DeZURIK

BULLETIN 100
NOVEMBER 2025

APCO CRF RUBBER FLAPPER SWING CHECK VALVES

Design & Construction

APCO CRF-100C/100 Rubber Flapper Swing Check Valves are uniquely simple in design but durable for use on a variety of applications. The valves are engineered and tested to meet the requirements of the AWWA C508 standard. Available in sizes 2-48" (50-1200mm), they are available in ductile iron bodies with ASME 125/150 flanges. For additional abrasion resistance, 100% flow area bodies can be lined with elastomers.

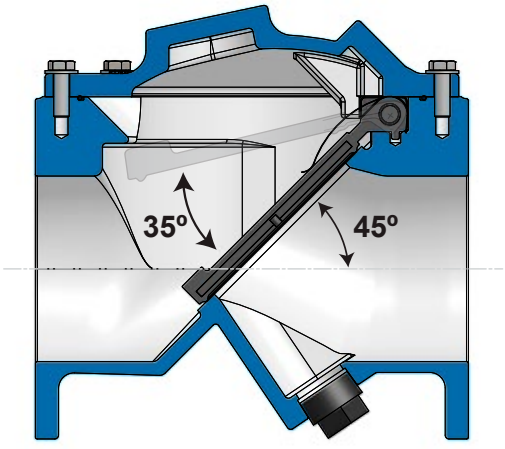
Since the APCO CRF Rubber Flapper Swing Check Valve was introduced in 1965, it has been operating successfully in thousands of installations. The features of the Rubber Flapper Swing Check Valve makes it ideally suited for applications such as raw sewage, water systems, industrial wastes, chemical lines,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

45° Angle Provides Non-Slam Properties

APCO CRF Rubber Flapper Swing Check Valves feature a 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 center line of the pipe, permitting horizontal or vertical flow up installation. The 45° angle on the body seat gives the valve non-slamming properties. The flapper travels 35° quickly from open to closed position upon pump shutdown, normally before flow reversal occurs, minimizing the potential for slam.

100% 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 low through the APCO Rubber Flapper Swing Check Valve.



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 Terpolymer of Ethylene Propylene & A Diene (EPDM) or other synthetic rubbers on application. A steel disc for strength and a steel bar are molded inside the flapper.

Flapper Prevents Jamming or Sticking and Provides Bubble-Tight Sealing

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.The o-ring seal molded into the disc face assures positive sealing, even at lower pressures. The flapper passed 1,000,000 cycles in accordance with AWWA C508 testing.

Leaf Spring Standard

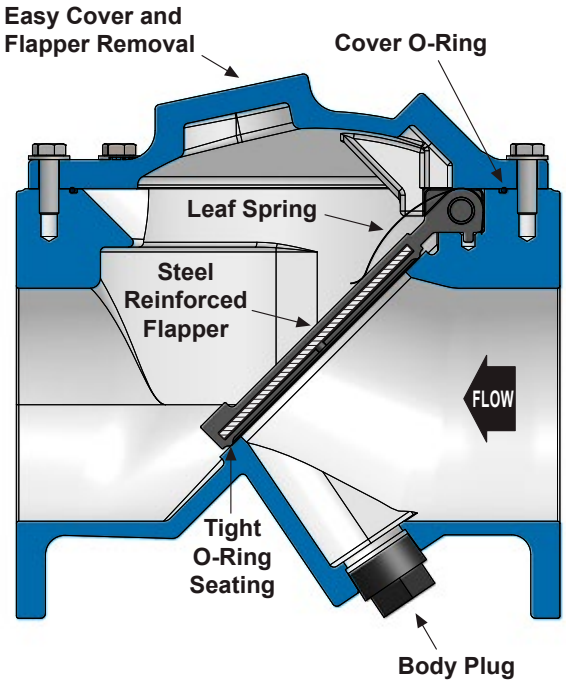
Standard construction includes an internal leaf spring to assist in closure prior to flow reversal.

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 contours readily accept the 1/8" rubber lining or coating. The result after lining is an encapsulated valve body that is protected from media exposure. Bodies can be lined with Natural Rubber (NR), Terpolymer of Ethylene Propylene & A Diene (EPDM) or Acrylonitrile-Butadiene (NBR).

