VACUVENT

Leading Air Release Technology

" the airbag for water pipelines "

AIR RELEASE AND VACUUM BREAK VALVES

SERIES VA

OWNER'S MANUAL

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INTRODUCTION

Congratulations on your purchase of the Vacuvent Air Release and Vacuum Break Valve. This air valve is the product of years of development and attention to detail. Innovation and commitment to progress has yielded a new generation of air valve fit to carry the demands of modern pipelines.

Vacuvent series VA air valves combine several features of different types of air valves into one compact unit. These reliable, sturdy and proudly made valves will ensure the safety of your pipeline for many problem free years.

This manual is intended to give guidelines for the installation, maintenance and general care required by the air valve to produce optimum results for the end user. Your Vacuvent air valve should function flawlessly for many years as it is virtually maintenance free.

This manual starts of by describing the valve specifications and the materials used in the air valve.

Quality control assures that the valve is in good working condition from the corrosion protection to the pneumatic functions and the valve integrity. This section describes the measures taken to deliver a high quality valve.

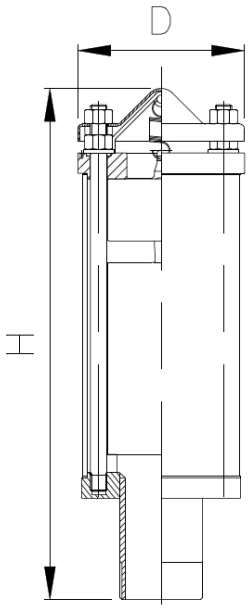
A general description of the valve function and purpose is included in this manual.

General information regarding the details of quality testing and shipping is provided for the end user to feel reassured.

This document is not intended to be used a design guide for the Vacuvent air release valve.

GENERAL SPECIFICATION

SCREWED – DN25 (1”), DN50 (2”)



DN	Model No.	PN	H	D	Weight
mm		bar	mm	mm	kg
25	025VA25	25	420	97	4.3
25	025VA40	40	510	97	5.6
50	050VA25	25	354	122	6
50	050VA40	40	424	122	7.5

Figure 1- Overall Dimensions

Type:
Double Orifice (Small and large orifice) with Anti-Shock Orifice Mechanism

End Connection:
Screwed BSP or NPT male

Nominal Size
DN25 (1”) and DN50 (2”)

Model No’s
See Table

Operating Pressure
PN25 0.5 bar (7.2 psi) – 25 bar (363 psi)
PN40 0.5 bar (7.2 psi) – 40 bar (580 psi)

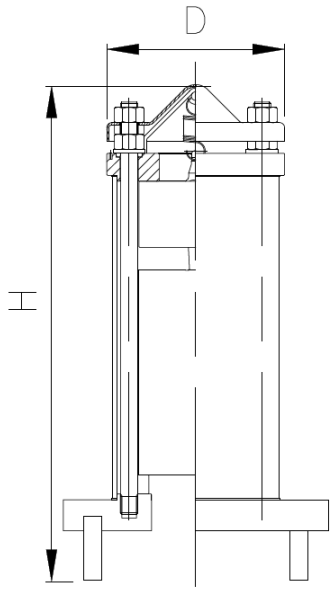
Operating Temperature
4^{o}C (40^{o}F) to 85^{o}C (185^{o}F)

Acceptable Media:
Potable or strained raw water

Function:
1. High Volume Air Discharge for pipeline filling
2. Pressurized Air Discharge for air in filled pipeline
3. High volume Air Intake for pipeline draining
4. Anti-shock- surge dampening

GENERAL SPECIFICATION

STUDDED –DN80 (3”), DN100 (4”)



DN	Model No.	PN	H	D	Weight
mm		bar	mm	mm	kg
80	080VA25	25	436	149	13
80	080VA40	40	504	149	15.5
100	100VA25	25	453	176	15.5
100	100VA40	40	489	176	18.8

Figure 2- Overall Dimensions

Type:
Double Orifice (Small and large orifice) with Anti-Shock Orifice Mechanism

End Connection:
Flanged for alignment to
BS 4504 PN10, PN16, PN25 or PN40
SANS 1123 T1000/3, T1600/3, T2500/3 or T4000/3
ANSI B16.1 Class150 or ANSI B16.5 Class 300

Nominal Size
DN150 and DN200

Model No’s
See Table

Operating Pressure
PN25 0.5 bar (7.2 psi) – 25 bar (363 psi)
PN40 0.5 bar (7.2 psi) – 40 bar (580 psi)

