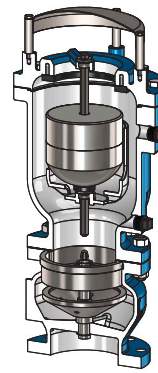


APCO CSV-1600A SURGE CHECK VALVE FOR SLOW CLOSING

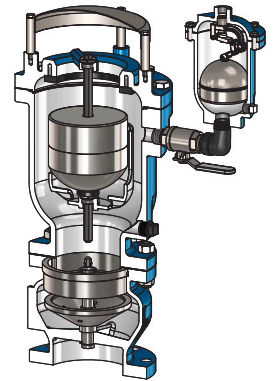
APCO CSV Surge Check Valves for Slow Closing AVV Air/Vacuum Valves & Slow Closing Dual Body Combination Valves

The APCO Surge Check Valve is designed to prevent critical shock conditions occurring in installations where the operating conditions could cause a regular Air Vacuum Valve to slam open and/or closed. The Surge Check Valve is bolted to the inlet of an APCO AVV Air/Vacuum Valve to protect it from slam.

The Surge Check Valve may be purchased as a complete assembly, or purchased separately to add to a previously installed air/vacuum valve. Because the Air/Vacuum Valve and the Surge Check unit are each self-contained items, the Surge Check can be added to any Air/Vacuum Valve already in service, making it into a Slow Closing Air Vacuum Valve. CSV Surge Check Valves are available in sizes 1-18" (25-450mm)



Slow Closing Air/Vacuum Valve, AVV Body Style 150 with CSV Surge Check Valve

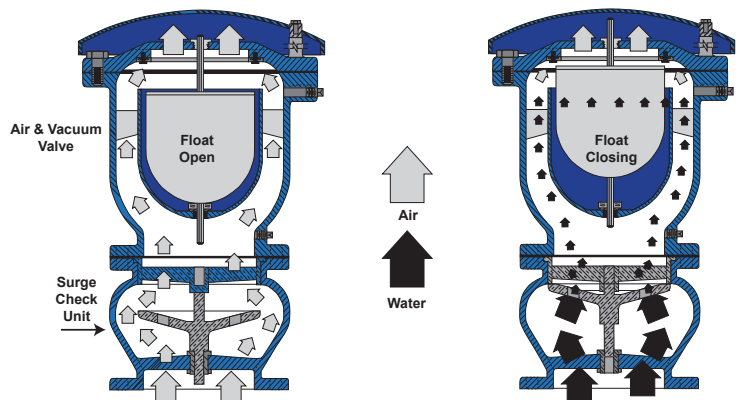


Slow Closing Dual Body Combination Valve, AVV Body Style 1800/1800K with CSV Surge Check Valve

Slow Closing Valve Operation

The Surge Check Valve operates on the interphase between the kinetic energy in the relative velocity flows of air and water. The Surge Check Valve is a normally open valve, so that air passes through unrestricted. When water rushes into the Surge Check Valve, the disc begins to close and reduces the rate of flow of water into the air valve by means of openings in the disc. This ensures normal, gentle closing of the Air/Vacuum Valve regardless of the initial velocity flows and minimizes pressure surges when the valve closes.

As soon as the Air/Vacuum Valve is closed, the pressure on both sides of the Surge Check Valve disc equalizes and the disc automatically returns to its open position. The Air/Vacuum Valve does not need an incipient vacuum to open; it can open at any time the water level drops and the line pressure approaches atmospheric level. This immediately allows the full re-entry flow of air into the pipeline before a vacuum can form.



The Air/Vacuum Valve allows air to escape freely during normal operation.

When water rushes into the Surge Check Valve, the disc closes to reduce the rate of flow into the air valve by means of throttling openings in the disc. Air passes through unrestricted.

Where to Use It

Because the pipeline media flows through the Surge Check Valve, it should be used in applications containing clean media. Following are locations where Surge Check Valves may be needed:

1. High points in pipelines where the hydraulic gradient and flow conditions are such that a negative pressure can possibly form.
2. High points on sections of pipelines having water velocities in excess of 10 fps (3.048 m/s).
3. Adjacent to any quick-closing valve in a pipeline such as a check or gate valve where a vacuum can be formed upon closure.
4. On the discharge of a larger deep well turbine pump, between the pump and the check valve.