No Regular Maintenance Required

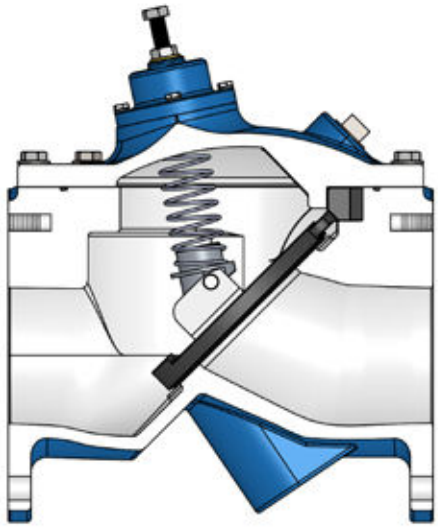
With only three major parts: Body, Flapper and Cover, the CRF Rubber Flapper Swing Check Valve requires relatively no maintenance. The flex portion of the flapper includes a special extended warranty for twenty-five years. If maintenance should be required, the flapper can be replaced in a matter of minutes. The flapper features a self-locating pin that ensures quick and error-free installation.



Rubber Flapper Swing Check Valve with Spring Return (SR) Option

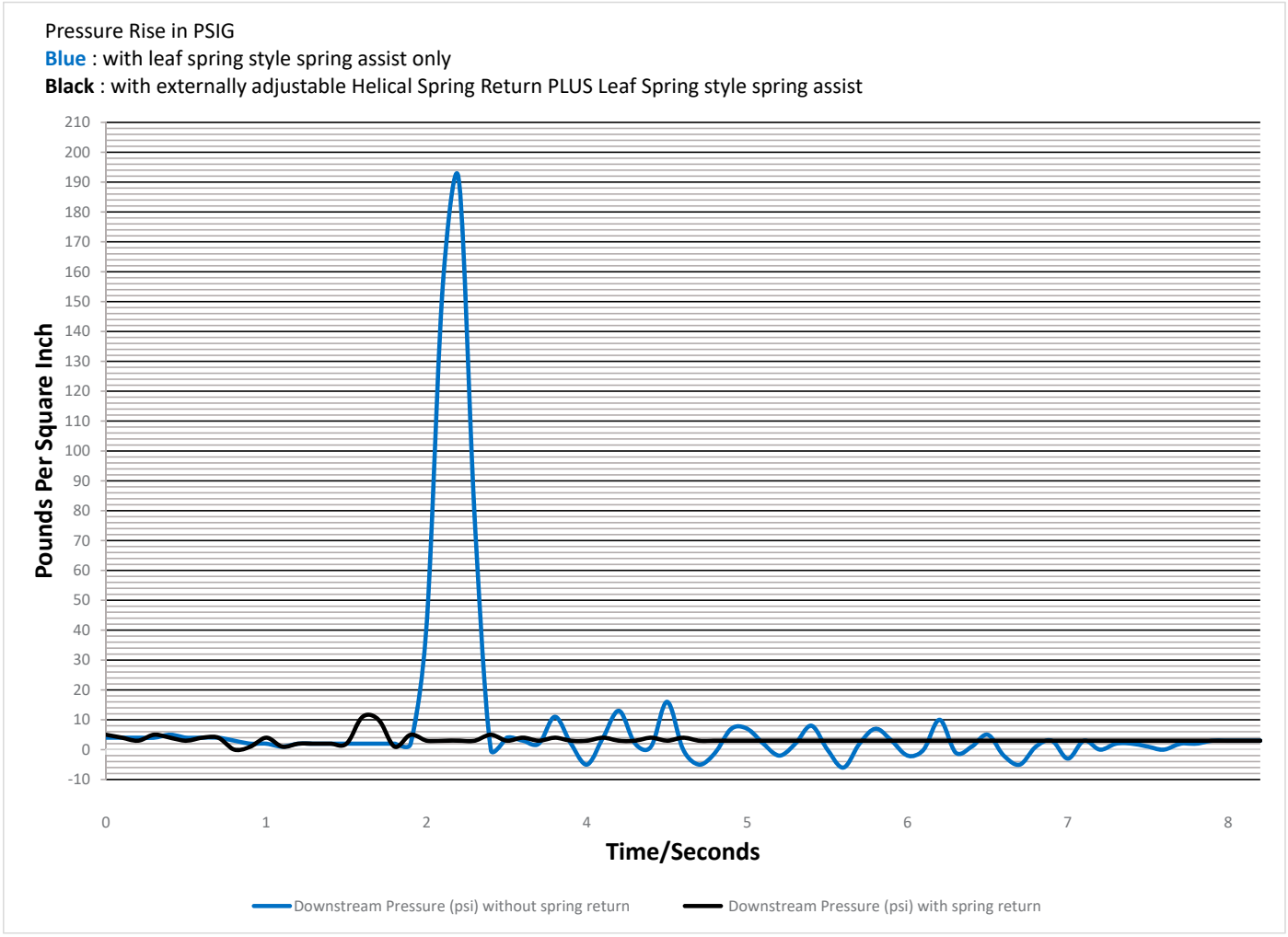
In difficult high head applications where rapid flow reversal can occur, standard swing check valves can potentially slam. The CRF with Spring Return was designed to eliminate or minimize slam in these applications, even in tough vertical flow-up installations.

