



## 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:

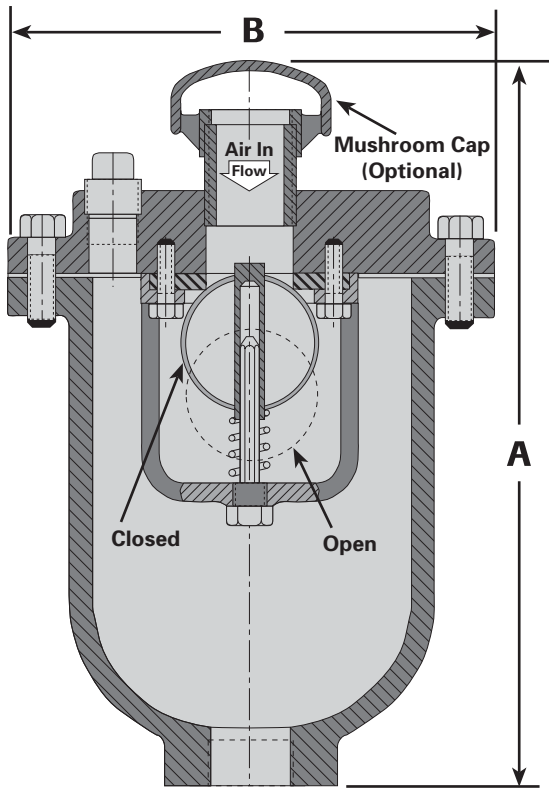
12" (300mm) Air/Vacuum

16" (400mm) Air Inlet

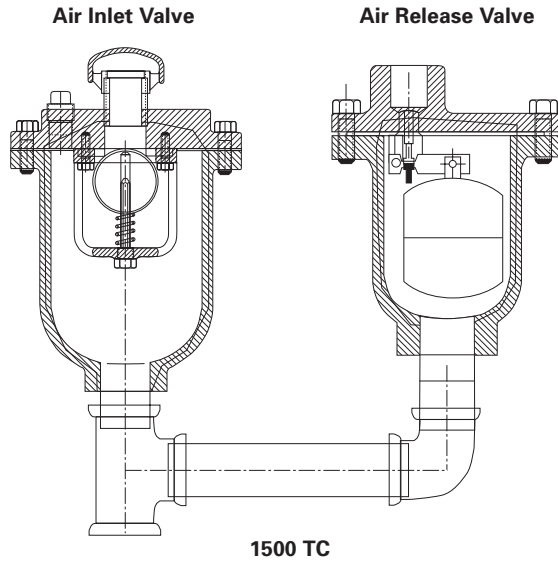


Northern California Water Resources delivers water through Penstock (108", 2700mm Dia.) to Southern California Devil's Canyon Power Plant.

