



APCO SEWAGE AIR VALVES GENERATION II



Sewage Air Release Valve
Series 400 SARV



Sewage Air/Vacuum Valve
Series 401 SAVV
Patented Concave Float



Sewage Combination Air Valve
Series 440 SCAV

Generation II APCO Air Valves for Sewage Pipeline Systems

Effects of air in a pressurized closed-pipeline system must be recognized. An air pocket will decrease the cross sectional area and increase frictional pressure loss. The combined loss for two-phase flow (air and water) is always greater than the pressure loss for each phase flowing alone. Thus, air in a pipeline increases system flow resistance and increases system head against which pumps must operate.

Air may enter a piping system in many ways:

- (1) Air in the pipeline when initially filled may not be completely purged.
- (2) Air may be drawn in at a pump inlet by entrainment if the liquid level falls below the inlet elevation.
- (3) Air in solution (about 2% by volume) will be released at points in the pipeline where the pressure is reduced, especially where the line elevation is close to the hydraulic gradient.
- (4) Gas created from digested sewage.
- (5) Air may be drawn in through packings, seals and flanged joints.
- (6) Air may enter by vortexing at the pump.

Air in piping tends to collect at high points in the line when flow velocities are low. If the air pocket formed is large, part of it will be removed when the velocity increases. This partitioned air may or may not go through the system. It all depends on velocity, pipe size, and pipe down-slope. It may only move into the sloping straight section and then return to the summit when the velocity decreases.

While it is impossible to totally prevent accumulation of air (or gases) within the piping system, the volume can be greatly minimized by installing APCO Sewage Air Release Valves.

When air is present in a hydraulic pipeline, flows are erratic, unpredictable and have high head losses. Sewage works require Air Release Valves on pipeline high points.

All APCO Sewage Valves are furnished for 150 psi (1034 kpa). Higher pressures available. Specify if operating pressure is below 20 psi (138 kpa) for a lower durometer seat.

Backflushing Attachments Optional for All Sewage Valves

While sewage media is standing in the valve body, sediment will attempt to settle out at the bottom. This sediment may be flushed out periodically.

After installation, Sewage Valves should be inspected to determine need to backflush approximately once a year. Inspection takes only a few minutes and is simple:

1. Shut off the inlet valve.
2. Open the blow off valve and observe. If fluid drains out the valve body rapidly, flushing is not required.

Should heavy suspended solids and grease be anticipated, attachments shown are recommended for ease of flushing.

Sewage Combination Air Valve - Series 440 SCAV

- First in a single body
- No spills
- No spurts
- Shorter
- Patented Concave float

Now, APCO brings you the latest state of the art Sewage Air Valve design: a single body, double orifice "Sewage Combination Air Valve." Generation II...a new generation of air valve design.

Field tested under actual operating conditions. Incorporating all features that have made the 400 Sewage Air Release Valves and 401 Sewage Air/Vacuum Valves the world's finest...Now in a single body-plus a new concave float – to give even greater performance and reliability.

You no longer need to dig deeper trenches or build deeper vaults because the 440 series is at least 30% shorter than other models!

Valves that won't spill or spurt before shutting off. No more messy waste flooded valve vaults to pump out – or pump station floors to mop up – it shuts off drop tight.

Take a serious look at Generation II – APCO Sewage Valves. Manufactured to our industry's highest standards providing the highest efficiency and reliability of any sewage air valve available in the market today.



Series 440 SCAV

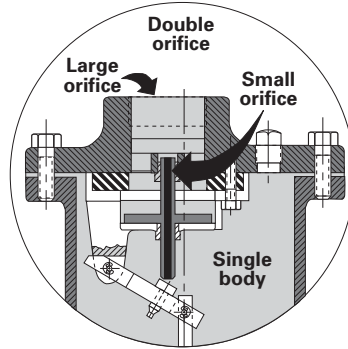
Model	Size	Inlet	Outlet	Height		Dia.	Weight	
				Valve	w/Attachments		Plain	w/Attachments
443	1" 25	2" NPT 50	1" NPT 25	19.5" 495	24.5" 622	9.5" 241	87 39	95 43
445	2" 50	2" NPT 50	2" NPT 50	20.5" 521	27" 686	9.5" 241	93 42	100 45
447	3" 80	3" NPT 80	3" NPT 80	23.5" 597	29.5" 749	11" 279	147 67	157 71
449	4" 100	4" NPT 100	4" NPT 100	23.5" 597	30" 762	11" 279	150 68	175 79
456	6" 150	6" 125 lb. Flange 150	6" 150	35" 889	39" 991	13.75" 349	242 110	297 135

