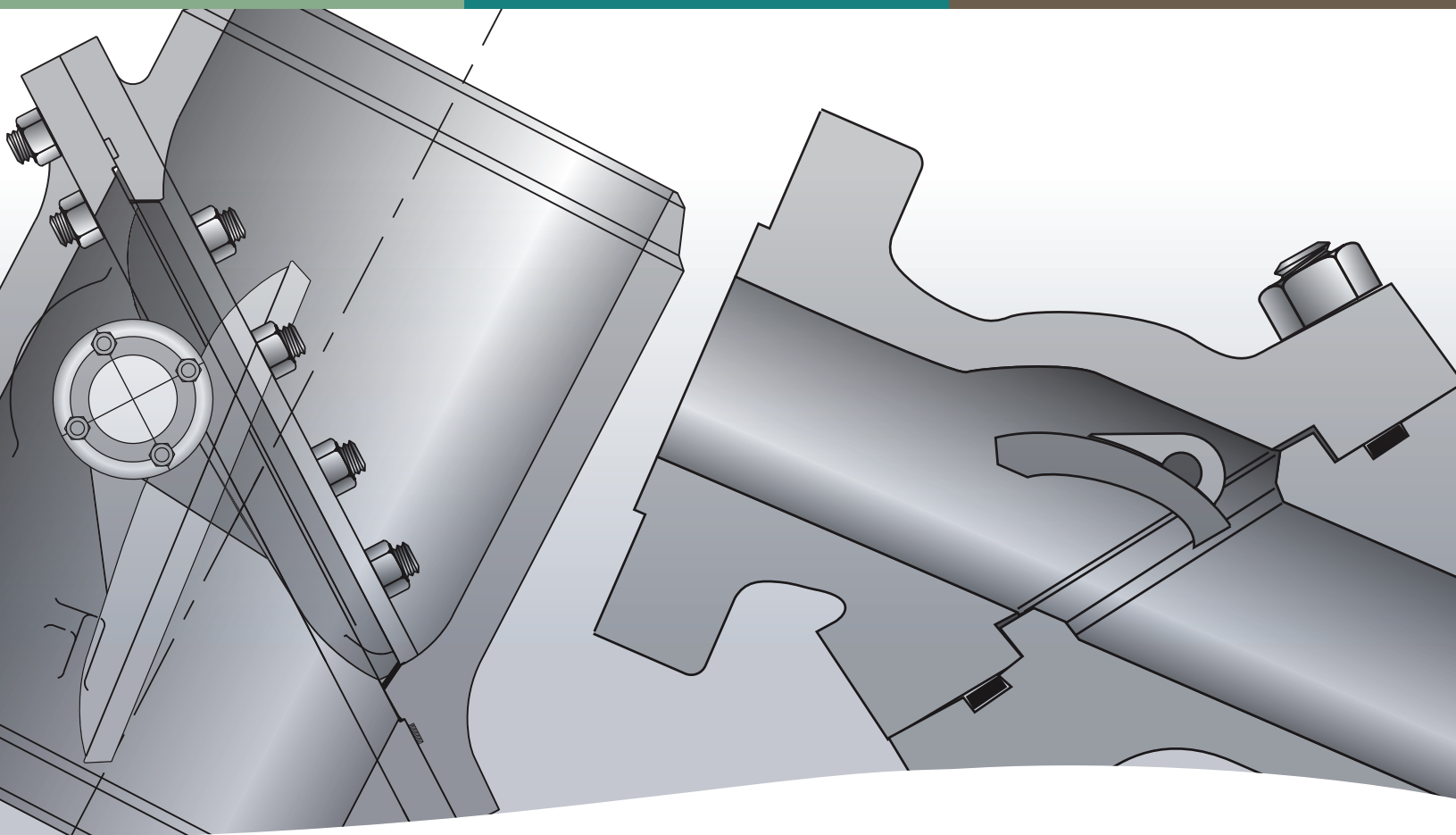


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NUCLEAR

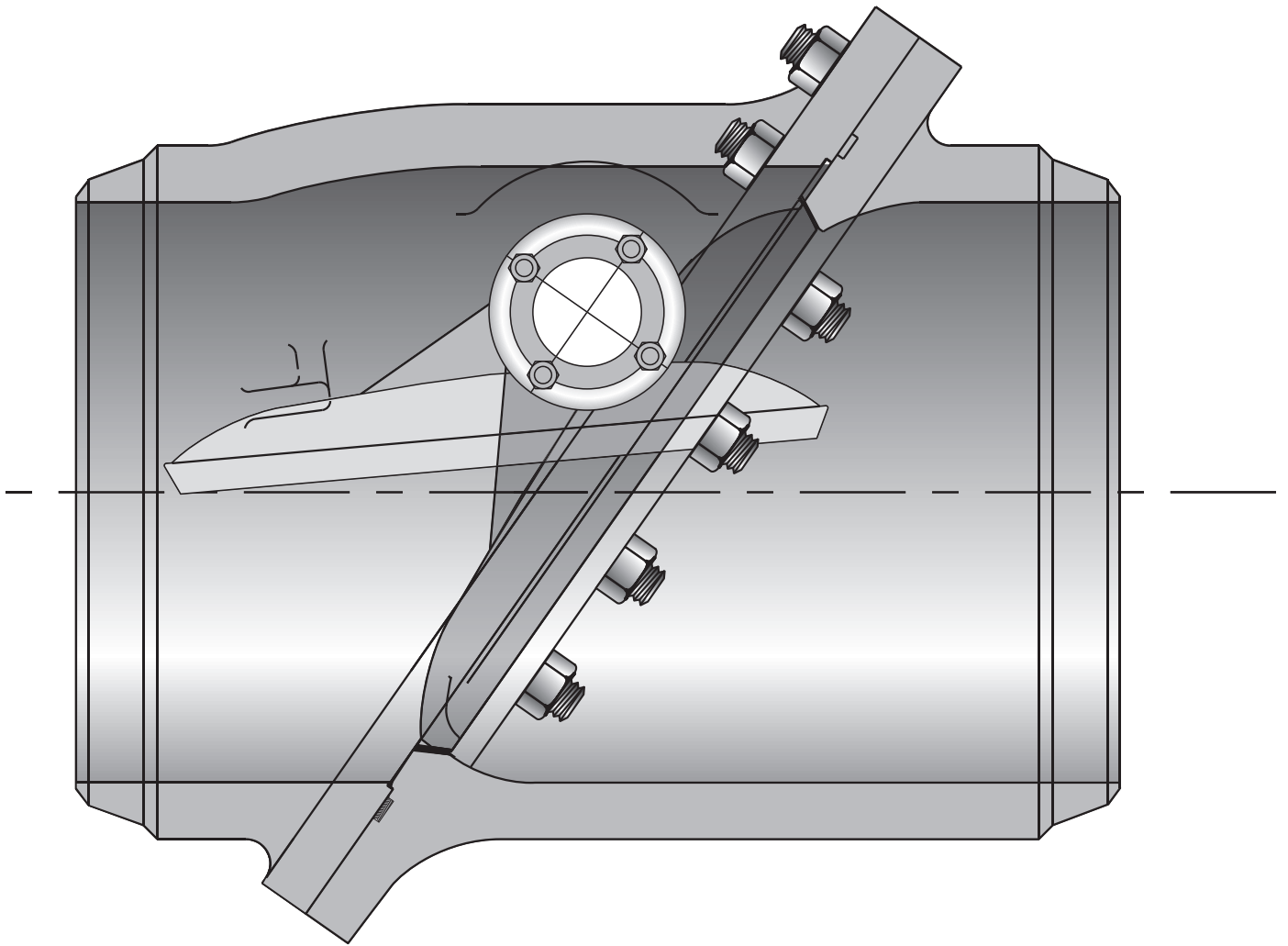
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Two Piece Split Body Check Valves

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Two Piece Tilting Disc Check Valves



Two Piece Tilting Disc Check Valves

Design Features and Benefits

Crane Nuclear Two-Piece Tilting Disc Check Valve – Principle of Operation

The core of a CNI Two-Piece Tilting Disc Check Valve consists of a pivoting circular disc secured within a cylindrical housing. The pivots are located just above the center of the disc, offset from the plane of the body seat. This design imparts a bell-crank action to the movement of the disc, allowing the disc to clear the seat as it rotates. The seat is a circular bevel type and the disc moves in and out of contact with no sliding or mutual wearing of the seat and disc edge. The disc seat lifts away from the body seat while opening, and drops back into contact as it closes, with no sliding or mutual wearing of the seat and disc edge. A clearance within the pivot mechanism allows the disc (when closed) to make contact with the body seat, producing excellent sealing.

