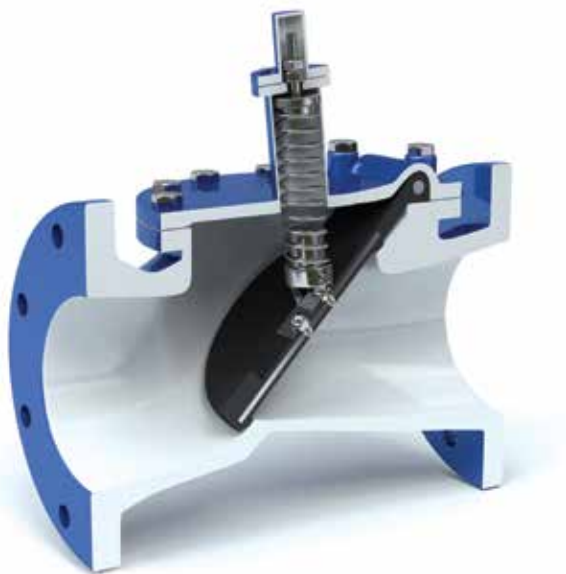




APCO CRF 100, 100SA & 100SR RUBBER FLAPPER SWING CHECK VALVES

Design & Construction

APCO CRF 100, 100SA and 100SR Rubber Flapper Swing Check Valves are uniquely simple in design but durable for use on a variety of applications. Available in sizes 2-48" (50-1200mm), they are available in Ductile Iron, Cast Iron or Bronze bodies with ASME 125/150 flanges and maximum pressure ratings up to 175 psi (1210 kPa). For additional abrasion resistance, full-flow area bodies can be lined with elastomers.



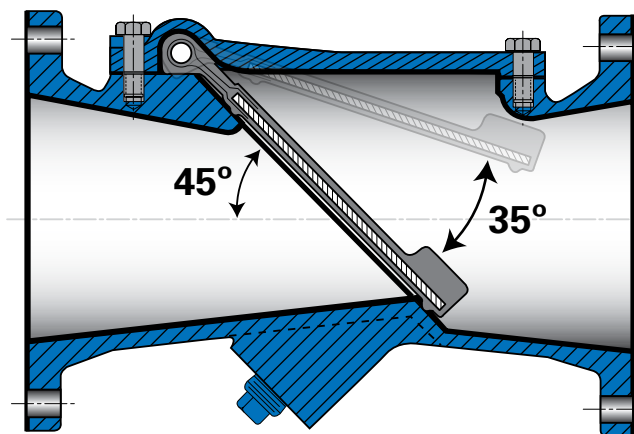
Since the APCO CRF Rubber Flapper Check Valve was introduced in 1965, it has been operating successfully in thousands of installations. The unique features of the Rubber Flapper Check Valve makes it ideally suited for applications such as raw sewage, water systems, industrial wastes, chemical lines, erosive services, ash service, acid lines, tailings systems, light slurries, corrosive services, leaching lines, scrubbers, and brine & salt water systems.

Unique 45° Angle Provides Non-Slam Properties

APCO CRF Rubber Flapper Swing Check Valves feature a unique, simple design with one moving part. The flapper does not swing from a hinge pin; it simply flexes open. The valve body seat is on an angle of 45° to the centerline of the pipe, permitting horizontal or vertical flow up installation. The unique 45° angle on the body seat gives the valve non-slammng properties. The flapper travels 35° from open to close, usually before column reversal can occur.

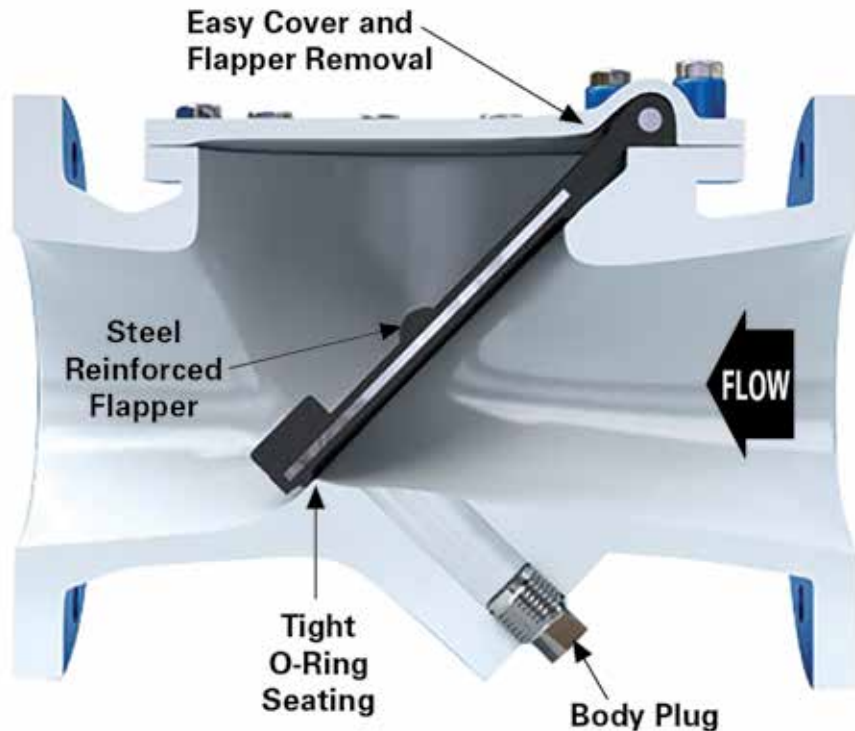
Full Flow Area

With the flapper fully open, there is a straight unobstructed flow passage, so all foreign matter is flushed away by the flowing medium. This eliminates clogging associated with other valve styles. Due to this unobstructed flow passage, the pressure drop is considerably lower through the APCO Rubber Flapper Check than through conventional swing check valves.



Precision Molded, Steel Reinforced Rubber Flapper Provides Bubble Tight Seating

The Acrylonitrile-Butadiene (NBR) flapper provides excellent abrasion-resistant qualities. The flapper can also be compression molded with Chloroprene (CR), Terpolymer of Ethylene Propylene & A Diene (EPDM), Fluoro Rubber (FKM) or other synthetic rubbers on application. A steel disc for strength and a steel bar are molded inside the flapper.



