BRITISH STANDARD

BS EN 593:2009
+A1:2011

Industrial valves — Metallic butterfly valves

ICS 23.060.30

National foreword

This British Standard is the UK implementation of EN 593:2009+A1:2011. It supersedes BS EN 593:2009, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by ⟩A1⟨.

The UK participation in its preparation was entrusted to Technical Committee PSE/18/3, Industrial valves, steam traps, actuators and safety devices against excessive pressure - Part turn valves (Ball, plug and butterfly).

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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EUROPÄISCHE NORM

EN 593:2009+A1

April 2011

ICS 23.060.30

Supersedes EN 593:2004

English Version

Industrial valves - Metallic butterfly valves

Robinetterie industrielle - Robinets métalliques à papillon

Industriearmaturen - Metallische Klappen

This European Standard was approved by CEN on 7 May 2009.

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 CEN Management Centre 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 CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 593:2009+A1:2011) 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of an identical text or by endorsement, at the latest by September 2011 and conflicting national standards shall be withdrawn at the latest by September 2011.

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.

〚A1〛 This document supersedes EN 593:2009. 〈A1〉

This document includes Amendment 1, approved by CEN on 2011-01-17.

The start and finish of text introduced or altered by amendment is indicated in the text by tags 〚A1〛 〈A1〉.

Informative Annexes A, B and C can be used for the practical application of this European Standard.

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 〚A1〛 EU Directive 97/23/EC 〈A1〉.

For relationship with 〚A1〛 EU Directive 97/23/EC 〈A1〉, see informative Annex ZA, which is an integral part of this document.

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.

1 Scope

This European Standard specifies requirements for butterfly valves having metallic bodies for use in flanged or butt welding piping systems and used for isolating, regulating or control applications.

The PN and Class ranges are:

PN 2,5 ; PN 6 ; PN 10 ; PN 16 ; PN 25 ; PN 40 ; Class 150 ; Class 300.

The DN range is:

— 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 1200 ; DN 1400 ; DN 1600 ; DN 1800 ; DN 2000 ; DN 2200 ; DN 2400.

DN 750 is used only for Class 150 and Class 300.

For special application as industrial process control valves, see EN 1349 and EN 60534-2-1.

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 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 1092-2:1997, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 2: Cast iron flanges*

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

EN 1092-4:2002, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 4: Aluminium alloy flanges*

EN 1267, *Valves — Test of flow resistance using water as test fluid*

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 1/2 to 24*

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

EN 1759-4:2003, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 4: Aluminium alloy flanges*

EN 10269, *Steels and nickel alloys for fasteners with specified elevated and/or low temperature properties*

EN 12266-1:2003, *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 12516-1:2005, *Industrial valves — Shell design strength — Part 1: Tabulation method for steel valve shells*

EN 12516-2:2004, *Industrial valves — Shell design strength — Part 2: Calculation method for steel valve shells*

EN 12516-3:2002, *Valves — Shell design strength — Part 3: Experimental method*

EN 12516-4:2008, *Industrial valves — Shell design strength — Part 4: Calculation method for valve shells manufactured in metallic materials other than steel*

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

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

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

EN 60534-2-3, *Industrial-process control valves — Part 2-3: Flow capacity — Test procedures (IEC 60534-2-3:1997)*

EN ISO 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics (ISO 1043-1:2001)*

EN ISO 5211, *Industrial valves — Part-turn actuator attachments (ISO 5211:2001)*

prEN ISO 10497[1)], *Testing of valves — Fire type-testing requirements (ISO/DIS 10497:2008)*

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

ISO 1629:1995, *Rubber and lattices — Nomenclature*

ASME B1.1:2003, *Unified inch screw threads, UN and UNC thread form*

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1) Under preparation.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 736-1:1995, EN 736-2:1997, EN 736-3:2008 and the following apply.