Design and construction

The design and construction of this valve results in four principal advantages over standard type swing check valves, namely:

- Closing without “slam”
- Reduced head loss
- Minimized wear of moving parts
- Improved Tightness

Closing without “slam”

The CNI Two-Piece Tilting Disc Check Valve will close without slamming when installed with normal piping arrangements. The special design features which limit slamming are as follows:

The angle of the seat is so inclined that the distance the disc must travel from its wide open position to its seat is reduced to the minimum consistent with overall design objectives, thereby enabling fast closing before reversal of flow can occur. The disc is pivoted just above its center, providing a near balance between the upper and the lower “halves” of the disc. This dampens the movement of the disc toward the seat as the action of the flow against the top of the disc partially offsets the force against the bottom. The seat and disc rings are beveled and the disc drops into the seat in the body as it closes, further cushioning any impact. Unlike the action of an ordinary swing check valve, the disc reaches its seat at the time of zero velocity in the line. This prevents slamming which can cause severe systemic problems due to the ensuing vibration of pipelines and connected equipment, including a potential rupture of pipe joints.

Reduced head loss

A very important advantage of the CNI Tilting Disc Check Valve is the mitigation of pressure loss that in other valves is attributable to friction. The reasons for this are threefold: **Due to being hinged just above its center of gravity, friction at pivoting surfaces is minimized. The lightweight disc’s “Aerofoil” shape provides additional lift and negligible drag on flow (of medium) when in the open position. The body is streamlined with no pockets or obstructions to perturb smoothness of flow, and at the seat it is enlarged by just the right amount needed to compensate for any reduction in volume of flow that might otherwise be caused by the disc.** With the disc in full open position, the pressure drop across the CNI Two-Piece Tilting Disc Check Valve will be approximately 0.3 times the velocity head. This constant will generally hold for either liquids or gases. This value applies to steel valves having a stop angle of 5°. The CNI Two-Piece Tilting Disc Check Valve will be fully open at velocity heads of approximately 0.25 psi. To maintain disc stability, velocity heads for gaseous flow should not be less than 0.03 psi. Reducing the size of the tilting disc should be considered at these values. A test on a 22 inch CNI Two-Piece Tilting Disc Check Valve under 450 pounds gas pressure, carrying 3,200,000 feet of gas per hour, showed a drop in pressure of slightly less than 7 inches of water. This kind of performance results in substantial savings in the cost of power for pumping.

Minimum wear of moving parts

CNI Two-Piece Tilting Disc Check Valves are extremely simple in design and construction. They have only one moving part - the disc, and as was detailed above (under Principle of Operation), the mechanism of its motion practically eliminates physical wear: The pivot pins and bushings are made of bronze or specially hardened and corrosion resisting alloys, practically impervious to wear.

