

VENT-O-MAT[®]

SERIES RGX

SEWAGE AIR RELEASE & VACUUM BREAK VALVES

OWNER'S MANUAL

SERIES RGX "ANTI-SURGE" SEWAGE AIR VALVE OWNER'S MANUAL

INTRODUCTION

Thank you for your purchase of the Vent-O-Mat series RGX "Anti-Surge" sewage air valve. This air valve design is the culmination of years of intensive research, innovative design and leading edge technology.

The Vent-O-Mat series RGX sewage air valve has transcended the line of being a mere air valve or surge alleviation mechanism as it represents more than just the combination of these functions. In fact, it is best described as a cost effective pipeline management system incorporating the features of a double acting sewage air valve and surge alleviation device.

This manual is intended to provide the project engineer, contractor and end user with a useful guide on how best to install operate, maintain and maximise the performance of the Vent-O-Mat series RGX sewage air valve. Included are comments on sewage air valve sizing and positioning, Vent-O-Mat testing procedures and useful technical data.

Note this document is specifically directed at the use of Vent-O-Mat series RGX sewage air valves and is not intended as a comprehensive pipeline design guide or system engineering manual.

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QUALITY CONTROL

Vent-O-Mat maintains stringent manufacturing and test procedures to ensure the best possible service and reliability is given by every valve produced. At Vent-O-Mat however, quality assurance is more than just a series of product inspections and tests it is in fact our approach to growth. Whilst it is true that each valve must pass a final test before it is cleared for dispatch, our basic belief is that quality cannot be inspected into a valve but must be designed and built into each valve. Total customer satisfaction is ensured through our employment of dedicated people, solid engineering and carefully monitored manufacturing procedures. We recognise the need for and encourage individual pride and self satisfaction which is gained in producing reliable, innovative and durable valves. This attitude to quality, permeates through our company, from the directors to the newest employees.

Vent-O-Mat Quality Control Programme

Vent-O-Mat has a well established and stringent standard Production Quality Programme. The general chain of material procurement, manufacturing and testing procedures are outlined below.

The general chain of events on receipt of an order are as follows:

Quality Requirements & Tests	Specification/Acceptance
1. Planning	
2. Procurement of materials and sundries	Standard materials spec.
3. Machining of flanges/body & floats	Drawings
4. Post machining dimensional inspection	Drawings
5. Assembly	Drawings
6. Hydrostatic test	0.5 bar - 1.5 times working pressure
7. Test Certificates	Standard
8. Final inspection prior to dispatch	Visual
9. Dispatch	Works

Enclosed below, is a more detailed description of some of the procedures carried out and checks put in place to ensure that each valve produced is of the highest standard.

1. Planning

On receipt, orders are reviewed initially by the Production Director before transcribing onto internal paper work. At this stage, any new or non - standard requirements are identified and actioned as appropriate.

This is then passed to the Planning Department who procure the relevant materials and sundries .

All correspondence relating to an order is held in the sales order file which also contains copies of all material and product test certification on completion of the order .

2. Work Instructions

The Planning Department issues to the Manufacturing Department , copies of the works order , detailed piece part drawings and manufacturing route cards which indicate both manufacturing and inspection operations . Detailed method sheets are compiled for each machining operation and issued as part of the full instruction package .

Any non - standard operations , such as specialised testing or marking are either detailed in the works order or the works order refers to a separately issued procedure.

3. Records

The records maintained against standard products are material test certification for pressure containing parts and final product certification.

In - house records are maintained in respect of components and final inspection

4. Design Control

All calculations and drawings are checked and signed - off by either the Production Director or the Technical Manager.

5. Documentation and Change Control

A drawing register is maintained which reflects current issue and date of drawings available. Change to the drawings is controlled by a change note system which maintains records of all changes.

Copies of modified drawings are issued to all relevant departments and are signed for on receipt . Copies of the superseded drawings are removed and destroyed . Control of process procedures, e.g. welding, is the responsibility of the Quality Assurance Manager and are issued as necessary against the specific works order.

6. Control of Inspection, Measuring and Test Equipment

Regular checks are carried out on equipment being used.

Pressure gauges used in product testing are tightly controlled. Each gauge is identified by a unique gauge or test stand number and the dates when calibration are due are clearly shown.

Calibration records of checks against a master standard pressure gauge are maintained.

7. Control of Purchased Materials and Services

Purchased supplies usually consist of raw materials, such as stainless steel and high density polyethylene, which are procured from well established suppliers who supply as standard, material test certificates.

Sub contracted processes are limited to plating operations, specialised welding and the machining of flanges.

Supplier performance is judged from an analysis of the Goods Received inspection reports.

All purchase orders are clearly drawn up and references are given to the required specifications.

All material received is first passed to Goods Receiving Inspection for checking and acceptance.

Visual inspection, verification of identification against test certification and dimensional inspection are carried out. Responsibility for the checking and signing - for the acceptance of materials test certification lies with Quality Assurance Manager. Materials are not passed to the stores until clearance has been obtained.

Material is cleared to the Stores by an inspection sign off or the stores receipt note .

Any reject material is segregated, marked and an inspection rejection note is raised.

8. Manufacturing Control

A work packet comprising the component drawings, method sheets and route card is prepared and issued for each item or batch of items to be manufactured. The route cards indicate the intermediate and final inspection operations.

A system of first off and patrol inspection is employed in addition to a 100% final inspection on all assembled products.

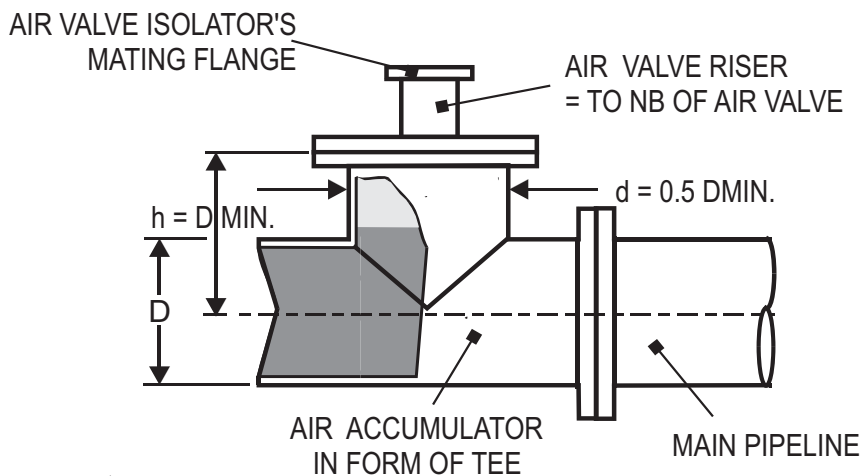
9. Completed Item Inspection Test

Assembly of the final product is carried out using the parts issued from the warehouse having identifiable inspection clearance, with reference to the general arrangement drawings.

RECOMMENDED INSTALLATION PROCEDURES

Air Accumulators

It is common practice amongst some design engineers to place an air valve on a riser welded directly onto the main pipeline. This method however leads to inefficient air valve operation and restrictions in the main pipeline as air that is taken in under vacuum conditions will be swept away when the pumps are restarted. It is good pipeline design practice, to provide an accumulator, as indicated below for every air valve, to facilitate efficient air valve operation.

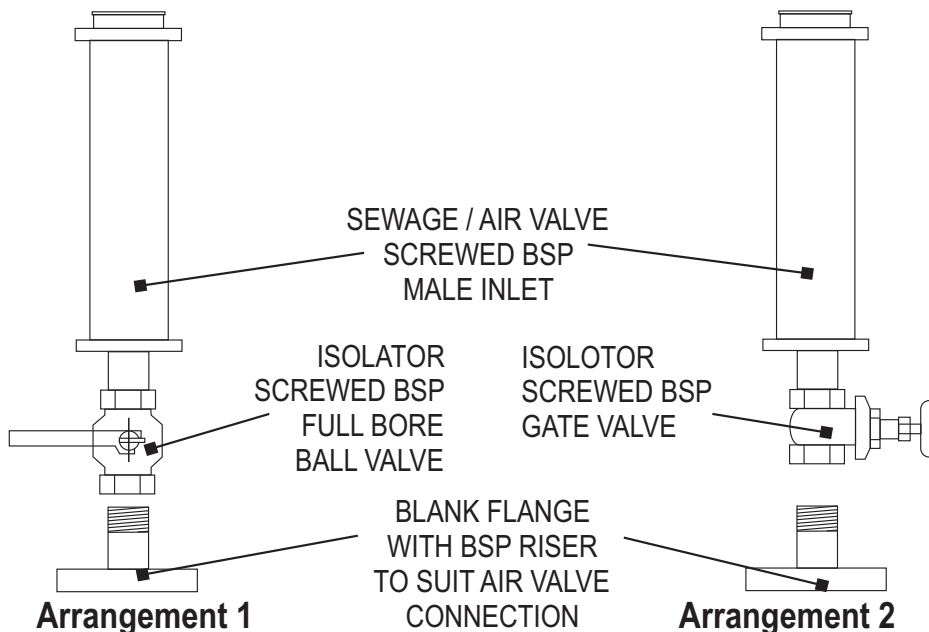


Isolator Arrangements

Every air valve installed, should have an isolator installed directly underneath it to allow the removal of the air valve in case of repairs. Indicated on the enclosed diagrams are Vent-O-Mat's recommended installation arrangements.

Arrangements 1 & 2

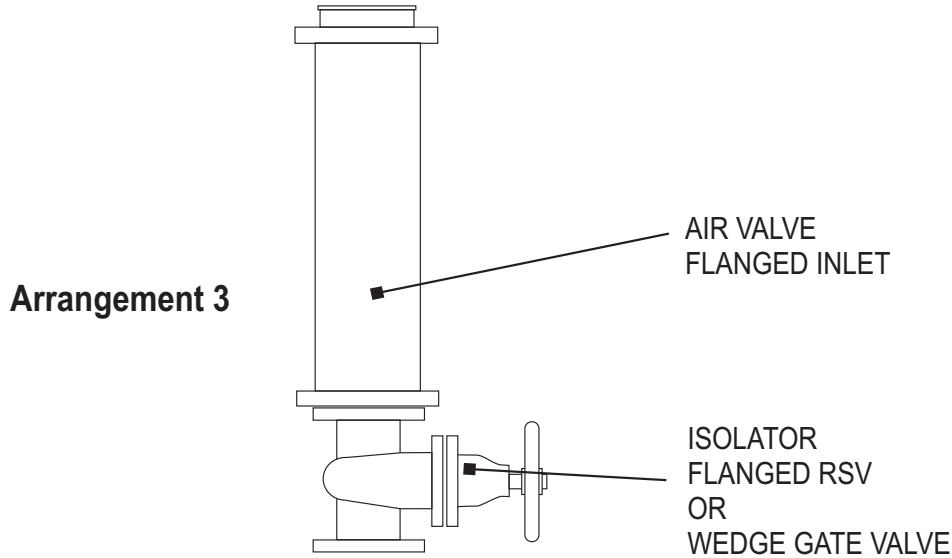
Specific to DN50 Vent-O-Mat Series RGX valves.



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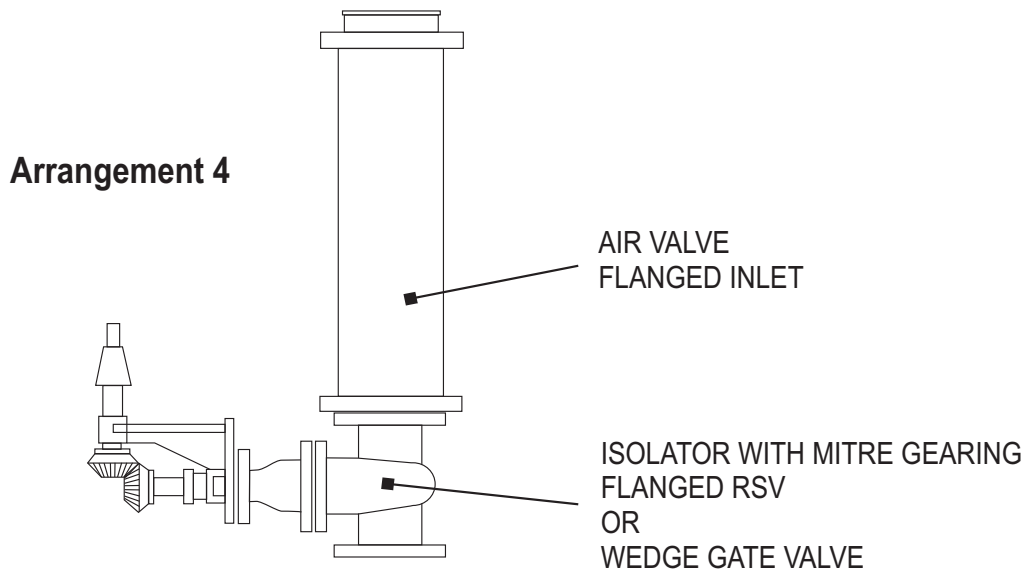
Arrangement 3

Specific to DN80(3"), 100(4"), 150(6") and 200(8") valves - Recommended for valves not installed in a valve chamber. Either a Wedge Gate or a Resilient Seal Valve can be utilised.