3.1
maximum allowable pressure, PS
maximum pressure for which the equipment is designed, as specified by the manufacturer

3.2
maximum allowable temperature, TS
maximum temperature for which the equipment is designed, as specified by the manufacturer

3.3
end of line service
condition that occurs when the downstream side of the valve is opened to atmosphere

3.4
driving shaft
shaft connected to the obturator to operate the valve in the case of a multi-shaft valve

3.5
double flanged butterfly valve
butterfly valve having double flanged body ends for connection to flanges of adjacent components by individual bolting (see Figure 1)

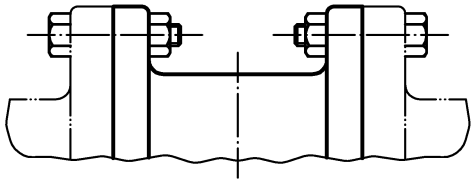

Figure 1 — Double flanged body

3.6
wafer butterfly valve
butterfly valve intended for clamping between flanges of adjacent components

NOTE Different body shapes are possible (see Figures 2, 3 and 4).

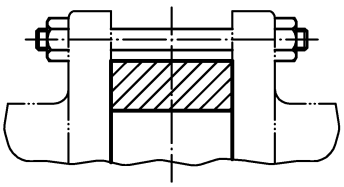

Figure 2 — Flangeless wafer body

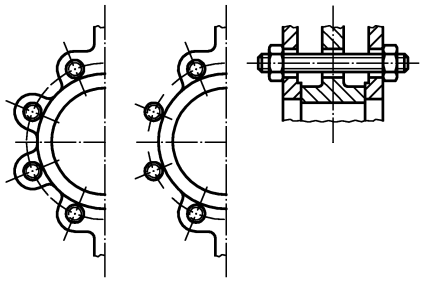

Figure 3a) — Valve with central lugs

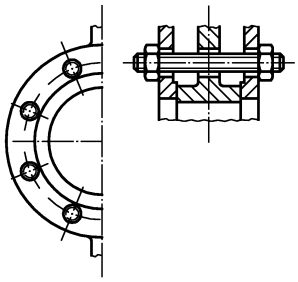

Figure 3b) — Central single flange valve

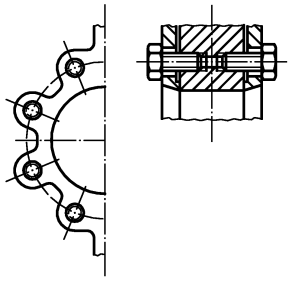

Figure 3c) — Valve with lugs with internally threaded holes

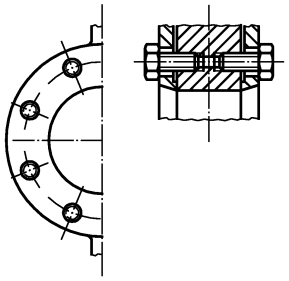

Figure 3d) — Single-flange valve with internally threaded holes

Figure 3 — Single flange or lugged wafer body

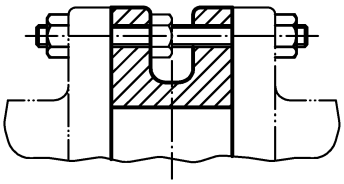

Figure 4 — "U" section wafer body

3.7
butt welding end butterfly valve
butterfly valve intended for butt welding into a pipeline (see Figure 5)

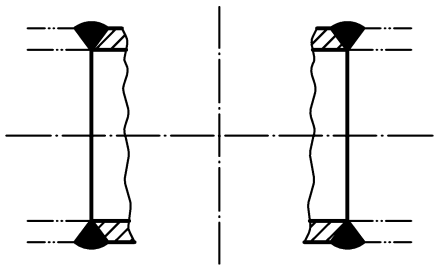

Figure 5 — Butt welding end body

3.8
trim
parts in contact with the fluid as defined in EN 736-2

4 Requirements

4.1 Design

4.1.1 Construction

4.1.1.1 General

The valve shall be of either concentric design (see Figure 6) or eccentric design (see Figure 7). The offset may be single, double or triple.

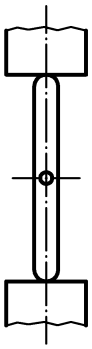

Figure 6 — Concentric design

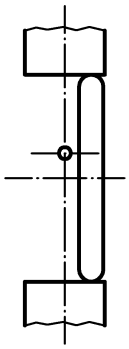

Figure 7 — Eccentric design (example of double offset design)

The design details are the responsibility of the manufacturer.

4.1.1.2 Body

Flanges of double flanged valves and single flange wafer valves shall have bolt holes in accordance with the relevant standard as specified in 4.1.4.2. Threaded holes can be provided where the design of the valve precludes through flange bolting.