Tightness

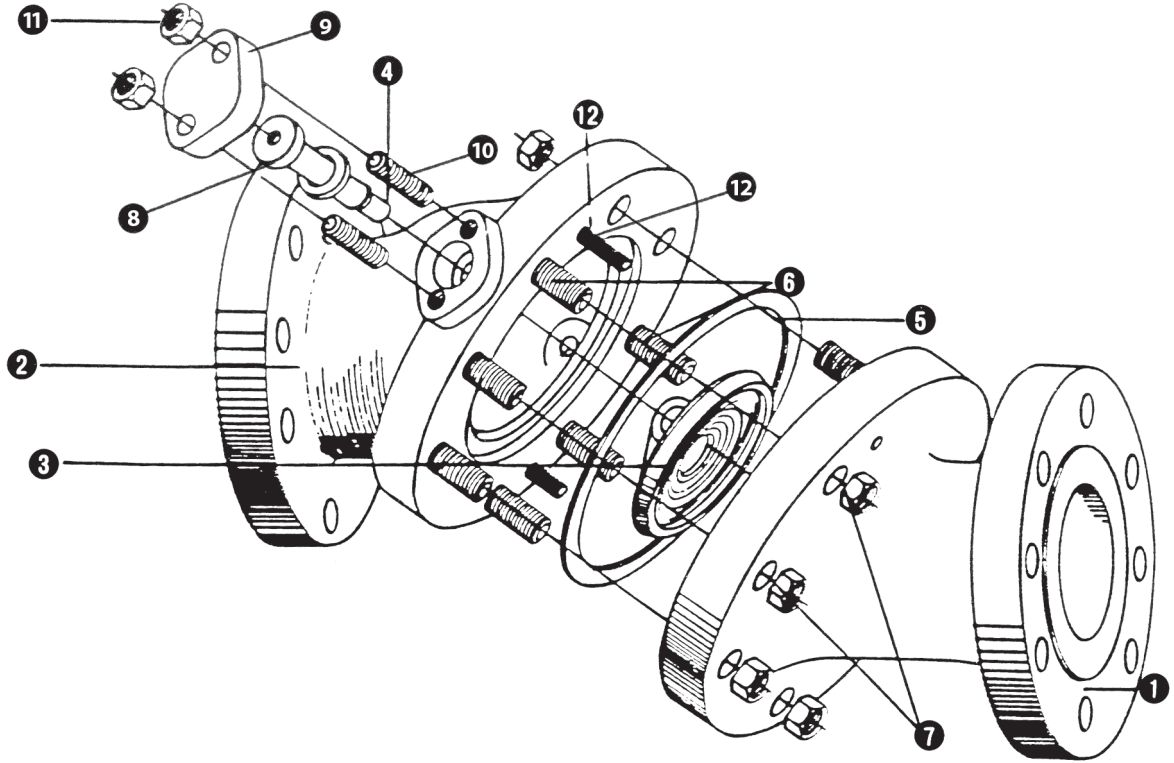
The CNI Two-Piece Tilting Disc Check Valve pivot pins allow the disc ring to make a complete seating contact with the body ring without sliding or rubbing, as the seating surfaces of these rings are beveled and very precisely machined. This minimizes the possibility of wear and potential leakage after a long period of service, while maintaining excellent sealing under all pressures.

Valve line placement

The CNI Two-Piece Tilting Disc Check Valve operates equally well in either a horizontal or a vertical position, provided the flow is upward if vertically oriented (downward flow would neutralize its disc balancing characteristics). The valve must be positioned not less than ten (10) pipe diameters (of straight pipe) apart from the discharge of a pump, and not less than five (5) pipe diameters (of straight pipe) away from a fitting, pump inlet, or other line disruption.

Two Piece Tilting Disc Check Valves

Components and Materials of Construction



Description	Material
Inlet Body	ASTM A216 WCB W/13 CR Overlay Seat
Outlet Body	ASTM A216 WCB
Disc	13% CR Overlay
Pivot Pin	ASTM A479 Type 410
Body Gasket	Stainless Steel Spiral wound Graphite
Body Studs	ASTM A193 B7
Body Nuts	ASTM A194 2H
Bearing Cap	ASTM A516 Gr70
Bearing Cap Gaskets	Soft Steel
Bearing Cap Studs	ASTM A193 B7
Bearing Cap Nuts	ASTM A194 2H
Dowel Pins	Carbon Steel

- | | |
|---------------------------|-----------------------|
| 1. Body Inlet Half | 2. Body Outlet Half |
| 3. Disc | 4. Pivot Pin |
| 5. Body Gasket | 6. Body Studs |
| 7. Body Stud Nuts | 8. Bearing Cap Gasket |
| 9. Bearing Cap | 10. Bearing Cap Studs |
| 11. Bearing Cap Stud Nuts | 12. Dowel Pins |

Standard body design configurations

The seat, disc and pivot pins are combined into one subassembly secured to the inlet side of the body with a locking ring in sizes 3" (80 mm) and smaller. This construction avoids the need for extending the pivot pins through the valve body. The seat formed on the end of the inlet body section by cobalt base alloy hard facing deposit in sizes 4" (100 mm) and larger. The pivot pins supporting the disc are inserted through capped and gasketed bearing bosses in the outlet section of the body.

GENERAL NOTES:

- Standard construction: WCB-Trim 8, other options are available.
- The table lists typical materials of construction. Actual materials will meet customer requirements.