Cycle Tested Flapper Prevents Jamming or Sticking

A high strength fabric is integrally molded over the disc and bar to form a flexible joint. When the valve is assembled, the flapper is firmly clamped between body and cover. This feature eliminates problems of moving parts, shafts, pins, bearings, bushings or packing (as required in conventional check valves). The flapper design prevents jamming or sticking in the open position.

Rubber Flapper Provides Bubble-Tight Sealing

The o-ring seal molded into the disc face assures positive sealing, even at lower pressures.

No Regular Maintenance Required

With only three major parts: Body, Flapper and Cover, the CRF Rubber Flapper Check Valve requires relatively no maintenance. If maintenance should be required, the flapper can be replaced in a matter of minutes.

4.3" Size Designed Specifically for Raw Sewage

The 4.3" size Rubber Flapper Swing Check Valve is specifically designed for raw sewage with a flow area through the seat almost twice (23.76", 604mm) that of standard pipe (12.73", 323mm) permitting the valve to pass a 3" (76mm) diameter solid as required by many states and municipalities for 4" (100mm) check valves used on sewage lift stations.

Choice of Body Materials

Unlined bodies are normally made of Ductile Iron for 2-24" (50-600mm) sizes and Cast Iron for 30-48" (750-1200) sizes. Bronze body valves are available in sizes 2-10" (50-250mm) and Navy Bronze are available in 2-4.3" (50-100mm) sizes. Ductile Iron and Cast Iron valves can be lined with elastomers for additional abrasion resistance.

Buried Service Valves

When used in buried service applications, the CFR Rubber Flapper Swing Check Valve can be ordered with 316 stainless steel cover bolts for corrosion resistance.

Rubber Lined Bodies For Extra Abrasion Resistance

The CRF Rubber Flapper Swing Check Valve is specially designed for rubber lining. The valve contains no sharp corners or crevices, and the smooth body and cover contours readily accept the 1/8" rubber lining or coating. The result after lining is a totally encapsulated valve without any exposed metal surfaces. Bodies can be lined with Chloroprene (CR), Natural Rubber (NR), Terpolymer of Ethylene Propylene & A Diene (EPDM) or Acrylonitrile-Butadiene (NBR).



Spring Return Rubber Flapper Swing Check Valve (100SR)

In difficult high head applications where rapid flow reversal can occur, standard swing check valves will often slam. The CRF-100SR Spring Return model was designed to eliminate or minimize slam in these applications, even in tough vertical flow-up installations.

The externally adjustable spring return accelerates flapper closure before flow reversal can occur. The stainless steel helical compression spring can be externally adjusted without removing the cover from the valve or removing the valve from service. Adjustments are made by an external sealed screw which provides infinite adjustment to the internal spring compression.

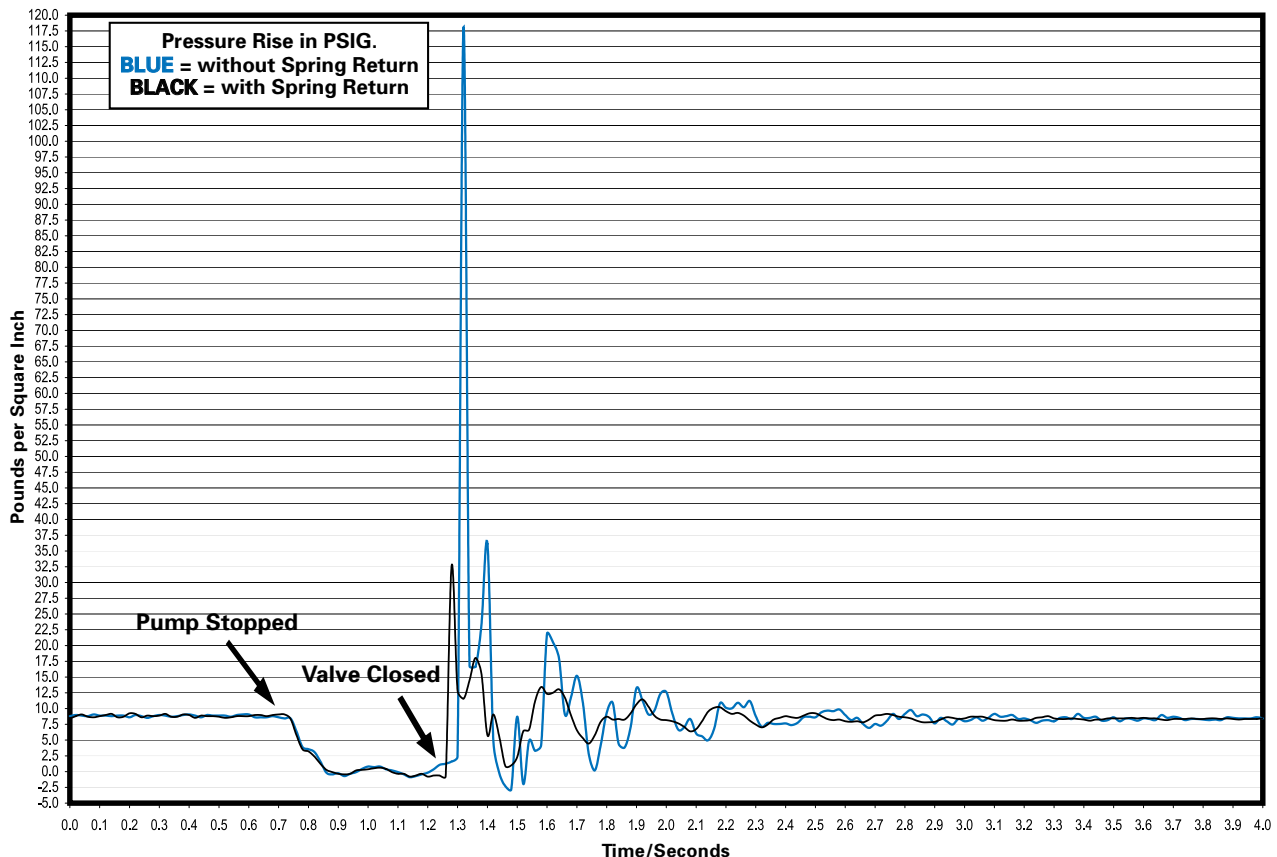
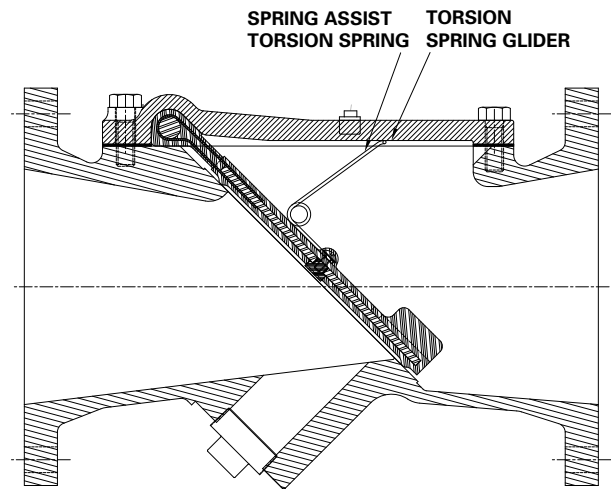