Flangeless wafer valves (see Figure 2) are intended for clamping between pipe flanges using through bolting. The shape of wafer valve bodies shall be such that centring of the valves within the appropriate flange bolt

circle is ensured. Where through bolting is not practicable due to the valve design, e.g. close to shaft passages, threaded holes can be provided for individual bolting.

Lugged or single flange wafer valves (see Figure 3) are supplied with threaded or through holes for installation between two flanged components or at the end of a pipeline (i.e. end of line service or downstream dismantling).

Threaded holes shall allow full thread engagement to a depth at least equal to the nominal bolt diameter and at least 0,67 of the bolt diameter when the bolt hole is adjacent to the valve shaft.

For Class designed valves threaded body flange holes for bolts 1 inch or less in diameter shall be drilled and tapped in accordance with ASME B1.1, UNC coarse thread series, Class 2B. For bolts 1 1/8 inches or more in diameter, such holes shall be drilled and tapped in accordance with ASME B1.1, UN 8 eight thread series, Class 2B. Threads according to other standards shall be specified.

The manufacturer's literature shall be consulted to determine if through bolting or/and end of line assembly is possible. Any limitation regarding end of line service condition shall be indicated.

Elastomeric or plastic linings and liners can be extended over the flange faces of the body to form a gasket for the flange.

4.1.1.3 Obturator (disc)

The valve manufacturer's technical documentation shall specify all necessary dimensions showing the protrusion of the obturator in the open position beyond the faces of the valve.

4.1.1.4 Seat seal or body liner

The valve manufacturer's technical documentation shall specify whether the seat seal or body liner is replaceable or non-replaceable.

4.1.1.5 Driving shaft

The external end of the driving shaft shall indicate the orientation of the obturator.

The shaft shall indicate by design or marking the position of the obturator. Where required by the design of valve, the manufacturer's operating instructions shall specify the method to preserve the indication of the obturator position, during and after re-assembly of the obturator to the shaft, e.g. for routine maintenance.

The sealing of the shaft shall remain leak tight to atmosphere when the operating device is removed.

The shaft shall be retained in the valve, so it cannot be ejected out of the body when external parts are removed.

When anti-blow out design is required, it shall be in accordance with EN 736-3.

External parts as stated in 3.3.7 of EN 736-3:2008, are parts which are not included in the bare shaft valve e.g. bracket, lever, actuator.

4.1.1.6 Other requirements

a) Fire type tested design: valves designated as fire type tested design shall be in accordance with prEN ISO 10497.

   If valves are required to be a fire type tested design, this shall be specified (see Annex A).

b) Anti-static design: valves with anti-static design shall have electrical continuity between shaft, obturator and body in accordance with EN 12266-2.

If valves are required to be an anti-static design, this requirement shall be specified (see Annex A).

4.1.2 Materials

4.1.2.1 Shell

a) Body and cover: the steel alloy materials for the body and cover (if any) shall be selected from the grades listed in EN 12516-1.

For metallic materials other than steel, the body and cover (if any) materials shall be selected from the grades listed in EN 12516-4.

b) Bolting: bolting material shall be selected from EN 10269.

4.1.2.2 Trim

The trim comprises the following:

a) obturator;

b) shaft(s);

c) seat or liner.

The valve manufacturer's technical documentation shall specify the relevant materials for the trim parts (see Annex B).

The materials of seat and liner can be elastomeric, plastic, composite, metallic or a combination of these materials.

The valve manufacturer's technical documentation shall specify the material type of the seat or liner.

4.1.2.3 Corrosion protection

a) External corrosion protection: valve shells shall be protected against corrosion by proper material selection or surface treatment.

The valve manufacturer's technical documentation shall specify the choice of the materials and/or the type of the surface treatment.

Surface treatment system may be chosen according to classification category given by Annex C.

Test assessment and test procedures are the responsibility of the manufacturer.

b) Internal corrosion protection: all surfaces in contact with the fluid shall be protected against corrosion by suitable material selection or surface treatment (see Annex B).

The valve manufacturer's technical documentation shall specify the materials and /or the type of surface treatment.

4.1.3 Pressure/temperature ratings

The pressure/temperature rating shall be as specified in:

a) steel materials: EN 12516-1 for the particular body/bonnet material group;

b) cast iron materials: EN 1092-2;

c) copper alloy materials: EN 1092-3 for PN designated valves; EN 1759-3 for Class-designated flanged valves;

d) aluminium alloys: EN 1092-4 for PN designated valves; EN 1759-4 for Class-designated flanged valves.