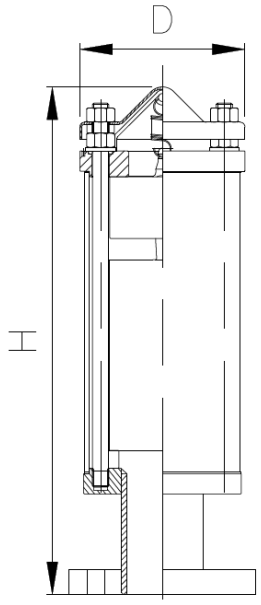
Operating Temperature
4^{o}C (40^{o}F) to 85^{o}C (185^{o}F)

Acceptable Media:
Potable or strained raw water

Function:
1. High Volume Air Discharge for pipeline filling
2. Pressurized Air Discharge for air in filled pipeline
3. High volume Air Intake for pipeline draining
4. Anti-shock- surge dampening

GENERAL SPECIFICATION

FLANGED –DN150 (6”), DN200 (8”)



DN	Model No.	PN	H	D	Weight
mm		bar	mm	mm	kg
150	150VA25	25	619	275	45.8
150	150VA40	40	660	275	55
200	200VA25	25	666	328	70
200	200VA40	40	670	328	84

Figure 3- Overall Dimensions

Type:
Double Orifice (Small and large orifice) with Anti-Shock Orifice Mechanism

End Connection:
Flanged for alignment to
BS 4504 PN10, PN16, PN25 or PN40
SANS 1123 T1000/3, T1600/3, T2500/3 or T4000/3
ANSI B16.1 Class150 or ANSI B16.5 Class 300

Nominal Size
DN150 and DN200

Model No’s
See Table

Operating Pressure
PN25 0.5 bar (7.2 psi) – 25 bar (363 psi)
PN40 0.5 bar (7.2 psi) – 40 bar (580 psi)

Operating Temperature
4^{o}C (40^{o}F) to 85^{o}C (185^{o}F)

Acceptable Media:
Potable or strained raw water

Function:
1. High Volume Air Discharge for pipeline filling
2. Pressurized Air Discharge for air in filled pipeline
3. High volume Air Intake for pipeline draining
4. Anti-shock- surge dampening

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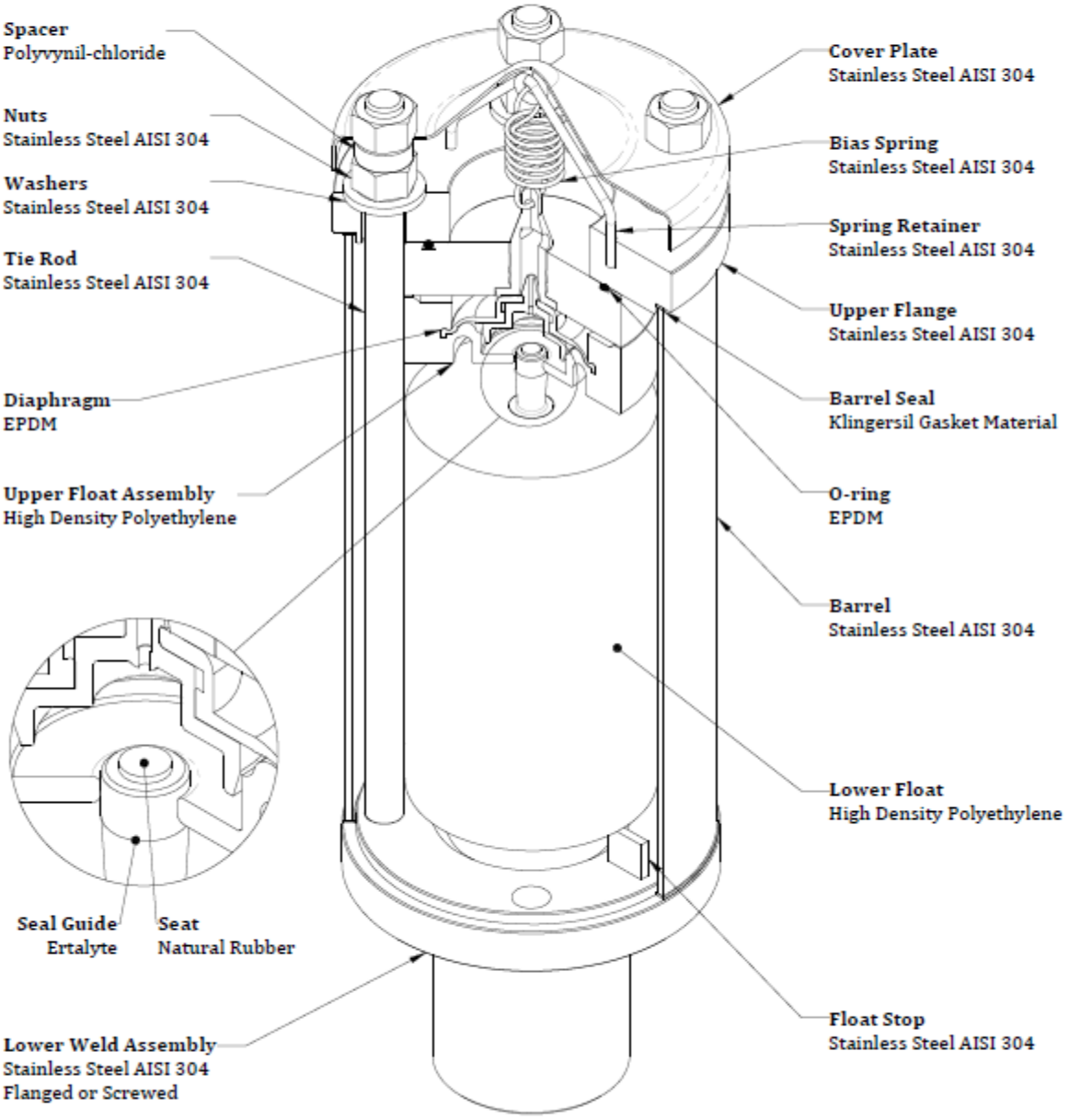
DN25-DN50