The graph below compares closing characteristics of the rubber flapper swing check valve with and without the spring return closure. The installation is "flow up" and the power failure simulation for the tests was identical. The pressure rise (black line) with the spring return closure was only 33 psi (228 kPa). This represents a 85 psi (586 kPa)

reduction in the pressure surge. Also, subsequent wave patterns were more subdued and rounded. On-site closure noise (valve slam) and pipe displacement disappeared with the 100SR Spring Return.

Spring Assist Rubber Flapper Swing Check Valve (100SA)

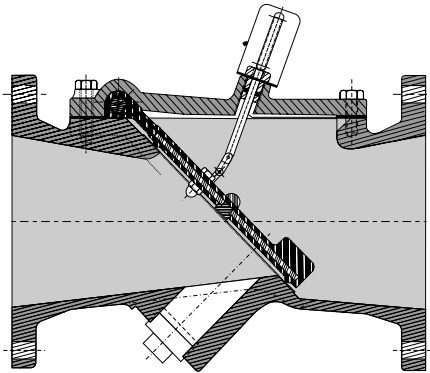
The CRF Rubber Flapper Check Valve with Spring Assist Closure includes a Stainless Steel double torsion spring mounted to the flapper that accelerates valve closure before reverse flow can occur, minimizing potential valve slam. The double torsion spring is rigidly secured to the flapper.



Options & Accessories

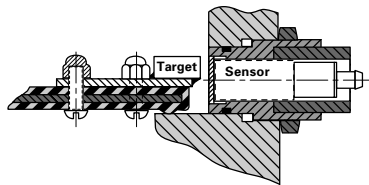
Disc Position Indicator (PI)

The Disc Position Indicator is mounted to the cover and clearly identifies the position of the flapper upon visual inspection. The Disc Position Indicator is available on body styles 100 and 100SA.



Proximity Switches & Limit Switches Available

An inductive type proximity switch can be mounted on the valve body with its target mounted internally on the flapper. The switch transmits an electrical signal indicating when the flapper is fully closed. Mechanical Limit switches are also available.



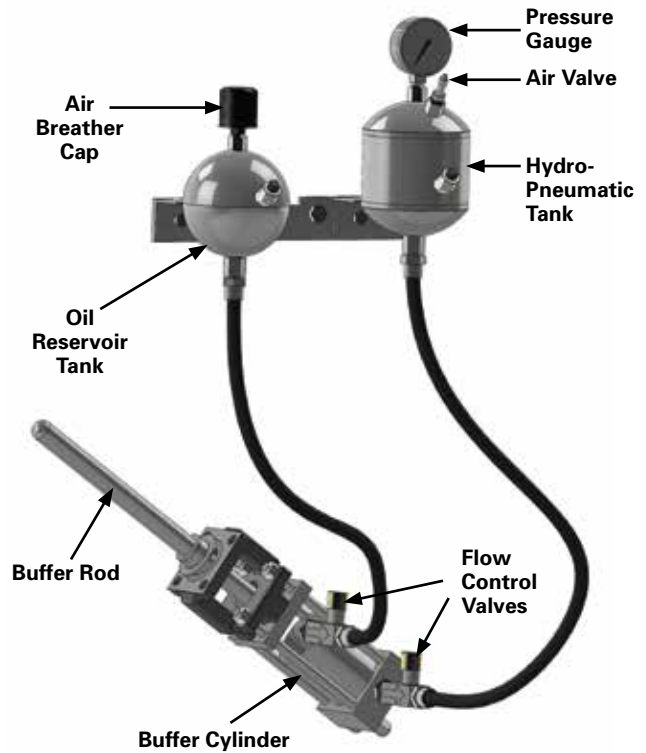
Hold Open Device For Backflushing

The Hold Open Device, available on 3-30" (80-750mm) valve sizes, can be ordered on the valve to make back-flushing the system, priming pumps or draining the system safe and convenient. The APCO Backflow Device meets OSHA's easily activated requirements without risk of injury to operating personnel during a backflow procedure. This Hold Open Device is positive and will not slip during full backflow. The Backflow Device can be operated without removing the check valve or taking the pump out of service. Hold Open Devices on size 3" and 4" (80 and 100mm) are constructed of Bronze ASTM B-584 as approved by U.S. Navy for fleet service.