The externally adjustable spring return accelerates flapper closure before flow reversal can occur. The 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 11 psi (76 kPa). This represents a 180 psi (1241 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.



Note: Field results may vary.

Hold Open Device (HOD) for Backflushing

The Hold Open Device can be ordered on the valve to make back-flushing the system, priming pumps or draining the system safe and convenient without risk of injury to operating personnel during a backflow procedure. This Hold Open Device will not slip during full backflow. The HOD can be operated without removing the check valve or taking the pump out of service.

Disc Position Indicator (PI) Option

The Disc Position Indicator is mounted to the cover and clearly identifies the position of the flapper upon visual inspection.

Proximity Switches Available

An inductive type proximity switch (SEL30) can be mounted on the position indicator. The switch transmits an electrical signal indicating when the flapper is fully closed. Switches must be ordered with Position Indicator (PI).

Body Styles

2-24" (50-600mm) Design

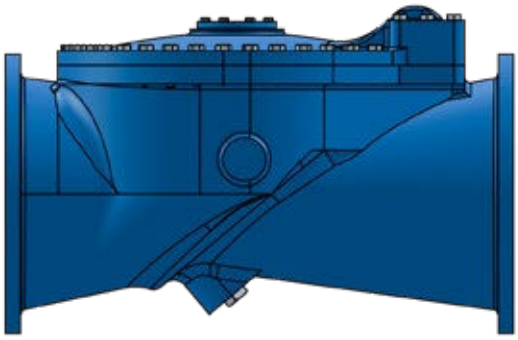
100C
ASME 125/150 Flanges, 250 psi (1965 kPa) CWP

30" (750mm) & Larger Design

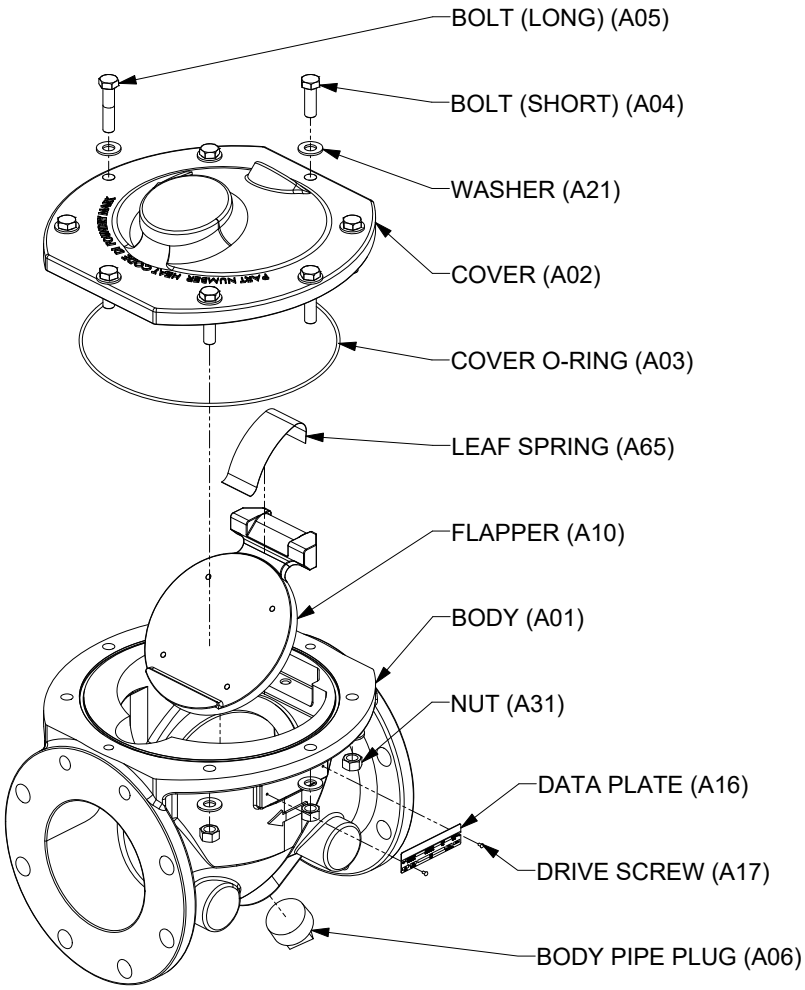
100
ASME 125/150 Flanges, 175 psi (1210 kPa) CWP

