



APCO VACUUM RELIEF/ AIR INLET VALVES



Series 1500

Vacuum Relief/Air Inlet Valves

Pipeline Vacuum Prevention And Water Hammer Control

APCO Vacuum Relief/Air Inlet Valves are proven reliable. They were first introduced over thirty years ago in cooperation with a major midwest consulting engineering firm for their water transmission pipeline project in Sao Paulo, Brazil. Forty 8" (200 mm) size valves were installed without a single failure.

APCO Vacuum Relief/Air Inlet Valves were selected because they are ruggedly constructed with a cast iron body and heavy bronze internals, utilizing a precisely coiled and annealed stainless steel spring. Shut-off is "drop-tight." Our resilient seating is "compression molded" (not glued or chemically bonded).

A Vacuum Relief/Air Inlet Valve is generally shut for prolonged periods and often not readily accessible for inspection. Therefore, it is critically important to the design engineer and client to select a reliable high quality valve.

Vacuum Prevention

The Vacuum Relief/Air Inlet Valve is normally closed. Should the system pressure become negative, the Vacuum Relief/Air Inlet Valve will immediately admit air into the system and prevent a vacuum from forming. When system pressure returns to positive, the Vacuum Relief/Air Inlet Valve closes air tight. Standard Vacuum Relief/Air Inlet Valves are designed to open with a minimal 0.25 psi (2 kpa) pressure differential across the orifice. Higher or lower relief settings are available to suit the application.

Where to Install

The Vacuum Relief/Air Inlet Valve should be installed at high points on a pipeline or a tank or level points on a pipeline where it has been determined a vacuum will occur.

This vacuum may:

- Cause the pipeline or tank to collapse, or
- Cause water column separation to take place resulting in water hammer (pressure surge) when the water column rejoins.

Damages Due to Vacuum Conditions

Note: Severity of damage due to water column separation and resulting pressure surges in a pipeline when the column rejoins will generally cause greater damage than the initial vacuum condition. However, a vacuum condition can be sufficient to collapse a thin wall pipeline or a sealed water tank.

**Recommended for water or sewage applications.
(Slightly different configuration for sewage applications.)**

Vacuum Relief/Air Inlet Valves

Pictured below:

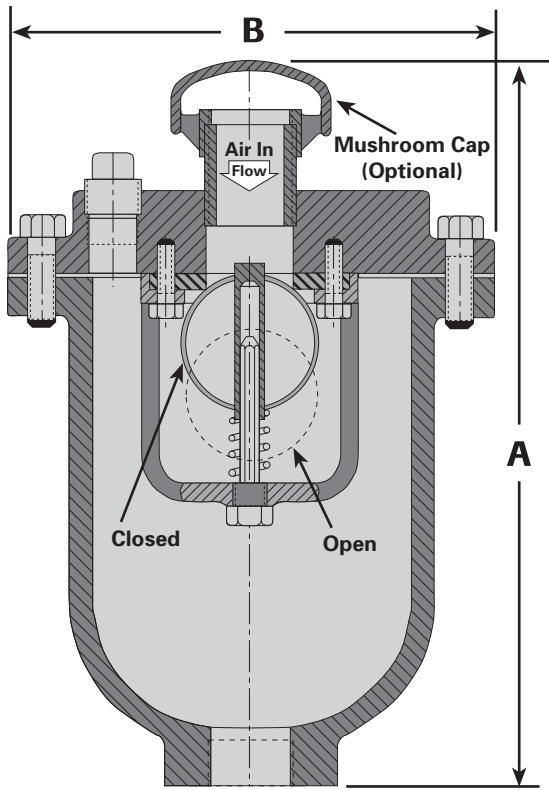
12" (300mm) Air/Vacuum

16" (400mm) Air Inlet

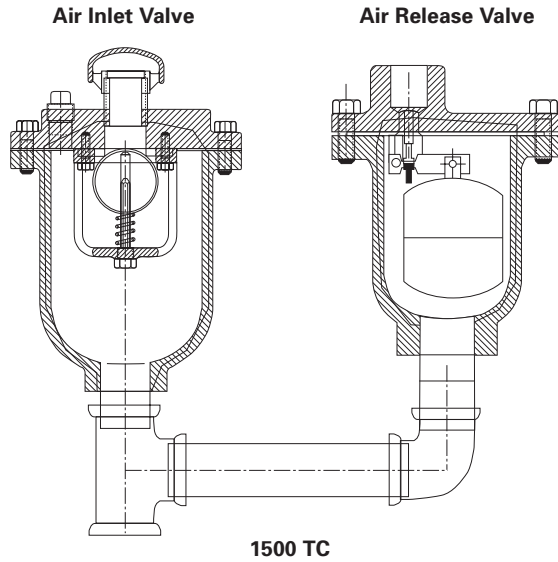


Northern California Water Resources delivers water through Penstock (108", 2700mm Dia.) to Southern California Devil's Canyon Power Plant.

Sizing



1500 T
Threaded Type



Valve Size and Orifice	Model	A	B	C
.5" 15	1500, 5T	12.5" 318	5" 127	—
1" 25	1501T 1501TC	14" 356	7" 178	20" 508
2" 50	1502T 1502TC	17" 432	9.5" 241	23" 584
3" 80	1503T 1503TC	20" 508	9.5" 241	26" 660

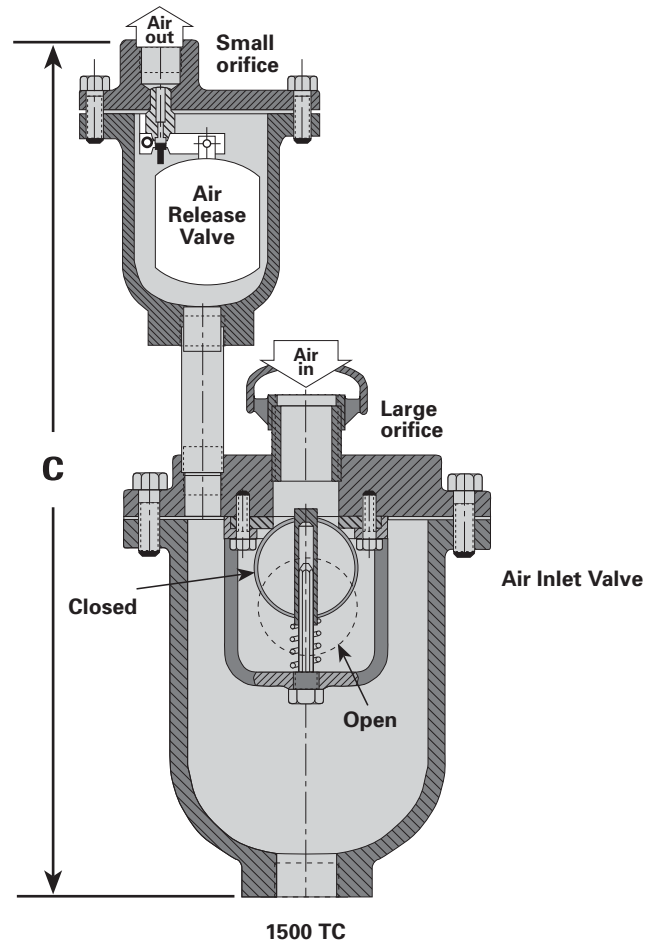
Inch
Millimeter

Orifice Seletion Chart

Pressure Range, psi/kpa		Air Release Valve
0-150 0-1034	0-300 0-2068	
.094" 2	.063" 2	50