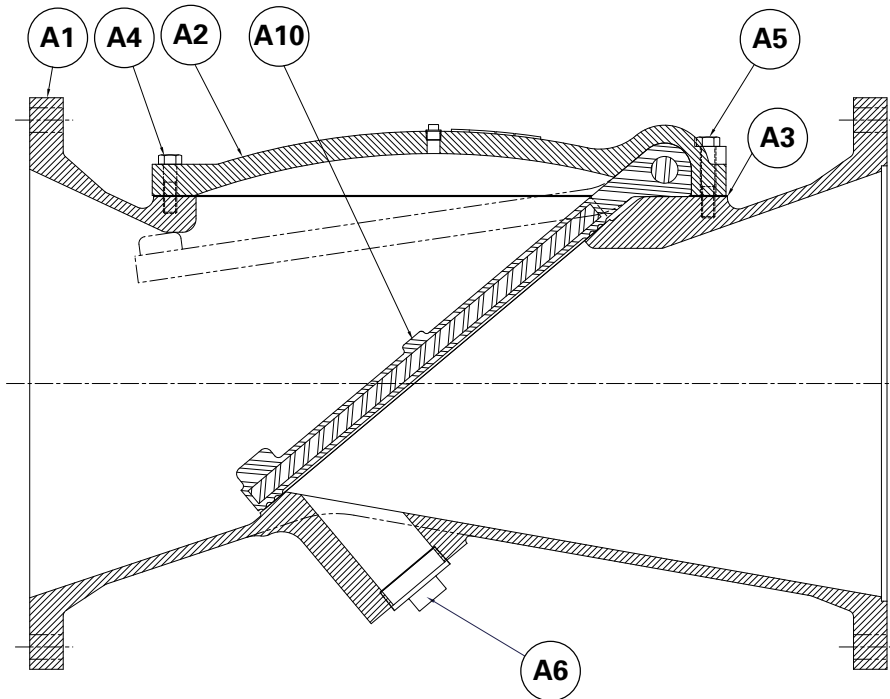


Bottom Mounted Buffer

Bottom Mounted Buffers have been used successfully for decades to reduce slamming of the valve disc and resultant water hammer. The bottom hydraulic buffer permits free opening, but positive non-slam closure of the rubber flapper. The hydraulic buffer rod contacts the rubber flapper during the final 10% of closure to control closing speed until shut-off. The final closure can be adjusted with the two color-coded flow control valves which have locking set screws to secure the final setting. The oil hydraulic buffer controls disc closure speed to suit flow conditions and reduces slam, water hammer and pressure surges.



Materials of Construction



Item	Description	Material
A1	Body	Cast Iron, ASTM A126, Grade B
		Bronze, ASTM 584
		Ductile Iron, ASTM A536, Grade 65-45-12
		Bronze Navy "M" ASTM B584 C92200
A2	Cover	Same as body material
A3	Gasket*	Non-asbestos with butadiene rubber binder
A4	Cover Bolt	316 Stainless Steel, or Steel A449, Grade 5
		Brass ASTM B16 C36000 (On Bronze Body)
A5	Cover Bolt	316 Stainless Steel, or Steel A449, Grade 5
		Brass ASTM B16 C36000 (On Bronze Body)
A6	Body Pipe Plug	Iron, Malleable, ASTM A48, Class 40
A10	Rubber Flapper	Reinforced NBR, Acrylonitrile-Butadiene, Carbon Steel ASTM A36
		Reinforced CR, Chloroprene, Carbon Steel ASTM A36
		Reinforced EPDM, Terpolymer of Ethylene Propylene & A Diene, Carbon Steel ASTM A36
		Reinforced FKM, Fluoro Rubber, Carbon Steel ASTM A36

*Cover gasket is not used on lined valves

Valve Selection

Pressure Ratings

Body Style	Maximum Differential Cold Working Pressure
100, 100SA & 100SR	175 psi (1210 kPa)

Note: Specify operating pressure when ordering

Temperature Ratings

Material	Temperature Range*
NBR, Acrylonitrile-Butadiene	-70 to 250° F (-57 to 121° C)
CR, Chloroprene	-40 to 250° F (-40 to 121° C)
EPDM, Terpolymer of Ethylene Propylene & A Diene	-20 to 300° F (-29 to 150° C)
FKM, Fluoro Rubber	-40 to 425° F (-40 to 218° C)
NR, Natural Rubber	-40 to 180° F (-40 to 82° C)

*Maximum operating temperature is a function of the materials used in the valve.

All valves are rated to a maximum temperature of at least 180° F (82° C).

Contact application engineering if the valve is required to operate above 180° F (82° C).

Applicable Standards

APCO CRF Rubber Flapper Swing Check Valves are designed and/or tested to meet the following standards:	
MIL V 18436 F	Conforms to material requirements of Group A, Type III, Trim 1, Bronze Swing Check Valves
ASME B16.1	Cast iron pipe flanges and flanged fittings. Conforms to related flange drilling dimensions.
AWWA C508	Valves tested as a complete assembly per AWWA C508