100SA (Spring Assist)
ASME 125/150 Flanges, 175 psi (1210 kPa) CWP

100SR (Spring Return)
ASME 125/150 Flanges, 175 psi (1210 kPa) CWP



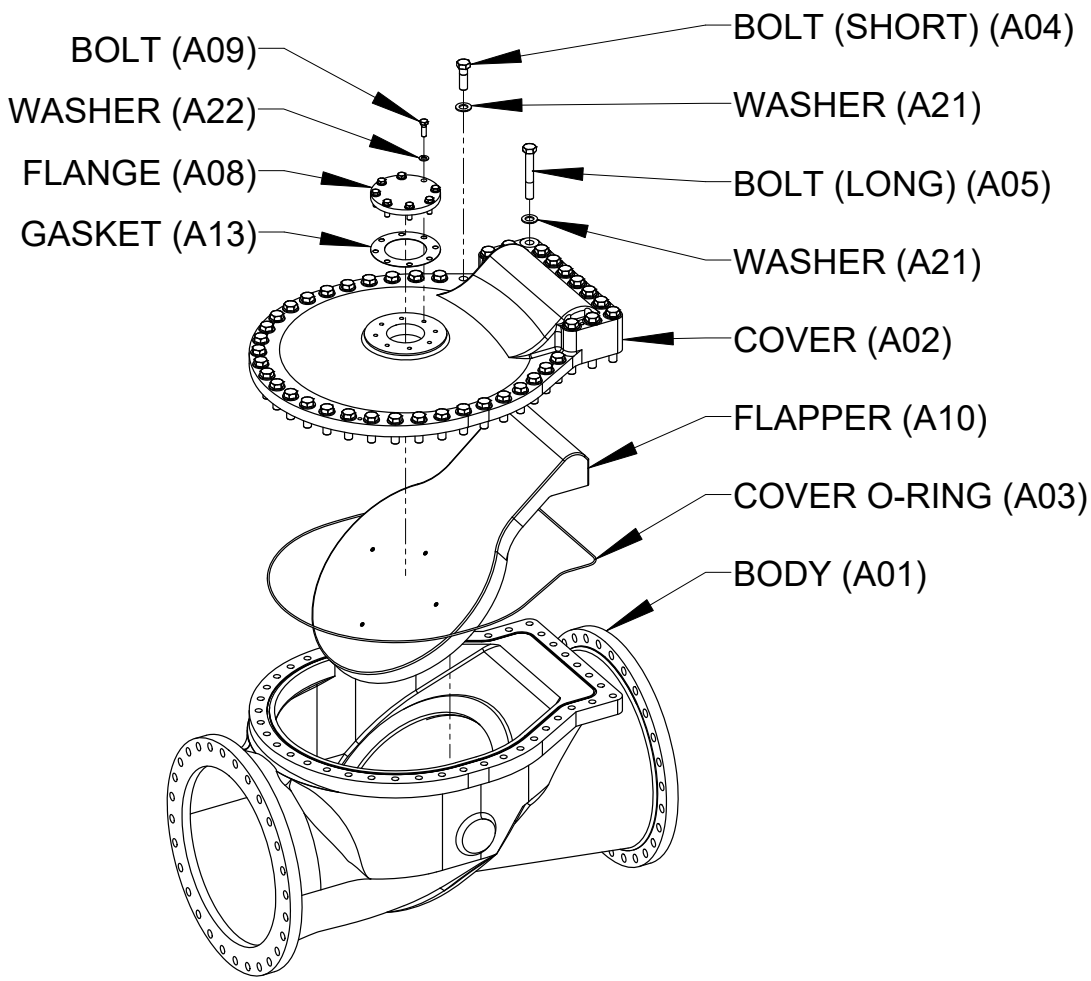
Materials of Construction



2-24" (50-600mm) Design

Item	Description	Material
A01	Body	Ductile Iron, ASTM A536, Grade 65-45-12
A02	Cover	Ductile Iron, ASTM A536, Grade 65-45-12
A03	Cover O-Ring	Terpolymer of Ethylene Propylene & A Diene (EPDM)
		Acrylonitrile-Butadiene (NBR)
A04	Bolt (Short)	316 Stainless Steel, ASTM F593, Grade G or H
A05	Bolt (Long)	316 Stainless Steel, ASTM F593, Grade G or H
A06	Body Pipe Plug	Zinc Plated Carbon Steel, SAE J502, Heat Treated
		304 Stainless Steel
A10	Flapper	Terpolymer of Ethylene Propylene & A Diene (EPDM)
		Acrylonitrile-Butadiene (NBR)
A16	Data Plate	316 Stainless Steel
A17	Drive Screw	18-8 Stainless Steel
A21	Washer	316 Stainless Steel
A31	Nut	316 Stainless Steel, ASTM F594F
A65	Leaf Spring	301 Stainless Steel, ASTM A666