Inch Pounds
Millimeter Kilograms

Sewage Combination Air Valve (Single Body) With Two Independent Orifices Series 440 SCAV

- Large orifice [for air out and in] (Air/Vacuum Valve function)
- Small orifice [for air release] (Under pressure function)
- Concave float

Two major complaints now remedied with APCO's introduction of the concave float.



1. Spillage

People easily tolerate and are reasonable about water spillage from valves but sewage is cause for some engineers and users alike to avoid use of Sewage Air Valves, regardless of need to a system.

During the past 30 years, the single most highly objectional complaint about the Sewage Air Valve is, "it spills" or "it spurts sewage."

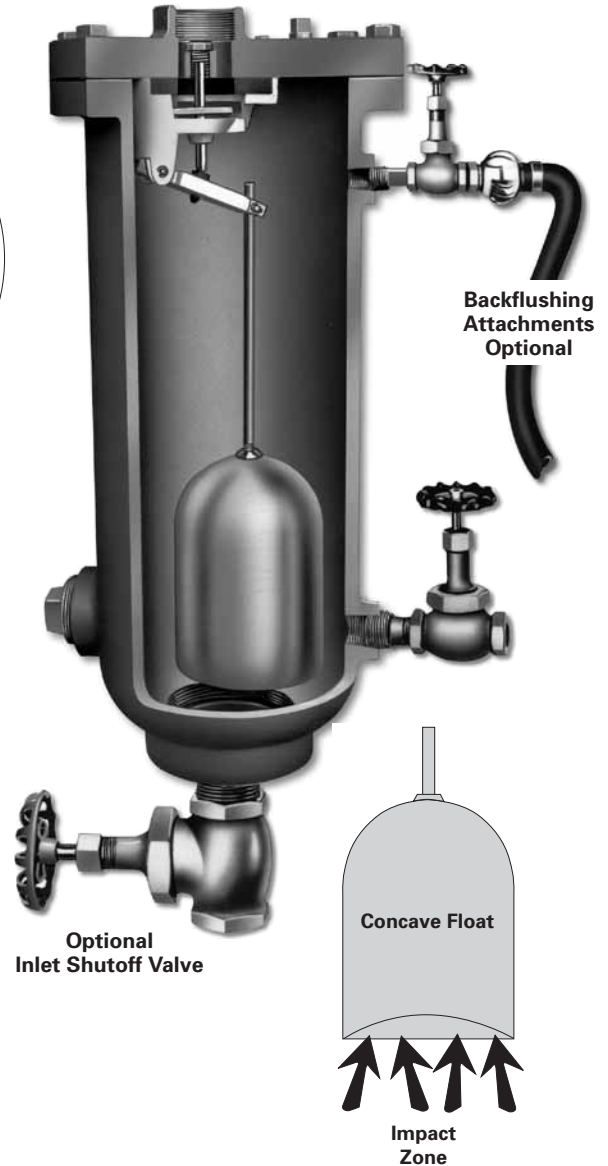
The concave float eliminates this complaint because of the unique impact zone which is extremely sensitive to sewage media entering the Sewage Air Valve. The impact zone causes instantaneous and upward movement of the float to shut-off the discharge orifice as soon as media contacts the float.

No spilling or spurting occurs even with low pressure (below 20 psi, 138 kpa).

2. Height

The second most objectional complaint has been height. Sewage Air Release Valves of standard design have been too tall, requiring deeper pipeline trenches and bigger valve vaults. These are costly requirements.