Arrangement 4

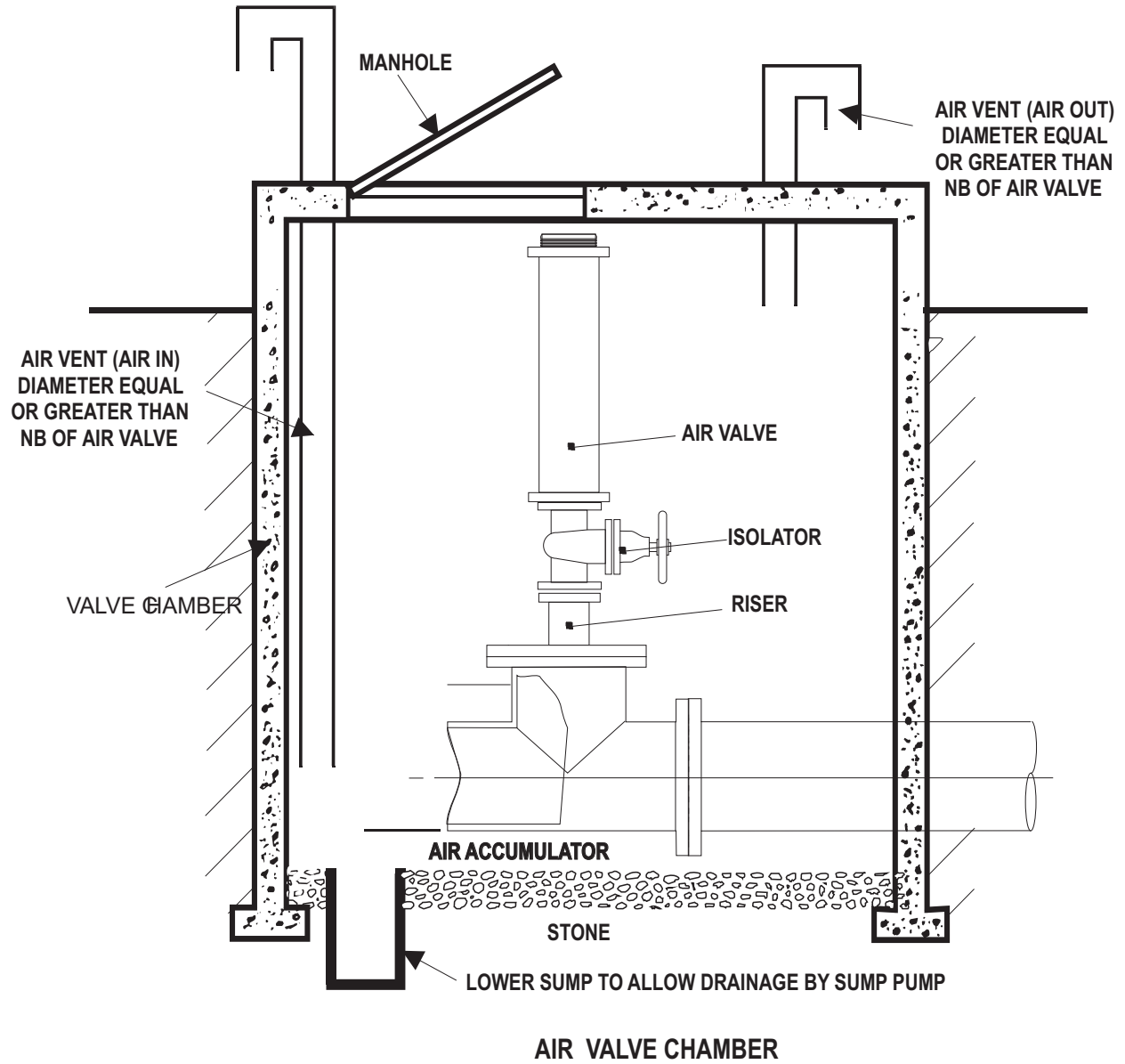
Specific to DN80(3"), 100(4"), 150(6") and 200(8") valves - Recommended for valves installed inside a valve chamber, to be operated by a Tee Key.



Air Valve Chamber Design

A well designed air valve chamber is important and should be designed with easy access to the valve for installation and subsequent maintenance. Good support is required in the case of chamber settling. It is a common practice to place a layer of stone underneath the pipe for drainage purposes. Two vents should also be installed, in the manner indicated on the opposite page to allow free and constant air circulation.

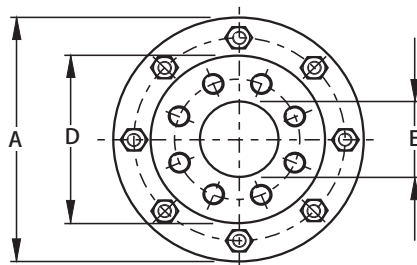
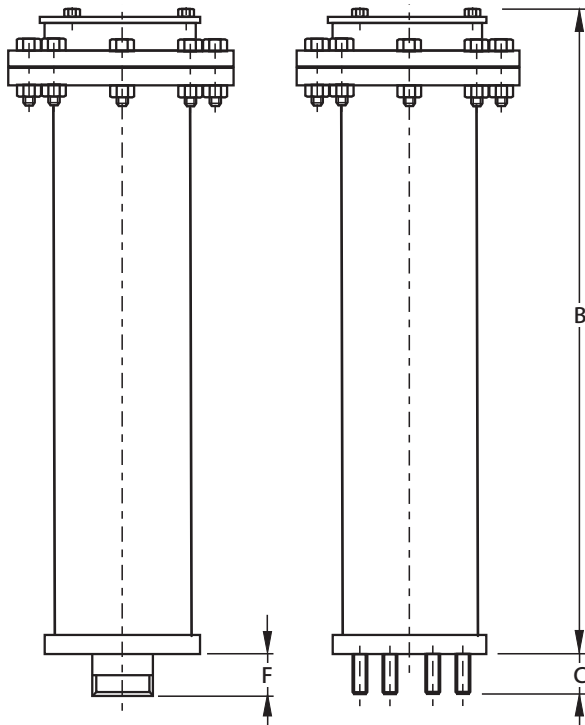
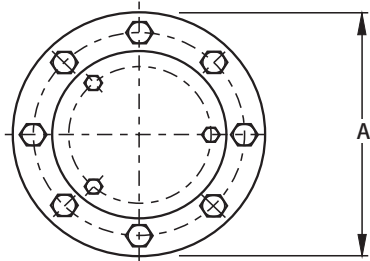
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GENERAL SPECIFICATIONS

THREADED 50 (2") & STUDED INLET - 80 (3") TO 200 (8")



Type:

Double Orifice (Small & Large Orifice) with Anti Surge Orifice mechanism.

End Connection:

Flange with DN50 (2") Male BSP/NPT Threaded and Screwed Studs for Alignment to BS4504, SABS 1123 and ANSI B16.5 Class 150 for DN80 (3") to DN200 (8").

Nominal Sizes:

DN50 (2"), DN80 (3"), DN100 (4"), DN150 (6") & DN200 (8")

Model No's:

RGX 1011/1021 _____ PN10 (145 psi)

RGX 1001/1031 _____ PN10 (145 psi)

Pressure Ratings bar (psi):

Operating Pressure Range - bar (psi):

Min Max.
PN10 (145 psi) _____ 0.5 (7.2) _____ 10 (145)

Function:

- i) High volume air/gas discharge - pipeline filling.
- ii) High volume air intake - pipeline draining
- iii) Pressurized air/gas discharge - pipeline filled.
- iv) Surge dampening - high velocity air/gas discharge, liquid column separation & liquid oscillation.

Valve Selection:- see pages 11 & 12

Materials of Construction:- see pages 5 & 7

Installation:- see page 3

Standard Factory Tests:

- i) Hydrostatic test -1.5 x max. rated working pressure
- ii) Low head leak test - 0.5 bar (7.2 psi)
- iii) Small orifice function test at max. rated working pressure (minimum 1 valve in 10).

OVERALL DIMENSIONS & WEIGHTS

DN	mm	in	Model No.	A		B		C		D		E		F		Weight		kg	lbs
				mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in		
50	2	050	RGX 1011/1021	220	8 2/3	770	30 3/8	N/A		125	5	50	2	42	1 2/3	18	39.7		
80	3	080	RGX 1001/1031	285	11 1/4	780	30 7/10	55	2 1/8	200	7 7/8	80	3	N/A		36.5	80.5		
100	4	100	RGX 1001/1031	285	11 1/4	780	30 7/10	55	2 1/8	220	8 2/3	100	4	N/A		36	79.4		
150	6	150	RGX 1001/1031	395	15 9/16	1060	41 7/10	55	2 1/8	285	11	150	6	N/A		82	180.8		
200	8	200	RGX 1001/1031	445	17 1/2	1060	41 7/10	55	2 1/8	340	13 6/16	200	8	N/A		103	227		

Note: DN50 (2") valves have DN50 (2") BSP/NPT male inlet connections as standard.

information subject to change without prior notice.

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COMPONENT DESCRIPTION & MATERIAL SPECIFICATION THREADED 50 (2") & STUDED INLET - 80 (3") TO 100 (4")

Type:

Series RGX - Double Orifice (Small & Large Orifice)
with "Anti-Surge" Mechanism.

End Connection:

Flange with Threaded BSP/NPT Male - 50 (2") valves.
Flange with Screwed Studs - 80 (3") & 100 (4") valves.

Nominal Sizes:

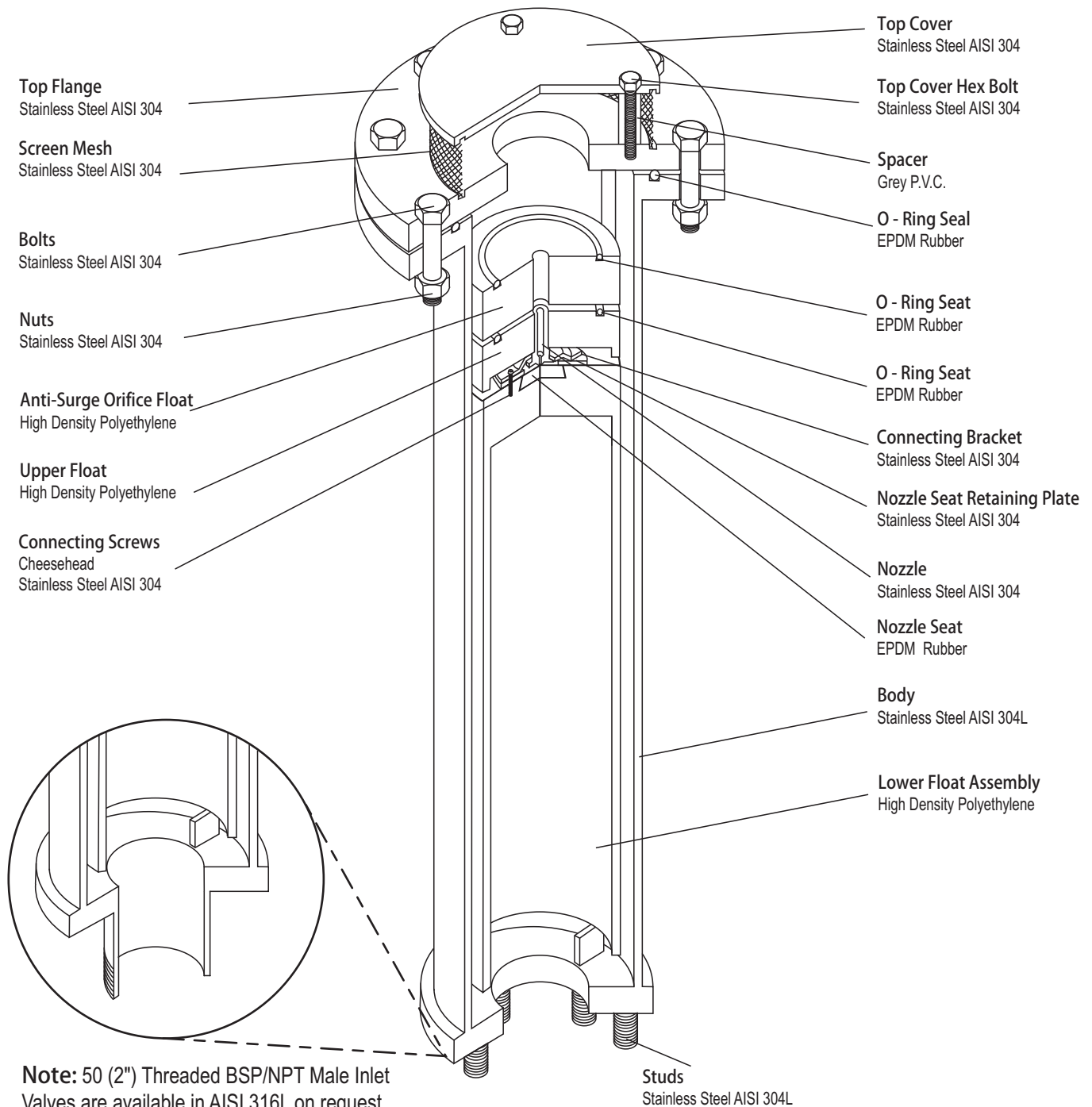
DN50 (2")
DN80 (3")
DN100 (4")