Two Piece Tilting Disc Check Valves

ASME Class 150 • Bolted Cap

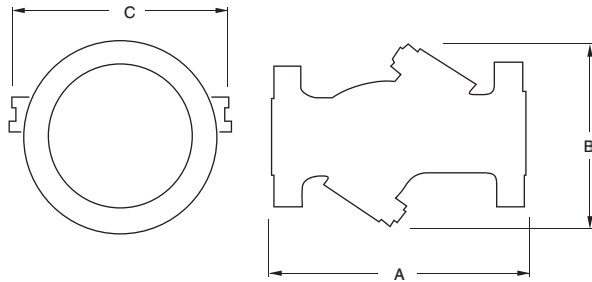
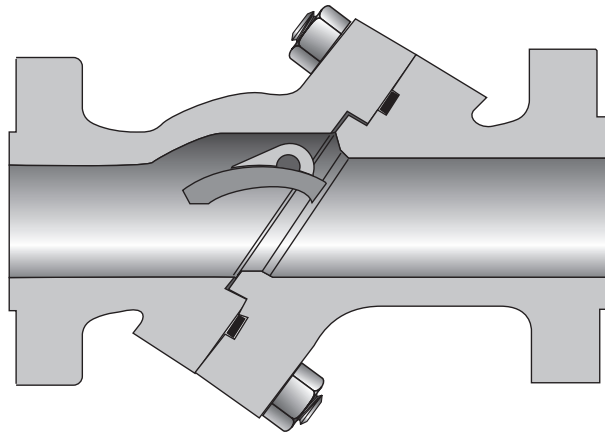


Fig. No. **123** Flanged

Fig. No. **123½** Butt Weld

Size Range

2 through 30 inches (50 - 750mm)

Industry Standards

Meets design requirements of ASME Section III, B16.34, B16.5, B16.25 and B16.10

DIMENSIONS AND WEIGHTS

Inches (millimeters) - pounds (kilograms)

VALVES	2 (50)	2½ (65)	3 (80)	4 (100)	5 (125)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)	24 (600)	30 (750)
A	8.00 (203)	8.50 (216)	9.50 (241)	11.50 (292)	13.00 (330)	19.50 (495)	24.50 (622)	27.50 (698)	31.00 (787)	30.00* (762)	33.00* (838)	32.50* (825)	38.00* (965)	49.50* (1257)
B	7 (177)	9 (229)	9 (229)	10 (254)	11 (279)	16 (406)	19 (482)	21 (533)	22 (558)	25 (635)	28 (711)	31 (787)	36 (914)	44 (1117)
C	8 (203)	9 (229)	9 (229)	13 (330)	16 (406)	21 (533)	25 (635)	28 (711)	29 (736)	34 (863)	36 (914)	39 (990)	45 (1143)	54 (1371)
Wt. (123)	38 (17)	51 (23)	59 (26)	102 (46)	139 (63)	293 (132)	488 (221)	690 (312)	823 (373)	1070 (485)	1435 (650)	1825 (827)	2887 (1309)	4790 (2172)
Wt. (123½)	22 (9)	38 (17)	42 (19)	75 (34)	108 (48)	240 (108)	400 (181)	570 (258)	690 (312)	885 (401)	1213 (550)	1760 (798)	2265 (1027)	4025 (1825)

* Mfg std end-to-end dimensions (less than B16.10)