# Sizing



1500 T  
Threaded Type



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

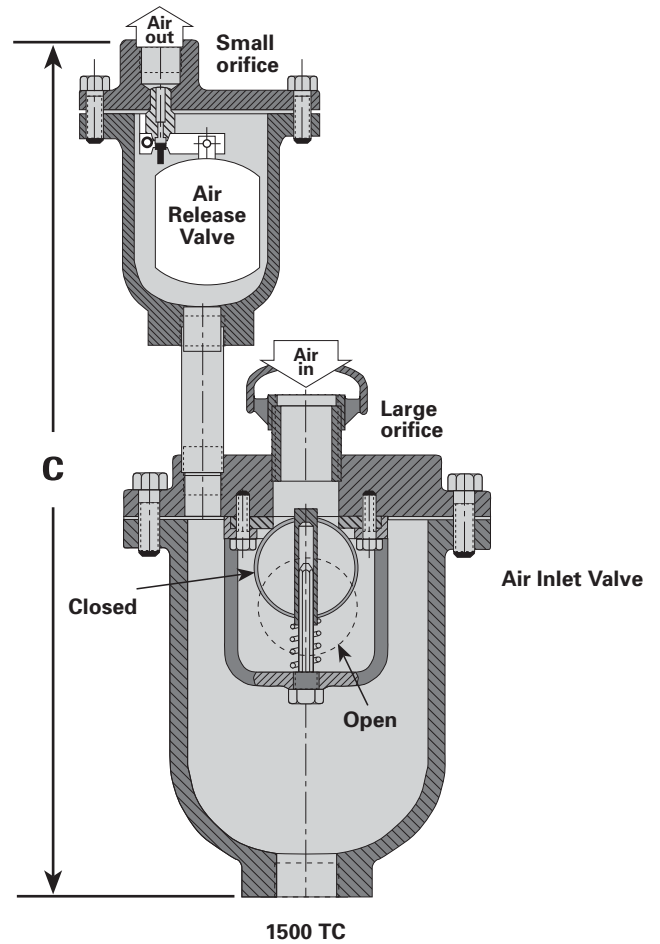
Inch  
Millimeter

## Orifice Seletion Chart

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

Inch  
Millimeter

See outflow capacities on page 5

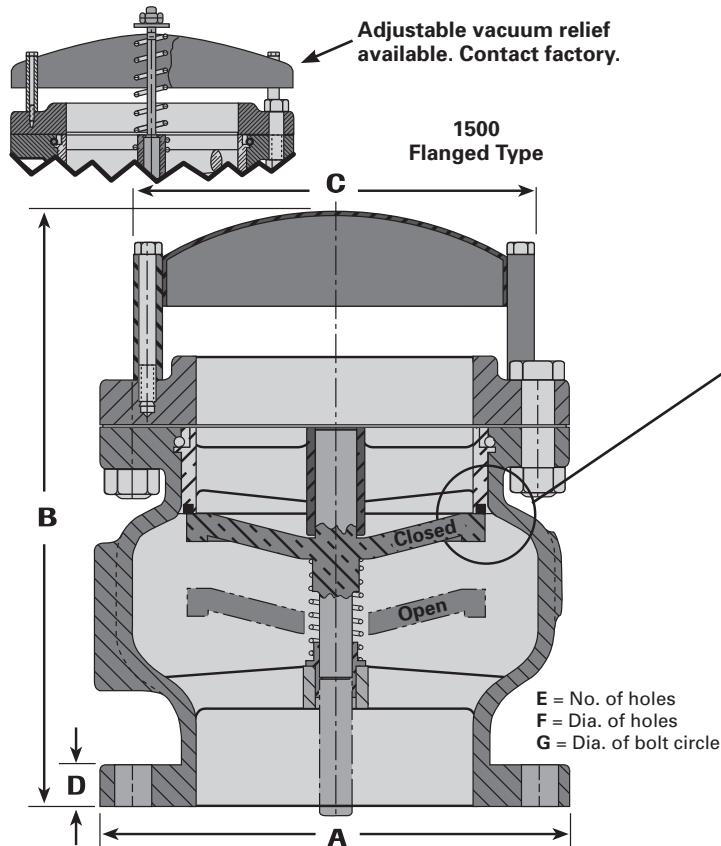


1500 TC

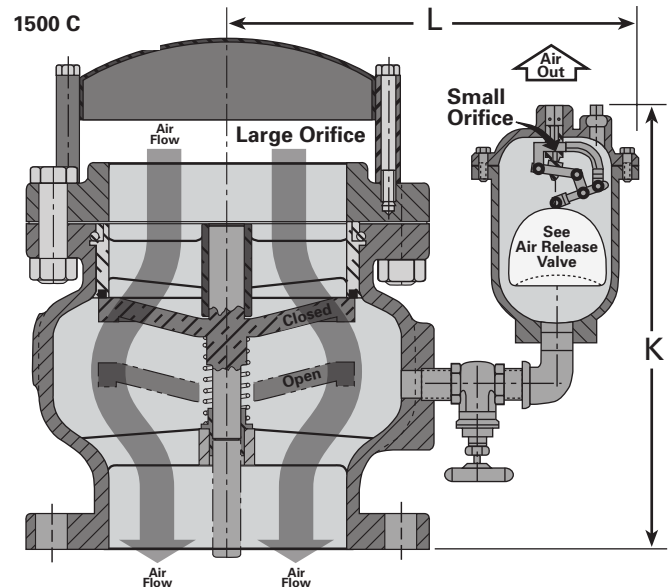
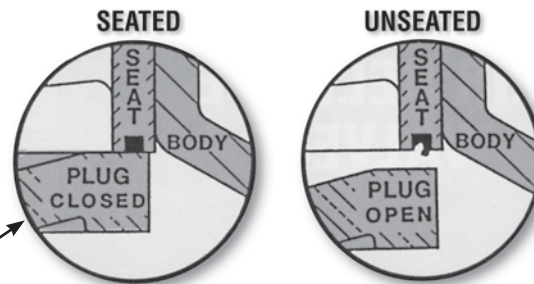
# Sizing