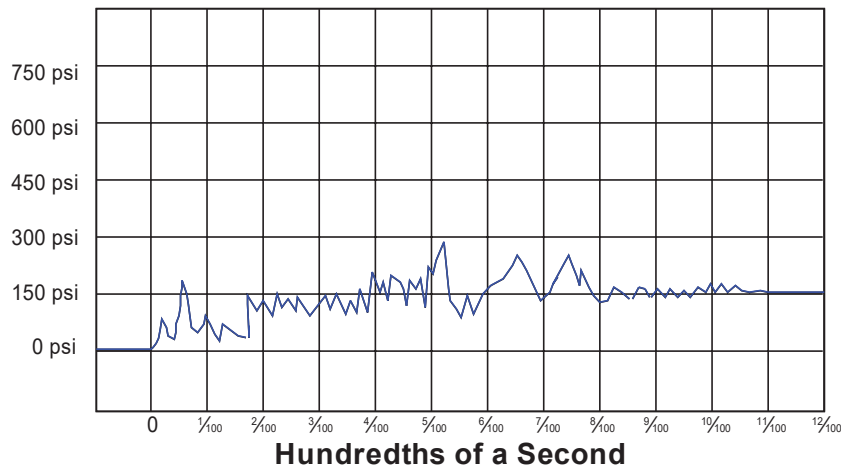
Surge Pressure Comparison

The Slow Closing Air/Vacuum Valve should not be considered as relief for shock conditions which develop elsewhere in the system. However, actual field tests prove the Surge Check Valve may protect the Air/Vacuum Valve from damage by severe shut-off shock.

The graphs below show actual surge pressures experienced closing a standard Air/Vacuum Valve under identical conditions with and without an APCO Surge Check Valve when filling a 150 psi line. Without the Surge Check Valve, the maximum surge pressure exceeds line pressure by 550 psi, or approximately five times line pressure. With the Surge Check Valve, the maximum surge pressure only exceeded the line pressure by 150 psi, or twice line pressure.

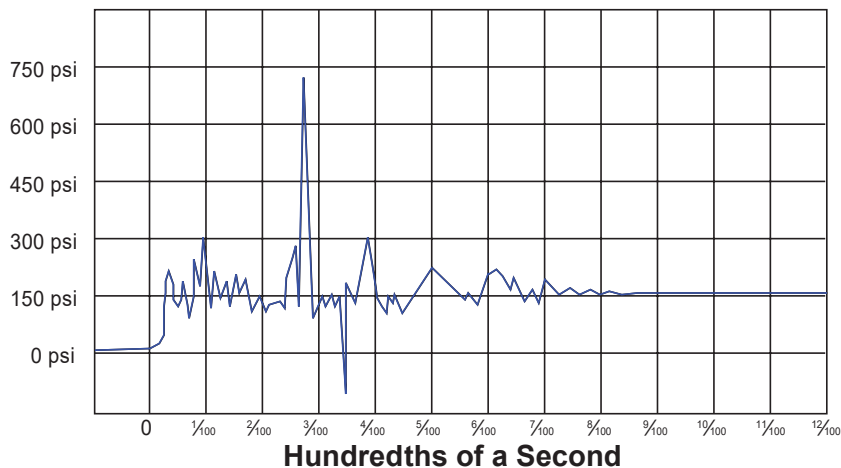
On especially critical installations, further surge dampening can be achieved by using two Surge Check Valves under the Air/Vacuum Valve. For pipeline shock protection, an APCO SRA Surge Relief Angle Valve can be used.