Two Piece Tilting Disc Check Valves

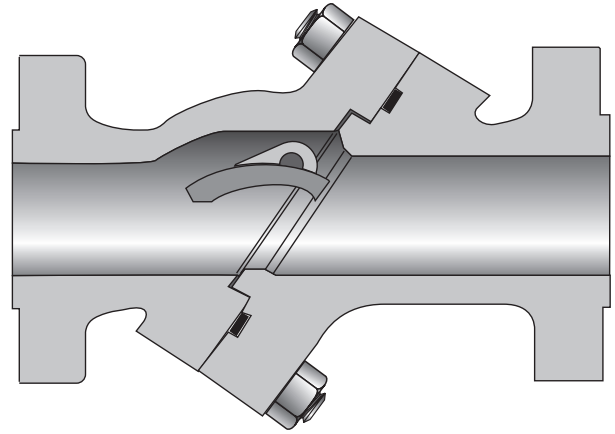
ASME Class 300 • Bolted Cap

Fig. No. **323** Flanged

Fig. No. **323½** Butt Weld

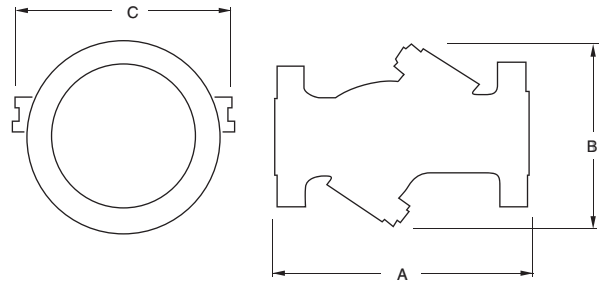
Size Range

2 through 18 inches (50 - 450mm)



Industry Standards

Meets design requirements of ASME Section III, B16.34, B16.5, B16.25 and B16.10



DIMENSIONS AND WEIGHTS

Inches (millimeters) - pounds (kilograms)

VALVES	2 (50)	2 ½ (65)	3 (80)	4 (100)	5 (125)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)
A	10.50 (266)	11.50 (292)	12.50 (317)	14.00 (355)	15.75 (400)	21.00* (533)	24.50 (622)	28.00 (711)	30.00 (762)	33.00 (838)	36.00 (914)
B	8 (203)	10 (254)	10 (254)	11 (279)	13 (330)	17 (431)	20 (508)	24 (609)	25 (635)	28 (711)	31 (787)
C	9 (229)	10 (254)	10 (254)	14 (355)	16 (406)	22 (558)	25 (635)	30 (762)	30 (762)	36 (914)	40 (1016)
Wt. (323)	38 (17)	51 (23)	59 (26)	102 (46)	139 (63)	293 (132)	488 (221)	690 (312)	823 (373)	1070 (485)	1435 (650)
Wt. (323½)	22 (9)	38 (17)	42 (19)	75 (34)	108 (48)	240 (108)	400 (181)	570 (258)	690 (312)	885 (401)	1213 (550)

* Mfg std end-to-end dimensions (less than B16.10)

Two Piece Tilting Disc Check Valves

ASME Class 600 • Bolted Cap

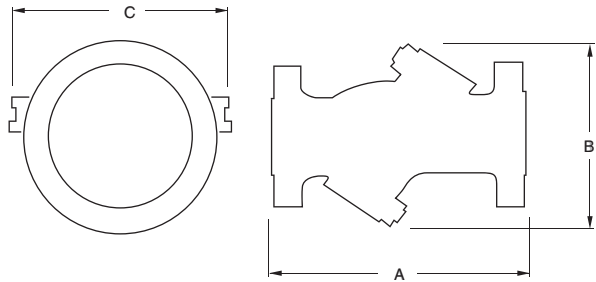
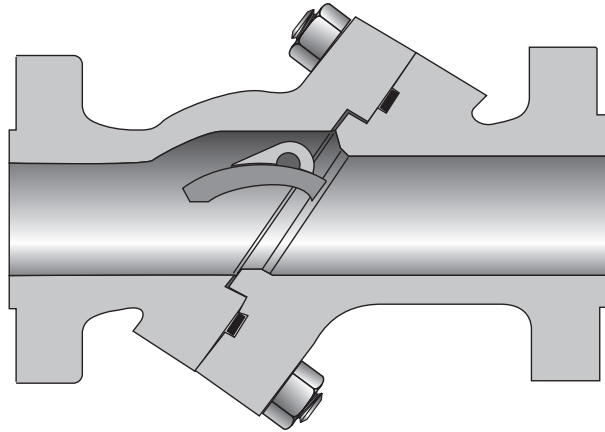


Fig. No. **623** Flanged

Fig. No. **623½** Butt Weld

Size Range

2 through 18 inches (50 - 450mm)

Industry Standards

Meets design requirements of ASME Section III, B16.34, B16.5, B16.25 and B16.10

DIMENSIONS AND WEIGHTS

Inches (millimeters) - pounds (kilograms)