Model No:

RGX 1011/1021
RGX 1001/1031

Pressure Ratings:

PN10 (145 psi)
PN10 (145 psi)



Note: 50 (2") Threaded BSP/NPT Male Inlet
Valves are available in AISI 316L on request.

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COMPONENT DESCRIPTION & MATERIAL SPECIFICATION STUDED INLET - 150 (6") & 200 (8")

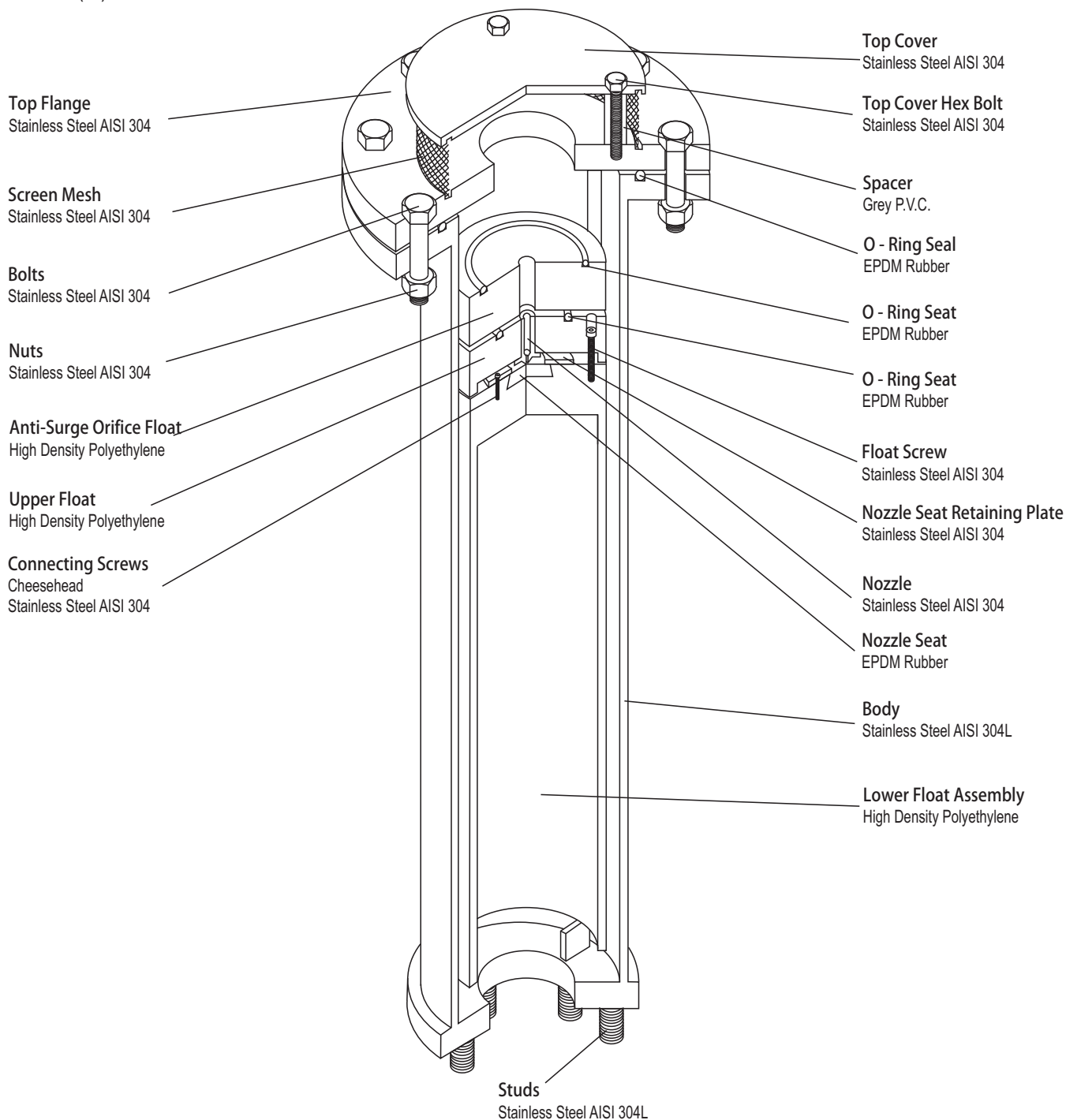
Type:
Series RGX - Double Orifice (Small & Large Orifice)
with "Anti-Surge" Mechanism.

End Connection:
Flange with Screwed Studs - 150 (6") & 200 (8") valves.

Nominal Size:
DN150 (6")
DN200 (8")

Model No:
RGX 1001/1031

Pressure Rating:
PN10 (145 psi)

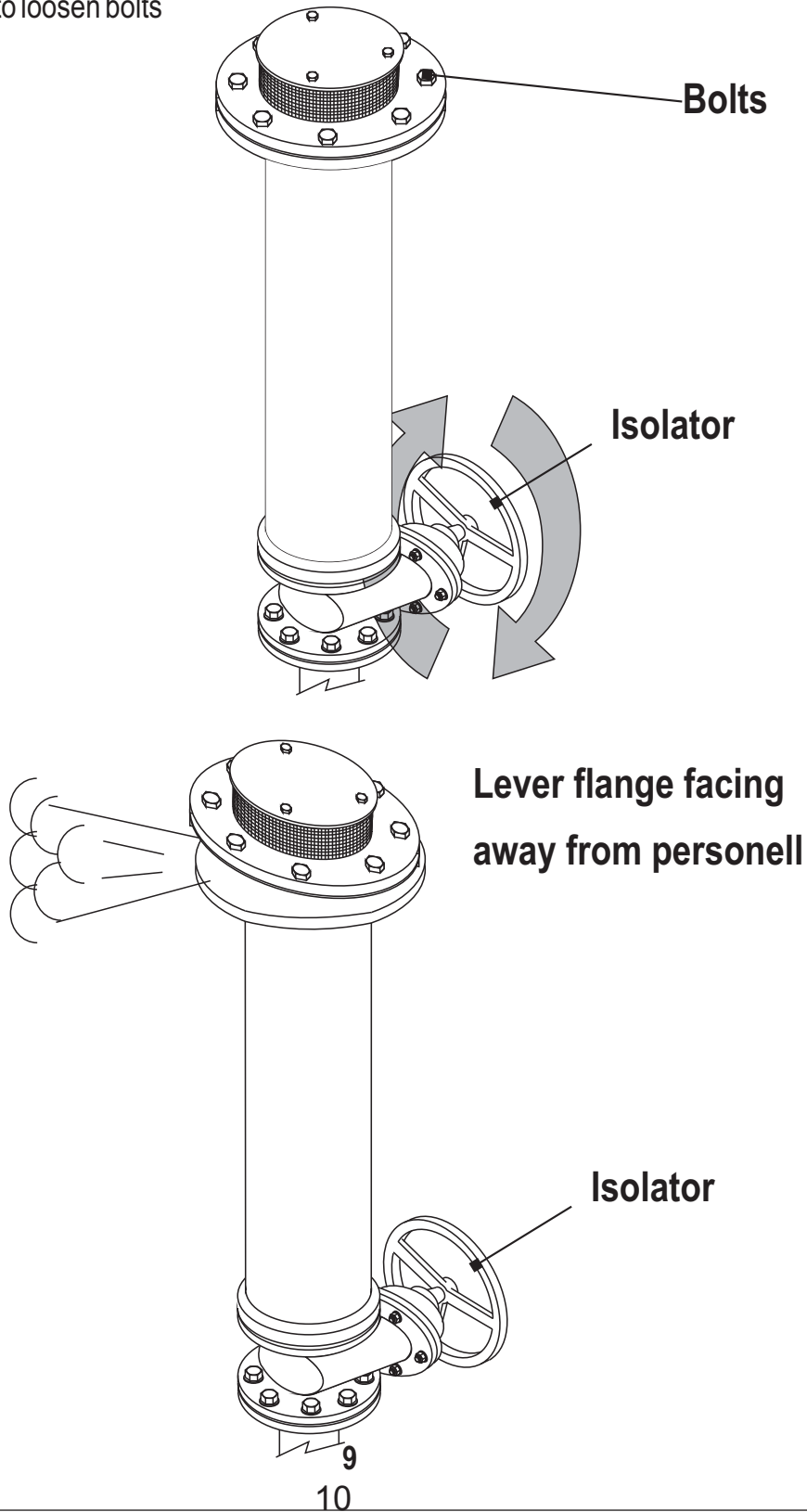


Note: Valves are available in AISI 316L on request.