Where restrictions on pressure and/or temperature are necessary on valves by reason of valve type, trim materials or other factors, the maximum allowable pressure and/or temperature shall be marked on the valve (in accordance with 8.1 and EN 19).

NOTE It is recommended that the service conditions under which a butterfly valve is to be used should be specified by the purchaser (see Annex A).

4.1.4 Dimensions and tolerances

4.1.4.1 Face-to-face and end-to-end dimensions

The face-to-face dimensions and tolerances for flanged and wafer type butterfly valves shall be selected from EN 558 for PN- and Class-designated valves.

The end-to-end dimensions and tolerances for butt welding end butterfly valves shall be selected from EN 12982.

The face to face or end-to-end dimension for DN lower or larger than those defined in EN 558 or EN 12982 shall be specified by the manufacturer.

4.1.4.2 Flange body ends

Flange ends shall be in accordance with:

a) EN 1092-1, EN 1092-2, EN 1092-3 and EN 1092-4 for PN designated butterfly valves;

b) EN 1759-1, EN 1759-3 and EN 1759-4 for Class designated butterfly valves.

4.1.4.3 Wafer bodies

Flangeless, lugged or single flanged bodies shall be such that they can be clamped between flanges in accordance with:

a) EN 1092-1, EN 1092-2, EN 1092-3 and EN 1092-4 for PN designated butterfly valves;

b) EN 1759-1, EN 1759-3 and EN 1759-4 for Class designated butterfly valves.

4.1.4.4 Butt welding ends

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

4.1.4.5 Valve actuator attachment

When the valve is operated otherwise than directly by lever, handwheel or key, the design of the valve shall be such that, either with or without intermediate parts, attachment of a part-turn actuator in accordance with EN ISO 5211 shall be possible.

4.1.5 Operation

4.1.5.1 Operational capability

All butterfly valves shall be capable of being operated at a differential pressure across the obturator equal to the maximum allowable pressure, PS at 20 °C or as marked on the valve, taking into account any limit in flow velocity (see 4.2.3.1).

4.1.5.2 Lever operated

The design of the lever shall be such that the lever can only be assembled to the valve so that it is parallel to the direction of flow when the valve is fully open.

Positive holds shall be provided in both the fully open and fully closed positions.

Levers shall be securely fitted yet shall allow removal and replacement.

4.1.5.3 Gearbox operated

Gearboxes shall be of the self-locking design.

Stops shall be provided in the fully open and fully closed positions. If adjustable, the stop(s) shall be set and secured in a reliable way.

The gearbox shall be fitted with a position indicator (except for buried application).

On request, the manufacturer shall provide the number of turns that are necessary to complete a full opening or closing operation.

4.1.5.4 Sizing the operating element

For handwheel and lever operated valves, the minimum size of the operating element shall be determined in accordance with EN 12570. The size of the operating element shall be selected such that the valve can be closed when the allowable differential pressure is equal to the maximum allowable pressure.

When specified, it is permissible to use a lower allowable differential pressure during closing or opening of the valve.

4.1.5.5 Direction of operation

Manually operated valves and bare shaft valves shall normally be closed by turning the handwheel or lever or the shaft in a clockwise direction when facing the handwheel or lever or the shaft end.

If anti-clockwise closing is required, this shall be specified and marked on the operating element.

4.1.5.6 Valve supplied bare shaft

When, on request, a butterfly valve without an operating device is supplied, the manufacturer shall provide the necessary torque values, based on the maximum flow velocities as specified in Table 1 and the maximum allowable pressure, PS at 20 °C, or the maximum differential pressure marked on the valve.

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 or other appropriate standard. Welders shall be approved to EN 287-1 and welding operators shall be approved to EN 1418 or other appropriate standard.

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 Application

Butterfly valves intended for isolating applications require to be seat tight in the closed position of the obturator.

NOTE For appropriate seat leakage rate, see 4.2.4.2.

Butterfly valves intended for regulating or control applications may have a clearance between obturator and body seat in the closed position.

4.2.2 Design strength

The shell strength resistance shall be determined as follows:

a) for steel valves designed by the tabulation method, it shall be according EN 12516-1;

b) for steel valves designed by calculation, it shall be according EN 12516-2;

c) for copper alloys, aluminium and cast iron valves, it shall be according EN 12516-4;

d) if the shell strength resistance is validated by an experimental method, it shall be according to EN 12516-3.