Component and Material Description



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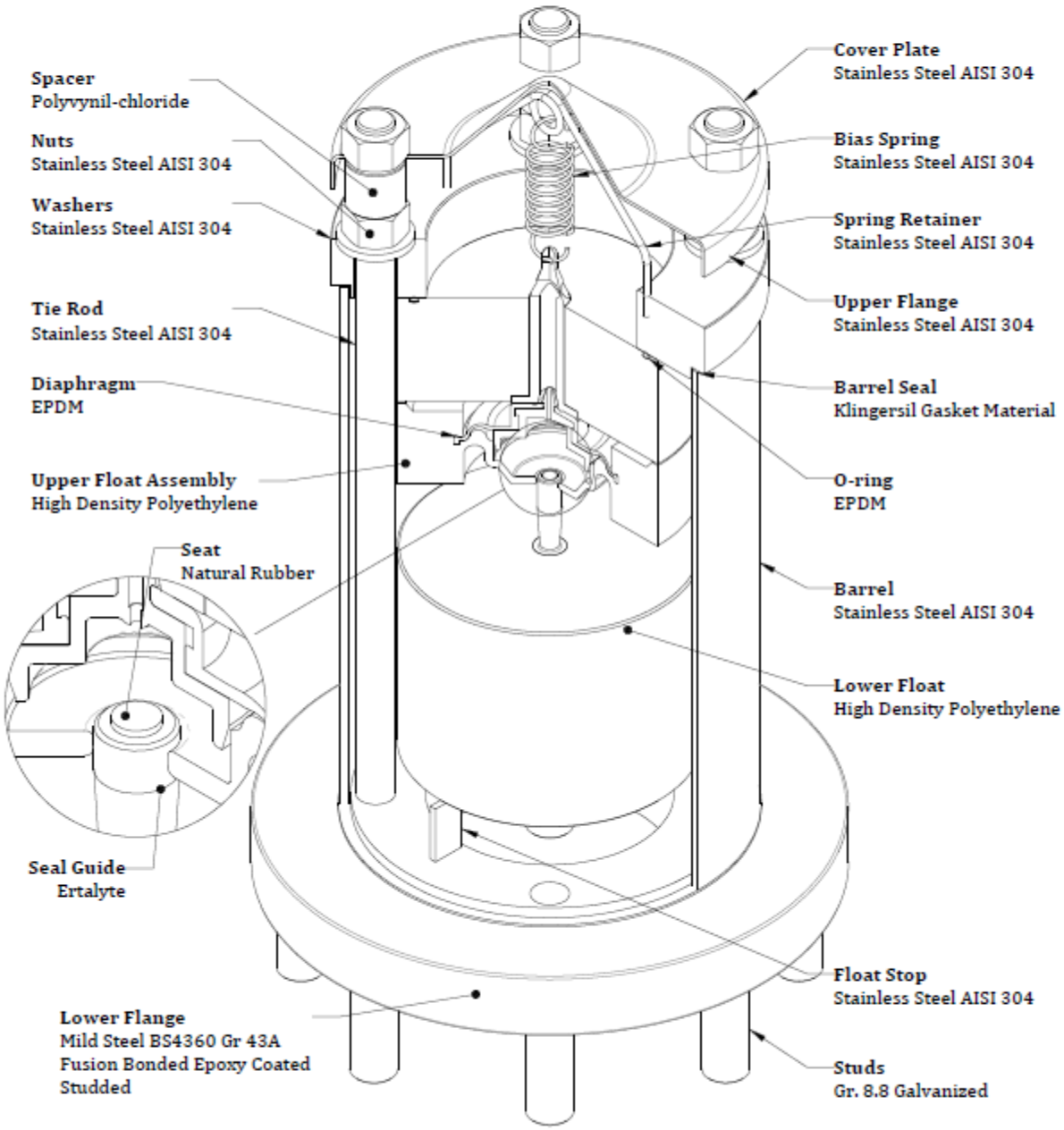
DN80-DN100