| Size       | 3"<br>80      | 4"<br>100     | 5"<br>125    | 6"<br>150     | 8"<br>200     | 10"<br>250    | 12"<br>300    | 14"<br>350    | 16"<br>400    | 18"<br>450    | 20"<br>500    | 24"<br>600    | 30"<br>750    | 36"<br>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"<br>191   | 9"<br>229    | 10"<br>254    | 11"<br>279    | 13.5"<br>343  | 16"<br>406    | 19"<br>483    | 21"<br>533    | 23.5"<br>597  | 25"<br>635    | 27.5"<br>699  | 32"<br>813    | 38.75"<br>984   | 46"<br>1168    |
|            | B             | 11"<br>279    | 12.5"<br>318 | 13.5"<br>343  | 14"<br>356    | 15.75"<br>400 | 18"<br>457    | 20.75"<br>527 | 23"<br>584    | 27.5"<br>699  | 28.5"<br>724  | 30.5"<br>775  | 36"<br>914    | 43.313"<br>1100 | 57"<br>1448    |
|            | C             | 6"<br>152     | 7"<br>178    | 10"<br>254    | 10"<br>254    | 12"<br>305    | 16"<br>406    | 18"<br>457    | 18"<br>457    | 18"<br>457    | 24"<br>610    | 28"<br>711    | 32"<br>813    | 38"<br>965      | 44"<br>1118    |
|            | D             | 1.313"<br>33  | 1.313"<br>33 | 1.313"<br>33  | 1"<br>25      | 1.125"<br>29  | 1.188"<br>30  | 1.25"<br>32   | 1.375"<br>35  | 1.438"<br>37  | 1.563"<br>40  | 1.688"<br>43  | 1.875"<br>48  | 2.125"<br>54    | 2.375"<br>60   |
|            | E             | 4"<br>102     | 8"<br>203    | 8"<br>203     | 8"<br>203     | 8"<br>203     | 12"<br>305    | 12"<br>305    | 12"<br>305    | 16"<br>406    | 16"<br>406    | 20"<br>508    | 20"<br>508    | 28"<br>711      | 32"<br>813     |
|            | F             | .75"<br>19    | .75"<br>19   | .875"<br>22   | .875"<br>22   | .875"<br>22   | 1"<br>25      | 1"<br>25      | 1.125"<br>29  | 1.125"<br>29  | 1.25"<br>32   | 1.25"<br>32   | 1.375"<br>35  | 1.375"<br>35    | 1.625"<br>41   |
|            | G             | 6"<br>152     | 7.5"<br>191  | 8.5"<br>216   | 9.5"<br>241   | 11.75"<br>298 | 14.25"<br>362 | 17"<br>432    | 18.75"<br>476 | 21.25"<br>540 | 22.75"<br>578 | 25"<br>635    | 29.5"<br>749  | 36"<br>914      | 42.75"<br>1086 |
| K 200A     | 12.25"<br>311 | 14.25"<br>362 | 15"<br>381   | 15.25"<br>387 | 17.25"<br>438 | 19.25"<br>489 | 20.75"<br>527 | 22"<br>559    | 23.75"<br>603 | 24.5"<br>622  | 26.25"<br>667 | 29"<br>737    | 32.75"<br>832 | 37"<br>940      |                |
| L 200A     | 14.75"<br>375 | 15.5"<br>394  | 16"<br>406   | 16.25"<br>413 | 16.75"<br>425 | 17.75"<br>451 | 19"<br>483    | 19.5"<br>495  | 20.75"<br>527 | 21.25"<br>540 | 22.25"<br>565 | 23.75"<br>603 | 26.5"<br>673  | 34.25"<br>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<br>0-1034         | 0-300<br>0-2068 |                   |
| .094"<br>2              | .063"<br>2      | 50                |
| .188"<br>5              | .156"<br>4      | 200A              |
| .375"<br>10             | .219"<br>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