The dimensioning procedures of parts using materials other than those specified in EN 12516-1, EN 12516-2, EN 12516-3 or EN 12516-4 are the responsibility of the manufacturer.

The design of the other parts is determined for a differential pressure defined by the pressure/temperature rating or for a differential pressure, which shall be indicated on the valve.

4.2.3 Flow characteristics

4.2.3.1 Flow velocity

Butterfly valves shall be designed in such a way that they are suitable at least for all flow velocities according to Table 1.

NOTE 1 High flow velocities are critical in butterfly valves.

NOTE 2 The flow velocity is the quotient of the volumetric flow rate (expressed in m^3/s) and the area calculated using the diameter (expressed in m) having a value equal to the number of the DN divided by 1 000.

〈A1〉

Table 1 — Flow velocity

PS bar	Maximum flow velocity m/s	
	Liquid fluids	Gaseous fluids [at ≈ 1 bar]
Up to 6	2,5	25
6 < PS ≤ 10	3	30
10 < PS ≤ 16	4	35
PS > 16	5	40

〈A1〉

4.2.3.2 Flow coefficient K_v

The manufacturer shall provide the flow coefficient (K_v) in the fully open position and the butterfly valve characteristic curve shall define the variation of the flow coefficient depending on the valve opening.

Measurement of the flow resistance ζ of butterfly valves intended for isolating purpose shall be in accordance with the procedure specified in EN 1267.

For valves intended to a regulating use only, the measurement of the flow resistance shall be in accordance with EN 60534-2-3.

4.2.4 Leak tightness

4.2.4.1 Shell tightness

No external leakage of the shell is permitted during the production or acceptance leak tightness tests in accordance with Test P11 of EN 12266-1.

4.2.4.2 Seat tightness

For all valves designed to be seat tight in the closed position of the obturator, the manufacturer shall indicate in the valve documentation an appropriate maximum allowable seat leakage rate selected from A.4.3 of EN 12266-1:2003.

NOTE See EN 1349 for the seat leakage rates of control valves.

For valves with a preferential direction of leak tightness, the manufacturer shall give guidance for installation in the documentation.

5 Testing procedures

5.1 Pressure tests

a) Shell strength Test, P10, shell tightness Test P11, and seat tightness Test P12, in accordance with EN 12266-1, shall be carried out on each valve;

b) For valves used for end of line service only, the obturator strength Test P20, in accordance with EN 12266-2, shall be carried out.

5.2 Operability test

Opening and closing Test F20, in accordance with EN 12266-2, shall be carried out on each valve.

5.3 Other tests

Additional tests of finished valves may also be carried out according to the requirements of EN 12266-2. The purchaser shall specify which additional tests are required.

6 Declaration of compliance

The manufacturer shall declare compliance to this European Standard in his documentation.

7 Designation

Butterfly valves in accordance with this European Standard shall be designated by the following elements in the same order as follows:

a) butterfly valve;

b) EN 593;

c) valve type : concentric or eccentric/double eccentric or triple-eccentric (see 4.1.1);

d) type of body end connection (see clause 3);

e) symbol DN and number;

f) PN or Class-designation;

g) body material;

h) trim or seat seal material;

i) if applicable: limitation of the maximum allowable pressure or the maximum allowable temperature (or maximum differential pressure);

j) for flanged or wafer type valves or welding end valves, the face-to-face or end-to-end dimension basic series number in accordance with EN 558 or EN 12982;

k) if not manually actuated, the type and specification of power actuator.

8 Marking and preparation for storage and transportation

8.1 Marking

All valves (including DN 20, DN 25, DN 32 and DN 40) shall be marked in accordance with EN 19:2002.

Appropriate to the design or other factors, the valve shall be marked in accordance with items 6, 7 and 9 of EN 19:2002.

Marking of the allowable differential pressure Δp is mandatory when it is less than the maximum allowable pressure PS of the valve (item 20 of EN 19:2002).

NOTE Δp is the allowable differential pressure. This pressure can be limited by internal components or the operating device.

Seat material shall be indicated by marking. For rubber and plastic seats, marking shall be in accordance with EN ISO 1043-1 and ISO 1629.

Valves designed with a preferred direction of flow shall be marked in accordance with item 5 of EN 19:2002.