Component and Material Description



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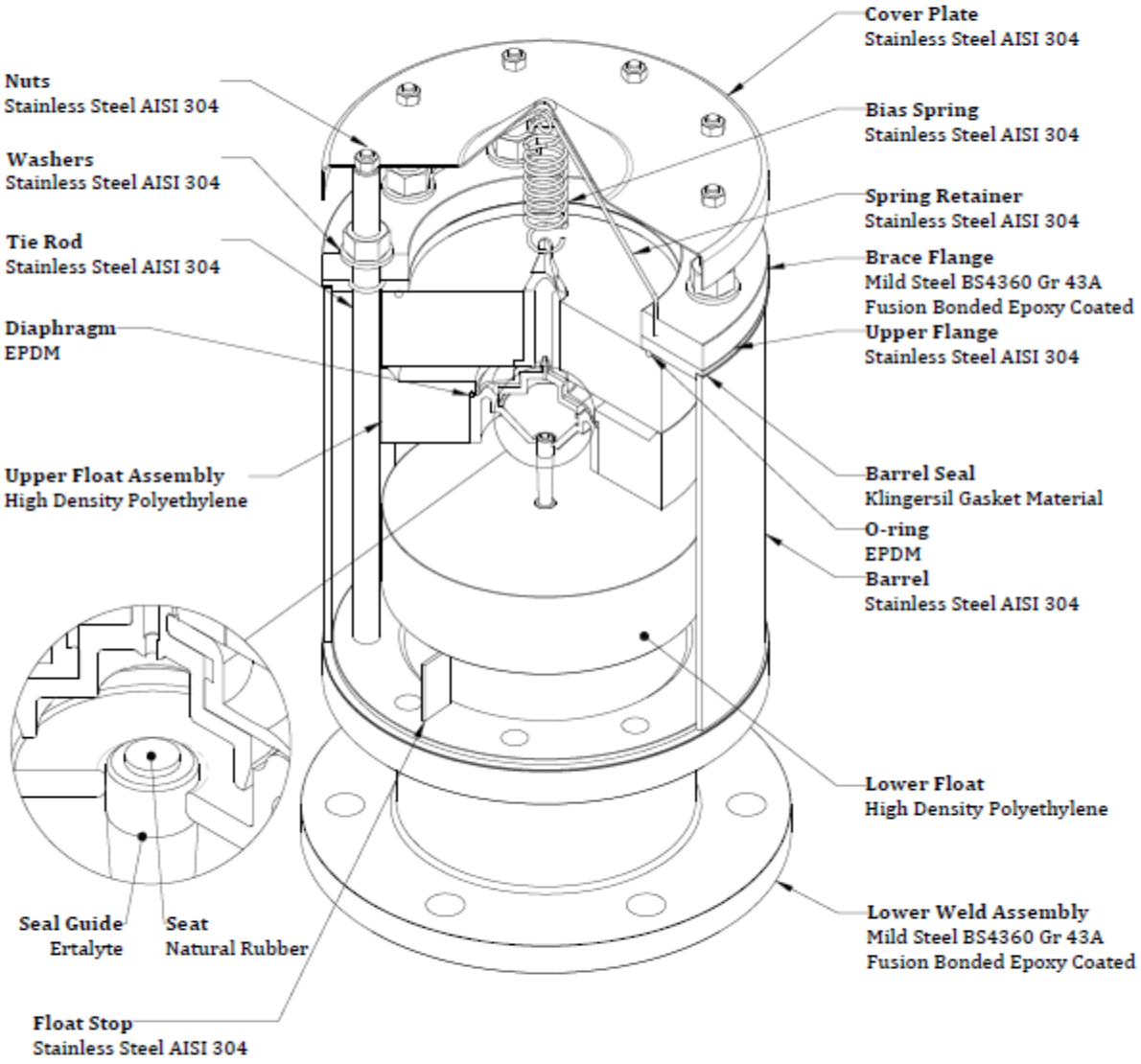
DN150-DN200

Component and Material Description



QUALITY CONTROL

All Vacuvent air valves conform to a stringent set of criteria before leaving the factory.