VALVES	2 (50)	2 ½ (65)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)
A	11.50 (292)	13.00 (330)	14.00 (355)	17.00 (431)	20.00 (508)	22.00 (558)	26.00 (660)	31.00 (787)	33.00 (838)	35.00 (889)	39.00 (990)	43.00 (1092)
B	8 (203)	10 (254)	10 (254)	13 (330)	15 (381)	16 (406)	19 (482)	22 (558)	26 (660)	27 (685)	30 (762)	34 (863)
C	9 (229)	10 (254)	10 (254)	16 (406)	19 (482)	20 (508)	24 (609)	28 (711)	31 (787)	33 (838)	36 (914)	43 (1092)
Wt. (623)	68 (30)	110 (49)	115 (52)	222 (100)	327 (148)	432 (195)	725 (328)	1035 (469)	1470 (666)	1830 (830)	2550 (1156)	3570 (1619)
Wt. (623½)	60 (27)	70 (31)	85 (38)	164 (74)	267 (121)	295 (133)	435 (197)	820 (371)	1055 (478)	1335 (605)	1965 (891)	2010 (911)

Two Piece Tilting Disc Check Valves

Steel Valves • C_v and Flow Resistance Coefficient "K"

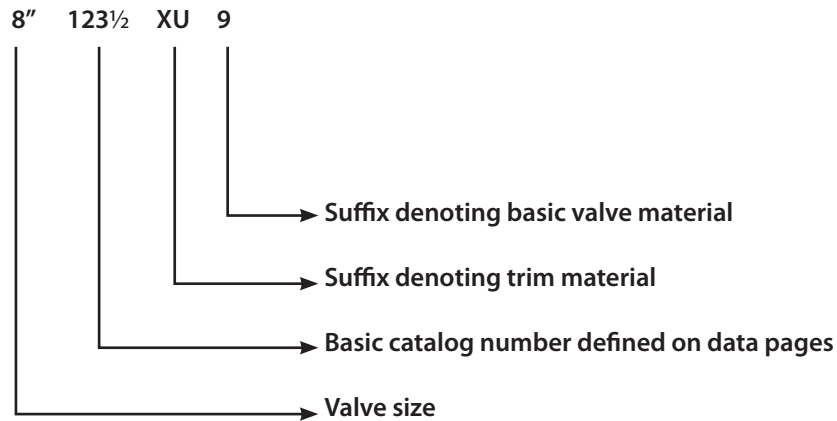
Catalog No.		Valve Size														
		2	2½	3	4	5	6	8	10	12	14	16	18	20	24	30
123, 123½	K	.75	.73	.69	.65	.62	.60	.57	.41	.39	.38	.25	.24	.24	.23	.22
	C_v	150	210	340	600	960	1400	2500	4700	6800	8400					
323, 323½	K	.75	.73	.69	.65		.60	.57	.41	.39	.38	.25	.24	.24	.23	
	C_v	150	210	340	600		1400	2500	4700	6800	8400					
623, 623½	K	.76	.74	.70	.66	.63	.60	.57	.41	.40	.39	.25	.24	.24	.23	
	C_v	130	190	300	540	880	1300	2300	4300	6200	7400					

(1) Pin-Guided Disc. "X" Type Globe Valves are not included.

Two Piece Tilting Disc Check Valves

Ordering Number System

Examples:



SEATING TRIM DESCRIPTION

Cat. No. Suffix	Seating Surfaces
U	Hard Facing (1)
X	13% Chromium (2)
XU	13% Chromium to Hard Facing (2)
L	Austenitic (3) Stainless Steel
LU	Austenitic Stainless Steel to Hard Facing
A	Monel
AU	Monel to Hard Facing

BODY MATERIALS

Crane Designation	Cat. No. Suffix	ASTM Spec.	Material Classification
Carbon Steel	None	A216 Gr. WCB	Carbon Steel
No. 5 Steel	5	A217 Gr. C5	5% Cr, ½% Mo
No. 7 Steel	7	A217 Gr. WC6	1¼% Cr, ½% Mo
No. 9 Steel	9	A217 Gr. WC9	2¼% Cr, 1% Mo
"LCB" Steel	2	A352-LCB	Low Carbon Steel
"Arctic" Steel	3	A352-LC3	3½% Nickel Steel

1. Hard Facing is weld deposited Cobalt base alloy.
2. 13% Chromium AISI Type 410 Stainless Steel.
3. Austenitic Stainless Steel is a Ni-Cr-Mo stainless steel in the AISI Type 316 category.

Notes

Notes



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NU-SECS-BU-EN-LT-CN-2013_08

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