When fitted, the levers or handwheels of valves supplied for anti-clockwise closing shall be marked to show the direction of operation.

When required by the application, items 10, 12, 18 of EN 19:2002 shall be marked.

8.2 Preparation for storage and transportation

Each valve shall be drained of any liquid.

The disc of a soft seated valve may remain slightly open with the seat material not in compression.

Flange covers – when provided – shall extend over the entire gasket face. Body end surfaces to be welded shall be suitably protected to prevent mechanical damage during normal conditions of transportation and storage.

The valve packaging or the body end protection shall prevent the introduction of foreign matter.

Annex A
(informative)

Information to be supplied by the purchaser

It is recommended that the purchaser provides the information as indicated in Table A.1.

Table A.1 — Valve data sheet

Data for butterfly valves to EN 593

Feuille de données pour robinet à papillon selon l'EN 593

Technische Daten für Klappen nach EN 593

Butterfly type valve **Type de robinet à papillon** **Typ der Klappe**

DN [ ] see clause 1/voir article 1/siehe Abschnitt 1 PN/Class [ ] see clause 1/voir article 1/siehe Abschnitt 1

- [ ] Double flanged/A brides/mit Flanschen (see 3.5)
- [ ] Wafer/A insérer/Zum Einklemmen (see 3.6)
- [ ] Downstream dismantling/Démontage aval/abströmseitige Demontage
- [ ] End of line service/Service bout de ligne/Endarmatur

Working conditions	**Conditions de service**	**Betriebsbedingungen**
Type of fluid	Type de fluide	Art des Mediums
Maximum working pressure	Pression de service	Betriebsdruck
Fluid temperature	Temperature du fluide	Temperatur des Mediums
Flow velocity	Vitesse du fluide	Strömungsgeschwindigkeit
Differential pressure (valve closed)	Pression différentielle (robinet fermé)	Differenzdruck(Klappe geschlossen)
Frequency of operation	Fréquence des manoeuvres	Betätigungsfrequenz
Opening time	Temps d'ouverture	Öffnungszeit
Closing time	Temps de fermeture	Schließzeit
Operating Δp (valve closing or opening)	Δp de manœuvre (robinet s'ouvrant ou se fermant)	Δp bei Betätigung (sich öffnende oder schließende Klappe)

Materials (see 4.1.2)	**Matériaux** (voir 4.1.2)	**Werkstoff** (siehe 4.1.2)
Body	Corps	Gehäuse
Shaft	Arbre	Welle
Disc	Obturateur	Abschlusskörper
Seal/seat/liner	Joint/siège/manchette	Dichtung/Sitz/Manschette

Operation (see 4.1.5) **Manœuvre** (voir 4.1.5) **Betätigung** (siehe 4.1.5)

- [ ] Manual/Manuel/Handantrieb
  - [ ] Lever/Levier/Handhebel
  - [ ] Gearbox/Démultiplicateur/ Getriebe
  - [ ] Others/Autres/Sonstige
- [ ] Automatic/Automatique/Automatisch
  - [ ] Electric/Electrique/Elektrisch
  - [ ] Pneumatic/Pneumatique/Pneumatisch
  - [ ] Hydraulic/Hydraulique/Hydraulisch
- [ ] Failsafe/Position de sécurité/Sicherheitsstellung
  - [ ] Single acting open/Simple effet ouverture/einfach wirkend auf
  - [ ] Single acting closed/Simple effet fermeture/einfach wirkend zu

Option

- [ ] Fire type tested design/Conception tenue au feu/Feuersichere Ausführung (see prEN ISO 10497)
- [ ] Anti-static design/Conception antistatique/Antistatische Ausführung (see EN 12266-2)
- [ ] Limit switch signalling/Signalisation de fin de course/Endschalteranzeige
- [ ] Emergency hand control/Commande manuelle de secours/Notbetätigung

Others (specify)/Autres (à préciser)/Andere (genau angeben)

Complementary information/Informations complémentaires/Zusätzliche Angaben :

Annex B
(informative)

Trim material list

Table B.1 gives a list of materials from which the manufacturer may select the materials for all trim parts.

