

International Standard



5996

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Cast iron gate valves

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 5996 was prepared by Technical Committee ISO/TC 153, Valves.

Cast iron gate valves

0 Introduction

The purpose of this International Standard is the establishment of the basic requirements for cast iron gate valves with bolted bonnet connections and flanged ends.

1 Scope

This International Standard specifies requirements for hand-wheel or actuator-operated cast iron gate valves for general application including the following features:

- inside screw stem (non-rising) or outside screw stem (rising);
- wedge or parallel obturator;
- single or double obturator;
- metallic or elastomeric obturator seatings;
- metallic or elastomeric body seatings;
- ferrous metal and/or copper alloy trims;
- bolted bonnet connection;
- flanged ends.

2 Field of application

2.1 This International Standard covers valves of the following nominal sizes, DN:

40; 50; 65; 80; 100; 125; 150; 200; 250; 300; 350; 400; 450; 500 (550); 600 (650); 700; 750; 800; 900; 1000.

2.2 This International Standard applies to valves of the following nominal pressures, ISO PN:

- 1; 1,6; 2,5; 4; 6 and 10 in isomorphous series in flake graphite cast iron, and
- 10; 16; 20 and 50 in flake graphite cast iron, and
- 10; 16; 20; 25; 40 and 50 in spheroidal cast iron.

3 References

- ISO 185, *Classification of grey cast iron.*¹⁾
- ISO 1083, *Spheroidal graphite or nodular graphite cast iron.*
- ISO 5208, *Industrial valves — Pressure testing for valves.*²⁾
- ISO 5209, *General purpose industrial valves — Marking.*
- ISO 5210/1, *Multi-turn valve actuator attachment — Part 1: Flange dimensions.*
- ISO 5752, *Metal valves for use in flanged pipe systems — Face-to-face and centre-to-face dimensions.*
- ISO 7005/2, *Metallic flanges — Part 2: Iron flanges.*²⁾
- ISO 7268, *Pipe components — Definition of nominal pressure.*

4 Pressure/temperature ratings

Pressure/temperature ratings in accordance with ISO 7005/2 shall apply.

1) At present at the stage of draft. (Revision of ISO/R 185-1961.)

2) At present at the stage of draft.

5 Design

5.1 Face-to-face dimensions

The figures shown in tables 1 and 2 apply to unlined valves and include the raised faces of the flanges.

Table 1 — Face-to-face dimensions for isomorphic series flake graphite cast iron valves, ISO PN1 to ISO PN10

DN	ISO PN1	ISO PN1,6	ISO PN2,5	ISO PN4	ISO PN6	ISO PN10	Flange mating dimensions
	Face-to-face dimensions mm						
40						140	ISO PN10 in accordance with ISO 7005/2
50						150	
65						170	
80						180	
100						190	
125						200	
150						210	
200					230		
250					250		
300					270		
350				290			
400				310			
450				330			
500				350			
600			390				
700			430				
800		470					
900	510						
1 000	550						
Basic series in accordance with ISO 5752	14						

Table 2 — Face-to-face dimensions for flake graphite and spheroidal cast iron gate valves, ISO PN10 to ISO PN50

DN	ISO PN10/16/20 (CI)		ISO PN25		ISO PN40	ISO PN50 (CI)
	Short	Long	Short	Long		
Face-to-face dimensions mm						
40	165	240	190	240	190	190
50	178	250	216	250	216	216
65	190	270	241	270	241	241
80	203	280	283	280	283	283
100	229	300	305	300	305	305
125	254	325	381	325	381	381
150	267	350	403	350	403	403
200	292	400	419	400	419	419
250	330	450	457	450	457	457
300	356	500	502	500	502	502
350	381	550	572	550	762	572
400	406	600	610	600	838	610
450	432	650	660	650	914	660
500	457	700	711	700	991	711
(550)	483	750	749	750	1 092	749
600	508	800	787	800	1 143	787
(650)	559	850				
700	610	900				
750	610	950				
800	660	1 000				
900	711	1 100				
1 000	811	1 200				
Basic series in accordance with ISO 5752	3	15	19	15	4	19