Materials of Construction



30" (750mm) and Larger Design

Item	Description	Material
A1	Body	Ductile Iron, ASTM A536, Grade 65-45-12
A2	Cover	Ductile Iron, ASTM A536, Grade 65-45-12
A3	Gasket*	Non-asbestos with butadiene rubber binder
A4	Cover Bolt	316 Stainless Steel, or Steel A449, Grade 5
A5	Cover Bolt	316 Stainless Steel, or Steel A449, Grade 5
A6	Body Pipe Plug	Iron, Malleable, ASTM A48, Class 40
A10	Rubber Flapper	Reinforced NBR, Acrylonitrile-Butadiene, Carbon Steel ASTM A36
		Reinforced EPDM, Terpolymer of Ethylene Propylene & A Diene, Carbon Steel ASTM A36

*Cover gasket is not used on lined valves

Valve Selection

Pressure Ratings

Body Style	Maximum Differential Cold Working Pressure
100C	250 psi (1965 kPa)
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)
EPDM, Terpolymer of Ethylene Propylene & A Diene	-20 to 300° F (-29 to 150° 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:	
MSS SP-136	Ductile Iron 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

Flow Parameters

Valve Size	Cv* Kv* 100%Open
2" 50mm	105 91
3" 80mm	257 222
4" 100mm	437 378
6" 150mm	1111 961
8" 200mm	1855 1605
10" 250mm	3151 2726
12" 300mm	4397 3803
14" 350mm	6820 5899
16" 400mm	7851 6791
18" 450mm	11586 10022
20" 500mm	14168 12255
24" 600mm	20782 17976

*Cv = Flow in GPM of water at 1 psi pressure drop.
*Kv = Flow in m^3/hr. of water at 100 kPa pressure drop.

Valve Weights

Valve Size	Ductile Iron Body
2" 50mm	30 14
3" 80mm	50 23
4" 100mm	80 36
6" 150mm	130 60
8" 200mm	250 115
10" 250mm	470 215
12" 300mm	690 315
14" 350mm	820 375
16" 400mm	1050 480
18" 450mm	1350 615
20" 500mm	1530 700
24" 600mm	2310 1050

Pounds
Kilograms

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

Note: Larger sizes available, contact factory for pricing and availability

Body Style
Give body style code as follows:

100C	=	Rubber Flapper (2-24")
100	=	Rubber Flapper (30-48")
100SA	=	Rubber Flapper with Spring Assist (30")
100SR	=	Rubber Flapper with Spring Return (30")

End Connection
Give end connection code as follows:

F1	=	Flanged ASME 125/150

Body Material
Give body material code as follows:

Unlined		**Body Styles 100C, 100, 100SA, or 100SR**
DI	=	Ductile Iron (standard for 2-30")
Lined		**Body Style 100C, (2-24")**
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

Flapper Material
Give flapper material code as follows:

NBR	=	Acrylonitrile-Butadiene, -70 to 250° F (-57 to 121° C)
EPDM	=	Terpolymer of Ethylene Propylene & A Diene -20 to 300° F (-29 to 150° C)

Options
Give options code as follows:

DTR	=	DeZURIK Standard Certified Production Hydrostatic Shell & Seat Test Report
PI	=	Disc Position Indicator (3-30"), Unlined Valves Only
SR	=	Spring Return (3-30")
SB16	=	316 Stainless Steel Bolting (30")
AIS	=	American Iron and Steel. Valves conform to Consolidated Appropriations Act, 2014 section 436 (EPA, Clean Water and Drinking Water State Revolving Funds) and Consolidated Appropriations Act, 2017 section 746 (USDA RUS Water & Environmental Programs (WEP)). (2-24")
BABA	=	Build America, Buy America (2-24")
NSF	=	Drinking Water (2-24")