Valve Weights

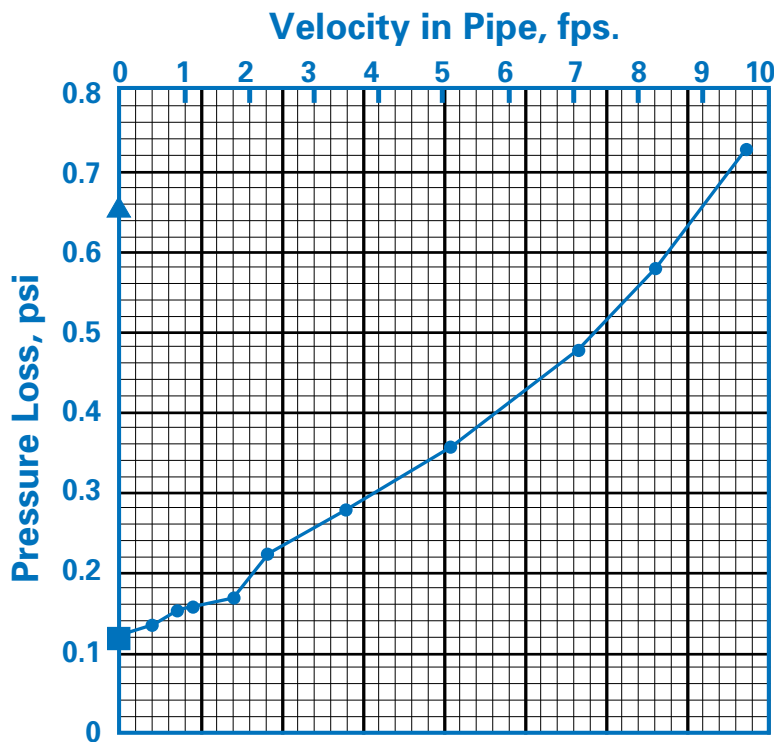
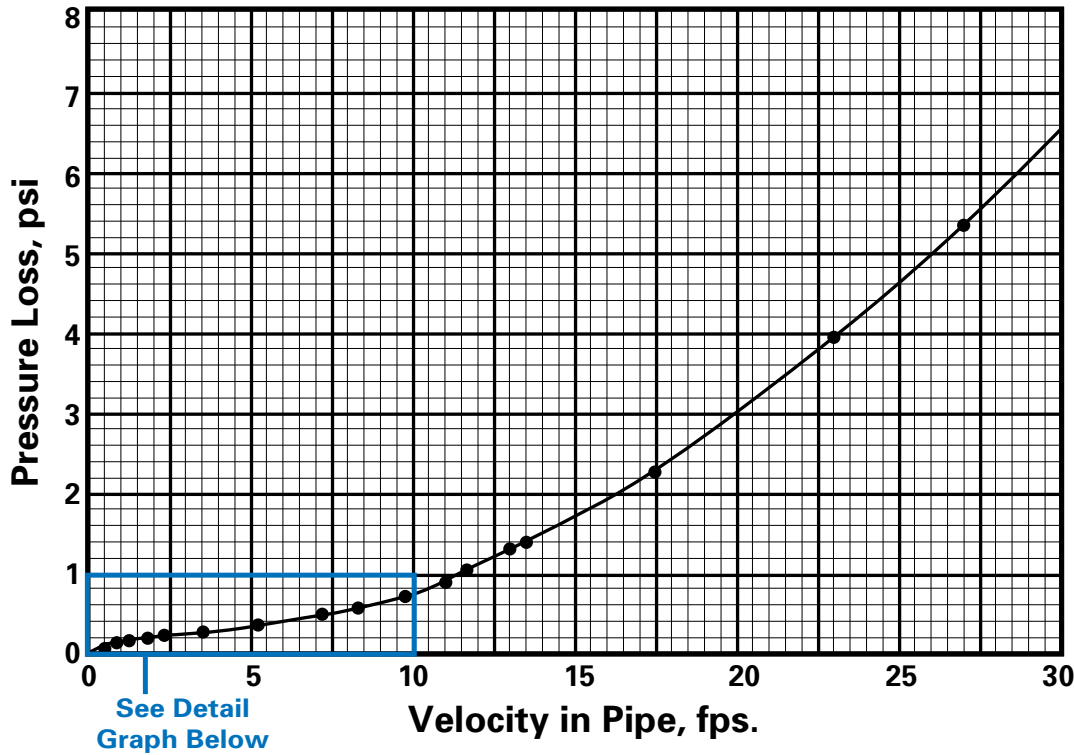
Valve Size	Ductile Iron Body
2" 50mm	19 8
2.5" 65mm	20 9
3" 80mm	21 10
4" 100mm	38 17
4.3" 110mm	70 32
5" 125mm	74 34
6" 150mm	100 45
8" 200mm	185 84
10" 250mm	335 152
12" 300mm	475 215
14" 350mm	640 290
16" 400mm	950 431
18" 450mm	1250 567
20" 500mm	1550 703
24" 600mm	2000 907
30-48" 750-1200mm	Contact DeZURIK

Pounds
Kilograms

Valve Selection

12" Rubber Flapper Swing Check Valve

Tests indicate losses are slightly higher for smaller sizes and lower for larger sizes than shown here



- ▲ Actual Test Points
- Pressure head to unseat flapper with downstream pipe full (discharge side). Flapper submerged and bouyant
- ▲ Pressure head to unseat flapper, downstream pipe empty

Ordering

To order, simply complete the valve order code from information shown.
An ordering example is shown for your reference.

Valve Style

Give valve style code as follows:

CRF = Rubber Flapper Swing Check Valves

Valve Size

Give valve size code as follows:

2	=	2"	(50mm)	14	=	14"	(350mm)
2.5	=	2.5"	(65mm)	16	=	16"	(400mm)
3	=	3"	(80mm)	18	=	18"	(450mm)
4	=	4"	(100mm)	20	=	20"	(500mm)
4.3	=	4"	(100mm)	24	=	24"	(600mm)
5	=	5"	(125mm)	30	=	30"	(750mm)
6	=	6"	(150mm)	36	=	36"	(900mm)
8	=	8"	(200mm)	42	=	42"	(1100mm)
10	=	10"	(250mm)	48	=	48"	(1200mm)
12	=	12"	(300mm)				

Body Style

Give body style code as follows:

100 = Rubber Flapper (2-48")
100SA = Rubber Flapper with Spring Assist (4.3-30")
100SR = Rubber Flapper with Spring Return (3-30")

End Connection

Give end connection code as follows:

F1 = Flanged ASME 125/150

Body Material

Give body material code as follows:

Unlined - Body 100, 100SA or 100SR

BRZ = Bronze (2-10")
CI = Cast Iron (standard for 30-48")
DI = Ductile Iron (standard for 2-24")
NBRZ = Navy Bronze (2-4.3"). For Navy Valve requirements, contact the factory (Body style 100)

Lined - Body Styles 100, 100SA & 100SR (2-24")

DICR = Ductile Iron, Chloroprene (CR) Lined
DINR = Ductile Iron, Natural Rubber (NR) Lined
DIEP = Ductile Iron, Terpolymer of Ethylene Propylene & A Diene (EPDM) Lined
DINB = Ductile Iron, Acrylonitrile Butadiene (NBR) Lined

Lined - Body Styles 100, 100SA & 100SR (30-48")

CICR = Cast Iron, Chloroprene (CR) Lined
CINR = Cast Iron, Natural Rubber (NR) Lined
CIEP = Cast Iron, Terpolymer of Ethylene Propylene & A Diene (EPDM) Lined
CINB = Cast Iron, Acrylonitrile Butadiene (NBR) Lined

Flapper Material

Give flapper material code as follows:

NBR = Acrylonitrile-Butadiene, -70 to 250° F (-57 to 121° C)
CR = Chloroprene, -40 to 250° F (-40 to 121° C)
EPDM = Terpolymer of Ethylene Propylene & A Diene
-20 to 300° F (-29 to 150° C)
FKM = Fluoro Rubber, -40 to 425° F (-40 to 218° C)
Body Styles 100, 100SA or 100SR, Unlined bodies only

Options

Give options code as follows:

DTR = DeZURIK Standard Certified Production Hydrostatic
Shell & Seat Test Report
PI = Disc Position Indicator (4.3-30")
SB16 = 316 Stainless Steel Bolting