All valves are tested for full functionality and corrosion protection quality before being released by the in-house quality manager.

Corrosion protection is of the highest quality and the mild steel components are fusion bonded epoxy coated. Threaded components interacting with the fusion bonded epoxy coated parts are wet assembled using a two pack epoxy approved for use in potable water.

Quality control documents and material data sheets can be made available on request with purchase.

The Vacuvent series VA air valve has very little that can corrode and is prepared for active duty in water delivery pipelines.

GENERAL DESCRIPTION

The Vacuvent - VA anti-shock series of air valves are intended to reduce the risks associated with pressure variance in pipelines. Surge and water hammer will always be present in fluid transporting pipelines; the intent of the Vacuvent air valve is to effectively manage the affects thereof in liquid transporting pipelines.

When water drains from the pipeline, the VA series air valve opens to allow atmospheric air to force its way into the pipeline, preventing a negative pressure forming inside the pipeline. This allows for designers to reduce wall thicknesses in their pipes as negative pressure will not have such a substantial effect on the line.

During filling or introduction of air into a pipeline the Vacuvent VA series anti shock air valve will throttle the outgoing air via the small orifice and anti-shock orifice. Pressure is regulated via a pneumatic relay between the small orifice and the much larger anti-shock orifice. This system will ensure that air is drained from the pipeline.

Where necessary an optional - full stainless steel - body construction can be specified.

Before being packaged all Vacuvent air valves have to pass functional tests such that it is ensured that they will function fully upon delivery.

General Information

FUNCTIONAL TESTING AND OVERALL INSPECTION

Before final release all valves will pass the following functional and visual tests:

1. **Pneumatic Drop Test**

   Purpose: Simulation of anti-shock air release
   Criteria: Pneumatic relay must open to release large quantities of air

2. **Low Head Seal Test**

   Purpose: Check seal of the valve under no more than 0.5 bar
   Criteria: Drip dry seal

3. **Hydrostatic Test**

   Purpose: Test valve integrity at no less than 1.5x the rated operating pressure
   Criteria: No leaks on the seal or body

4. **Pipeline Simulation Drop Test** - Only on 10% of Valves

   Purpose: To simulate the introduction of air in a filled pipeline under pressure
   Criteria: Small orifice release of air up to working pressure
   Anti- shock opening up to working pressure

5. **Visual Inspection**

   Purpose: Ensure quality of the product
   Criteria: No visible oil, dirt or debris on the inside or outside of the valve
   No damage to corrosion protection systems
   No visible rust

CORROSION PROTECTION

Vacuvent Air valves consist of stainless steel, polymer based and mild steel components; mild steel components are fusion bonded epoxy coated to prevent corrosion to a minimum thickness of 250 microns DFT.

Screw thread of stainless steel components interacting with mild steel are wet paint assembled using a two pack epoxy approved for use in potable water to prevent galvanic corrosion.

SHIPPING

Vacuvent air valves are packaged in sturdy container after being wrapped in shock absorbent materials to ensure that the valve reaches its destination in good working condition.

INSTALLATION, REMOVAL AND STORAGE INSTRUCTIONS

POSITIONING

Air valves should be positioned in very specific areas in order to function optimally. It is suggested that Vacuvent air valves be placed on top of an air accumulator, shown below.

This accumulator should be a tee to the main pipeline; a reduction can then be added to which the air valve is mounted. Minimum recommended dimensions are given in the drawing. The accumulator facilitates the effective introduction of air into a draining pipeline. If an accumulator is not used the incoming air may be swept away before effectively vented.