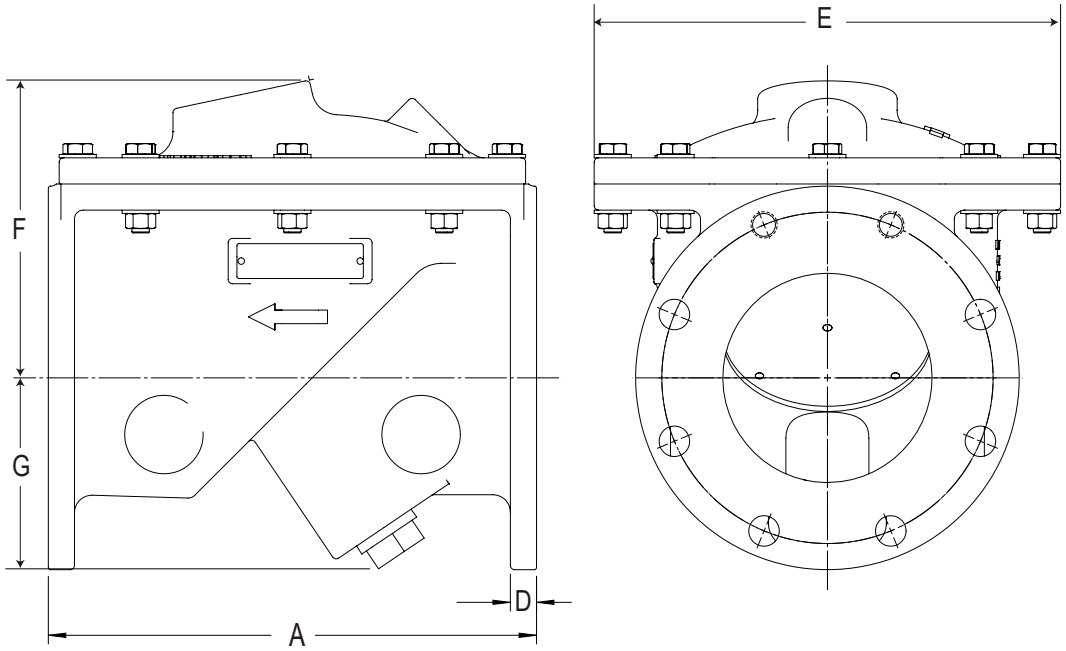
Accessories
Give accessory code as follows:

HOD	=	Hold Open Device (Back flush) (2-30")
SEL30	=	(1) Proximity Switch - SPDT GO 73-13566-B2, (3-30") Unlined Valves Only (Must be ordered with PI)