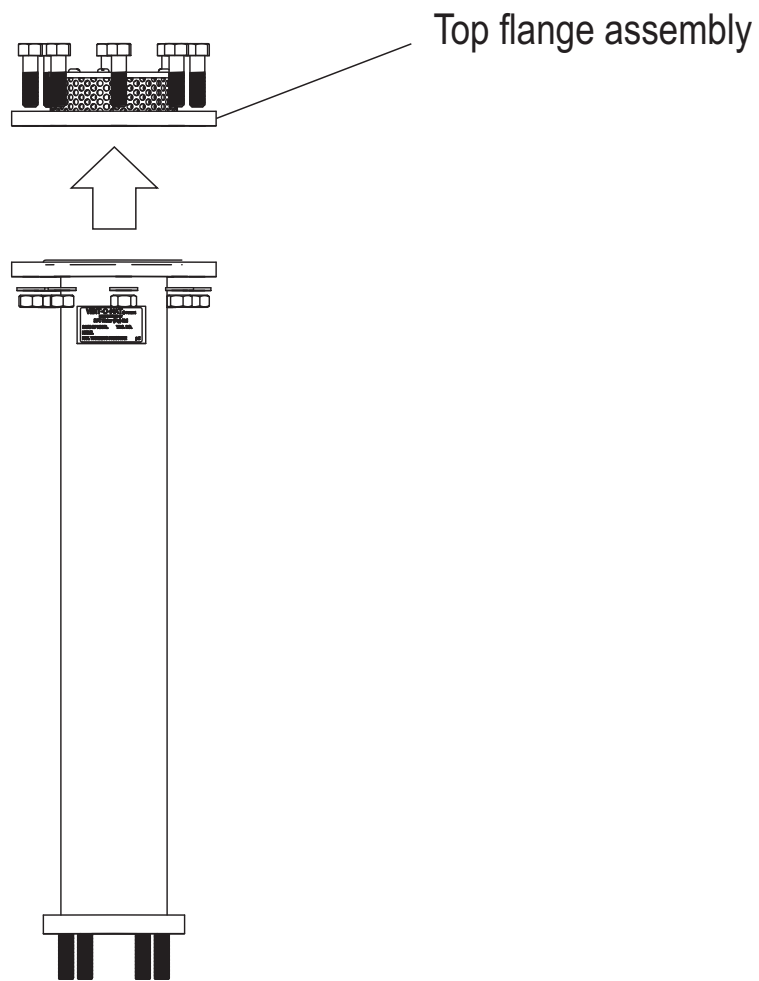
Maintenance Procedures - RGX Valves

Isolating Valves

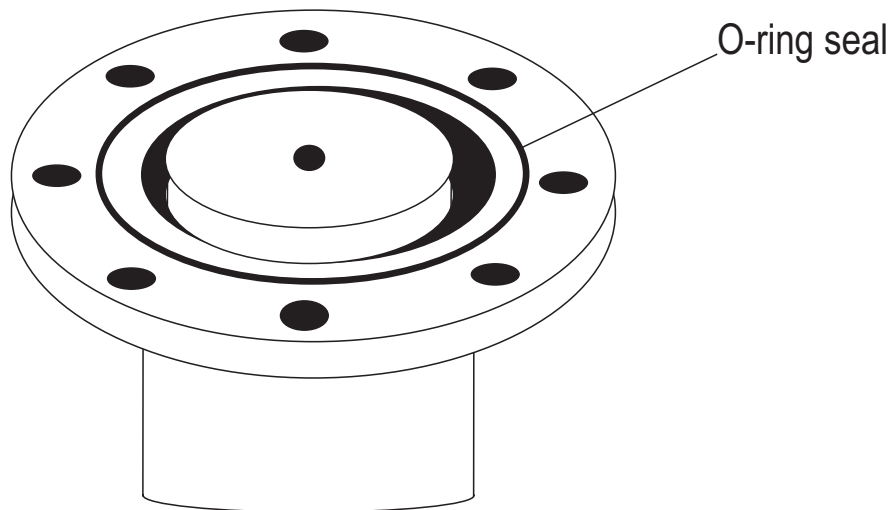
Close the Isolator Valve . Loosen Bolts in a circular fashion. Ensure that any entrapped pressure is bled off slowly before fully removing the cover. This can be ensured by first loosening bolts partially and levering the top flange upwards facing away from the maintenance personnel. Once Pressure is released continue to loosen bolts



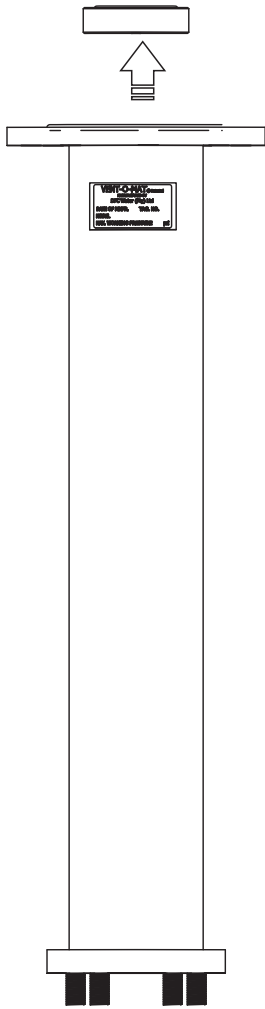
Remove the Top Flange Assembly



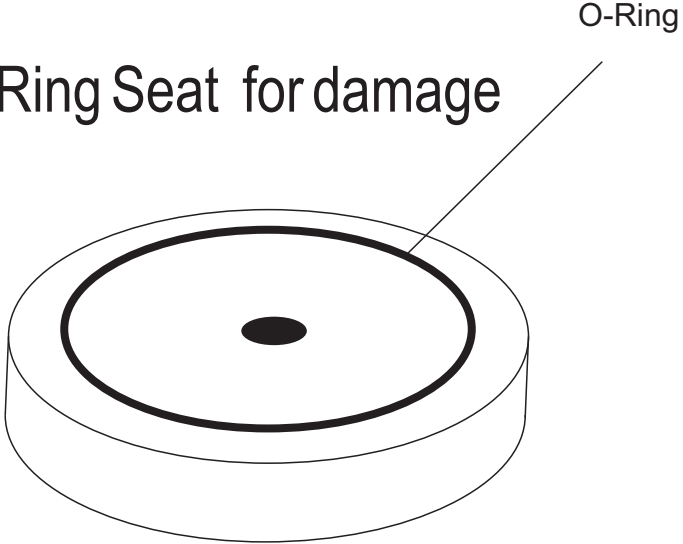
Check the o-ring seal for damage



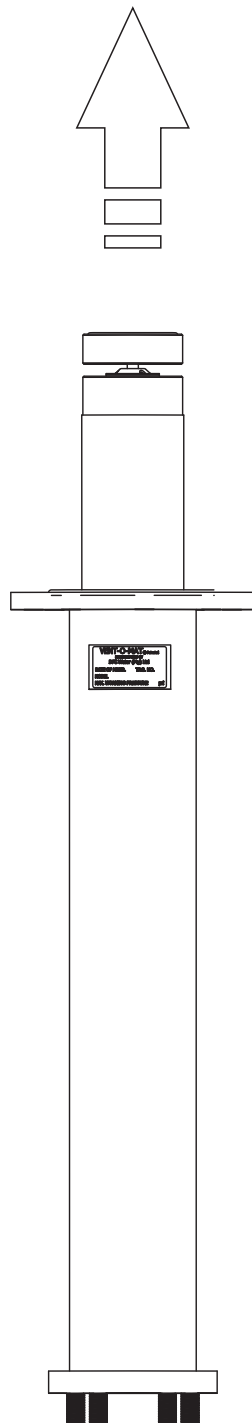
Remove the "Anti-Surge float"



Inspect the O-Ring Seat for damage



Remove the Lower float assembly



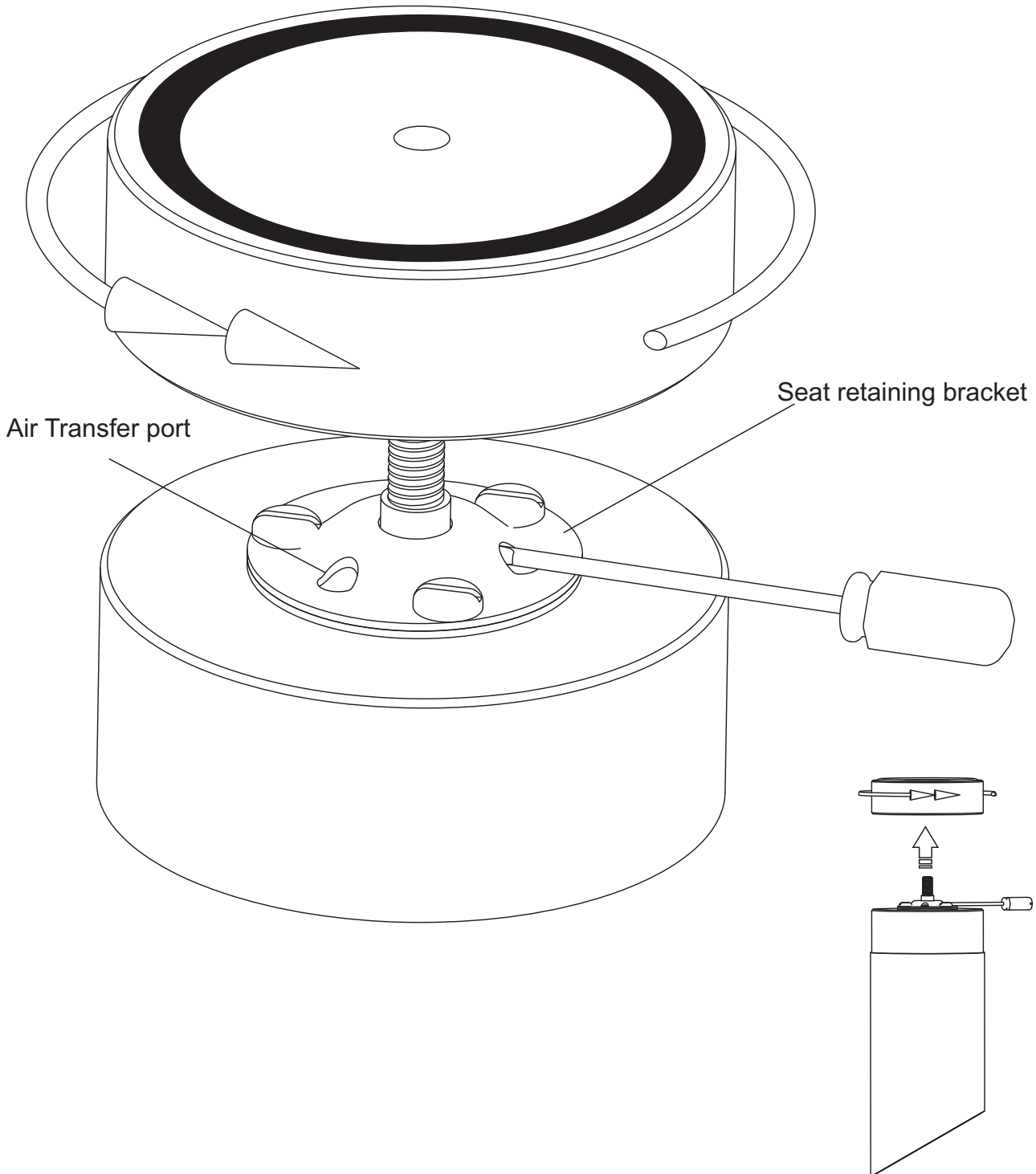
Draw the Lower Float Assembly from the valve, rinse the floats with clean water before conducting further maintenance

Accessing the small orifice

For DN 50 (2") TO DN 100 (4")

using a flat screw driver stabilize the nozzle by placing it into the air transfer port of the seat retaining bracket.

Push the screwdriver against the nozzle ensuring the flat side of the screwdriver pushes up against a flat side of the nozzle. This will prevent the nozzle being able to turn. Once the nozzle is immobilized, turn the float so that it unscrews from the nozzle.

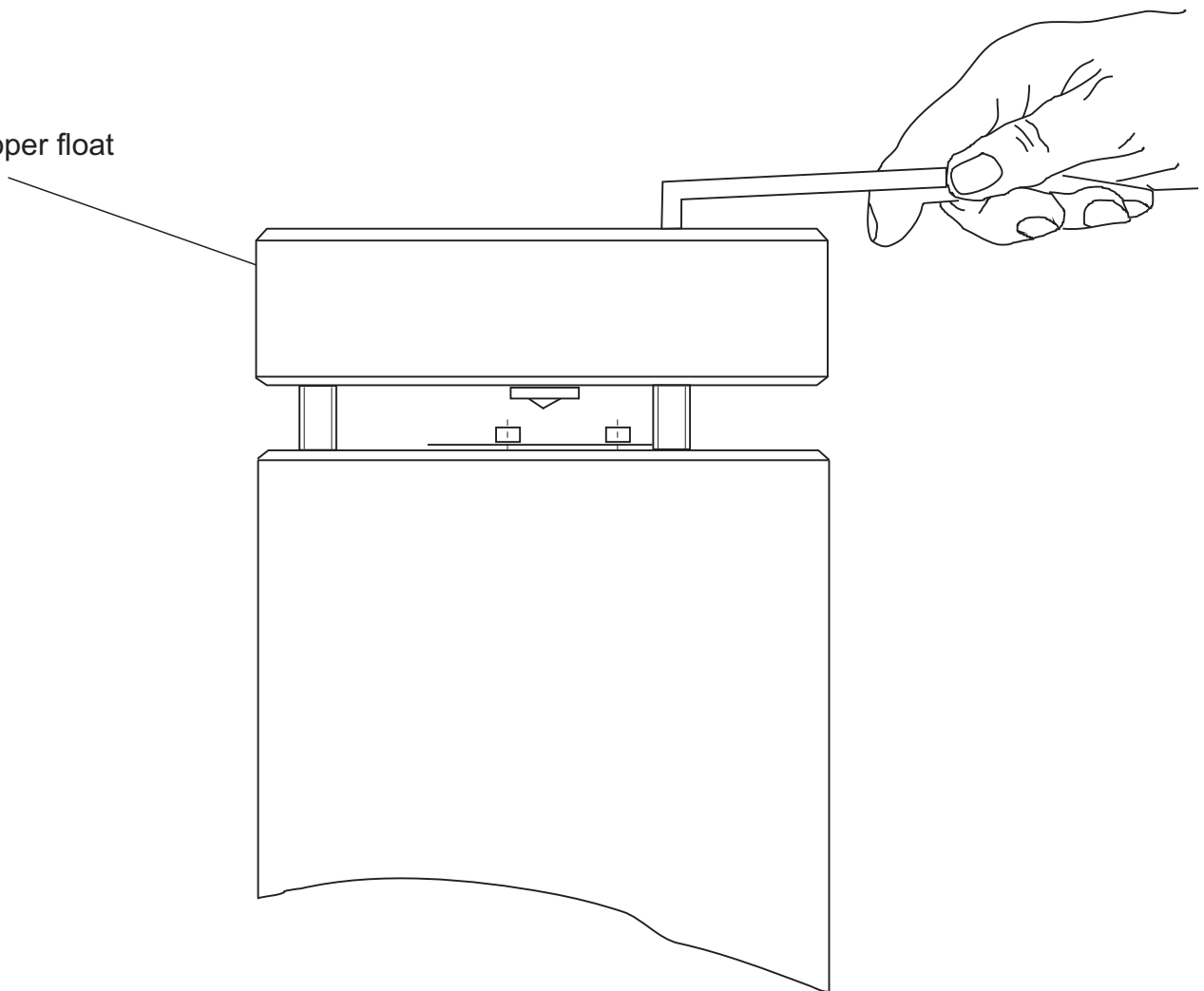


Accessing the small orifice

For Dn150 (6") -DN300(12")

Using an Allen Key/Hex Key, remove the hex nuts from the upper float / small orifice float to expose the Nozzle seat.