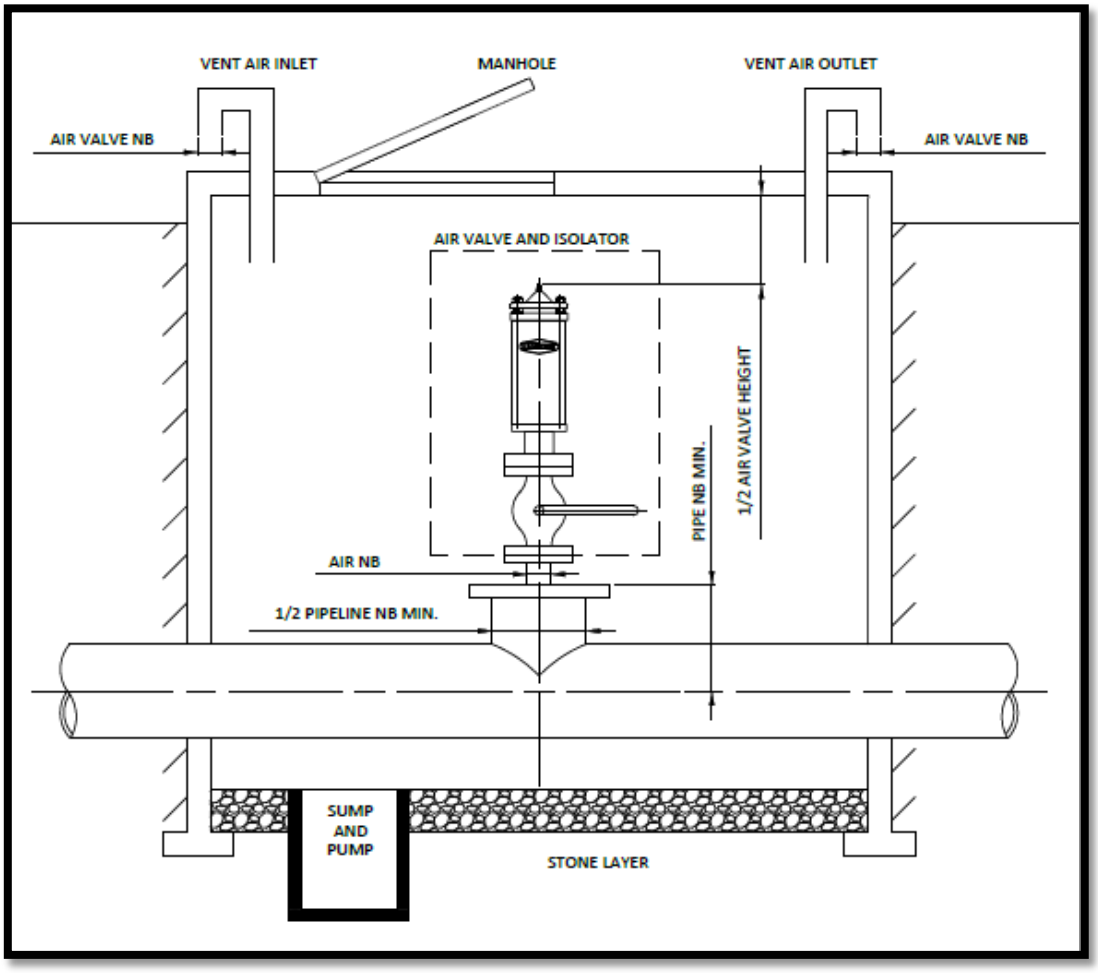


Figure 4- Air Valve Arrangement

It is good practice to add an isolator valve underneath the air valve, as shown in the image above, to facilitate the removal of the air valve for maintenance or repair without disrupting the pipeline.

Air Valve isolating valves usually are either screwed or flanged ball valves (dependent on air valve end connection ordered) on 25mm to 50mm Air Valves, Flanged Resilient Seal Gate Valves for 80mm to 200mm Air Valves for design pressures up to 25 bar and Flanged Wedge Gate Valves or

Flanged Ball valves for 80mm to 200mm Air Valves for design pressures from 25 bar up to 40 bar, for higher sizes and /or pressure ratings please consult us. Although we do not prescribe the type of valve that must be used as an Air Valve Isolating Valve we generally recommend that the valve should be allow “full bore” flow through it so that air flow is not restricted in any way.

AIR VALVE CHAMBER

An Air valve chamber should provide adequate drainage of water. An air intake and outlet should also be provided that is of the same nominal bore or greater than that of the air valve so that a free flow of air can enter and exit the chamber effectively.

INSTALLATION

SCREW TYPE

Screw type valves need to be installed following standard practices. It is however recommended to mount the valve using PTFE thread tape. The air valve isolating valve can be screwed onto the air valve prior to installation on the pipeline using a spanner on the hexagon section on the air valve isolating valve whilst securing the air valve firmly. DO NOT USE A PIPE WRENCH ON THE AIR VALVE AND ON THE BARREL OF THE AIR VALVE. THIS MAY RESULT IN DAMAGE TO THE COATING AND/OR MECHNICAL DAMAGE TO THE AIR VALVE.

FLANGED TYPE

Flanged type air valves require a suitable gasket to go between the mounting surface and the air valve. Bolts should be placed though all the holes located on either flange with washer at both ends. Bolts should be tightened in a crosswise fashion.