Inch
Millimeter

See outflow capacities on page 5

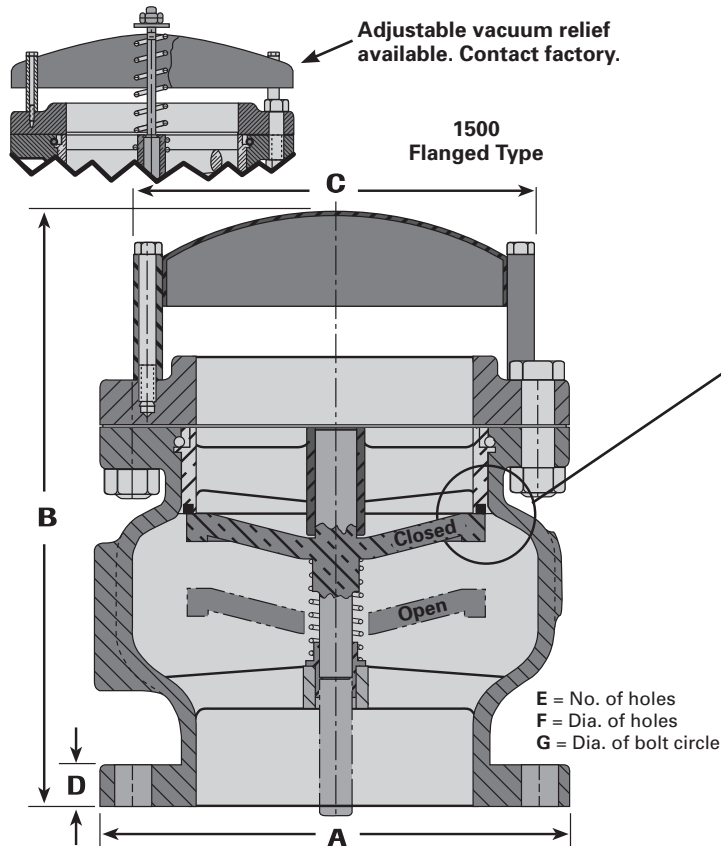


1500 TC

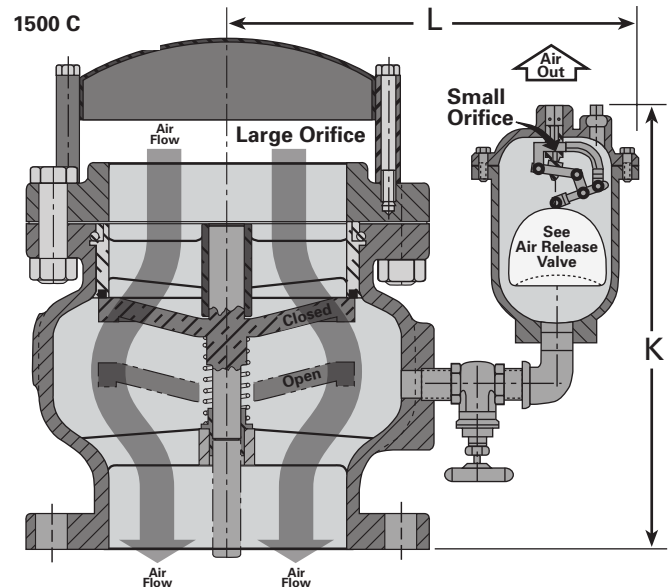
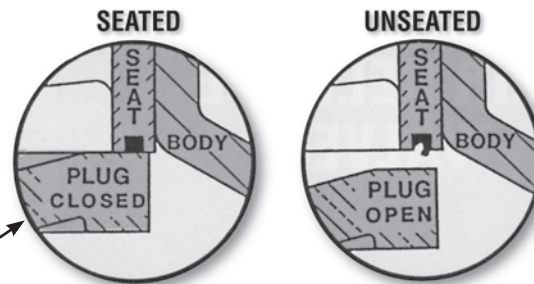
Sizing

