Air valves

BOAVENT® -SVA
BOAVENT®-SVF
BOAVENT®-AVF
BOAVENT®-SIF

1 General Instructions

The air valves must be placed to support the following functions:

- Admit large volumes of air through main orifice
- Discharge large volumes of air through main orifice
- Release air under pressure

A) They are normally dimensioned to protect pipeline from vacuum that may be caused by pipe bursting or by a sudden pump stop causing column separation

B) Rules analysed for air inflow and diameter choice are also valid in his case; also consider for this analysis that ometimes double float conventional air valves are prematurely closed discharging air with a maximum p on the main orifice exceeding 0.5 bar/ 7.25 psi due to "dynamic closure" phenomenon, while kinetic air valves may release air at high speeds.

C) Air release from each air release valve depends on the existence of a "critical relationship" between nozzle area and float mass. Under pressure air and water develop inside the valve equivalent forces that are opposed to each other, except for the small section in contact with the nozzle DN, that is subject to atmospheric pressure. The float is thus pushed upstream by a force which is:

F=AxP

A = nozzle area

P = working pressure

if this force exceeded the float weight, the latter would remain always stuck against the nozzle and air releasing would never take place. This is the reason why the same air release valve can work with a larger hole nozzle at 10 bar! 145 psi rather than at 25 bar! 362.6 psi. It is difficult to determine in advance the amount of entrapped air which must be released from a given system and the sizing of Air valves is a decision based on experience. The 2% air content may change noticeably depending on temperature, pressure and head losses along the profile.

2 Air valve Operation

The automatism is composed of a metallic disk (with 2 or more small orifices), a guide bar and a stainless steel counteracting spring that lays directly on the sealing seat. Such simple construction guarantees high reliability and it may equip both the 2 and the 3 function air release valves.

- During vacuum condition the mobile block is laid over the aerodynamic diffuser, the antishock disk comes down pulling the stainless steel spring, allowing the entrance of a large volume of air through the main orifice to compensate for the vacuum effect.
- When negative pressure conditions ends, the stainless steel spring pulls back the anti-shock disk to close the main orifice. Internal air must flow out now through the small disk orifices creating a counter-pressure inside the conduct that will slow down water speed avoiding upsurges

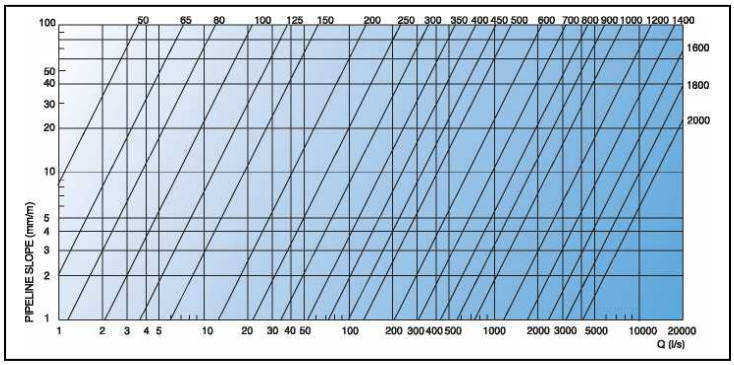
2.1 Sizing

To size an air valve, maximum flow rate in such point must be determined in case of pipe bursting using the following formula, that is valid in case of absolutely turbulent state.

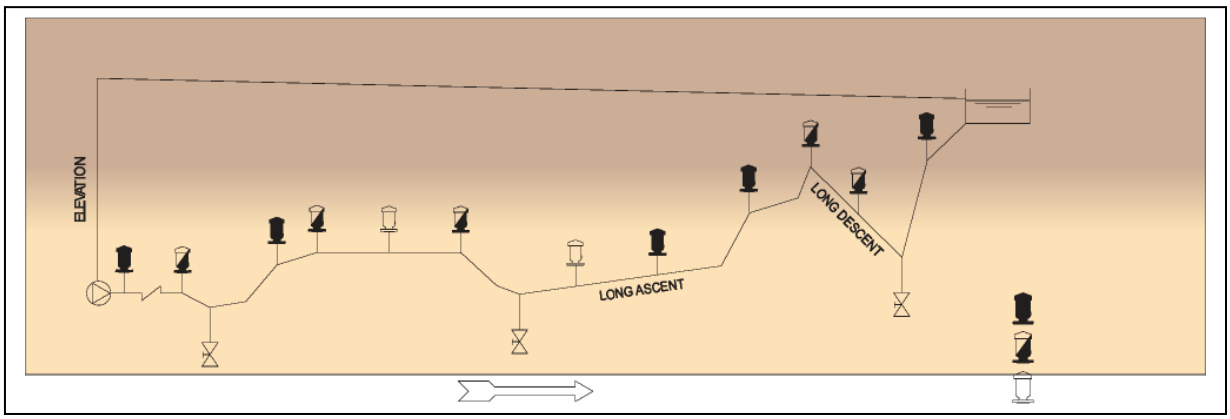
$hf = Q^{152} * C_F * L / (C_{HW}^{1.852} * D^{4.87})$