Accessories

Give accessory code as follows:

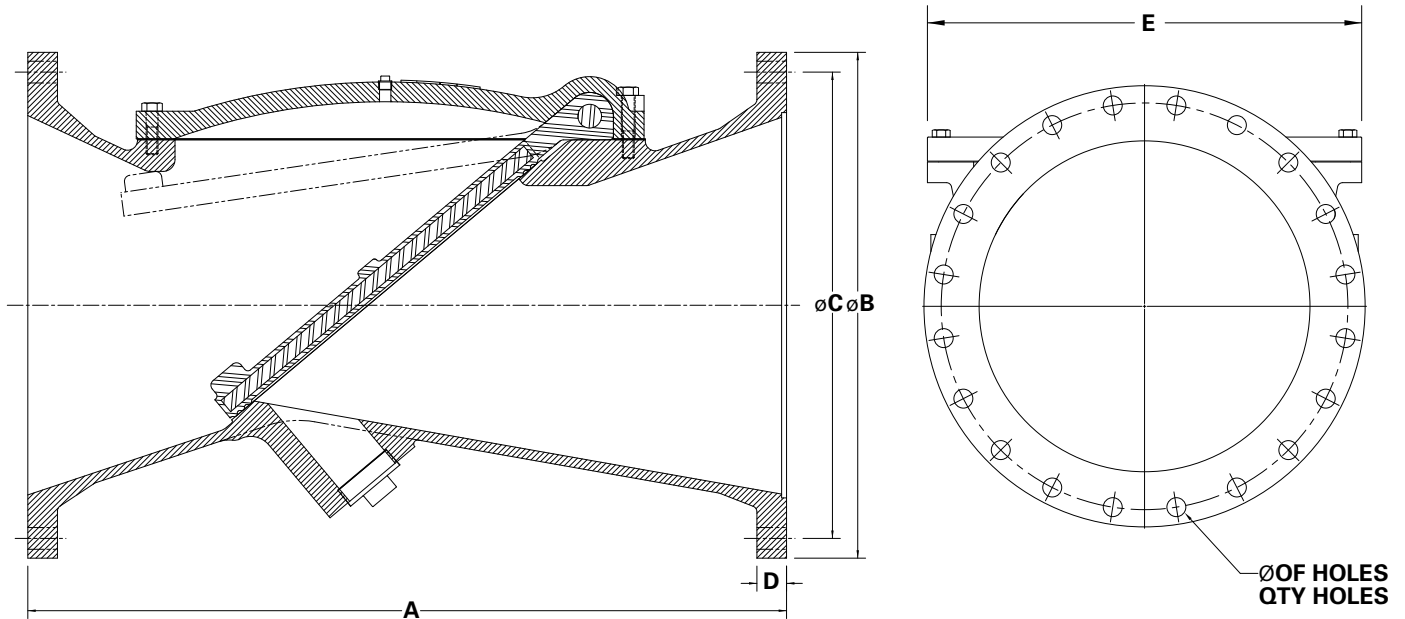
BMB = Bottom Mounted Buffer (4.3-48")
HOD = Hold Open Device (Back flush) (3-30")
SEL20 = Limit Switch with Disc Position Indicator
AB 802T-ATP (4.3-30") Body styles 100 or 100SA
SEL30 = (1) Proximity Switch - SPDT GO 73-13526-B2. Body Styles
100 (2-12"), 100SA (10-12"), 100SR (8-12")
SEL31 = (1) Proximity Switch - SPST - Balluff BES 516-432-E4-L-02.
Body styles 100 (14-48"), 100SA or 100SR (14-30")