Now, the concave float with an impact zone allows fast action closure to create a greater air trap inside the Sewage Air Valve body than possible with the hemispherical style float. This new design is also 30% shorter in height.



Small Orifice		
Operating Pressure psi/kpa	Small Orifice Diameter	Venting Capacity CFAM
0-150 0-1034	.219" 6	68
0-300 0-2068	.156" 4	95

Inch
Millimeter

Higher operating pressures available

Specifications

Specify APCO With Confidence

Sewage Combination Air Valve Series 440 SAVV

Sewage Combination Air Valve (single body, double orifice) allows large volumes of air to escape or enter through the larger diameter orifice when filling or draining a pipeline.

When the pipeline is filled and pressurized the large air/vacuum orifice shall stay closed, but the smaller diameter air release orifice shall remain operative and open to allow small pockets of air accumulation to escape automatically and independently of the large orifice.

The large air/vacuum orifice shall shut off when the free floating-center guided plug is raised into the orifice by the lifting force of the concave - bottom float. The large orifice shut-off shall be "without spilling."

The Buna-N seat must be fastened to the valve cover, without distortion, for drop-tight shut-off.

The overall height and width shall not exceed the dimensions shown on the table on page 3.

Optional - Inlet and blow off valves, quick disconnect couplings and minimum 5' (1.5m) hose for flushing. Engineer to specify.

Materials of construction shall be certified the following ASTM specifications:

Body & Cover	Cast Iron	ASTM A126 GR.B
	Ductile Iron	ASTM A536 GR 65-45-12
Patented Concave Float	Stainless Steel	ASTM A240 T304
Stem	Stainless Steel	Series T300
Needle and Seat	Buna-N	Nitrile Rubber
Plug (1"-4")(25-102mm)	Brass	ASTM B124
(6" size)(152mm)	Stainless Steel	ASTM A240 T304
Leverage Frame (1"-2")(25-51mm)	Delrin or Cast Iron (3"-4"-6")	ASTM D4181/ASTM A126 GR.B
Exterior Paint	Universal Metal Primer	FDA Approved for Potable Water

Sewage Air/Vacuum Valve - Series 401



Series 401 and larger Model APCO Sewage Air/Vacuum Valves are specifically designed for operation on sewage and waste media.

Air/Vacuum Valves are needed to vent large volumes of air when the sewage line is filled and allow air to re-enter when draining, to prevent vacuum or column separation occurring. Sewage Air/Vacuum Valves utilize two floats, each connected to a common stem which is guided through a bushing.

The upper float shuts off instantaneously against the seat, due to the impact zone and lifting force of the much larger concave bottom float, as sewage media enters the valve body.

Once closed, and pressurized, the Air/Vacuum Valve will not open to release air. It will open under negative pressure allowing air to re-enter and prevent vacuum from forming in the line.

Dimensions and Specifications

Series 401 Sewage Air Vacuum Valve

Model	Size		Height		Major Dia.	Weight	
	Inlet	Outlet	Valve	w/Attachments		Plain	w/Attachments
401	<u>2" NPT</u> 50	<u>1" NPT</u> 25	<u>16.25"</u> 413	<u>20"</u> 508	<u>7"</u> 178	<u>41</u> 19	<u>55</u> 25
402	<u>2" NPT</u> 50	<u>2" NPT</u> 50	<u>19.75"</u> 502	<u>23.5"</u> 597	<u>9.5"</u> 241	<u>85</u> 39	<u>115</u> 52
403	<u>3" NPT</u> 80	<u>3" NPT</u> 80	<u>19.75"</u> 502	<u>23.75"</u> 603	<u>9.5"</u> 241	<u>85</u> 39	<u>118</u> 54
404	<u>4" NPT</u> 100	<u>4" Plain</u> 100	<u>30"</u> 762	<u>35.25"</u> 895	<u>12"</u> 305	<u>130</u> 59	<u>200</u> 91
406	<u>6" FLG</u> 150	<u>6" Plain</u> 150	<u>32.5"</u> 826	<u>36.5"</u> 927	<u>16"</u> 406	<u>190</u> 86	<u>290</u> 132
408	<u>8" FLG</u> 200	<u>8" Plain</u> 200	<u>36"</u> 914	<u>40"</u> 1016	<u>18"</u> 457	<u>310</u> 141	<u>430</u> 195
410	<u>10" FLG</u> 250	<u>10" Plain</u> 250	<u>41"</u> 1041	<u>45"</u> 1143	<u>20"</u> 508	<u>600</u> 272	<u>800</u> 363
412	<u>12" FLG</u> 300	<u>12" Plain</u> 300	<u>47"</u> 1194	<u>53.5"</u> 1359	<u>25"</u> 635	<u>750</u> 340	<u>980</u> 445
414	<u>14" FLG</u> 350	<u>14" Plain</u> 350	<u>51.5"</u> 1308	<u>57.25"</u> 1454	<u>29"</u> 737	<u>950</u> 431	<u>1230</u> 558

