISO 15607, *Specification and qualification of welding procedures for metallic materials — General rules (ISO 15607:2003)*

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 definitions of types of valves and components and the terms and definitions given in EN 736-1:1995, EN 736-2:1997 and EN 736-3:2008 apply.

# 4 Requirements

## 4.1 Design

### 4.1.1 Materials

**4.1.1.1** The body, bonnet and cover materials shall be selected from the grades listed in EN 12516-1.

**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 DN 50 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 EN 12516-1 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 $\frac{800}{600}$.

**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 EN 12516-1, 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 27J 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 and Class designated flanged end valves shall be in accordance with EN 558.

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.

#### 4.1.3.2 Body end

**4.1.3.2.1** Flanged ends shall comply with requirements of EN 1092-1 for PN-designated flanges or with EN 1759-1 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 DN 50.

**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 EN 12516-1 and EN 12516-2.

**4.1.3.2.4** Threaded ends shall be of the internal form in accordance with Type Rc and Rp to ISO 7-1:1994 or Type G to EN ISO 228-1:2003 or Type NPT to ASME B1.20.1-1983.

#### 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.

**Table 1 – Nominal inside diameter of the body end port**

Dimensions in millimetres

| DN | PN 10 | PN 16 | Class 150 | PN 25 | PN 40 | Class 300 | PN 63 | PN 100 | 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

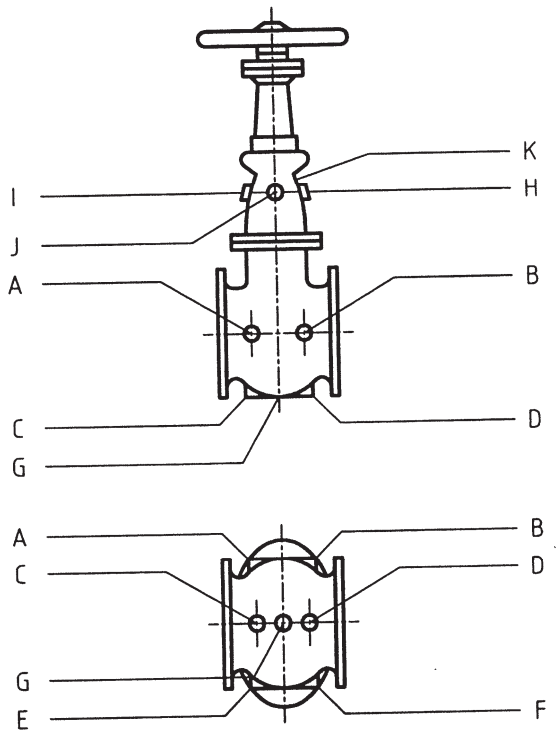
Unless otherwise specified by the customer the valve shall be supplied with a handwheel. If the valve is to be operated by an actuator then the valve/actuator attachment shall be in accordance with EN ISO 5210.

#### 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 EN 19.

### 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 ≤ DN ≤ 100 | DN 15 |
| 125 ≤ DN ≤ 200 | DN 20 |
| 250 ≤ DN ≤ 600 | DN 25 |
| 700 ≤ DN | DN 40 |

#### 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 ISO 15607. 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 EN 12516-1 and EN 12516-2.

It is equally acceptable to verify the design strength of the valve shell by carrying out an elevated pressure test in accordance with the requirements of EN 12516-3.

#### 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 EN 12266-1 shall be:

1) elastomeric or polymeric seating — Rate A;

2) other seatings — Rate B.

The allowable rate for the back seat leakage test specified in EN 12266-2 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 shall not exceed the values given in EN 12570. 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 EN 12266-1.

**5.2** Additional tests of finished valves can also be carried out to the requirements of EN 12266-2. 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 European Standard by marking the valve with the number of this European Standard.

## 7 Designation

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

1) “Gate valve”;

2) “EN 1984”;

3) Body end type i.e. flanged, threaded, socket welding or butt welding;

4) Symbol “DN” and the number;

5) Pressure designation;

6) Material of the body and bonnet;

7) For flanged valves the face-to-face dimensions basic series;

8) 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 EN 19.

For valves equal to or smaller than nominal size DN 50, thread size 2 where due to the physical size of the valve it is not practical to apply the mandatory markings as specified in EN 19, 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 for 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 European 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)

## 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 EU 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) |
|---|---|---|
| 4.1 | General Design | 2.1 |
| 4.2.3, 5.1 | Proof test | 3.2.2 |
| 4.2.3, 5.1 | Hydrostatic test pressure | 7.4 |
| 8.1.2 f) | Traceability | 3.1.5 |
| 8.1.2 | 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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BSI Group
Headquarters 389
Chiswick High Road,
London, W4 4AL, UK
Tel +44 (0)20 8996 9001
Fax +44 (0)20 8996 7001
www.bsigroup.com/
standards