hf = head loss due to friction
Q = flow rate (expressed in cfs, m3lsec)
D = Pipe inside diameter(ft, mt)
C_{HW} = Hazen Williams roughness coefficient
C_F = unit conversion factor (4.73 English, 10.7 SI)
L = distance between two sections (ft, mt)

We suggest to evaluate flow rate curves shown for each air valve and choose a diameter that guarantees a vacuum condition less than 0.1 bar/1.45 psi inside the conduct.



For easier consultation, resulting flow rates have been traced for each DN from free discharge on given slopes for an adequate air valve sizing.

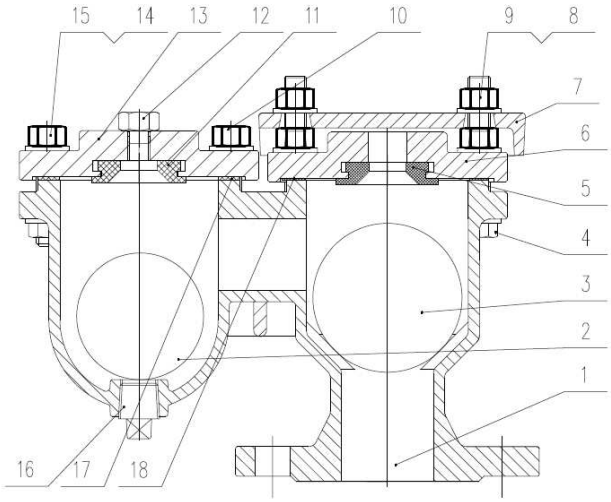


3 Installation

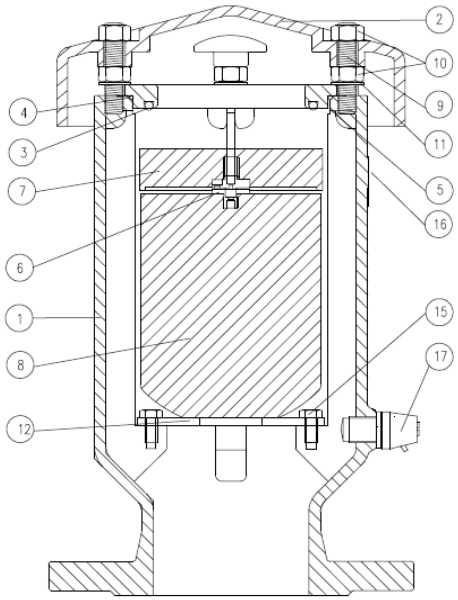
3.1 Drawings

The sectional drawings below provide of the general design / configuration of the valves. For illustrations relating to specific valve series and further information please refer to the respective type series booklets.

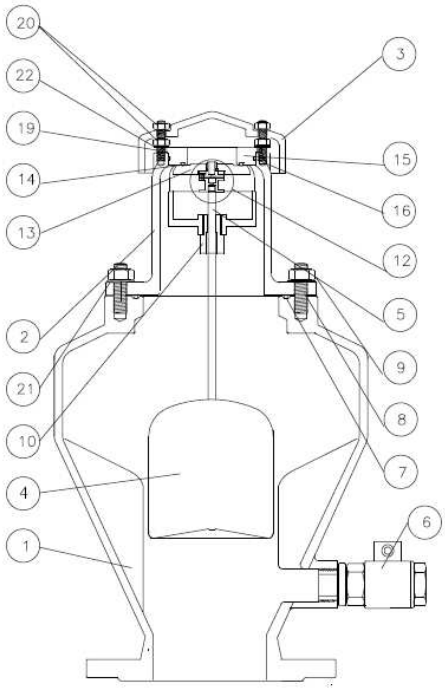
Type	DN	PN	Material	Type leaflet No.
BOAVENT® -AVF	50-300	16	Ductile Iron EN-GJS-400-15	9166.51-10
BOAVENT® -SVF	25-200	16/25/40	Ductile Iron EN-GJS-400-15	9167.51-10
BOAVENT® -SVA	50-200	16	Ductile Iron EN-GJS-400-15	9169.51-10
BOAVENT® -SIF	25-200	16	Stainless steel	9168.51-10