Inch Pounds
Millimeter Kilograms

4" (100mm) and larger flanged outlets available.

Specify APCO with Confidence - Sewage Air/Vacuum Valve Series 401

Sewage Air/Vacuum Valves shall allow unrestricted venting or re-entry of air through it during filling or draining of the force main to prevent vacuum. The Sewage Air/Vacuum Valve shall incorporate (2) stainless steel floats directly connected by a stainless steel stem, to maintain an air gap between the bottom concave float and top shut-off float. The air gap shall retard waste solids from fouling or clogging the top shut-off float. The internal baffle shall be fitted with a guide bushings and act to protect the shut-off float from direct air flow. The baffle shall retain the Buna-N seat in place, without distortion for tight shut-off.

All internals shall be easily removed thru the top cover without removing the main valve from the line. The complete valve shall withstand 500 psi (3447 kpa) test. Optional - Inlet and blow off valves, quick disconnect couplings and minimum 5' (1.5m) hose for flushing. Engineer to specify.

The valve manufacturer shall furnish professionally printed installation and maintenance instruction manuals with each valve.

Materials of construction shall be certified the following ASTM specifications:

Body, Cover and Baffle	Cast Iron	ASTM A126 GR.B
	Ductile Iron	ASTM A536 GR 65-45-12
Upper Float	Stainless Steel	ASTM A240
Patented Concave Lower Float	Stainless Steel	ASTM A240 T304
Stem, Guide Bushing	Stainless Steel	Series T300
Seat	Buna-N	Nitrile Rubber
Exterior Paint	Universal Metal Primer	FDA Approved for Potable Water

Sewage Air Release Valve - Series 400 & 450

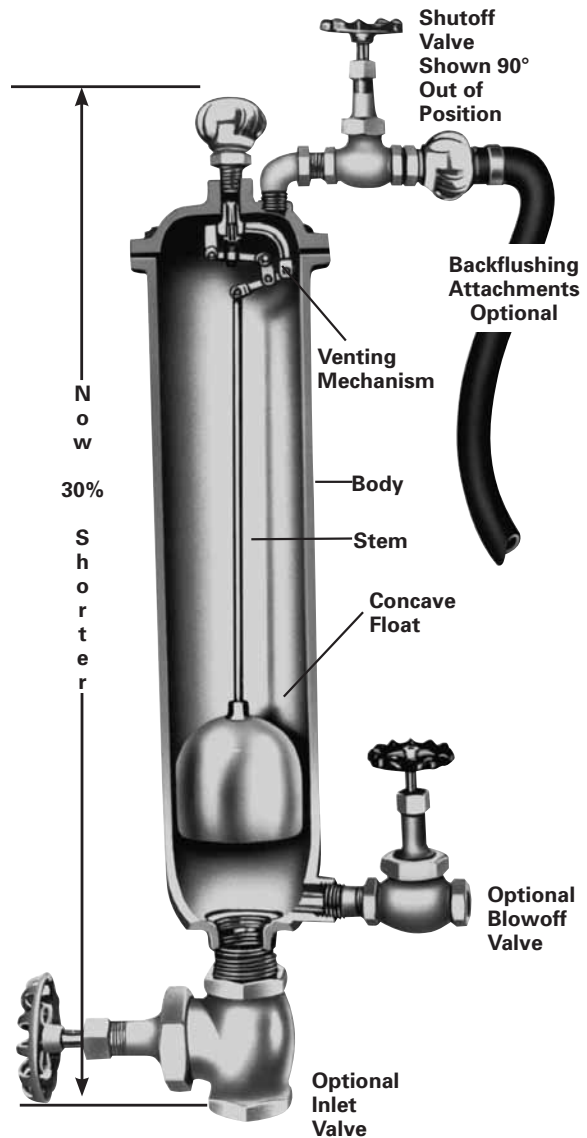
Series 400 and 450 APCO Sewage Air Release Valves are specially designed for use with sewage and waste media.