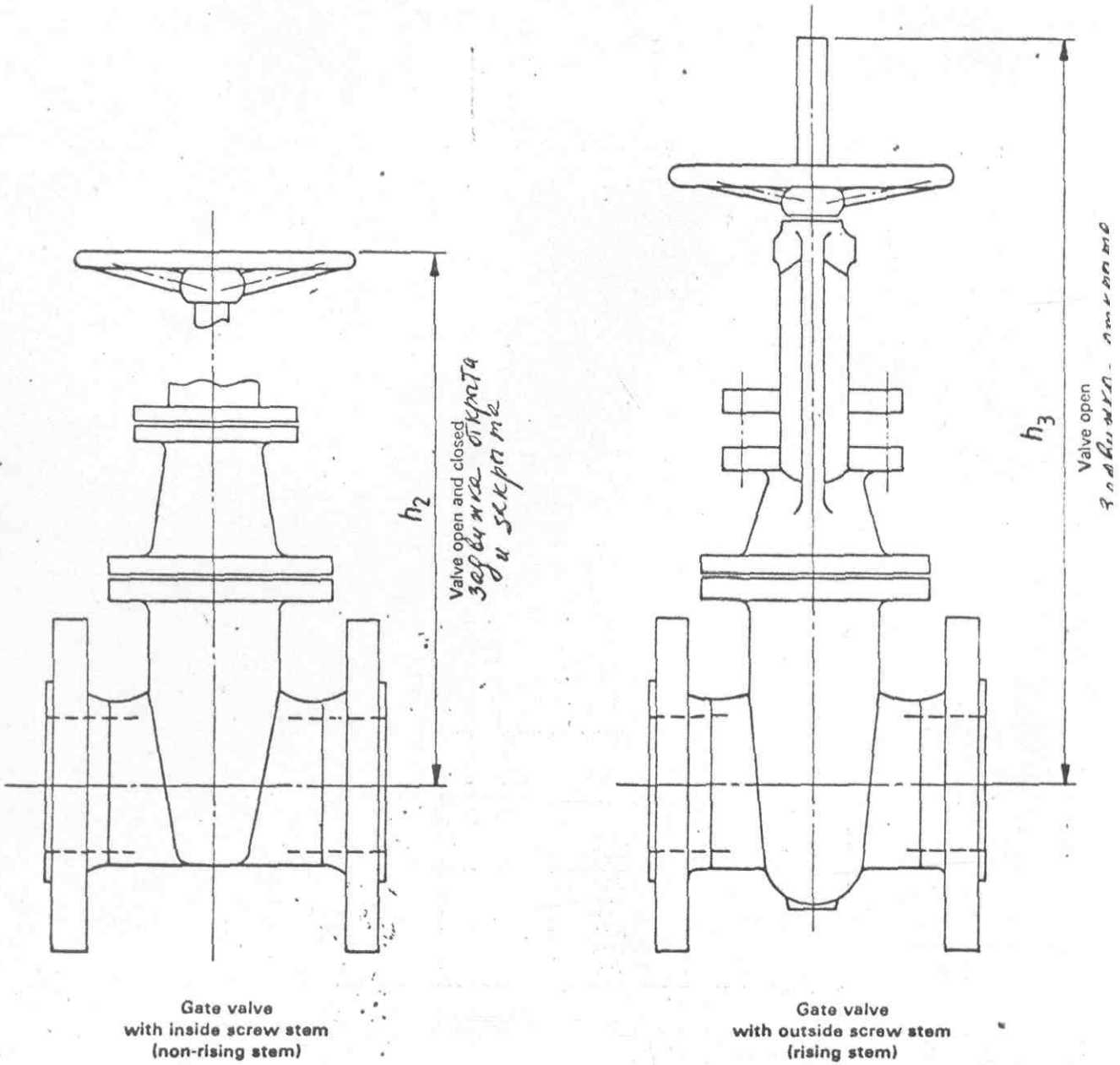
Table 3 — Tolerances on face-to-face dimensions

Dimensions and tolerances in millimetres

Face-to-face dimensions of unlined valves		Tolerances
over	up to and including	
0	250	± 2
250	500	± 3
500	800	± 4
800	1 000	± 5
1 000	1 600	± 6

5.2 Other dimensions (see figure 1)

The illustrations are intended to show only the location of dimensions h_2 and h_3 .