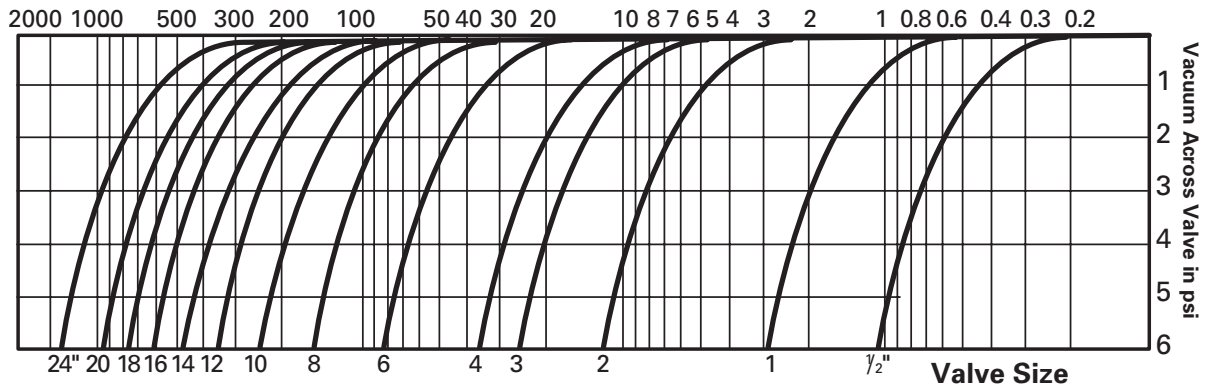
Inflow curves shown are actual flow capacities at 14.7 psi barometric pressure and at 70°F temperature based on tests conducted by: Phillips Petroleum Company, Engineering Department - Test Division, Edmond Plant, February 2, 1961. Southern Research Institute, Birmingham, Alabama, May 8, 1959.

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

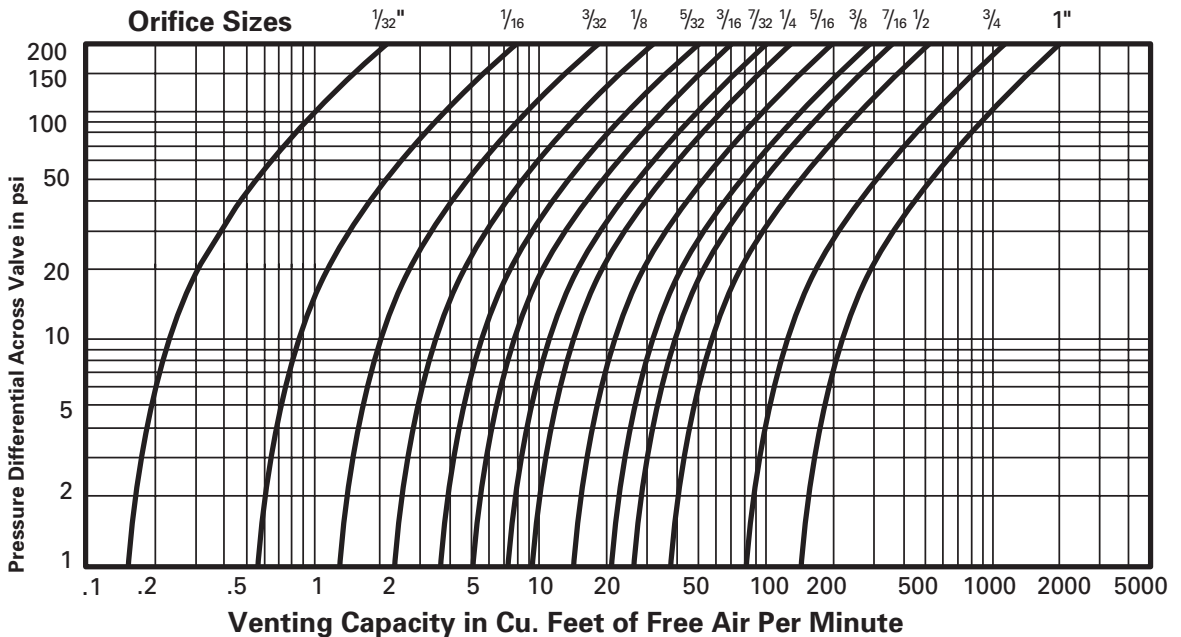
Large Orifice Air Inlet/Vacuum Valves

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<br>or Ductile Iron | ASTM A126 Gr. B<br>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:

Web Site: [www.dezurik.com](http://www.dezurik.com) E-Mail: [info@dezurik.com](mailto:info@dezurik.com)



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