With Surge Check Units

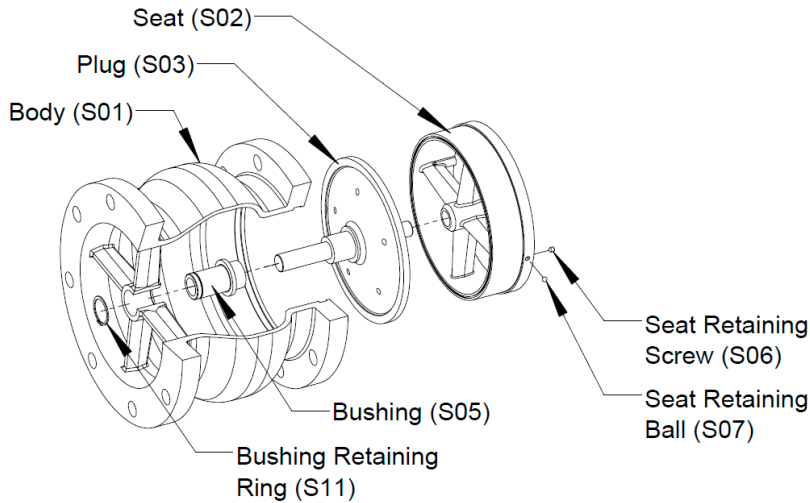


The pressure recordings were taken on a high speed oscillograph with a maximum frequency response of 5000 cps and a linograph travel of 10 inches per second.

Without Surge Check Units

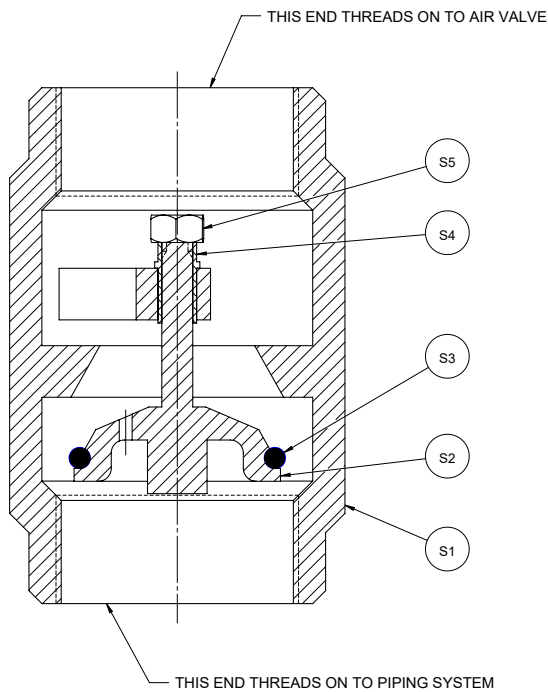


Materials of Construction



3-18" (80-450mm) Materials of Construction

Item	Description	Material
S01	Body	Ductile Iron, ASTM A536
		Carbon Steel, ASTM A216
S02	Seat	316 Stainless Steel, ASTM A743
S03	Plug	316 Stainless Steel, ASTM A743
S05	Bushing	316 Stainless Steel, ASTM A213
S06	Seat Retaining Ball	440 Stainless Steel
S07	Seat Retaining Screw	18-8 Stainless Steel
		316 Stainless Steel
S11	Bushing Retaining Ring	316 Stainless Steel, ASTM A240
		15-7PH Stainless Steel, ASTM A693



1" & 2" (25-50mm) Materials of Construction

Item	Description	Material
S1	Body	Silicone Bronze
S2	Plug	Silicone Bronze
S3	O-Ring	Acrylonitrile-Butadiene (NBR)
S4	Bushing	Stainless Steel
S5	Nut	Stainless Steel

Valve Selection

Pressure Ratings (CWP) - Ambient Temperature

Body Material	Maximum Differential Pressure	
	T1 Threaded Inlet	
	1" Valve Size	2" Valve Size
Bronze	400 psi (2760 kPa)	600 psi (4140 kPa)
Ductile Iron	N/A	N/A
Carbon Steel	N/A	N/A
316 Stainless Steel	N/A	N/A

Body Material	Maximum Differential Pressure		
	F1 Flanged	F2 Flanged	
		3-12" Valve Size	14-18" Valve Size
Bronze	N/A	N/A	N/A
Ductile Iron	250 psi (1720 kPa)	400 psi (2760 kPa)	300 psi (2070 kPa)
Carbon Steel	285 psi (1960 kPa)	450 psi (3100 kPa)	325 psi (2240 kPa)
316 Stainless Steel	275 psi (1900 kPa)	425 psi (2930 kPa)	325 psi (2240 kPa)

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

All valves are rated to a maximum temperature of at least 250° F (121° C).

Contact application engineering if the valve is required to operate above 250° F (121° C).

