BRITISH STANDARD

BS EN
14341:2006

Industrial valves — Steel check valves

The European Standard EN 14341:2006 has the status of a British Standard

ICS 23.060.50

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 14341:2006.

The UK participation in its preparation was entrusted by Technical Committee PSE/7, Valves, to Subcommittee PSE/7/2, Gate, globe and check valves made from steel or copper alloy, which has the responsibility to:

— aid enquirers to understand the text;

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

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 14, an inside back cover and a back cover.

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2006

ISBN 0 580 48719 9

Amendments issued since publication

Amd. No.	Date	Comments

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14341

July 2006

ICS 23.060.50

English Version

Industrial valves - Steel check valves

Robinetterie industrielle - Clapets de non-retour en acier

Industriearmaturen - Rückflussverhinderer aus Stahl

This European Standard was approved by CEN on 19 June 2006.

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Ref. No. EN 14341:2006: E

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Foreword

This document (EN 14341:2006) 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of an identical text or by endorsement, at the latest by January 2007, and conflicting national standards shall be withdrawn at the latest by January 2007.

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(s).

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

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1 Scope

This European Standard specifies the requirements for steel check valves, which are forged, cast or fabricated in straight, angle or oblique pattern (see EN 736-2) with end connections flanged or wafer, butt welding, socket welding, or threaded.

This standard is applicable to steel check 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.

Back flow prevention anti-pollution check valves are outside the scope of this standard.

The range 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 PN designated flanged end connections.

DN 8, DN 10 and DN 12 are not used for Class designated 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 end, wafer type and butt welding end valves:

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

Class 150; Class 300; Class 600.

b) for socket welding end valves and threaded end valves:

PN 40; PN 63; PN 100;

Class 600; Class 800.

NOTE Class 800 is a 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 19:2002, *Industrial valves — Marking of metallic valves*

EN 287-1:2004, *Qualification test of welders — Fusion welding — Part 1: Steels*

prEN 558:2005[1)], *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 736-3:1999, *Valves — Terminology — Part 3: Definition of terms*

EN 1092-1:2001, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: Steel flanges*

EN 1418:1997, *Welding personnel — Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials*

EN 1503-1:2000, *Valves — Materials for bodies, bonnets and covers — Part 1: Steels specified in European Standards*

EN 1503-2:2000, *Valves — Materials for bodies, bonnets and covers — Part 2: Steels other than those specified in European Standards*

EN 1759-1:2004, *Flanges and their joint — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 1: Steel flanges, NPS ½ to 24*

EN 10045-1:1990, *Metallic materials — Charpy impact test — Part 1: Test method*

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 12351:1999, *Industrial valves — Protective caps for valves with flanged connections*

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 12627:1999, *Industrial valves — Butt welding ends for steel valves*

EN 12760:1999, *Valves — Socket welding ends for steel valves*

EN 12982:2000, *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 15607:2003, *Specification and qualification of welding procedures for metallic materials — General rules (ISO 15607:2003)*

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1) Under preparation.

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

ISO 4200:1991, *Plain end steel tubes, welded and seamless — General tables of dimensions and masses per unit length*

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*

3 Terms and definitions

For the purposes of this standard, the terms and definitions of types of valves and components and the terms and definitions given in EN 736-1:1995, EN 736-2:1997 and EN 736-3:1999 apply.

NOTE 1 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.

NOTE 2 EN 736-1 illustrates four basic check valve types. The axial and lift types are based on the globe valve, the swing type is based on the butterfly valve and the diaphragm type is based on the diaphragm valve. Other check valve types are possible and are considered to be within the scope of this standard.

4 Requirements

4.1 Design

4.1.1 Materials

4.1.1.1 The body and cover materials shall be selected from those listed in EN 1503-1 and EN 1503-2.

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.

4.1.2 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 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 and special trims shall be indicated on the valve (see 8.1e).

4.1.2.4 For temperatures below the lowest temperature shown in the pressure/temperature rating tables in EN 12516-1 the maximum allowable pressure shall be not 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 and cover material measured on three 10 mm $\times$ 10 mm specimens in accordance with EN 10045-1, shall be not 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, centre-to-face, end-to-end and centre-to-end dimensions

Face-to-face and centre-to-face dimensions for PN or Class designated flanged end and wafer type valves shall be in accordance with prEN 558.

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

The end-to-end and centre-to-end dimensions of socket welding end and threaded end valves are at the choice of the manufacturer.

4.1.3.2 Body end

4.1.3.2.1 Flanged ends shall comply with the requirements of EN 1092-1 for PN designated flanges or EN 1759-1 for Class designated flanges.

Flanged ends shall be cast or forged integral with the body except that flange 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 or EN 12516-2.

4.1.3.2.4 Threaded ends shall be of the internal form in accordance with Type R_c and R_p to ISO 7-1 or Type G to EN ISO 228-1 or Type NPT to ASME B1.20.1.

4.1.3.2.5 The body of wafer type valves shall have means of centralising its location within the bolting of flanges in accordance with EN 1092-1 and EN 1759-1 as appropriate.

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	—
1 000	1 000	991	991	991	983	983	971	928	928	—

4.1.4 Operation of wafer type obturators

Wafer type obturators shall be capable of operation when the valve is connected to pipework according to ISO 4200.