NOTE — If not otherwise specified, the valve shall be supplied with a handwheel.

Figure 1

Table 4 — Maximum heights

DN	h_2	h_3
	mm	mm
40	350	480
50	400	510
65	425	560
80	475	610
100	575	720
125	650	875
150	700	950
200	850	1 200
250	1 025	1 440
300	1 125	1 675
350	1 150	1 900
400	1 275	2 070
450	1 350	2 250
500	1 500	2 430
(550)	1 575	2 600
600	1 700	2 850
(650)	1 775	3 125
700	1 800	3 250
750	1 975	3 450
800	2 000	3 750
900	2 400	4 150
1 000	2 500	4 450

NOTE — The dimensions h_2 and h_3 given in table 4 and illustrated in figure 1 are for installation purposes and represent the maximum heights of valves conforming to this International Standard.

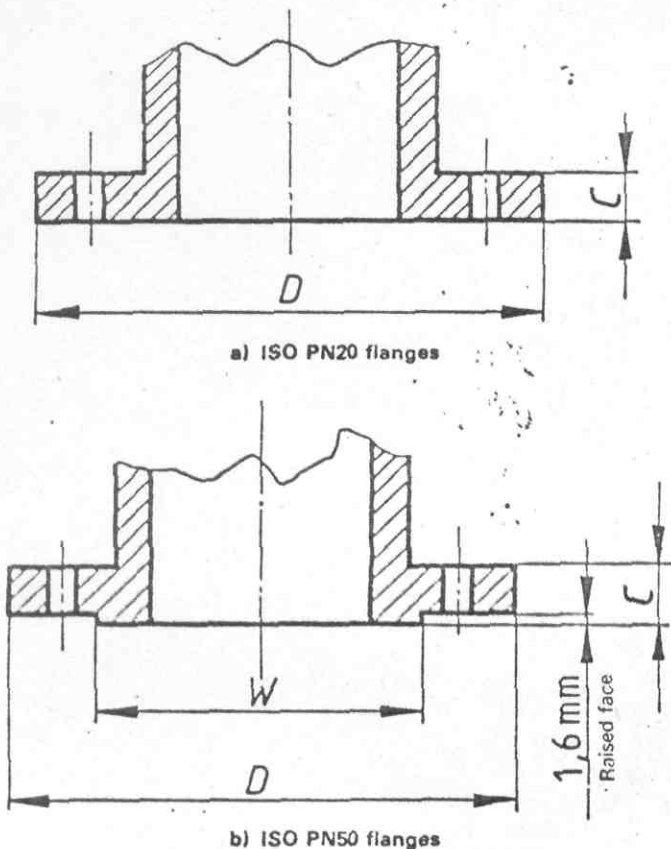


Figure 2

(See 5.3)

5.3 Flanged body ends

The body flange dimensions shall comply with ISO 7005/2 with the exception of body flange ends for valves in flake graphite cast iron ISO PN20 and ISO PN50 (see figure 2), the dimensions of which are given in table 5.

Table 5 — Body flange dimensions for flake graphite cast iron gate valves, ISO PN20 and ISO PN50

DN	ISO PN20 ¹⁾		ISO PN50 ²⁾		Diameter of raised face W
	Diameter of flange D	Thickness of flange C	Diameter of flange D	Thickness of flange C	
	mm	mm	mm	mm	
40	127	14,5	156	21,0	91
50	152	16,0	165	22,5	106
65	178	17,5	191	25,5	125
80	191	19,0	210	28,5	144
100	229	24,0	254	32,0	176
125	254	24,0	279	35,0	211
150	279	25,5	318	36,5	246
200	343	28,5	381	41,5	303
250	406	30,5	445	48,0	357
300	483	32,0	521	51,0	418
350	533	35,0	584	54,0	481
400	597	36,5	648	57,5	535
450	635	40,0	711	60,5	592
500	699	45,0	775	63,5	649
(550)					
600	813	48,0	914	70,0	770

- 1) Bolt hole dimensions correspond to ISO 7005/2 (ISO PN20).
- 2) Bolt hole dimensions correspond to ISO 7005/2 (ISO PN50).