Ordering Example

CRF,10,100C,F1,DI,NBR*HOD

Dimensions

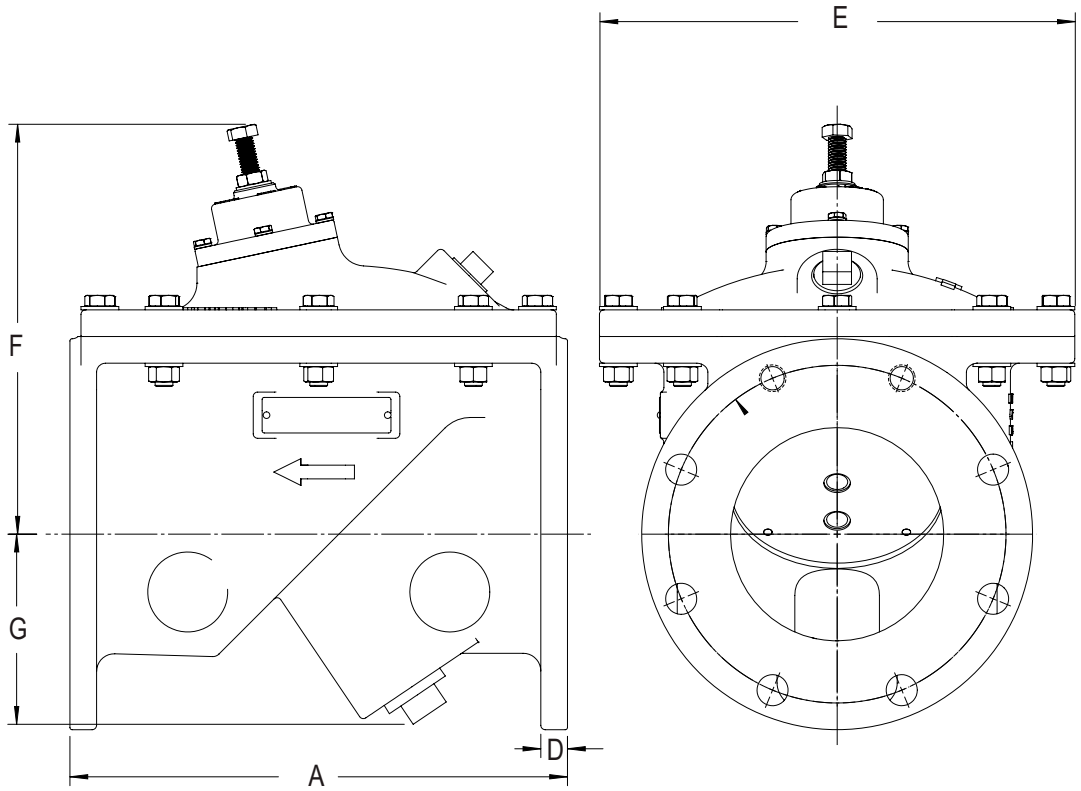


Basic Valve

Valve Size	A	D	E	F	G
2" 50mm	8.00 203	.69 18	5.55 141	3.88 99	2.88 73
3" 80mm	9.50 241	.81 21	7.50 191	6.00 152	3.63 92
4" 100mm	11.50 292	.75 19	12.28 312	6.88 175	4.13 105
6" 150mm	14.00 356	.75 19	13.38 340	8.63 219	5.75 146
8" 200mm	19.50 495	.88 22	17.75 451	10.00 254	7.00 178
10" 250mm	24.50 622	1.18 30	23.00 584	14.13 369	8.75 222
12" 300mm	27.50 699	1.25 32	24.50 622	14.88 378	10.25 260
14" 350mm	31.00 787	1.38 35	27.75 705	15.25 387	12.13 308
16" 400mm	36.00 914	1.43 36	30.00 762	16.75 425	12.13 308
18" 450mm	40.00 1016	1.56 40	33.00 838	18.25 464	13.75 349
20" 500mm	40.00 1016	1.68 43	35.25 895	20.75 527	15.00 381
24" 600mm	48.00 1219	1.88 48	40.25 1022	23.25 591	17.25 438