Ordering Example

CRF,10,100SA,F1,DICR,CR,SB16*BMB

Dimensions

Body Style 100

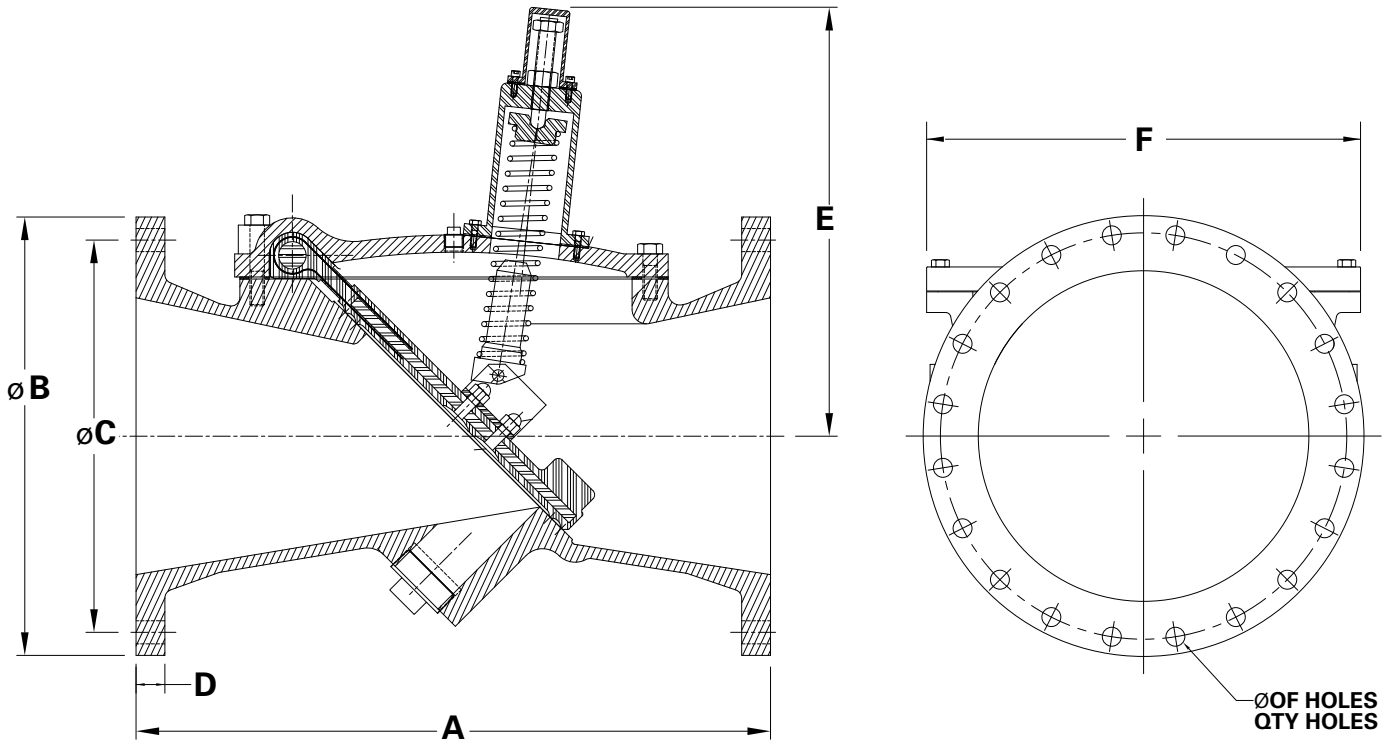


Valve Size	A	B	C	D	No. of Flange Bolts	Bolt Hole Size	E
2" 50mm	8.00 203	6.00 152	4.75 121	0.63 16	4	0.75 19	5.26 134
2.5" 65mm	8.50 216	7.00 178	5.50 140	0.69 18	4	0.75 19	4.88 124
3" 80mm	9.50 241	7.50 191	6.00 152	0.75 19	4	0.75 19	7.00 178
4" 100mm	11.50 292	9.00 229	7.50 191	0.94 24	8	0.75 19	7.38 187
4.3" 100mm	13.75 349	9.00 229	7.50 191	0.94 24	8	0.75 19	10.25 260
5" 125mm	13.75 349	10.00 254	8.50 216	0.94 24	8	0.88 22	10.25 260
6" 150mm	15.00 381	11.00 279	9.50 241	1.00 25	8	0.88 22	10.25 260
8" 200mm	19.50 495	13.50 343	11.75 298	1.13 29	8	0.88 22	15.25 387
10" 250mm	24.50 622	16.00 406	14.25 362	1.19 30	12	1.00 25	19.26 489
12" 300mm	27.50 699	19.00 483	17.00 432	1.25 32	12	1.00 25	19.26 489
14" 350mm	31.00 787	21.00 533	18.75 476	1.38 35	12	1.13 29	23.63 600
16" 400mm	32.00 813	23.50 597	21.25 540	1.44 37	16	1.13 29	24.00 610
18" 450mm	36.00 914	25.00 635	22.75 578	1.56 40	16	1.25 32	27.75 705
20" 500mm	40.00 1016	27.50 699	25.00 635	1.69 43	20	1.25 32	27.75 705
24" 600mm	48.00 1219	32.00 813	29.50 749	1.88 48	20	1.38 35	31.50 800
30" 750mm	70.50 1791	38.75 984	36.00 914	2.13 54	28	1.38 35	49.00 1245
36" 900mm	75.00 1905	46.00 1168	42.75 1086	2.38 60	32	1.63 41	55.00 1397
42-48" 1100-1200mm	Contact Factory						

Inches
Millimeters

Dimensions

Body Style 100SR, Spring Return

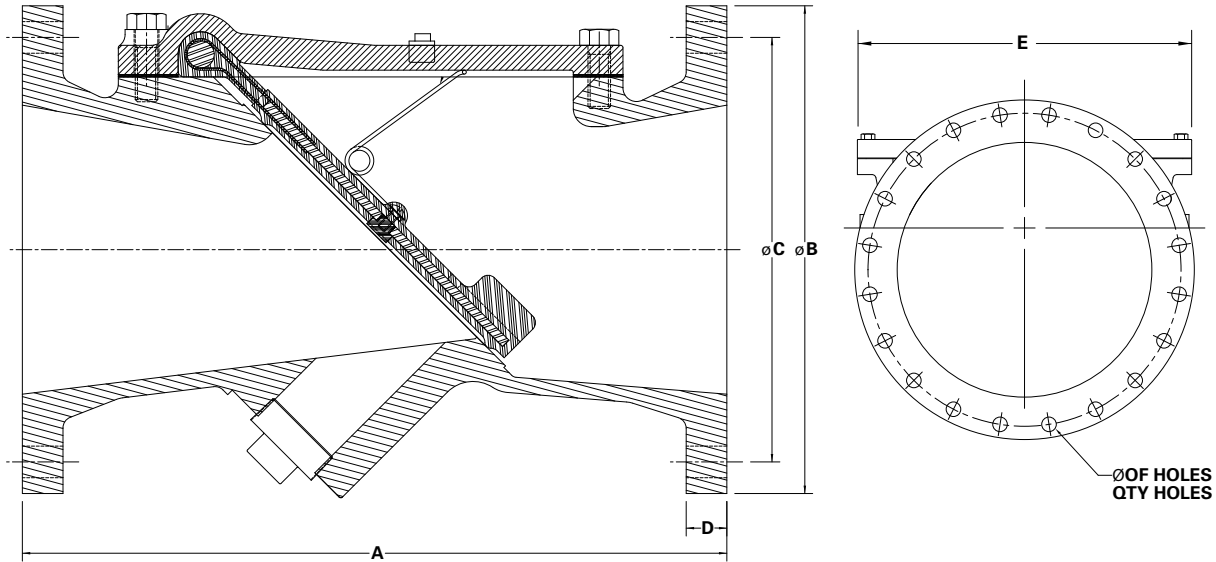


Valve Size	A	B	C	D	E	No. of Flange Bolts	Bolt Hole Size	F
3" 80mm	9.50 241	7.50 191	6.00 152	0.75 19	8.50 216	4	0.75 19	7.00 178
4" 100mm	11.50 292	9.00 229	7.50 191	0.94 24	8.50 216	8	0.75 16	7.38 187
4.3" 100mm	13.75 349	9.00 229	7.50 191	0.94 24	16.00 406	8	0.75 19	10.25 260
5" 125mm	13.75 349	10.00 254	8.50 216	0.94 24	16.00 406	8	0.88 22	10.25 260
6" 150mm	15.00 381	11.00 279	9.50 241	1.00 25	16.00 406	8	0.88 22	10.25 260
8" 200mm	19.50 495	13.50 343	11.75 298	1.13 29	17.00 432	8	0.88 22	15.25 387
10" 250mm	24.50 622	16.00 406	14.25 362	1.19 30	20.75 527	12	1 25	19.26 489
12" 300mm	27.50 699	19.00 483	17.00 432	1.25 32	20.75 527	12	1 25	19.26 489
14" 350mm	31.00 787	21.00 533	18.75 476	1.38 35	24.75 629	12	1.13 29	23.63 600
16" 400mm	32.00 813	23.50 597	21.25 540	1.44 37	24.75 629	16	1.13 29	24.00 610
18" 450mm	36.00 914	25.00 635	22.75 578	1.56 40	26.25 667	16	1.13 29	27.75 705
20" 500mm	40.00 1016	27.50 699	25.00 635	1.69 43	26.25 667	20	1.13 29	27.75 705
24" 600mm	48.00 1219	32.00 813	29.50 749	1.88 48	25.75 654	20	1.38 35	31.50 800