Upper float

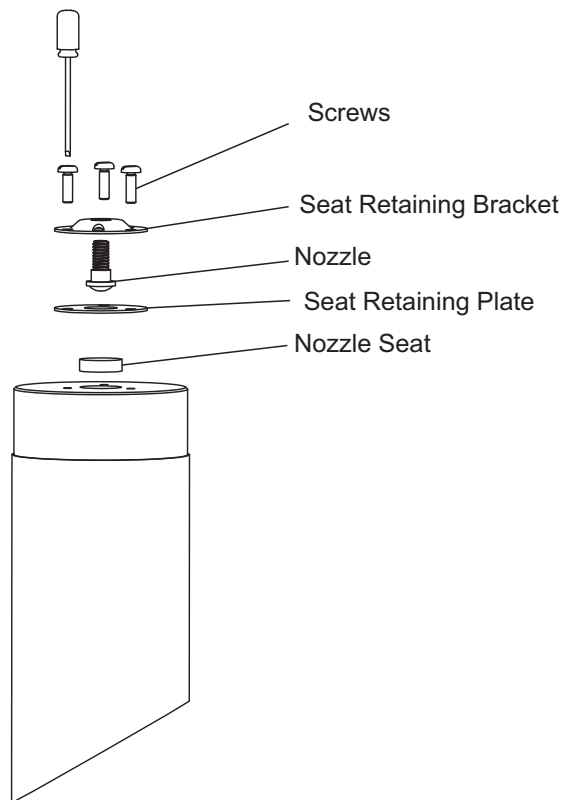


Disassembly of small orifice

DN 50 (2") to DN 100 (4")

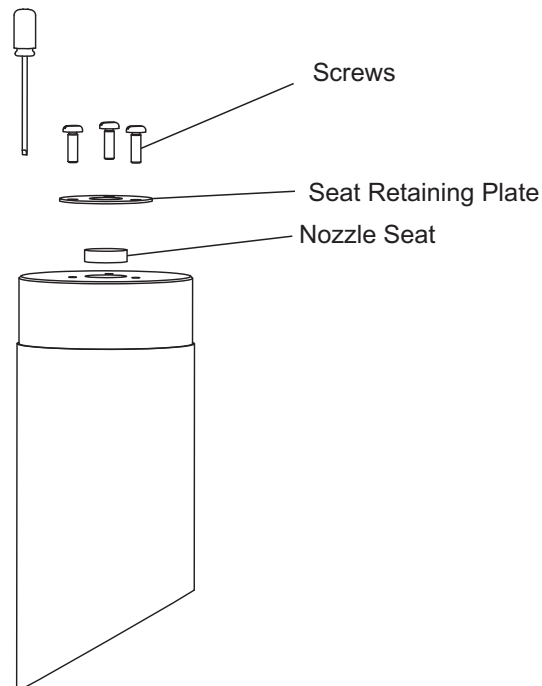
Unscrew screws from float, remove the seat retaining bracket and seat retaining plate. Check nozzle seat for damage and if necessary remove and replace.

Check the nozzle for blockage or damage. If blocked clear using thin wire. If damaged, replace.



DN 150 (6") to DN 300 (12")

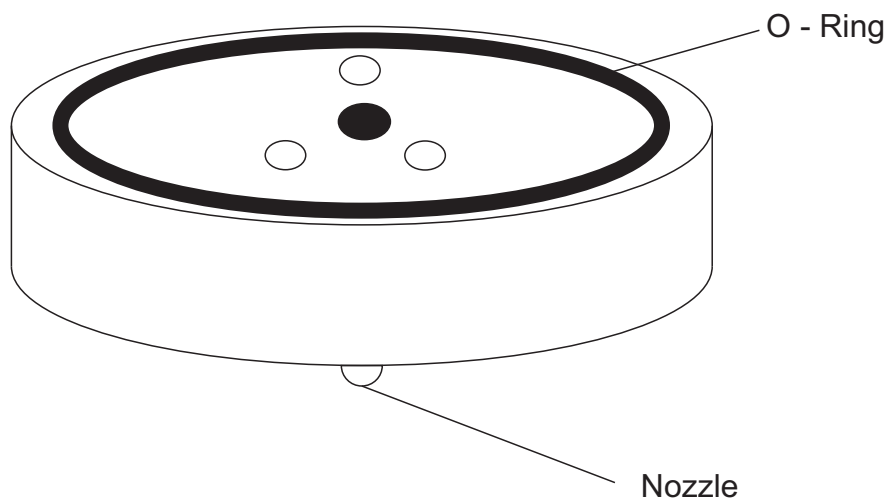
Remove screw, remove seat retaining plate. Check nozzle seat for damage if necessary remove and replace.



Disassembly of small orifice (cont)

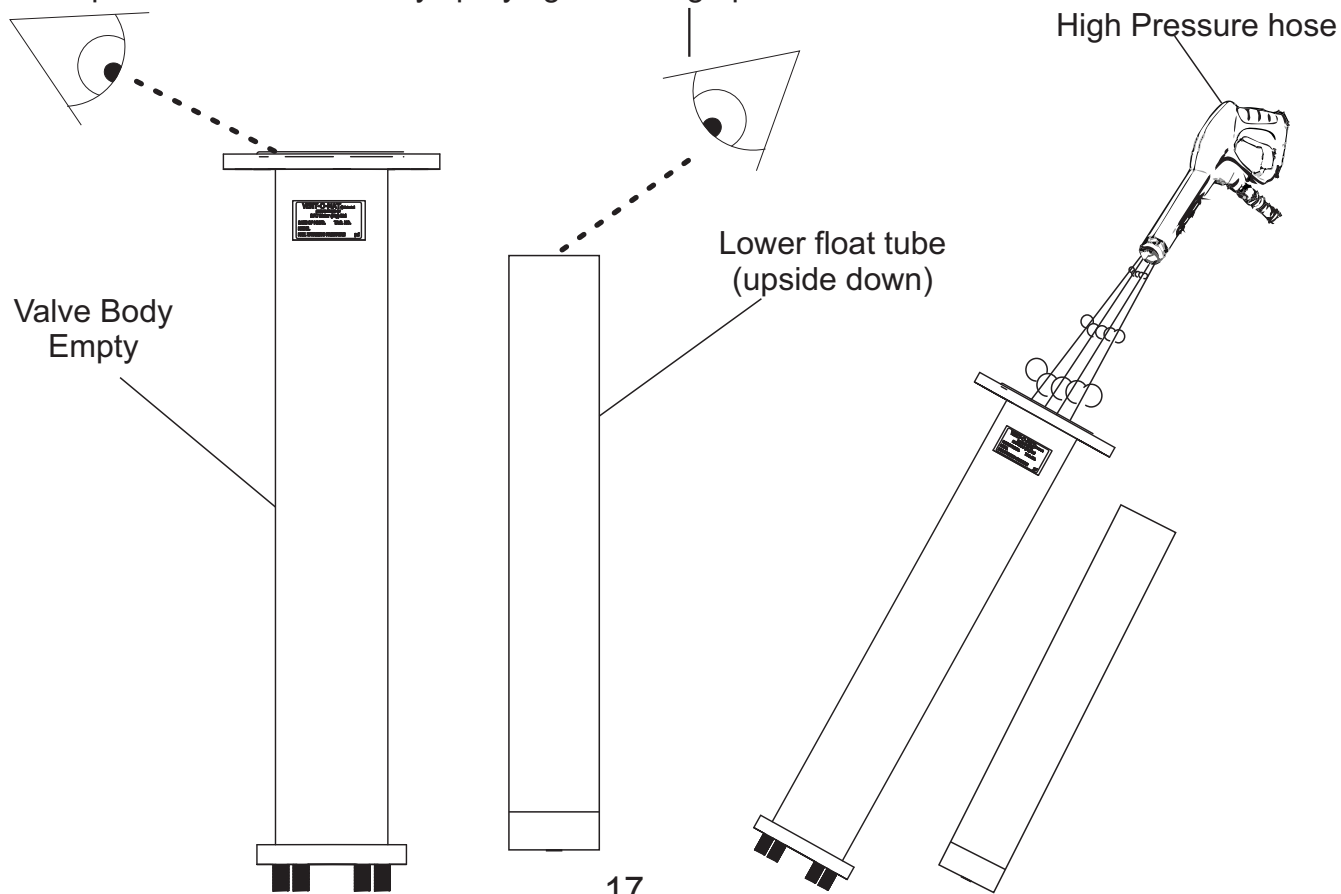
DN 150 (6") to DN 300 (12")

For the Sizes From DN 150 (6") up to DN 300 (12") the Nozzle Remains in the float during dismantling and only has to be removed should it be damaged. If the Nozzle is blocked it can be cleaned with a thin piece of wire while still housed in the float.



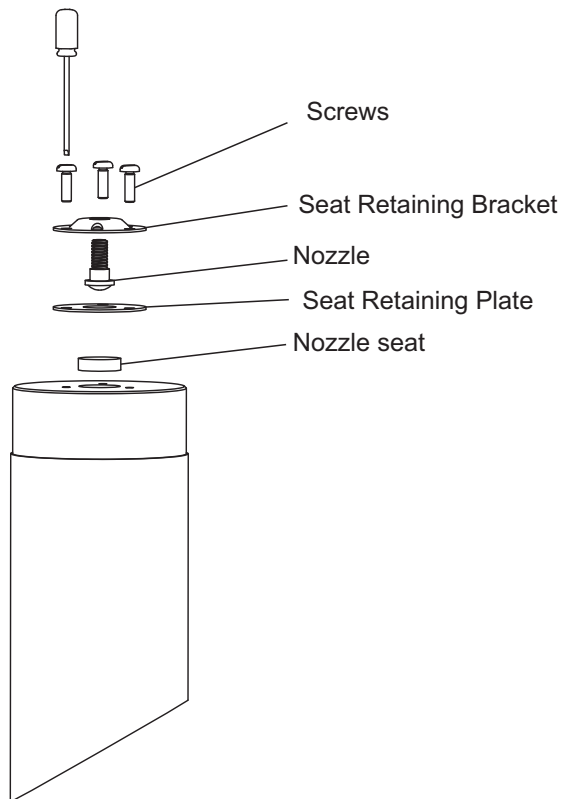
Cleaning body and float tube

After Checking nozzle, seats and seals for damages and replacing items where necessary. The final step is to check the body and lower float tube for debris or build up. Any debris and build up can be cleaned out by spraying with a high pressure hose.



Reassembling the floats.