The concave float, stem and body keep the valve venting mechanism as free from contact with sewage as possible. The float hangs freely in the center of the valve body and responds instantaneously to the fall and rise of the sewage media due to the concave float.

How It Works

When sewage enters the valve, it rises, forcing air out ahead of it. Then as sewage reaches the concave float, it raises the float and float stem instantly, due to the very sensitive impact zone. This fast action closes the venting mechanism, trapping the remaining air in the valve body. This entrapped air is initially at atmospheric pressure but it's compressed after the venting mechanism closes. The sewage continues rising in the valve, until air and sewage are at the same pressure. The sewage then stops rising, leaving the venting mechanism free from contamination.

Additional gases given off by the sewage rise into the valve body, displacing and lowering the sewage level until the float drops, opening the venting mechanism allowing gases to escape. Sewage again rises to occupy the space vacated by the escaped gas, lifts the float and closes the venting mechanism. This cycle is repeated frequently as air and gas collect in the valve without spillage or spurling, due to the sensitivity of the patented concave float.



Dimensions and Specifications

Series 400 & 450 Sewage Air Release Valves

Model	Size		Height		Major Dia.	Operating Pressure psi/kpa	Orifice Dia.*	Venting Capacity CFAM	Weight	
	Inlet	Outlet	Valve	w/Attach.					Plain	w/Attach.
400	2" NPT 50	.5" NPT 13	17.5" 445	23.5" 597	7.5" 191	0-50 0-345	.313" 8	55	41 19	55 25
	3" NPT 80					0-150 0-1034	.25 STD 6	90		
	4" NPT 100					0-300 0-2068	.156" 4	25		
450	2" NPT 50	1" NPT 25	20" 508	26.5" 673	9.5" 241	0-150 0-1034	.5" STD 13	350	85 39	118 54
	3" NPT 80					0-300 0-2068	.438" 11	520		
	4" NPT 100									

Inch Pounds
Millimeter Kilograms

*Orifice diameter is determined by pressure, not by size.

Specify APCO With Confidence Sewage Air Release Valve Models 400 & 450

Sewage Air Release Valves shall have an elongated body and be designed to operate (open) while pressurized allowing entrained air in a sewage force main line, sewage pump or waste water system to escape through the air release orifice without spillage or spurting. After entrained air escapes through the air release orifice, the valve orifice shall be closed by a needle mounted on a compound lever mechanism, (energized by a concave float) and prevent media from escaping. The air release orifice will then remain closed until more air accumulates and the opening cycle repeats automatically. The internal compound lever mechanism shall be stainless steel to prevent corrosion. Optional: Inlet and blow off valves, quick disconnect couplings and minimum 5' (1.5m) hose for flushing. Engineer to specify.