Applicable Standards

APCO CSV Surge Check Valves are designed and/or tested to the following standards:	
AWWA C-512	Air-Release, Air/Vacuum, and Combination Air Valves for Waterworks Service
ASME B16.5	F1/ASME Class 150 & F2/ASME Class 300 style flanged valves made from carbon steel or stainless steel
ASME B16.42	F1/ASME Class 150 & F2/ASME Class 300 style flanged valves made from ductile iron

Weights

Threaded Ends

Valve Size	Weight
1" 80mm	1 .5
2" 100mm	4 2

lbs.
Kg.

Flanged Ends

Valve Size	Weight	
	Class 125/150 (F1)	Class 250/300 (F2)
3" 80mm	28 13	31 14
4" 100mm	54 24	54 24
6" 150mm	70 32	96 44
8" 200mm	116 53	159 72
10" 250mm	168 76	247 112
12" 300mm	300 136	325 147
14" 350mm	392 178	440 200
16" 400mm	510 231	613 278
18" 450mm	594 269	800 363

Valve Selection - continued

Slow Closing Air/Vacuum Valve Selection

The following steps for selection will satisfy normal installations.

Contact your local DeZURIK representative for specific considerations.

1. Check pump curve for GPM (LPM) capacity at no head condition.
2. Refer to chart below to determine AVV Valve size.
3. If valve is to be installed inside pump house, specify discharge connection.
4. If the pump is scheduled to run for prolonged periods (6-8 hours) without stopping, Air Release Valve should be added.

5 psi with Slow Close Device

Pump Capacity No Head GPM/LPM	Size	Optional Air Release Valve Body Style
Below 6300 Below 23848	See Bulletin 586	
6301 - 13500 23852 - 51103	4" 100mm	200A
13501 - 32000 51107 - 121133	6" 150mm	200A
32001 - 60000 121137 - 227125	8" 200mm	200A
60001 - 90000 227128 - 340687	10" 250mm	200
90001 - 140000 340691 - 529958	12" 300mm	200
140001 - 180000 529961 - 681374	14" 350mm	200
180001 - 250000 681378 - 946353	16" 400mm	200

Inch
Millimeter

Ordering

To order the Surge Check Valve as a separate item, 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:

CSV = Surge Check Valve

Valve Size

Give valve size code as follows:

1 = 1" 25mm	10 = 10" 250mm
2 = 2" 50mm	12 = 12" 300mm
3 = 3" 80mm	14 = 14" 350mm
4 = 4" 100mm	16 = 16" 400mm
6 = 6" 150mm	18 = 18" 450mm
8 = 8" 200mm	

Body Style

Give body style code as follows:

1600A = Surge Check Valve

End Connection

Give end connection code as follows:

T1 = Threaded Inlet NPT (1" & 2")
Only Available with Certified Lead Free Silicon Bronze (BRZ) body, plug, and seat
F1 = Flanged, ASME 125/150 (3-18")
F2 = Flanged, ASME 250/300 (3-18")

Body Material

Give body material code as follows:

DI = Ductile Iron
CS = Carbon Steel (3-18")
S2 = 316 Stainless Steel (3-18")
BRZ = Bronze (1-2")

Plug & Seat Material

Give plug & seat material code as follows:

BRZ = Bronze (1-2")
S2 = 316 Stainless Steel (3-18")

Options

Give option code as follows if required:

DTR = DeZURIK Standard Certified Production Hydrostatic Shell & Seat Test Report
--- = Coatings, Contact Factory for special coatings

Ordering Example (separate item):

CSV,6,1600A,F1,DI,S2*

Refer to APCO AVV Air/Vacuum Valve bulletin for ordering as part of a complete assembly.

NOTE: Maximum operating temperature is a function of the materials used in the valve. All valves are rated to a maximum temperature of at least 400° F (205° C). Contact application engineering if the valve is required to operate above this temperature.