Inches
Millimeters

Dimensions

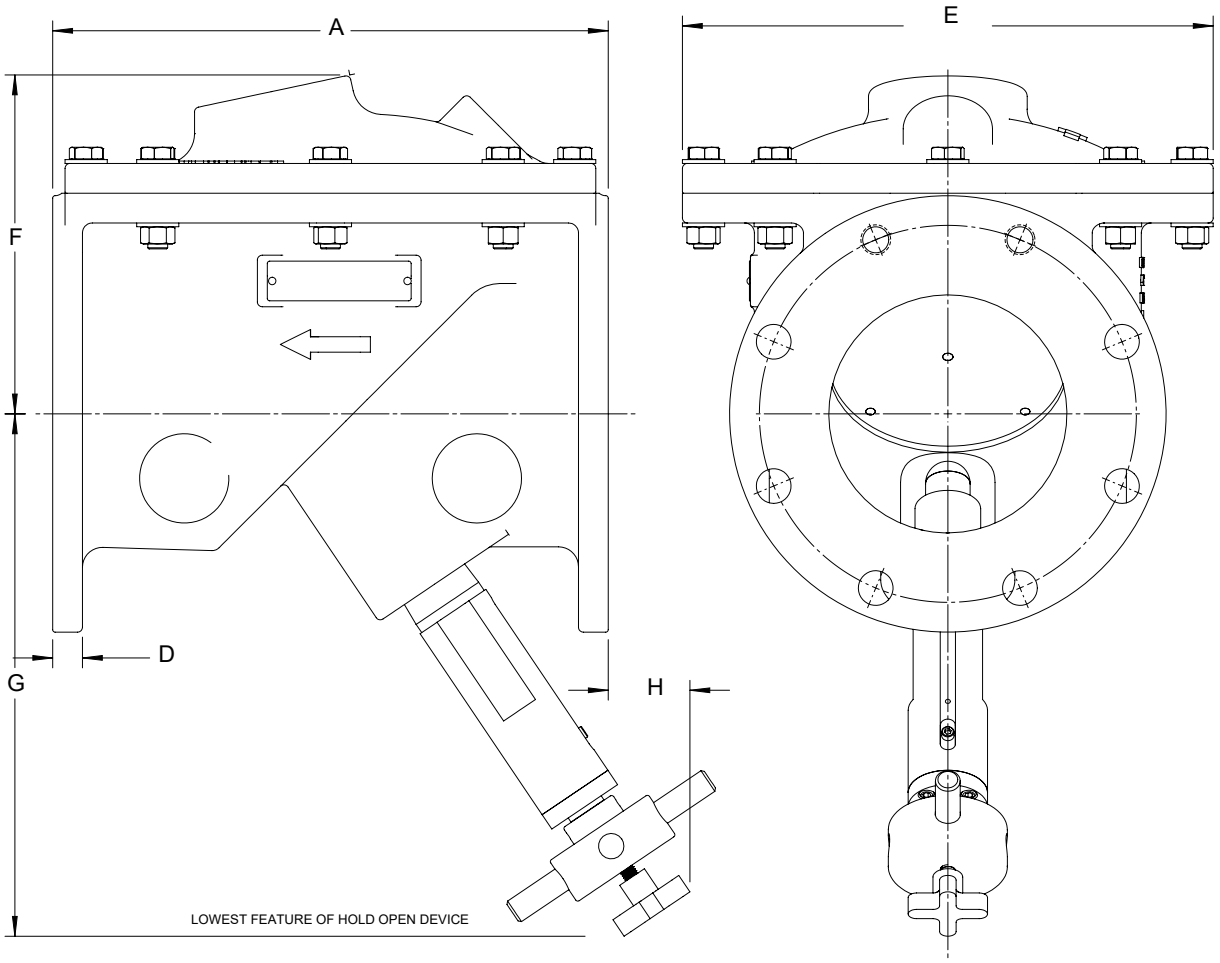


Spring Return (SR) Option

Valve Size	A	D	E	F	G
3" 80mm	9.50 241	.81 21	7.50 191	7.50 191	7.25 184
4" 100mm	11.50 292	.75 19	12.28 312	8.63 219	8.25 210
6" 150mm	14.00 356	.75 19	13.38 340	12.63 321	11.63 295
8" 200mm	19.50 495	.88 22	17.75 451	14.75 375	13.50 343
10" 250mm	24.50 622	1.18 30	23.00 584	18.38 467	17.25 438
12" 300mm	27.50 699	1.25 32	24.50 622	18.75 476	17.63 448
14" 350mm	31.00 787	1.38 35	27.75 705	19.88 505	18.88 480
16" 400mm	36.00 914	1.43 36	30.00 762	21.25 540	20.25 514
18" 450mm	40.00 1016	1.56 40	33.00 838	23.63 600	22.50 572
20" 500mm	40.00 1016	1.68 43	35.25 895	26.00 660	25.13 638
24" 600mm	48.00 1219	1.88 48	40.25 1022	28.38 721	27.38 695

Inches
Millimeters

Dimensions

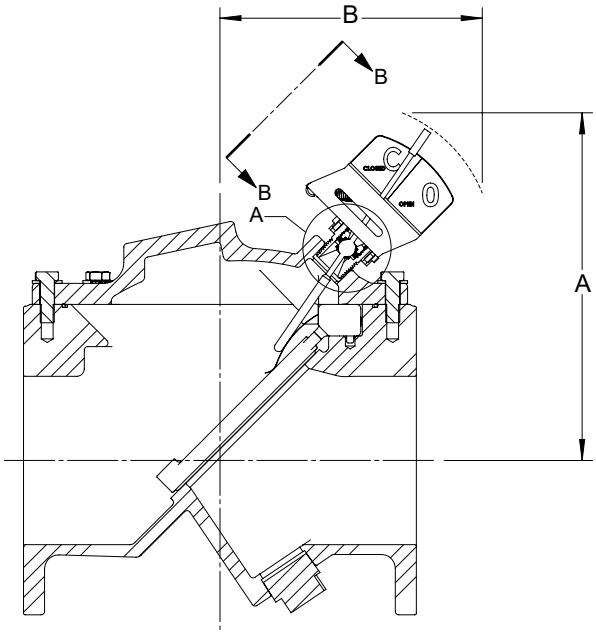


Hold Open Device (HOD) Option

Valve Size	A	D	E	F	G	H
2"	8.00	.69	5.55	3.88	11.50	3.50
50mm	203	18	141	99	292	89
3"	9.50	.81	7.50	6.00	12.38	3.50
80mm	241	21	191	152	314	89
4"	11.50	.75	12.28	6.88	14.75	5.00
100mm	292	19	312	175	365	127
6"	14.00	.75	13.38	8.63	13.38	2.75
150mm	356	19	340	219	340	70
8"	19.50	.88	17.75	10.00	16.25	2.13
200mm	495	22	451	254	413	54
10"	24.50	1.18	23.00	14.13	22.00	6.63
250mm	622	30	584	369	559	168
12"	27.50	1.25	24.50	14.88	23.13	5.50
300mm	699	32	622	378	587	138
14"	31.00	1.38	27.75	15.25	24.88	4.00
350mm	787	35	705	387	632	102
16"	36.00	1.43	30.00	16.75	25.00	-0.75
400mm	914	36	762	425	635	-19
18"	40.00	1.56	33.00	18.25	30.75	3.00
450mm	10.16	40	838	464	781	76
20"	40.00	1.68	35.25	20.75	32.25	4.50
500mm	1016	43	895	527	819	114
24"	48.00	1.88	40.25	23.25	34.00	0.75
600mm	1219	48	1022	591	864	.19

Inches
Millimeters

Dimensions



Position Indicator (PI) Option

Valve Size	A	B
3.0" 75mm	10.63 270	8.13 207
4.0" 100mm	11.63 295	9.13 232
6" 150mm	12.88 327	9.88 251
8" 200mm	14.50 368	9.88 251
10" 250mm	17.88 454	11.75 298
12" 300mm	17.88 454	12.38 314
14" 350mm	18.88 480	13.25 337
16" 400mm	20.13 511	13.25 337
18" 450mm	21.38 543	14.63 372
20" 500mm	23.00 584	15.88 403
24" 600mm	26.00 660	16.25 413

Inches
Millimeters

Sales and Service

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