PTV®
Solutions

Kappa HC™ Triple Effect Air Vent

Highly Corrosive Series

Bleeding and Venting Air Vent, Kappa HC ™ Combination kinetic air release valve provide 3 functions in one:

1. Large air release during filling of the pipeline
2. Small air release under pressurized pipeline
3. Large air intake during draining of the pipeline

Kappa HC™ Triple Effect Air Vent is designed to work at most severe corrosive conditions in pipelines of chemical plants, pulp plants, treatment plants and mining operations. The unique and innovative design of the disc, and interior body lined PTFE, make it has an excellent corrosion protection in most hazardous conditions and environments. By far, Kappa HC™ is the best solution in the market since it has more corrosive protection than any typical air vent made in special steel alloy like Alloy 20 or Hastelloy C276, but at a much lower cost.

Features

A) It is designed to resist most corrosive fluids like **H2S** or **H2SO4** , **HCl** , and any kind of highly corrosive media; concentrated and diluted

B) **Excellent corrosion protection**, all wet parts are made in SS904L, Viton, HDPE, and PTFE

C) **Non slam closure** by the help of two stage closing design

D) **Single chamber air valve**, automatically operated by the medium

E) **Compact design**, small volume and light weight

F) **High venting capacity**, the capacity of venting and suction is better than normal two holes air vent

G) Large orifice for outlet and intake of large air volumes, during filling and emptying of pipeline

H) **Small orifice for air release** under pressure during the operation of pipeline

I) Reduces pressure drop

J) **Maintenance can be easily performed** from the top without removing the air valve from the pipe

K) **Coating suitable** for highly aggressive environments (Orange Epoxy Paint)

Technical Data

1. Size range: NPS 2"~8"
2. Pressure ratings: 150LB / 300LB
3. Working temperature: -29
4. Suitable Medium: highly corrosive fluids concentrated and diluted
5. Body Material: ASTM A216 WCB + Epoxy Paint
6. Interior Lined: PTFE / F46 / PFA
7. Trim Material: SS904L, HDPE, PTFE
8. Seat: Viton

Performance Standard

1. Design & Manufacture standard as to: ASME B31.3
   ASME B16.34
1. Height dimension (H) standard as to: MFR-STD
3. Flange dimension conforms as to: ASME B16.5
4. Testing And Inspection as to: API 598
5. Pressure-temperature conforms as to: ASME B16.34
6. Anti Corrosion as per NACE MR-0175(2002) requirement
7. Available in Class 150 and 300

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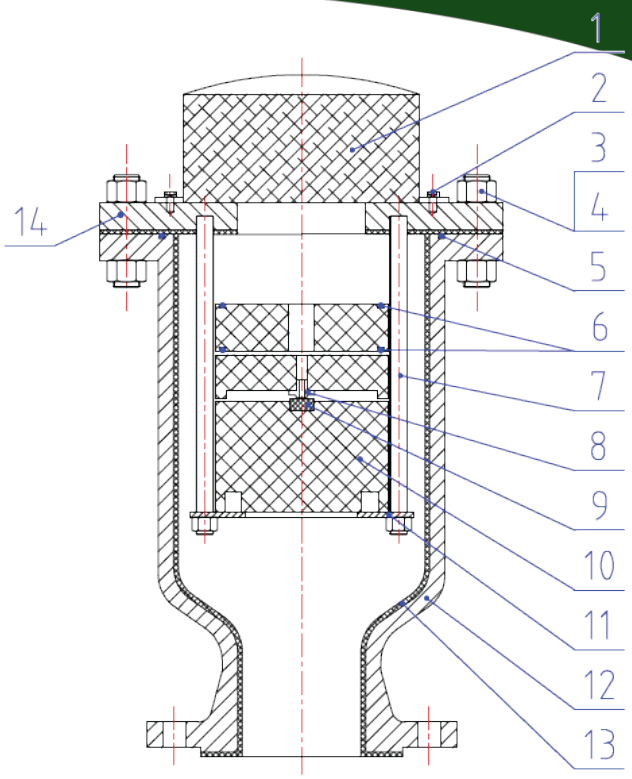
Fluid	% of Concentration	Temperature
HCl	Under 90%	Under 80°C
HClO	All range	Under 80°C
H2S	All range	Under 80°C
HN03	Under 25%	Under 70°C
H2S03	All range	Under 80°C
HClO4	Under 90%	Under 80°C
H2SO4	Under 90%	Under 80°C
H3PO4	Under 85%	Under 80°C



Part List

Kappa HC™ Triple Effect Air Vent 150LB / 300LB

No.	Part Name	Material	Standard
1.	Screen	SS304	ASTM A276
2.	Screen Bolt	B7	ASTM A193
3.	Bolt	B7	ASTM A193
4.	Nut	2H	ASTM A194
5.	Cover O-Ring	Viton	USA DuPont
6.	Disc O-Ring	Viton	USA DuPont
7.	Disc Retainer	SS904L	ASTM B625
8.	Nozzle	SS904L	ASTM B625
9.	Seat	Viton	USA DuPont
10.	Floating Disc	HDPE	ASTM D638-2010
11.	Retainer Plate	SS904L	ASTM B625
12.	Body	WCB	ASTM A216
13.	Body Lined	PTFE	USA DuPont
14.	Cover	A105	ASTM A105