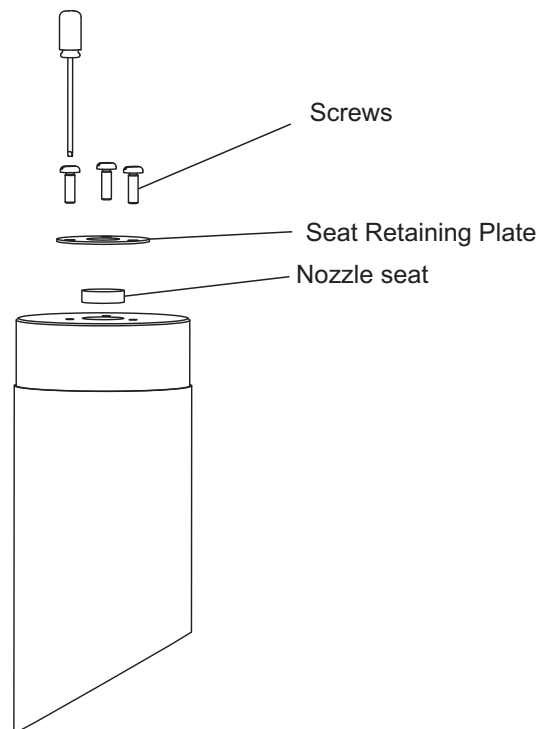
Once all maintenance is complete, the first step in reassembling the valves is to reassemble the floats.



DN 50 (2") -DN100 (4")

Make sure the nozzle seat is securely in place and that exposed surface is flat and level, place the Retaining plate over the Nozzle seat.

Thread the nozzle through the Seat Retaining Bracket so the rounded surface of the nozzle is pointing Downward and the raised side of the retaining bracket is pointing upward. Place the Nozzle and Seat Retaining Bracket against the Nozzle, line up the holes on the float with those in the Retaining Bracket and Retaining Plate. Screw in screws till flat against the surface of the retaining bracket do not over tighten.

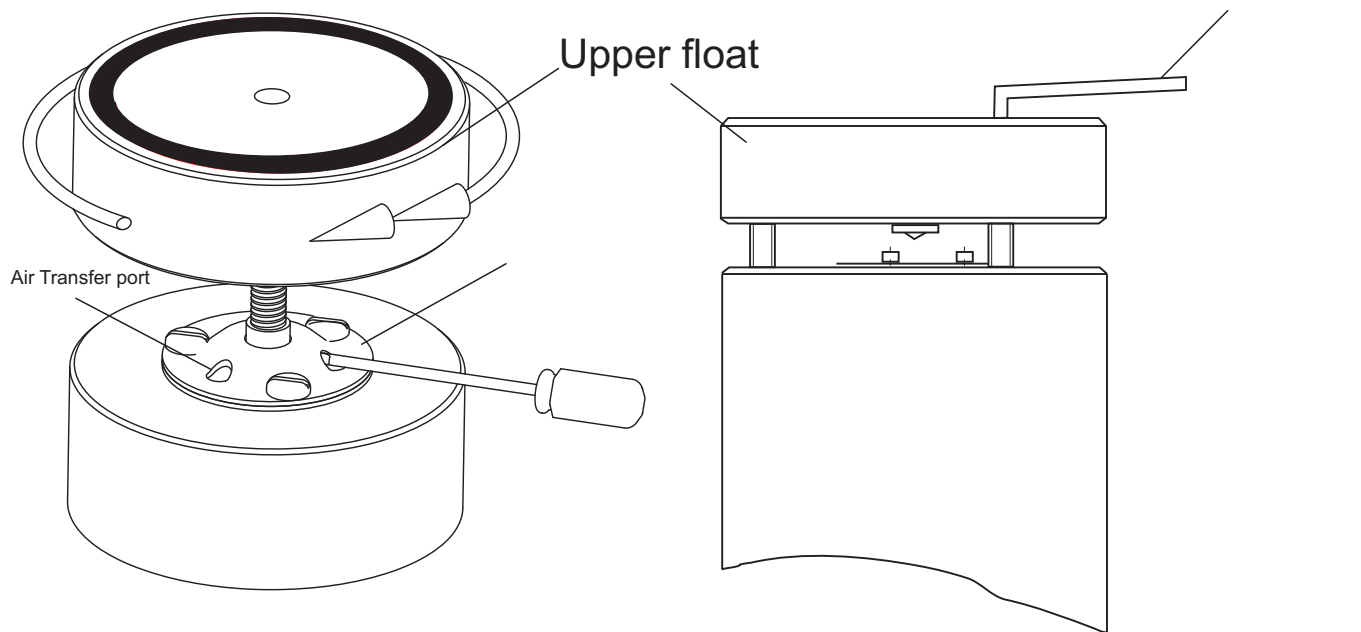


DN 150 (6") -DN300 (12")

Make sure the nozzle seat is securely in place and that exposed surface is flat and level, place the Retaining plate over the Nozzle seat. Line up the holes on the float with those in the retaining plate. Screw in screws till flat against the surface of the retaining bracket do not over tighten.

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Reattach the Upper float to the lower float



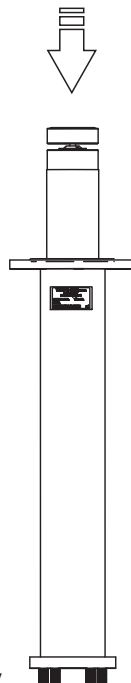
DN 50 (2") - DN 100 (4")

To replace the upper float once again immobilize the Nozzle by placing a flat screwdriver into the Air Transfer Port against the flat side of the Nozzle. This will prevent the Nozzle from moving and allow the upper float to be screwed back on to the nozzle stem. Fasten until sitting flush with the flat of the nozzle, do not over tighten. Remove the screwdriver the float should now be able to freely move around.

DN 150 (6") -DN 300 (12")

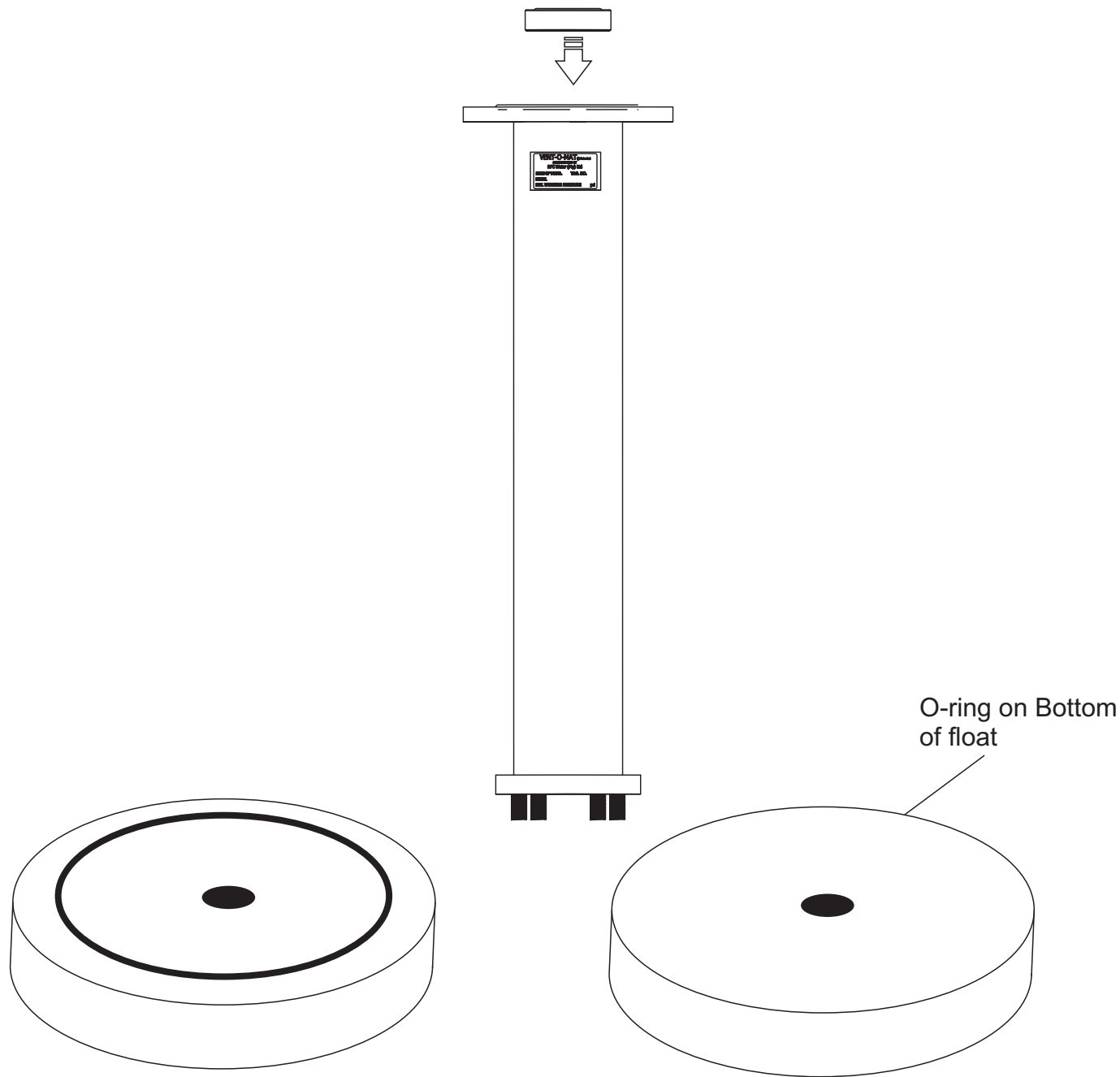
To Reattach the Upper Float replace the Cap Screws tighten until all the way in do not over tighten.

Replace the Lower Float Assembly



Slide the Lower float assembly into the valve body

Replace "Anti-Surge" Float

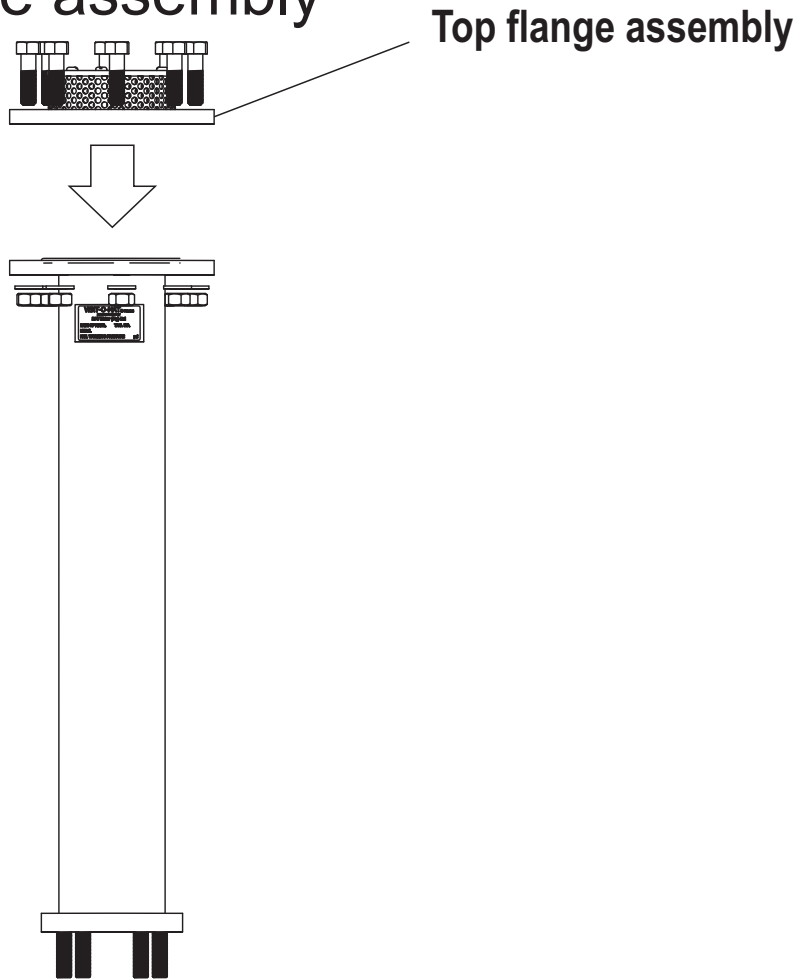


DN 50 (2") - DN 100 (4")
For these valves, the O-ring in the "Anti-Surge" Float seals against the top flange and therefore must face up. The blank surface of the float must face downwards.

DN 150 (6") - DN 300 (12")
For these valves, the O-ring in the "Anti-Surge" Float seals against the upper float and therefore must face down, The blank surface of the float must face upwards to seal against the O-ring in the flange.