Table B.1 — Trim materials for double flanged and butt welding end valves

Parts of the trim	Material and designation of trim						
	Trim A soft seated valves	**Trim B** metallic seated valves	**Trim C** other coatings	**Trim D** epoxy coated	**Trim E** enamel coated	**Trim F** rubber lined	**Trim G** fluored plastic lined
Body seat	Manufacturer's standard		Metallic, corrosion resistant alloy		Enamel coated	Rubber lined	PTFE, PVDF, PFA or ECTFE
Shaft + seat seal	To be specified by the manufacturer						
Shaft	Minimum 12% Cr or Cu-alloy					Rubber lined or CrNi- or Cu-alloy	Manufacturer's standard
Bushes	Manufacturer's standard						
Connecting part shaft/disc	Manufacturer's standard		Minimum 12 % Cr or Cu-alloy				Manufacturer's standard
Clamping ring for seat/disc seal	Manufacturer's standard			Minimum 12 % Cr or epoxy coated or Cu-alloy	Minimum 12 % Cr or enamel coated or Cu-alloy	Rubber lined or corrosion resistant alloy	—
Bolting for the clamping ring	Manufacturer's standard Minimum A2-70 or A4-70 (in accordance with EN ISO 3506-1 and EN ISO 3506-2) or Cu-alloy						
Body lining/coating	Manufacturer's standard			Epoxy coated	Enamel coated	Rubber lined	PTFE, PVDF, PFA or ECTFE
Disc lining or coating	Manufacturer's standard			Epoxy coated or disc stainless	Enamel coated or disc stainless	Rubber lined or disc CrNi- or Cu-alloy	PTFE, PVDF, PFA or ECTFE

Annex C
(informative)

Environmental corrosion protection

The following table can be used to define the corrosion category and to help the valve manufacturers to define the surface treatment for corrosion protection.

Table C.1 — Environmental corrosion protection

Corrosion category	Typical environments	
	Exterior	**Interior**
C2 (low)	Atmospheres with low level of pollution. Mostly rural areas.	Unheated buildings where condensation may occur, e.g. depots, sport halls.
C3 (medium)	Urban and industrial atmospheres, moderate sulphur dioxide pollution. Coastal areas with low salinity.	Production rooms with high humidity and some air pollution, e.g. food-processing plants, laundries, breweries.
C4 (high)	Industrial areas and coastal areas with moderate salinity.	Chemical plants, swimming pools, coastal shipyards.
C5-I (very high – industrial)	Industrial areas with high humidity and aggressive atmosphere.	Buildings or areas with almost permanent condensation and with high pollution.
C5-M (very high- marine)	Coastal and offshore areas with high salinity.	Buildings or areas with almost permanent condensation and with high pollution.
Immersed in water or buried in soil:		
Im 1 (Immersed in fresh water)	River installations, hydro-electric power plants.	
Im 2 (immersed in sea or brackish water)	Harbour areas and offshore structures.	
Im 3 (buried in soil)	Buried pipelines.	

NOTE This table is from EN ISO 12944-2:1998.

Annex ZA
(informative)

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

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 [A1] Official Journal of the European Union [A1] 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 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 Directive 97/23/EC (PED)

Clause(s)/sub-clause(s) of this EN	Annex I of Directive 97/23/EC Essential requirements	Essential Requirements (ERs) of Directive 97/23/EC
4.1.3, 4.2.2 a), 4.2.2 b)	2.1	General design
4.2.2 a)	2.2.1	Design loading factors
4.2.2 b), 4.2.2 c), 4.2.2 d)	2.2.2	Design for adequate strength
4.2.2 a), 4.2.2 c)	2.2.3	Design calculation method
4.2.2 d)	2.2.4	Experimental design method
8.1	3.3	Marking and labelling

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

Bibliography

[1] EN 1349, *Industrial process control valves*

[2] EN 60534-2-1, *Industrial-process control valves – Part 2-1: Flow capacity – Sizing equations for fluid flow under installed conditions (IEC 60534-2-1:1998)*

[3] EN ISO 3506-1, *Mechanical properties of corrosion-resistant stainless-steel fasteners – Part 1: Bolts, screws and studs (ISO 3506-1:1997)*

[4] EN ISO 3506-2, *Mechanical properties of corrosion-resistant stainless-steel fasteners – Part 2: Nuts (ISO 3506-2:1997)*

[5] EN ISO 12944-2, *Paints and varnishes – Corrosion protection of steel structures by protective paint systems – Part 2: Classification of environments (ISO 12944-2:1998)*

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