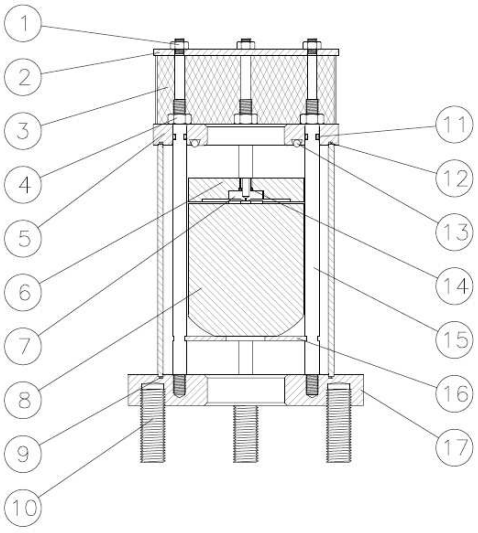
Sectional drawings (AVF)



Sectional drawings (SVF)



Sectional drawings (SVA)



Sectional drawings (SIF)

3.2 List of components

Part No. **AVF**	Description
1	Body
2	Small float ball
3	Large float ball
4	Nut
5	Ball seal large orifice
6	Large orifice cover
7	Dust cap
8	Nut
9	Washer
10	Bolt
11	Ball seal small orifice
12	Air release nipple
13	Small orifice cover
14	Nut
15	Washer
16	Screw plug
17	Washer
18	Washer

Part No. **SVF**	Description
1	Body
2	Cover
3	O-ring
4	O-ring
5	Seat
6	Small orifice
7	Disc
8	Float
9	Bolts
10	Nuts
11	Washer
12	Diffuser
15	Screw
16	Label
17	Drain valve

Part No. **SVA**	Description
1	Body
2	Cover
3	Cap
4	Float
5	Float shaft
6	Ball valve 1’
7	O-ring
8	Bolts
9	Nut
10	Guide
12	Small orifice
13	Large orifice
14	O-ring
15	Seat
16	O-ring
19	Bolts
20	Nuts
21-22	Washer

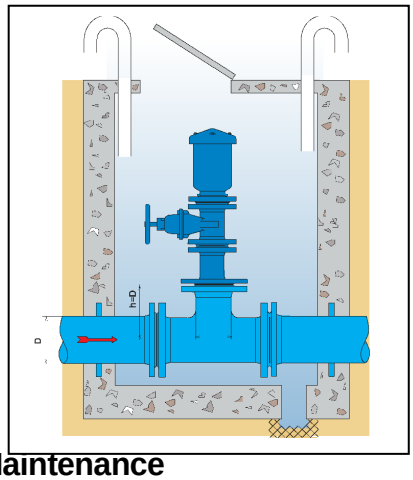
Part No. **SIF**	Description
1	Nuts
2	Cap
3	Filter
4	Nut
5	Seat
6	Disc
7	Small orifice
8	Float
9	O-ring
10	Bolts
11	O-ring
12	O-ring
13	O-ring
14	O-ring
15	Shaft guide
16	Diffuser
17	Flange

3.3 General

Before installing, accurately clean conducts to avoid any foreign bodies like stones or building material that may damage air releasing valves.

Air releasing valves must be assembled in wide enough and easily accessible pit to allow maintenance operations and inspection. They must be placed in a perfectly vertical position and on a "T" piece that must have a passage with a diameter at least equal to half main pipe diameter.

The pit must be equipped with a drainage pipe for cleaning operations, and at least one ventilation pipe to allow air intake and out-flow for chamber ventilation (one in-going and one out-going would be ideal). Never place an air release valve directly on the main pipe, to avoid that air return due to depression fills the main conduct without an accumulation point, being pushed when the pump is re-started causing section reduction and other problems that have already been mentioned. In order to guarantee maximum efficiency, it is therefore necessary to place the ARV as high as possible on the pipe (as shown in the diagram) placing a flanged or threaded coil between it and the ARV that will allow air accumulation.



4 Maintenance

ARV valves have simple and safe construction and their performance will depend on working conditions. Internal parts subject to heavier wear can be easily replaced from the top with the equipment still installed.

For any further information, please consult the installation and maintenance manual enclosed with every valve, or simply contact our tech support.