Size	3" 80	4" 100	5" 125	6" 150	8" 200	10" 250	12" 300	14" 350	16" 400	18" 450	20" 500	24" 600	30" 750	36" 900	
Model	1503	1504	1505	1506	1508	1510	1512	1514	1516	1518	1520	1524	1530	1536	
	1503C	1504C	1505C	1506C	1508C	1510C	1512C	1514C	1516C	1518C	1520C	1524C	1530C	1536C	
125# Class	A	7.5" 191	9" 229	10" 254	11" 279	13.5" 343	16" 406	19" 483	21" 533	23.5" 597	25" 635	27.5" 699	32" 813	38.75" 984	46" 1168
	B	11" 279	12.5" 318	13.5" 343	14" 356	15.75" 400	18" 457	20.75" 527	23" 584	27.5" 699	28.5" 724	30.5" 775	36" 914	43.313" 1100	57" 1448
	C	6" 152	7" 178	10" 254	10" 254	12" 305	16" 406	18" 457	18" 457	18" 457	24" 610	28" 711	32" 813	38" 965	44" 1118
	D	1.313" 33	1.313" 33	1.313" 33	1" 25	1.125" 29	1.188" 30	1.25" 32	1.375" 35	1.438" 37	1.563" 40	1.688" 43	1.875" 48	2.125" 54	2.375" 60
	E	4" 102	8" 203	8" 203	8" 203	8" 203	12" 305	12" 305	12" 305	16" 406	16" 406	20" 508	20" 508	28" 711	32" 813
	F	.75" 19	.75" 19	.875" 22	.875" 22	.875" 22	1" 25	1" 25	1.125" 29	1.125" 29	1.25" 32	1.25" 32	1.375" 35	1.375" 35	1.625" 41
	G	6" 152	7.5" 191	8.5" 216	9.5" 241	11.75" 298	14.25" 362	17" 432	18.75" 476	21.25" 540	22.75" 578	25" 635	29.5" 749	36" 914	42.75" 1086
K 200A	12.25" 311	14.25" 362	15" 381	15.25" 387	17.25" 438	19.25" 489	20.75" 527	22" 559	23.75" 603	24.5" 622	26.25" 667	29" 737	32.75" 832	37" 940	
L 200A	14.75" 375	15.5" 394	16" 406	16.25" 413	16.75" 425	17.75" 451	19" 483	19.5" 495	20.75" 527	21.25" 540	22.25" 565	23.75" 603	26.5" 673	34.25" 870	

Inch
Millimeter



APCO compression molded seat seal is guaranteed not to come out for the life of the valve (unique shape of molded seat will not be damaged from extrusion when seated).



Orifice Selection Chart

Pressure Range, psi/kpa		Air Release Valve
0-150 0-1034	0-300 0-2068	
.094" 2	.063" 2	50
.188" 5	.156" 4	200A
.375" 10	.219" 6	200

Inch
Millimeter

Combination Vacuum Relief-Air Inlet and Air Release Valves

Water Hammer Control

The large orifice Vacuum Relief/Air Inlet Valve combined with a small orifice Air Release Valve operates for water hammer control as follows:

Installed at points where water column separation is anticipated, the large valve will open due to vacuum, admitting air into pipeline which fills the void created by water separation. It will then instantly close, trapping air which will be compressed and act like brakes to slow down the rejoining water column and minimize severe pressure surge (water hammer) as system pressure returns to positive.

Meanwhile, the small orifice Air Release Valve has also opened due to vacuum and stays open regulating a slow discharge of air from the pipeline to enable a gradual return to normal pipeline system operating pressure without damage.

A selection of small orifice Air Release Valves is available to suit the application.

Higher pressure ranges available on application. See outflow capacities below.

Performance Graphs

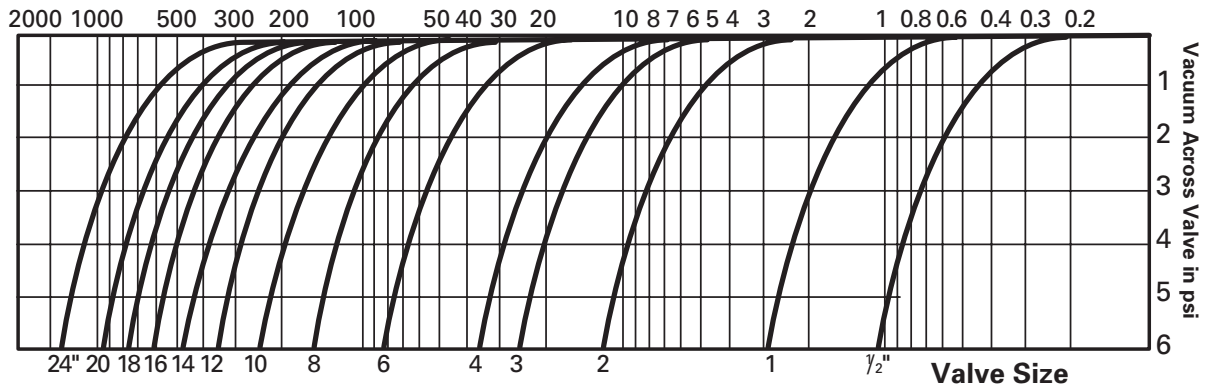
Inflow curves shown are actual flow capacities at 14.7 psi barometric pressure and at 70°F temperature based on tests conducted by: Phillips Petroleum Company, Engineering Department - Test Division, Edmond Plant, February 2, 1961. Southern Research Institute, Birmingham, Alabama, May 8, 1959.