5.4 Body tappings

Where the design permits, provision shall be made for a body tapping below the obturator. Body tappings, when required, shall be of the following size.

Valve size, DN	40 to 100	125 to 300	350 to 1000
Tapping size	1/2	3/4	1

5.5 By-passes

Under certain conditions for gate valves of sizes DN 200 and above, a by-pass may be required.

5.6 Stem sealing

The stem sealing may be of the stuffing box and gland form, injector packing form or toroidal seating rings (O-rings) or other pressure actuated types of seal. Seal material shall be suitable for the service temperature.

5.7 Obturator

The obturator design of valves in accordance with this International Standard shall be at the option of the manufacturer.

For example, the following obturator systems may apply:

- wedge seating;
- parallel seating, no seat tightness device;
- parallel seating, seat tightness device;
- resilient seating.

6 Materials

This International Standard is based on materials specified in tables 6 and 7.

6.1 Body and bonnet materials

Table 6 — Materials

Cast iron type	Quality	Corresponding International Standard
Flake graphite cast iron	Grade 20 minimum	ISO 185
Spheroidal graphite cast iron	Grade 370 — 17 Grade 400 — 12 Grade 500 — 07	ISO 1083

6.2 Trim materials

Table 7 shows the materials of the components in seven trim categories which are applicable to gate valves conforming to this International Standard.

Table 7 — Trim categories

Component	Category A (resilient seated)	Category B (copper alloy faced)	Category C (stainless steel)	Category D (copper free)	Category E (Cu-Ni-alloy)	Category F (hard facing)	Category G (all iron)
Obturator, integral faces	Cast iron or copper alloy	Copper alloy	Stainless steel, 11,5 % Cr min.	Cast iron.	Cu-Ni-alloy		Cast iron
Obturator, separate facings	Cast iron	Cast iron	Cast iron	Cast iron	Cast iron	Cast iron	Cast iron
Body seat and obturator facing	Resilient material*	Copper alloy	Stainless steel, 11,5 % Cr min.	Cast iron and non-alloy steel	Cu-Ni-alloy	Hard facing	Cast iron or stainless steel, 11,5 % Cr min.
Stem	Copper alloy or stainless steel, 11,5 % Cr min.	Copper alloy or stainless steel, 11,5 % Cr min.	Stainless steel, 11,5 % Cr min.	Non-alloy or stainless steel, 11,5 % Cr min.	Stainless steel, 11,5 % Cr min.	Stainless steel, 11,5 % Cr min.	Stainless steel, 11,5 % Cr min.
Stem nut/ yoke sleeve	Copper alloy, stainless steel, cast iron: — flake (inside screw only), — spheroidal, — malleable, — austenitic	Copper alloy, stainless steel, cast iron: — flake (inside screw only), — spheroidal, — malleable, — austenitic	Copper alloy, Cu-Ni-alloy, stainless steel, cast iron: — flake (inside screw only), — spheroidal, — malleable, — austenitic	No copper alloy	No copper alloy	Copper alloy, stainless steel, cast iron: — flake (inside screw only), — spheroidal, — malleable, — austenitic	Copper alloy, Cu-Ni-alloy or spheroidal cast iron

* Resilient material on either body seat or obturator facing.

7 Operation

Valves shall be operated by a handwheel (either directly or via a gearbox) or by actuators. For actuator or gearbox attachment see ISO 5210/1.

Valves shall be closed by turning the handwheel in a clockwise direction when facing the handwheel.

8 Marking

8.1 Every gate valve conforming to this International Standard shall be legibly marked.

8.2 Mandatory body markings are as follows (see ISO 5209):

- nominal size (symbol DN and appropriate number);
- nominal pressure (symbol ISO PN and appropriate number);
- body material identification (ISO designation see table 6);
- manufacturer's name or trade mark.