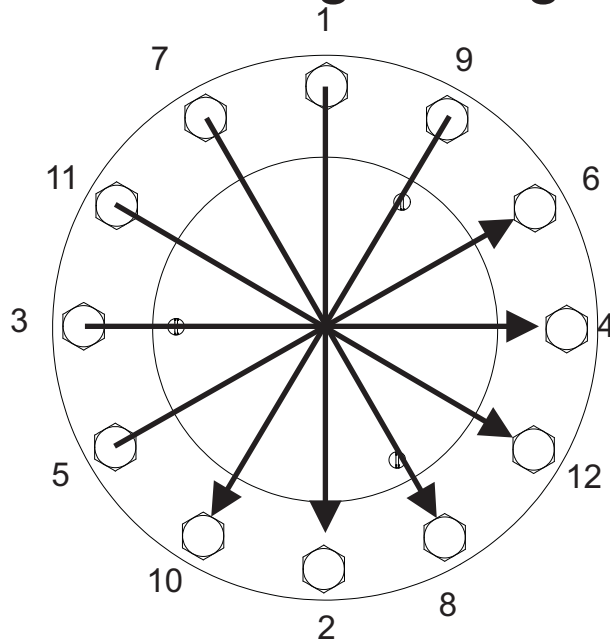
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Replace top Flange assembly

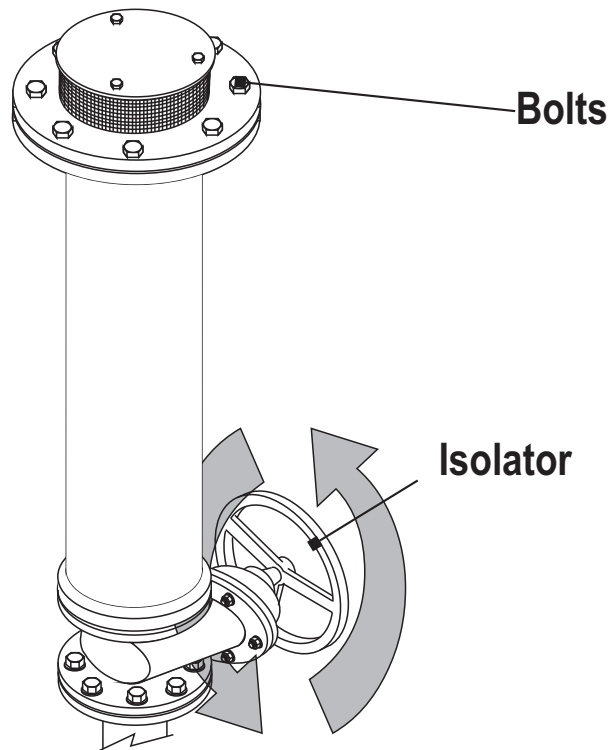


Replace the top flange assembly. Replace nuts and bolts. When replacing nuts utilize an anti-seize paste to prevent seizing of stainless steel nuts and bolts. Cross tighten nuts. Nuts need to be tightened by spanner so that they cannot be removed by hand but there is no need for a torque wrench to be used.

Cross tightening



Replace Valve On Pipeline Open Isolator



Once maintenance is complete replace the valve on the line. If the body was removed. Ensure that the isolator is fully open before commissioning. If opening on a pressurized line expect a possible burst of air upon opening of the isolator

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Vent-O-Mat Identity Labels

Each Vent-O-Mat valve sold has an identity label attached to the barrel, providing pertinent information on the valve. A sample of the label is provided below. For maintenance and technical assistance, kindly contact the agent that services your area (see page 13 for Vent-O-Mat's agent list), or the manufacturer (details on label), quoting the information on the label.

1. SEQ. No: Refers to sequential number of batch valves for specific orders/ contracts.
2. MODEL: Refer to page 14 for explanation of Model Numbers.
3. MAX WORKING PRESSURE: Indicates the valve's designed working pressure in kPa.
4. REF. No: Serial number that refers to Vent-O-Mat's internal paperwork, including test compliance that can be crossed referenced to any test carried out on valve.

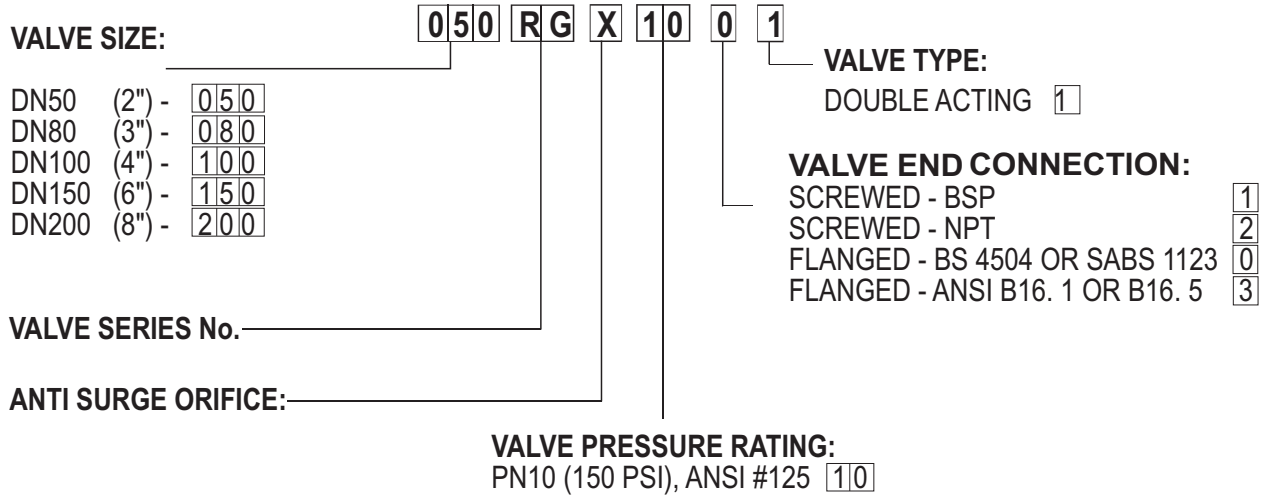


A sample of a Vent-O-Mat identity label. The label is rectangular with rounded corners and a dark background. At the top, it features the 'VENT-O-MAT' logo in large, bold, white capital letters, followed by a registered trademark symbol (®). Below the logo, in smaller white text, it says 'MADE BY VENT-O-MAT'. Further down, contact information is provided: 'P.O. BOX 16091 ATRISVILLE, 1465, SOUTH AFRICA (027 11) 845 1060' and 'FAX: (027 11) 422 3078 E MAIL: ventomat@iafrica.com'. The bottom half of the label contains four fields for identification: 'SEQ. No.' with a white rectangular box, 'MODEL' with a white rectangular box, 'REF. No.' with a white rectangular box, and 'MAX. WORKING PRESSURE' with a white rectangular box followed by 'kPa'.

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EXPLANATION OF MODEL NUMBERS

Vent-O-Mat model numbers are a series of numbers providing information on valve size, valve type, valve pressure rating and valve end connection.



SEWAGE AIR VALVE SIZING AND POSITIONING

The presence of air/gas in a sewer main in service or in the process of being filled is well known to be the cause of serious problems such as delay in filling, throttling and reduction in discharge capacities, risk of surge and corrosion.

The indiscriminate selection and positioning of double acting sewage air valves, without thorough evaluation of the system characteristics and dynamics will not solve the problem of air/gas in the main but can and will lead to the aggravation of phenomena associated with it's presence as well as introduce other destructive phenomena.

Air valve selection and positioning is a complex exercise because of the unpredictable nature of air/gas as it is influenced by many factors such as pressure, temperature, pipeline velocities etc., and it in turn influences the pipeline dynamics dramatically, making it difficult to quantify.

This section of the document provides the engineer with a guideline of where to position and how to size Vent-O-Mat sewage air valves to ensure the maximum performance and protection is gained from every valve installation. Reference should also be made to Vent-O-Mat's other publications and Vent-O-Mat's computer sizing disc for a more comprehensive guide on air valve sizing and positioning.

Positioning of Sewage Air Valves

Sewage air valves are positioned primarily on peak points to discharge air/gas during initial filling and to draw air into the pipeline under drainage conditions. There are however, a number of other locations where sewage air valves need to be installed to ensure effective pipeline operation and protection against phenomena such as surge. The table below provides a quick check reference on where to position sewage air valves.

Recommended Air Valve Locations
On apex points relative to the hydraulic gradeline. 5 metres below the apex points formed by the intersection of the hydraulic gradeline. Negative breaks - increase in downward slope or decrease in upward slope. Long horizontal sections - every 600 metres(1969 ft). Long ascending sections - every 600 metres(1969 ft). Long descending sections - every 600 metres(1969 ft). Pump discharge - subsequent to a pump non return valve. Blank ends - where a pipeline is terminated by a blank flange or a valve.

Sizing of Sewage Air Valves for Air Intake (Vacuum Conditions)

Sewage air valves are first and foremost sized for vacuum conditions (drainage) which may result from scouring of pipeline, pipeline rupture or instantaneous pump stoppage causing column separation.

The objective in sizing sewage air valve for vacuum conditions is to determine the smallest sewage air release and vacuum break valve capable of admitting air into the pipeline whilst not exceeding a differential pressure that would put the pipeline and gasket joint at risk due to negative internal pressure.

Good pipeline design practice dictates that the following negative pressures not be exceeded for various pipe material to ensure that pipe collapse or seal failure do not occur.

Pipe Material	Recommended Negative Differential
Steel	35 kPa(5 psi)
Ductile Iron	35 kPa(5 psi)
Fibre Cement	35 kPa(5 psi)
GRP	20 kPa(3 psi)
uPVC	15 kPa - 20 kPa(2-3 psi)
HDPE	15 kPa - 20 kPa(2-3 psi)
Concrete	35 kPa(5 psi)

Sewage air valves are generally sized on scouring velocities or partial rupture to economise on the valve size selected. The following rupture rates (as a percentage of pipeline area), are generally used. Note all these factors are taken into consideration in the Vent-O-Mat Sizing Disc which is freely available to any interested party.

Pipeline Material	Rupture Rate on which to base Size of Sewage Air Valve
Steel	10 - 15 %
GRP	10 - 15 %
Fibre Cement	50 - 100 %
Ductile Iron	10 - 15 %
uPVC	10 - 20 %
HDPE	10 - 20 %

Scouring rates are generally 11 to 12% of pipeline area.

Sizing of Sewage Air Valves for Air Discharge (Initial Filling Conditions)

It is prudent to size an air valve for both filling and drainage for a particular point on the pipeline and always to select the larger valve.

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Sizing a sewage air valve for filling is based on the velocity through the pipeline, the diameter of the pipeline and the pipeline material. Below is a quick check guide to determine if the valve on your pipeline is sized correctly. Vent-O-Mat recommends however, that air valve sizing should be done, utilising the Vent-O-Mat sizing programme, and with reference to Vent-O-Mat's document titled "Air Valve Technology Reviewed".

Pipeline Velocity	Pipeline Diameter	Recommended Valve Size
1 m/sec(3.3 ft/sec).	DN100 to DN400(4"-16")	DN50(2")
1 m/sec(3.3 ft/sec).	DN400 to DN600(16"-24")	DN80(3")
1 m/sec(3.3 ft/sec).	DN600 to DN700(24"-28")	DN100(4")
1 m/sec(3.3 ft/sec).	DN700 to DN900(28"-36")	DN150(6")
1 m/sec(3.3 ft/sec).	DN900 to DN1400(36"-56")	DN200(8")
2 m/sec(6.6 ft/sec).	DN100 to DN200(4"-8")	DN50(2")
2 m/sec(6.6 ft/sec).	DN200 to DN400(8"-16")	DN80(3")
2 m/sec(6.6 ft/sec).	DN400 to DN500(16"-20")	DN100(4")
2 m/sec(6.6 ft/sec).	DN500 to DN800(20"-32")	DN150(6")
2 m/sec(6.6 ft/sec).	Dn800 to DN1000(32"-40")	DN200(8")

TECHNICAL FEATURES & FINANCIAL BENEFITS

The criteria for assessing the merits of any form of pipeline equipment are capital costs and operating and maintenance requirements. It is likely if all the below are taken into account, Vent-O-Mat valves will be seen as a cheap, reliable and efficient form of pipeline protection.

Vacuum Protection

All Vent-O-Mat valves have large orifice diameters equal to the nominal size of the valve i.e., a DN200(8") valve has a 200mm(8") orifice. This ensures the least possible resistance to the intake of air and consequently the least possible negative pressure within a draining pipeline.

Discharge Performance

The Vent-O-Mat valve design is not limited by the velocity within the pipeline and the differential across the large orifice as conventional air valves are. This ensures the effective removal of all air/gas from a filling pipeline whilst eliminating the possibilities of surge on closure of the large orifice.