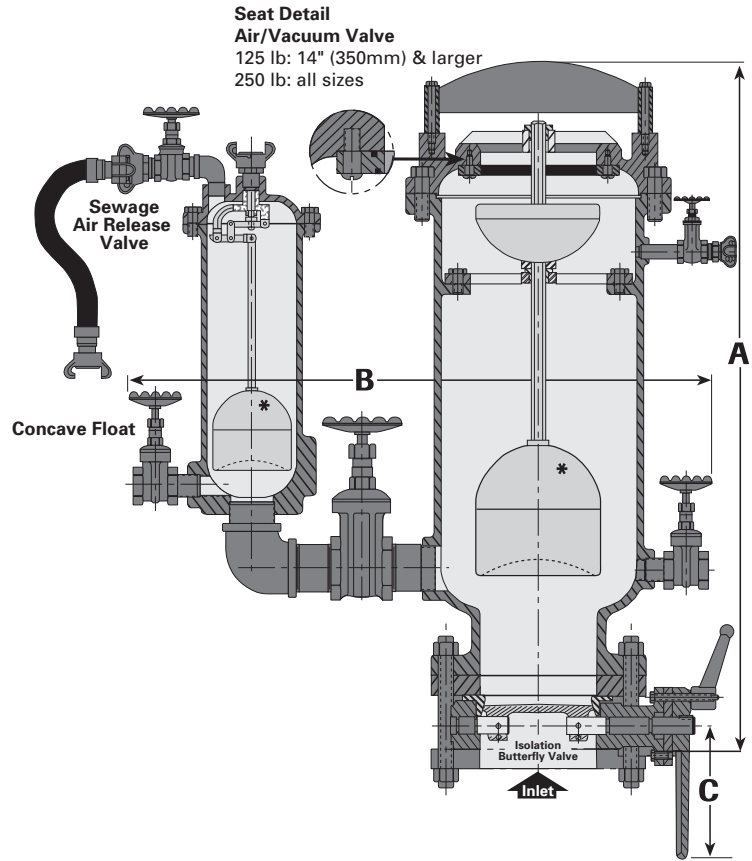
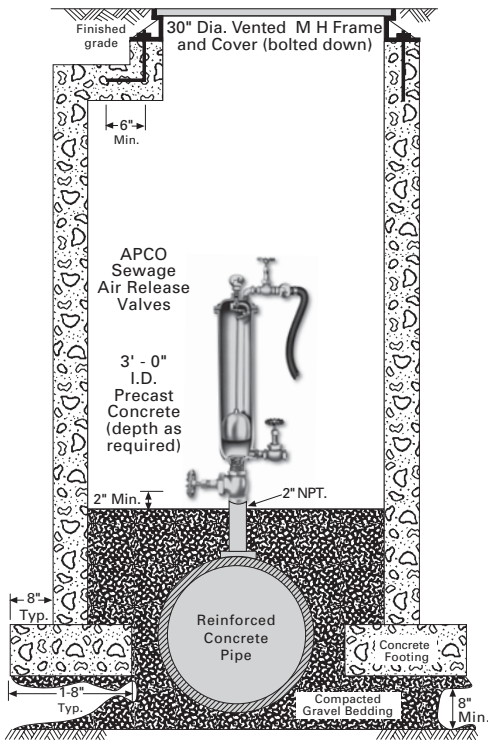
The internal linkage shall be fitted with a stem, having a stainless steel concave float threaded onto the opposite end. The concave float shall hang inside the valve body, slightly above the inlet and maintain an air gap between the lever mechanism and the waste media. The valve body and float shall withstand 500 psi (3447kpa) shell test pressure. The valve inlet shall be 2", 3", 4" NPT (50, 80, 100mm) Model 400 or 450. Engineer to specify.

Materials of construction shall be certified the following ASTM specifications:

Body & Cover	Cast Iron	ASTM A126 GR.B
	Ductile Iron	ASTM A536 GR 65-45-12
Internal Linkage, Stem	Stainless Steel	Series T300
Patented Concave Float	Stainless Steel	ASTM A240 T304
Needle	Buna-N	Nitrile Rubber
Exterior Paint	Universal Metal Primer	FDA Approved for Potable Water

Custom Combination Sewage Air Valves

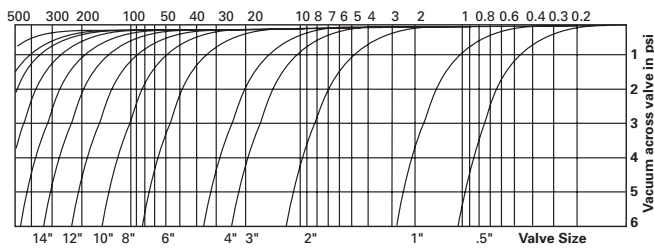
Typical pit installation detail for Sewage Air Valve