8.3 The trim category and the number of this International Standard shall be marked either on the body or on a identification plate (see 5209).

8.4 Any pressure or temperature restrictions which may be imposed by the manufacturer due to limitations on materials or design shall be shown on the identification plate including corresponding allowable pressure.

9 Testing and inspection

9.1 Each valve shall be pressure tested in accordance with requirements of ISO 5208, except that a shell test at 1,5 times the maximum permissible gauge working pressure is mandatory for *all* valve sizes.

9.2 Valves in accordance with this International Standard shall be seat tested as defined in ISO 5208.

Leakage rates shall be

- a) for metal seated valves: rate 1;
- b) for metal seated valves: rate 2 or 3 (if specified by the purchaser);
- c) for elastomeric or polymeric seated valves: rate 3.

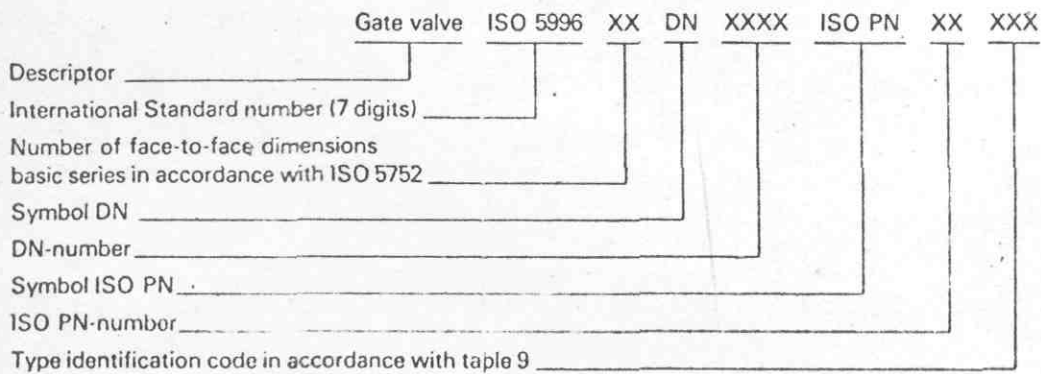
9.3 Items shown in table 8 shall be checked on each valve by the manufacturer prior to shipment.

Table 8 — Inspection requirements

Requirements	Checks
1 Type and trim The valve delivered shall comply with the order and product standard.	To check visually the type, its trim, accessories (for example handwheel) and other items of the order (for example obturator closed).
2 Marking The marking shall comply with clause 8.	To check visually that markings are complete and legible.
3 Surface condition	To examine visually prior to any coating or painting to ensure that the surface is free from defects which may affect safety and function of the valve.
4 Coating	To examine visually to ensure that any specified coating has been applied.
5 Operating	To check that the valve opens and closes.

10 Designation

A gate valve manufactured in accordance with this International Standard may be identified as follows:



Example:

Gate valve, handwheel operated, face-to-face dimension series 15, DN 500, ISO PN10, inside screw (symbol N), all iron trim (symbol D) spheroidal graphite cast iron, (symbol 2), obturator type

Gate valve ISO 5996 15 DN 500 ISO PN10 ND 2 ...

Table 9 — Type identification symbols

Identification symbols	Screwed stem	Outside	R
		Inside	N
	Trim category	Resilient seated	A
		Copper alloy faced	B
		Stainless steel	C
		Copper free	D
		Cu-Ni-alloy	E
		Hard facing	F
		All iron	G
	Body material	Flake graphite cast iron	1
Spheroidal graphite cast iron		2	

11 Preparation for despatch.

11.1 After testing, each valve shall be drained and prepared for despatch.

11.2 All valve obturators shall be in the closed position when despatched (except resilient seated valves which may be in a slightly open position), unless otherwise specified by the purchaser.

11.3 When specified by the purchaser the body ends shall be covered with wood, wood fibre, plastic or metal covers. Covers shall extend over the entire flange gasket face.