Serviceability

The Vent-O-Mat valve is virtually maintenance free, but facilitates extreme ease of service and maintenance in the rare instances when required. Components are in corrosion free materials to allow problem free disassembly and reassembly even after years of operation. All maintenance spares are replaceable without special tools or skills.

Performance

Vent-O-Mat series RGX has been designed and developed to provide the optimum usable and safe performance relative to all functions. Selection data has been substantiated through the council of Scientific and Industrial Research - South Africa and other testing and can be confidently referenced.

Surge Protection

Vent-O-Mat offers a cost effective and efficient solution to destructive phenomena such as surge as all valves are supplied as standard, with an integral "Anti-Surge" surge alleviation mechanism. This device only operates in instances such as rapid filling or column separation to effectively and efficiently eliminate surge, very much like an air bag in a motor vehicle in that it only operates in emergencies.

Financial Benefits

The "Anti-Surge" mechanism together with other features of the Vent-O-Mat design provides a number of financial benefits some of which are:

Reduction in Size or Total Elimination of Traditional Surge Protection Devices

The valve acts both as an effective double acting air valve and as a cost effective surge alleviation mechanism. Accommodating the Vent-O-Mat series RGX air valve in total surge protection strategy renders total protection to a pipeline at a fraction of the cost of any conventional method.

Shortening of Operational Procedures

Lengthy operational procedures can be dramatically shortened when utilising Vent-O-Mat air valves with out the risk of pipeline collapse, premature closure or water hammer. This allows for major time saving.

Cost Saving on Overspecified Pipe

Very many design engineers overspecify on pipe thickness to prevent unforeseen pipeline damage. This is unnecessary when utilising Vent-O-Mat air valves as it efficiently manages air within the pipeline therefore greatly minimising the possibility of unforeseen accidents.

Increase of Flow Through Existing Infrastructure

Many pipeline operate very inefficiently because of restriction created by air/gas that is not released effectively by air valves. Vent-O-Mat valves are designed to discharge all air/gas in a pipeline regardless of flow velocities, without the inducement of water hammer and other destructive phenomena associated with kinetic air valves. This feature allows for the increase of flow of up to 30% through existing infrastructure, by the mere replacement of conventional air valves with the Vent-O-Mat design.

SHIPPING & STORAGE

Shipping

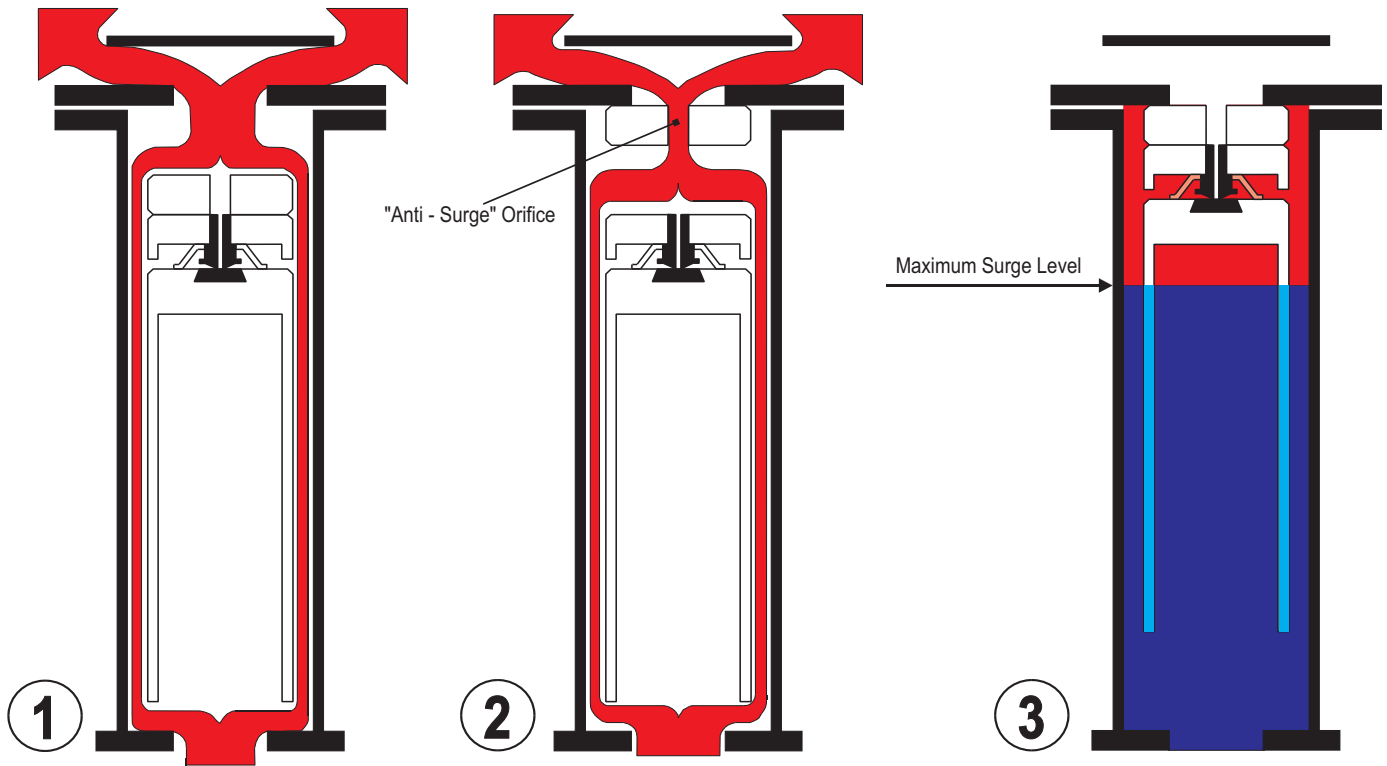
Vent-O-Mat valves are generally shipped by the factory or its agents in well constructed wooden crates or cases, with the content, destination and factory (or agent's) details clearly marked by a label on at least two sides of the crate or case. Valves are carefully packed to ensure that no damage occurs during transit.

Storage

It is recommended that the valves be stored in a cool area if not to be used immediately.

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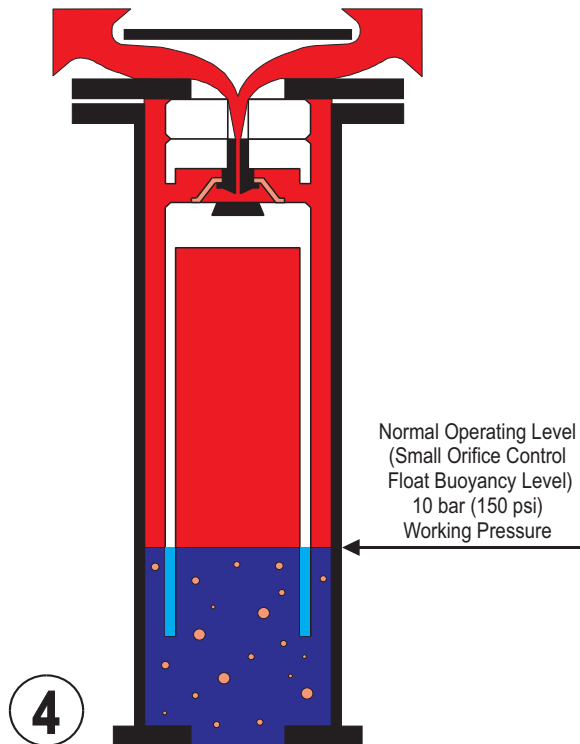
VENT-O-MAT SERIES RGX OPERATION



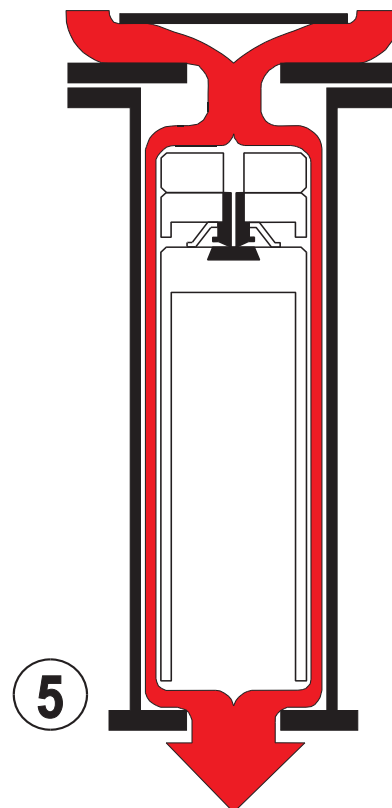
1 PIPELINE FILLING
(SUB CRITICAL SEWAGE/ EFFLUENT
APPROACH VELOCITY)

2 PIPELINE FILLING
(EXCESSIVE SEWAGE/ EFFLUENT
APPROACH VELOCITY)

3 PIPELINE FULLY CHARGED



4 PRESSURIZED AIR/GAS RELEASE



5 VACUUM RELIEF (AIR INTAKE)

VENT-O-MAT®

VENT-O-MAT SERIES RGX OPERATION

PRE NOTES:

A) VENTING OF A FILLING PIPELINE:

The operation of a conventional sewage air release valve is such that fast approaching sewage/effluent is almost instantaneously halted by the valve's closure. Consequently surge pressures of potentially damaging proportions can be generated in a pipeline system, even at normal filling rates.

In addition to venting through the Large Orifice when sewage/effluent approach velocities are sub critical, the Vent -O- Mat series RGX sewage air release valves feature an automatic "Anti - Surge" Orifice device that serves to decelerate sewage/effluent approaching at excessive speed, thereby limiting pressure rise in the pipeline.

B) SURGE ALLEVIATION - PIPELINE PRESSURIZED:

In instances where a pipeline experiences liquid column separation due to pump stoppage, high surge pressures can be generated when the separated column rejoins.

The Vent -O- Mat series RGX takes in air through the unobstructed large orifice when column separation occurs, but controls the discharge of air/gas through the "Anti - Surge" Orifice as the separated column commences to rejoin. The rejoining impact velocity is thereby sufficiently reduced to prevent an unacceptably high surge pressure in the system. In the same way the series RGX valve prevents high surge pressures resulting from liquid oscillation in a pipeline.

1. PIPELINE FILLING (SUB CRITICAL SEWAGE/ EFFLUENT APPROACH VELOCITY)

Air/gas flows through the annular area around the control float assembly and to atmosphere through the large orifice.

2. PIPELINE FILLING (EXCESSIVE SEWAGE/ EFFLUENT APPROACH VELOCITY)

In reaction to an increase in air/gas flow, the "Anti - Surge" float closes the large orifice and air/gas is forced through the "Anti - Surge" Orifice resulting in a deceleration of the approaching liquid due to the resistance of rising air/gas pressure in the valve.

Attention is drawn to Pre Notes (A) and (B) above.

3. PIPELINE FULLY CHARGED

Sewage/effluent has entered the valve chamber and buoyed the floats to close both the large and the small orifice. The design's compression/volume relationship prevents the media from ever exceeding the maximum surge level indicated in diagram 3. The resultant sewage/effluent free area protects against the fouling of the orifice seals by solids or high viscous substances - for this reason **NO FLUSHING CONNECTIONS ARE NECESSARY.**

4. PRESSURIZED AIR/ GAS RELEASE - PIPELINE OPERATING

The volume of disentrained air/gas increases in the valve and displaces the sewage/effluent to the lower, normal operating level (small orifice control float buoyancy level). Any additional lowering of the sewage/effluent level, as would occur when more air/gas enters the valve, will result in the control float dropping away from the small orifice through which pressurized air/gas is then being discharged to atmosphere.

The control float will close the small orifice when sufficient air/gas has been released to restore the sewage/effluent to the normal operating level. The considerable sewage/effluent free area obviates the possibility of leaks that could otherwise be caused by solids entering the sealing areas - for this reason **NO FLUSHING CONNECTIONS ARE NECESSARY.**

5. VACUUM RELIEF (AIR INTAKE) - PIPELINE DRAINING

When the internal pipeline pressure reduces to atmosphere the "Anti - Surge" mechanism and control float assembly drops, opens the large orifice and allows the pipeline to take in air to displace the draining media so as to prevent undesirable low negative pressure*.

The hollow, smooth side float design discourages adherence of solids and viscous substances which, therefore, tend to withdraw from the valve into the pipeline when draining occurs - for this reason **NO FLUSHING CONNECTIONS ARE NECESSARY.**

*NOTE: Negative pressure values are dependant on valve size selection.