Note: Values are given as a guide of what can be expected under specific flow conditions. These values approximate capacities and therefore data shown can be used for general application of the Air Inlet Valves.

Inflow

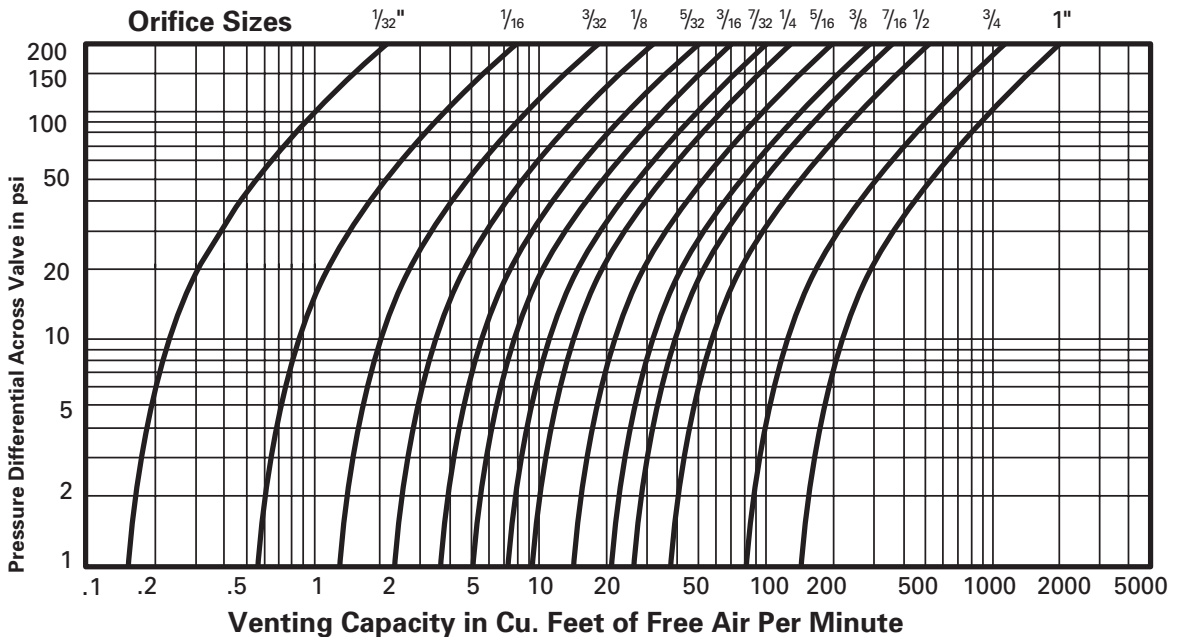
Large Orifice Air Inlet/Vacuum Valves

Air Inflow Through Valve in Standard Cubic Feet of Free Air Per Second (scfs)



Outflow

Small Orifice Air Release Valves



Specifications

Series 1500T Vacuum Relief/Air Inlet Valve Threaded Type

The Vacuum Relief/Air Inlet Valve shall consist of a body, cover, baffle, float, seat, stainless steel spring with a galvanized iron hood to prevent debris entering.

The seat (orifice) shall be Buna-N fastened to the cover without distortion and have a flow area equal or greater than the valve inlet size to insure full vacuum relief protection during draining, pipeline rupture or water column separation. The orifice shall open, allowing air entry when a vacuum/pressure differential exceeds 0.25 psi (2 kpa).