4.1.5 Auxiliary connections

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

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

Table 2 — Sizes of auxiliary connections

Valve nominal size	Auxiliary connection size
DN 50 to DN 100	DN 15
DN 125 to DN 200	DN 20
DN 250 to DN 600	DN 25
DN 700 to DN 1 000	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 in accordance with 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/or EN 12516-2.

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 EN 12516-3.

4.2.2 Flow characteristics

4.2.2.1 The seat bore shall be either full bore or reduced bore. It is permissible for any lugs required to facilitate the fitting of seat rings to intrude into the bore of the full bore or reduced bore valve.

4.2.2.2 Manufacturers shall give guidance in their literature in respect of recommended maximum and minimum flow velocities of liquids and/or gases and the minimum differential pressure against which the valve starts to open.

4.2.2.3 A check valve automatically opens by fluid flow, taking into account the manufacturers' recommendations given in 4.2.2.2, in the direction defined by the flow arrow and automatically closes to prevent fluid flow in the reverse direction. To prevent pressure surges or mechanical damage either to the valve or the pipework, means may be provided to restrict the degree of opening and/or influence the speed of opening or closing.

Depending upon obturator type and flow direction, valves operate in horizontal or vertical or all pipework orientations.

4.2.3 Seat tightness

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

a) for resilient seated valves, no visible leakage;

b) for metal seated valves, Rate C, Rate D, Rate E, Rate F or Rate G as specified by the purchaser.

4.2.4 Anti-blow out design

Valve designs, which have the shaft extending through the shell, shall be anti-blow out designs.

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 may also be carried out to the requirements of EN 12266-2. The purchaser shall specify which tests are required except that tests F21 and P21 shall not be applied to steel check valves.

6 Declaration of compliance

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

7 Designation

Check valves in accordance with this standard shall be designated by the following elements in the same order:

— check valve type (see EN 736-1);

— EN 14341;

— body pattern i.e. straight, angle or oblique;

— body end type i.e. flanged, threaded, socket welding, butt welding or wafer;

— symbol "DN" and number;

— pressure designation;

— material of the body and cover (if any);

— restrictions on maximum allowable temperature and/or maximum allowable pressure (see 4.1.2.3);

— for flanged end, butt welding end or wafer type valves the face-to-face or centre-to-face or end-to-end or centre-to-end dimensions basic series;

— permissible orientation of the pipework i.e. horizontal or vertical or all;

— seat test leakage rate (see 4.2.3).

EXAMPLE OF DESIGNATION

A flanged check valve to EN 14341, with angle pattern body, DN 65, PN 16 in EN 1503-1 Grade XXX, Face-to-face series 11 (of prEN 558).

8 Marking and preparation for storage and transportation

8.1 Marking

Marking shall be in accordance with EN 19. Valves shall be marked with the direction of fluid flow to open the valve.

The following supplementary markings shall be marked on the valve:

a) nominal size (item 1);

b) manufacturer's name or trademark (item 4);

c) PN/Class designation (item 2);

d) reference to this standard (item 11);

e) maximum allowable temperature (°C) (item 7) and maximum allowable pressure (bar) (item 9) to meet the requirements of 4.1.2.3;

f) product identification (item 10), only if different to manufacturer's name or trademark (item 4) (8.1b);

g) threaded end identification (item 8) for threaded end valves;

h) internal coating, liner, lining or painting (item 15) for lined valves;

i) the melt identification on the relevant shell component (in such a form that traceability is safeguarded, item 12);

j) year of manufacture (item 18).

For valves equal to or smaller than nominal size DN 50, 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:

— nominal size (item 1);

— manufacturer's name or trademark (item 4);

— PN/Class designation (item 2).

8.2 Preparation for storage and transportation

Each valve shall be drained of any test fluid. The valve shall be packaged or the body ends covered to prevent the ingress of foreign matter. In the case of polymeric or elastomeric seated valves the seating shall also be protected from ultra violet light.

When protective caps are used for valves with flanged end connections they shall be in accordance with EN 12351.

The weld profile of butt welding end valves shall be suitably protected to prevent mechanical damage or corrosion to the machined profile.

The obturator(s) that can be damaged in transit shall be provided with some means of temporary restraint.

Annex A
(informative)

Information to be supplied by the purchaser

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

a) this standard i.e. EN 14341;

b) check valve type (see EN 736-1);

c) body pattern i.e. straight, angle, oblique;

d) body end type i.e. flanged, wafer, butt welding, socket welding, or threaded (see 4.1.3.2);

e) maximum allowable temperature °C (see 4.1.2);

f) the nominal valve size (see Clause 1);

g) pressure designation (see Clause 1);

h) the fluid to be transported and the flow velocity or volumetric flow rate (see 4.2.2.2);

i) the material of the body and cover (if any) (see 4.1.1.1.);

j) for flanged end, wafer type or butt welding end valves the face-to-face or centre-to-face or end-to-end or centre-to-end dimensions basic series (see 4.1.3.1);

k) if auxiliary connections are required, their size and type (see 4.1.5);

l) orientation of pipework (see 4.2.2.3).

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 Official Journal of the European Communities 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)

Sub-clauses of this EN	Essential Requirements of Directive 97/23/EC (PED)	
	Essential Requirements	Annex I of PED
4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.1.5	General Design	2.1
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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