REMOVAL

SCREW TYPE

Removal of screw type valves are simple, first close the isolating valve located beneath the air valve, then secure the isolating valve with a spanner on the hexagon section on the air valve isolating valve and then using a suitable size flat bar or edge of spanner between the tightened tie rods on the top of the valve lever the air valve in an ant-clockwise direction thereby loosening and removing the air valve. DO NOT USE A PIPE WRENCH ON THE AIR VALVE AND ON THE BARREL OF THE AIR VALVE. THIS MAY RESULT IN DAMAGE TO THE COATING AND/OR MECHNICAL DAMAGE TO THE AIR VALVE.

FLANGED TYPE

Close the isolating valve beneath the air valve and thereafter loosen all nuts and carefully remove the bolts and washers, care should be taken on the fusion bonded coating that no damage occurs.

STORAGE

All Vacuvent air valves should be stored in a moderately cool area free from debris. If debris cannot be avoided, simply wrapping the air valve in plastic should be sufficient to prevent debris from entering the internal mechanisms of the air valve.

OPERATION AND SIZING

GENERAL SIZING

BASIC OPERATION

Vacuvent have full valve size intakes (large orifices) but control the exhaust exclusively via the Anti-Shock orifices.

No exhaust is vented via the large orifice and this function is specifically designed for (for further reading, see technical information). This valve range covers most applications as standard but still allows the designer some scope to specify more accurately.

BASIC PRINCIPLES

When a section drains down, the air valve at the apex must be sized to protect the pipe and seals until the next valve lower down opens. So intake cannot be calculated by adding all the valves on that section. Exhaust however is another matter and it's feasible in some instances to add all the anti-shock capabilities for one section. It's also important to ensure that enough head (including dynamic) is available to seal the valve off otherwise a syphon valve may be required. This is a consideration on pumping systems where the final section after the apex has the possibility of draining down faster than the pumping rate. Another factor is the differentiation between designed flow rates and possible drainage rates. Drainage rates are generally estimated 2 times the designed flow rates i.e. 1-2 m/sec flow rate and say 2-4 m/sec drainage. If the pipe is to be protected from vacuum, generally the exhaust capability is more than adequate

PLACEMENT

The graphic shows most of the common places where air release valves are fitted. High points are a natural start, also where the pipeline crosses obstacles like rivers and roads. Check for syphon application above the hydraulic grade line. To control pump start and pump trip, air release valves should be placed before and after the check valve.

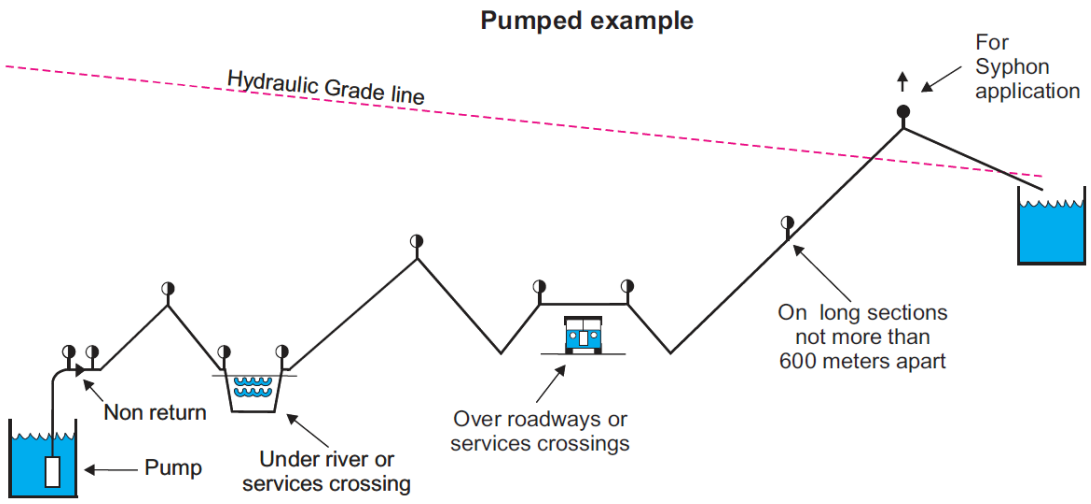


Figure 5- Pumped Example for Air Valve Placement

SIZING

Most sizing is based on the need to protect the pipeline from a negative pressure, vent the initial air, and to vent the pressurised air with the importance generally in that order. A good start is to select a scouring or drainage rate based on rupture or draining of 2-3 times the designed flow rate of that particular section. Size the air release valves to protect the pipeline and seals from low pressure within the pipeline during draining or other pipeline disturbances (e.g. pump trip).

One accepted method is to limit the internal pressure to 3.5 m ΔP (0.35 Bar) below atmospheric pressure. The air release valves curves in each individual valve catalogue indicate that point and the resultant inflow of air.