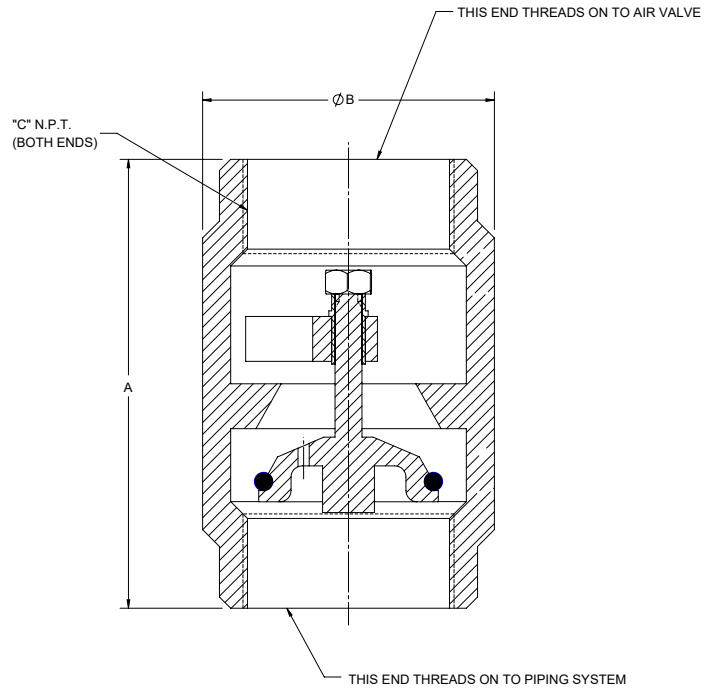
Additional sizes and materials available on application. Contact DeZURIK.

Dimensions

CSV Surge Check Valve with Threaded Inlet NPT

Valve Size	A	B	C
1" 80mm	3.63 92	1.88 48	1.00 25
2" 100mm	5.13 130	5.13 130	2.00 51

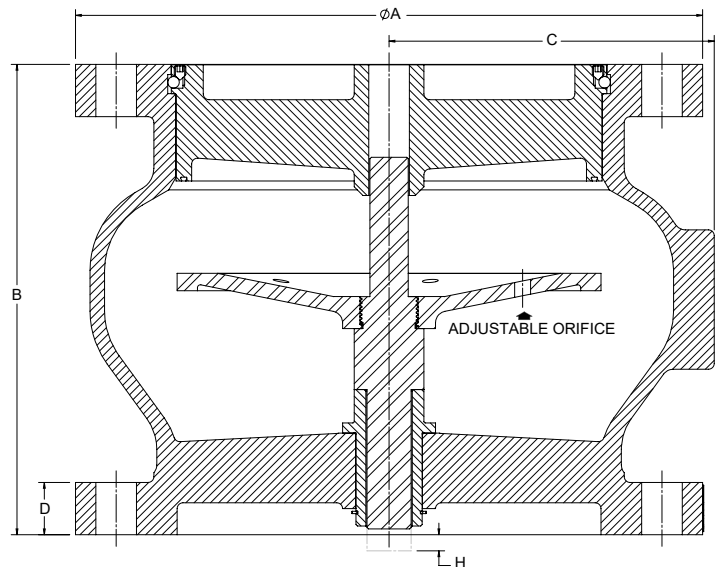
inches
millimeters



CSV Surge Check Valve with Flanged End Connection (F1 & F2)

Valve Size	A		B	C	D		H
	F1	F2			F1	F2	
3" 80mm	7.50 191	8.25 210	6.00 152	3.25 83	0.94 24	1.13 29	-
4" 100mm	9.00 229	10.00 254	7.25 184	4.13 105	0.94 24	1.25 32	-
6" 150mm	11.00 279	12.50 318	9.00 229	5.63 143	1.00 25	1.44 37	-
8" 200mm	13.50 343	15.00 381	10.13 257	7.00 178	1.13 29	1.63 41	-
10" 250mm	16.00 406	17.50 445	12.00 305	9.06 230	1.19 30	1.88 48	0.31 8
12" 300mm	19.00 483	20.50 521	14.38 365	10.38 264	1.25 32	2.00 51	0.31 8
14" 350mm	21.00 533	23.00 584	15.75 400	12.00 305	1.38 35	2.13 54	-
16" 400mm	25.50 597	25.50 648	17.63 448	13.31 338	1.44 37	2.25 57	0.69 18
18" 450mm	25.00 635	28.00 711	18.75 476	15.19 386	1.56 40	2.38 60	1.38 35

inches
millimeters



Sales and Service

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

Web Site: DeZURIK.com E-Mail: info@DeZURIK.com



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