The stainless steel float shall be center guided for drop tight shut-off and is normally closed by a stainless steel spring.

1500 Vacuum Relief/Air Inlet Valve Flanged Type

The Vacuum Relief/Air Inlet Valve shall have globe type body with integrally cast-on flanged ends. The valve shall have a cross-sectional inflow area 10% greater than equivalent pipe size for full vacuum relief protection during draining, pipeline rupture or water column separation. The Vacuum Relief/Air Inlet Valve will be covered by a steel hood to prevent debris entering.

The internal valve plug and seat shall be heavy cast bronze. The seat is retained in the body by a heavy cover having a (molded, not glued) resilient Buna-N seal, for positive shut-off. The plug is center guided on both ends to prevent jamming. The plug shall be normally closed, by means of a stainless spring and shall open when a vacuum/pressure differential exceeds 0.25 psi (2 kpa).

Series 1500C Combination Vacuum Relief Air Inlet and Air Release Valve

Combination Vacuum Relief/Air Inlet and Air Release Valves (double body, double orifice) allow large volume air entry through the large diameter air inlet orifice when a vacuum occurs in a system, then close air tight, trapping the air as the system returns to positive pressure. While the large orifice is closed, the smaller $\frac{1}{16}$ ", $\frac{3}{32}$ ", $\frac{5}{32}$ ", $\frac{3}{16}$ ", $\frac{7}{32}$ ", $\frac{3}{8}$ " or $\frac{1}{2}$ " (2, 3, 4, 5, 6, 10, 13mm) size air release orifice remains open to slowly release trapped air in a controlled manner, to prevent water hammer and excess pressure surges. The $\frac{3}{32}$ ", $\frac{3}{16}$ ", $\frac{3}{8}$ " or $\frac{1}{2}$ " (3, 5, 10, 13 mm) small orifice Air Release Valve shall operate (open) up to 150 psi (1034 kpa) and $\frac{1}{16}$ ", $\frac{5}{32}$ " or $\frac{7}{32}$ " (2, 4, 6 mm) small orifice shall operate (open) up to 300 psi (2068 kpa). (Engineer to select small orifice to suit Air Release control equipment.)

The small orifice Air Release Valve shall operate with a compound lever mechanism of stainless steel, actuated by a stainless steel float.

The Air Inlet Valve, internal plug and seat, shall be heavy cast bronze; the seat retained in the body by a heavy cover; have a (molded, not glued) resilient Buna-N seal for positive shut-off and plug center guided both ends to prevent jamming. The plug shall be normally closed by means of a stainless steel spring and shall open when a vacuum pressure differential exceeds 0.25 psi (2 kpa). The Combination Air Inlet Valve shall be rated 125 lb. or 250 lb. Class. Higher pressure available.

All 1500T, 1500TC, 1500 and 1500C Series valve internals shall be replaceable without removing the valve from the line and the materials of construction certified, conforming to following ASTM specifications:

Body & Cover	Cast Iron or Ductile Iron	ASTM A126 Gr. B ASTM A536 Gr. 65-45-12
Baffle 1/2", 1", 2" (15, 25, 50 mm)	Delrin	ASTM D4181
Baffle 3"	Cast Iron	ASTM A48 Cl. 30
Plug & Seat	Bronze*	ASTM B584
Plug 30" & 36" (750 & 900 mm)	Ductile Iron	ASTM A536 65-45-12
Exterior paint	Universal Metal Primer	FDA approved for potable water
Float	Stainless Steel	ASTM A240
Seat Needle	Buna-N	Nitrile Rubber
Spring	Stainless Steel	ASTM A276
Hood	Galvanized Iron or Steel	Commercial Grade
Lever Mech.	Stainless Steel	ASTM A351 T316

*Bronze components meet current lead-free requirements.

Valve to be APCO Series 1500T Vacuum Relief/Air Inlet Valve (threaded type) 1/2" (15 mm) through 3" (80 mm) or Series 1500 and Series 1500C Combination Air Inlet/Air Release (Flanged Type) 3" (80 mm) through 36" (900 mm).

Sales and Service

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

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