GENERAL OPERATION

The Vacuvent series air release valves provide a full bore solution to any pipeline. The large orifice is not restricted in vacuum and during filling operation works through the anti-shock nozzle only.

Vacuvent air valves operate in reaction to the pipeline conditions and require no external input from the end user.

PIPELINE FILLING

Venting of large quantities of air

During pipeline filling a large amount of air needs to escape from the pipeline, during this operation shown in figure 5- the small orifice, item 1 gives way and air discharges through the anti-shock orifice, item 2, through the upper float.

This discharge will be sufficient for the pressurised air to evacuate the valve and the pipeline. This type of valve operation is validated by Surge Analysis Software. It is not necessary for some or all the air to exhaust through the large orifice as on other air valves.

After the air has exhausted from the pipeline and water fills the air valve, the smart anti-shock orifice will shut and the air valve will once again pressurise.

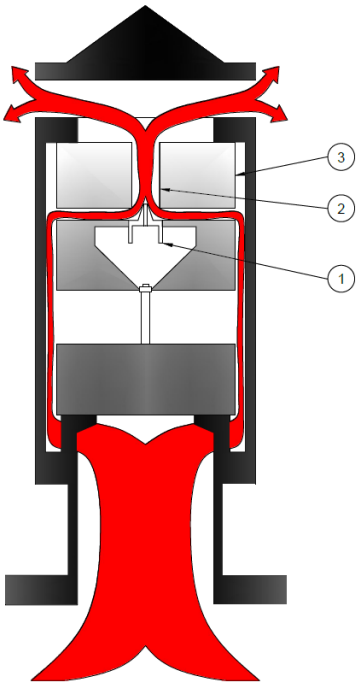


Figure 6- Air Valve Anti-Shock Operation

PIPELINE AT OPERATING PRESSURE

Venting of large quantities of air via the anti-shock

The valve will respond to large volumes of air when at operating pressure in the same manner as it does during filling – this function is fully automatic through the smart anti-shock orifice as in the previous figure.

Air Release from a Pipeline under Pressure (Small Orifice)

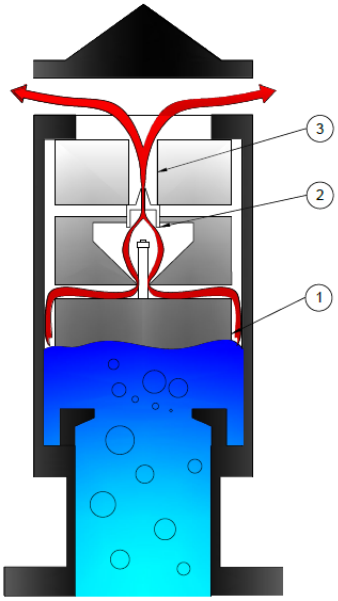


Figure 7- Air Valve Pressurised Air Release

In the above figure one can see the air accumulating in the valve with the pipeline under pressure, generally only when small amounts of air enters the valve through the pressurized system – again this operation is automatic. The air travels through the lower portion of the upper float and exists through the small orifice, item 2, which in turn flows out of the anti- shock orifice, item 3.

PIPELINE DRAINING

Air Intake of a Draining Pipeline

Referring to the following figure:

Any negative pressure present within the pipeline causes the atmospheric air to force its way in through the large orifice by pushing the upper float, item 1, downward on to the lower float, item 2, at the bottom of the valve.

Air enters the pipeline from the valve through the opening, item 3.

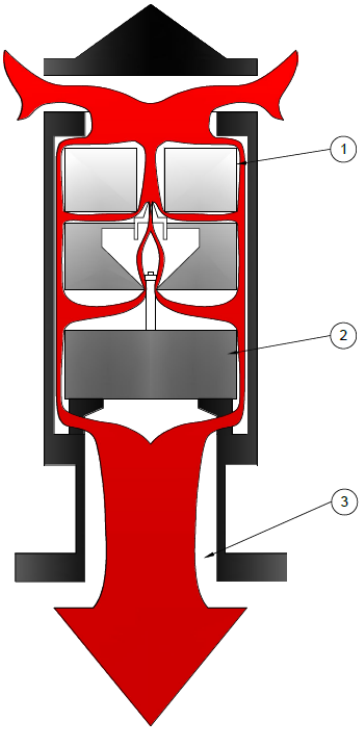


Figure 8- Air Valve Vacuum Function

As you can see, this one valve with its smart anti-shock will fulfil the functions of several different valves without modification or ad-ons.

CONTACT DETAILS

Feel free to contact us regarding your Vacuvent valve should you require any additional information.

Maintenance manuals are available upon request.

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