Inches
Millimeters

Dimensions

Body Style 100SA, Spring Assist

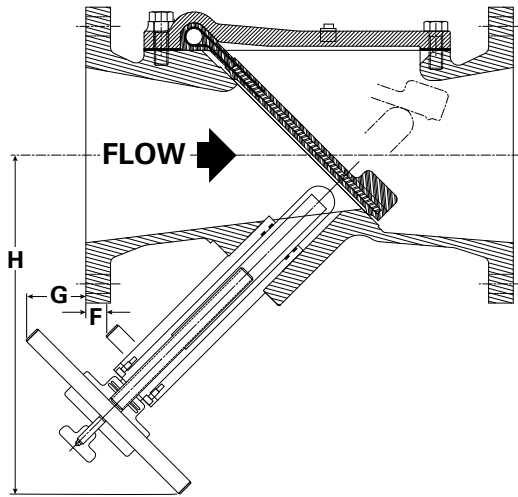


Inches
Millimeters

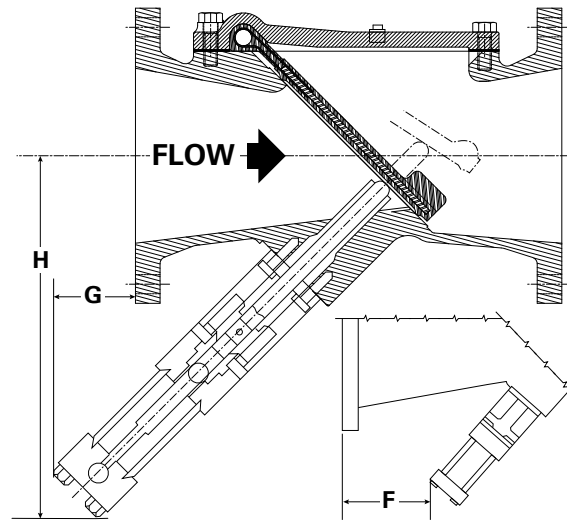
Valve Size	A	B	C	D	No. of Flange Bolts	Bolt Hole Size	E
4.3" 100mm	13.75 349	9.00 229	7.50 191	0.94 24	8	0.75 19	10.25 260
5" 125mm	13.75 349	10.00 254	8.50 216	0.94 24	8	0.88 22	10.25 260
6" 150mm	15.00 381	11.00 279	9.50 241	1.00 25	8	0.88 22	10.25 260
8" 200mm	19.50 495	13.50 343	11.75 298	1.13 29	8	0.88 22	15.25 387
10" 250mm	24.50 622	16.00 406	14.25 362	1.19 30	12	1.00 25	19.25 489
12" 300mm	27.50 699	19.00 483	17.00 432	1.25 32	12	1.00 25	19.25 489
14" 350mm	31.00 787	21.00 533	18.75 476	1.38 35	12	1.13 29	23.63 600
16" 400mm	32.00 813	23.50 597	21.25 540	1.44 37	16	1.13 29	24.00 610
18" 450mm	36.00 914	25.00 635	22.75 578	1.56 40	16	1.25 32	27.75 705
20" 500mm	40.00 1016	27.50 699	25.00 635	1.69 43	20	1.25 32	27.75 705
24" 600mm	48.00 1219	32.00 813	29.50 749	1.88 48	20	1.38 35	31.50 800

Dimensions

Hold Open Device



Bottom Mounted Buffer



Valve Size	F	G	H
3"	1.00	—	8.00
80mm	25	—	203
4"	2.75	—	8.50
100mm	70	—	216
4.3"	—	2.25	12.25
100mm	—	57	311
5"	—	2.50	12.00
125mm	—	64	305
6"	—	1.63	12.50
150mm	—	41	318
8"	—	1.75	15.50
200mm	—	44	394
10"	—	1.75	22.00
250mm	—	44	559
12"	—	2.00	20.50
300mm	—	51	521
14"	0.75	—	22.00
350mm	19	—	559
16"	1.25	—	22.00
400mm	32	—	559
18"	—	2.00	28.00
450mm	—	51	711
20"	—	1.75	28.00
500mm	—	44	711
24"	—	1.75	30.00
600mm	—	44	762
30"	Contact DeZURIK		
750mm	Contact DeZURIK		

Valve Size	F	G	H
4.3"	—	3.25	13.25
100mm	—	83	337
5"	—	3.00	13.25
125mm	—	76	337
6"	—	2.75	13.25
150mm	—	70	337
8"	—	1.25	14.00
200mm	—	32	356
10"	—	1.25	18.00
250mm	—	32	457
12"	0.75	—	18.00
300mm	19	—	457
14"	4.00	—	18.00
350mm	102	—	457
16"	4.25	—	18.00
400mm	108	—	457
18"	3.00	—	22.50
450mm	76	—	572
20"	5.00	—	22.50
500mm	127	—	572
24"	6.00	—	26.00
600mm	152	—	660

Inches
Millimeters

Inches
Millimeters

Sales and Service

For information about our worldwide locations, approvals, certifications and local representative:

Web Site: www.dezurik.com E-Mail: info@dezurik.com



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DeZURIK, Inc. reserves the right to incorporate our latest design and material changes without notice or obligation. Design features, materials of construction and dimensional data, as described in this bulletin, are provided for your information only and should not be relied upon unless confirmed in writing by DeZURIK, Inc. Certified drawings are available upon request.