Performance graph

For Air/Vacuum Valve inflow/outflow thru valve in standard cubic feet of free air per second, (SCFS) test conducted by: Phillips Petroleum Company Engineering Department — Test Division Edmond Plant Feb. 2, 1961 Southern Research Institute Birmingham, Alabama May 8, 1959

Inflow

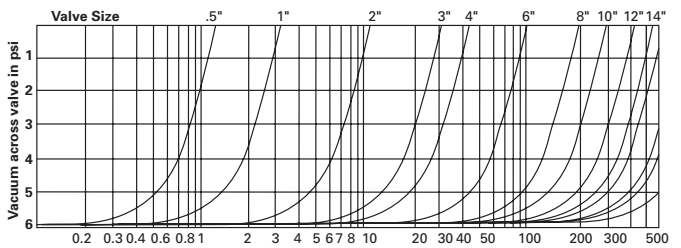


Curves shown are actual flow capacities at 14.7 psi barometric pressure and at 70°F temperature base on actual test.

These figures are not merely flow capacities across the orifice, but flow capacities across the entire valve.

In the test set-up, air approach velocity is negligible therefore, actual flow capacity exceeds the values shown on the chart.

Outflow



For accurate size selection use DeZURIK/APCO Air Valve Computer software. Apslide available upon request.



Specify APCO With Confidence Custom Combination Sewage Air Valve Series 400C

Custom Combination Sewage Air Valve shall be dual function; venting large volumes of air through the large orifice and small pockets of air through the small orifice before shutting off. Thereafter, while pressurized, collecting pockets of air will be vented through the small orifice automatically. Should vacuum develop in the force main, both orifices shall be open permitting large volumes of air to re-enter to break the vacuum.

The Custom Combination Sewage Air Valve shall consist of an independent large orifice Air/Vacuum Valve with an independent small orifice Air Release Valve side connected. The small orifice air valve shall be separated from the large orifice by a 2" (50mm) gate valve. The large orifice air valve shall incorporate one upper float and one lower concave float; thereby maintaining an air gap between the concave bottom float and upper shut-off float.

The small orifice air valve shall have an internal compound lever mechanism including a long float stem with a stainless steel float thereby maintaining an air gap between the float and the mechanism. The air gaps shall retard waste solids from clogging the upper shut-off float of the large orifice and the lever mechanism of the small orifice valve.

The Air/Vacuum Valve inlet shall be flanged 6" - 14" (150 - 350mm). The outlet shall be plain with hood or flanged. Engineer to specify.

The side connected Air Release Valve shall have a 2" (50mm) NPT inlet and 1/2" (15mm) NPT outlet. The small orifice shall be 1/4" (6mm) diameter for operating (opening) pressure up to 150 psi (1034kpa) and venting capacity of 90 CFFAM.

Optional Backflushing Attachments:

Custom Combination Sewage Air Valve shall be fitted with two inlet isolation Valves: 2" (50mm) all Bronze gate valve to isolate the Air Release Valve from the Air/Vacuum Valve. One 6" - 14" (150 - 350mm) APCO Butterfly Valve or Gate Valve to isolate the Air/Vacuum Valve from the force main. Two blow off valves, two flush valves and minimum of 5' (1.5m) rubber hose with quick disconnects for back-flushing. The manufacturer shall certify venting capacity and provide maintenance manuals with each valve.

Materials of construction shall be certified to the following ASTM specifications

Body, Cover	Cast Iron	ASTM A126 GR.B
	Ductile Iron	ASTM A536 GR 65-45-12
Float Stem	Stainless Steel	Series T300
Internal Linkage	Stainless Steel	Series T300
Needle and Seat	Buna-N	Nitrile Rubber
Patented Concave Float	Stainless Steel	ASTM A240 T304
Exterior paint	Universal Metal Primer	FDA Approved for Potable Water Contact

Valve to be APCO Series 400C Custom Combination Sewage Air Valve with attachments.

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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