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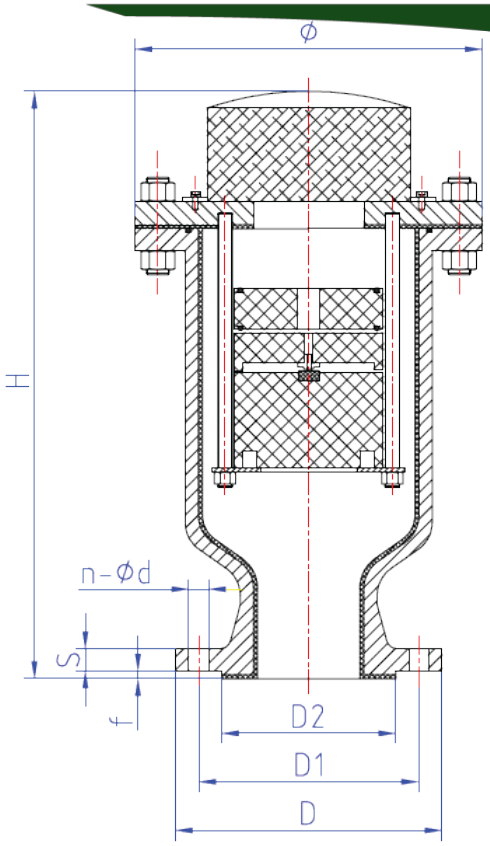

Main Dimension of Kappa HC™ Triple Effect Air Vent:

Class 150LB RF:

Flange dimension standard conforms as to ASME B16.5

NPS	H	Φ	D	D1	D2	S	N-Φ	f	Weight Kg
2″	270	160	150	120.7	92	17.5	4-Φ19	2	13
2 1/2″	280	175	180	139.7	105	21	4-Φ19	2	17
3″	280	175	190	152.4	127	22.5	4-Φ19	2	18.5
4"	310	195	230	190.5	157	22.5	8-Φ19	2	25
6"	380	225	280	241.3	216	24	8-Φ22	2	38
8"	435	280	345	298.5	270	27	8-Φ22	2	58

Class 300LB RF:

Flange dimension standard conforms as to ASME B16.5

NPS	H	Φ	D	D1	D2	S	N-Φ	f	Weight Kg
2″	270	160	165	127	92	21	8-Φ19	2	14.5
2 1/2″	280	175	190	149.2	105	24	8-Φ22	2	19
3″	280	175	210	168.3	127	27	8-Φ22	2	20
4"	310	195	255	200	157	30.5	8-Φ22	2	28
6"	380	225	320	269.9	216	35	12-Φ22	2	58
8"	435	280	380	330.2	270	40	12-Φ25.5	2	70

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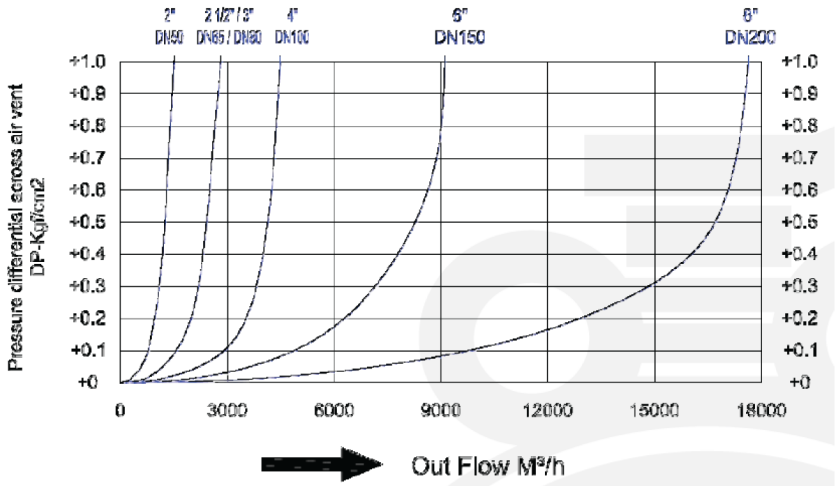
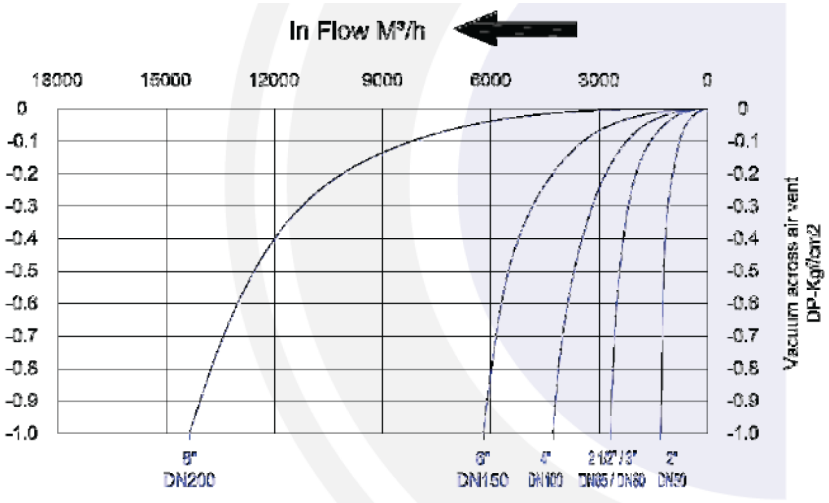
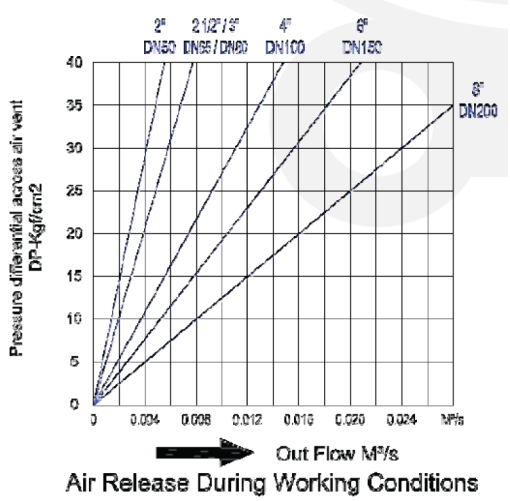
Kappa HCTM Discharge flow rate capacity, by size:



Kappa HCTM Vacuum flow rate, by size:



Kappa HCTM automatic air flowing out capacity, at high pressure, by size:



Air Release During Working Conditions

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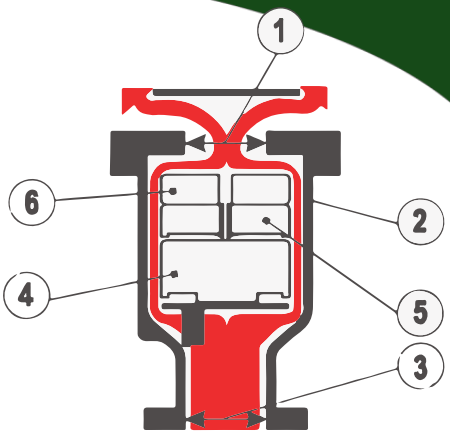
Operation

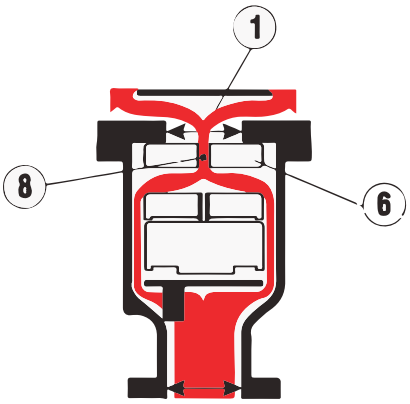
Venting of a filling pipeline (subcritical water approach

Air enters orifice (3), travels through the annular space between the cylindrical floats (4), (5), and (6) and the valve chamber barrel (2) and discharges from the large orifice (1) into atmosphere.



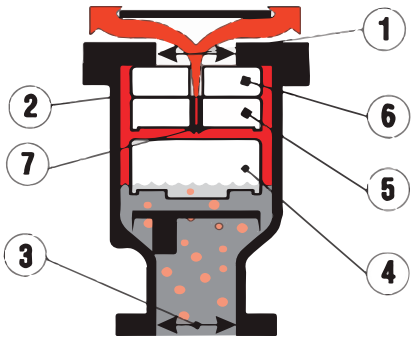
Venting of a filling pipeline (excessive water approach

In reaction to increased air flow, float (6) closes large orifice (1) and air is forced through the anti shock orifice (8) resulting in deceleration of the approaching water due to the resistance of rising air pressure in the



Pressurised air release from a full pipeline

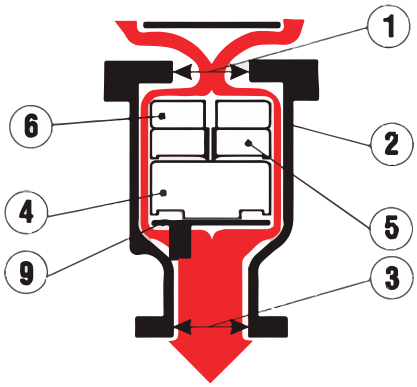
the filling of a pipeline, liquid enters the valve barrel chamber (2) and the floats (4), (5) and (6) are buoyed so that the large orifice (1) is closed by float (6). The valve will then become internally pressurized. A minimal working pressure of 0.5 bar (7.3 psi) acting on the relatively large area of the orifice (1) will lock float (6) into the closed position across the large Orifice (1).



Disentrained air rises through the liquid and accumulates in the valve chamber. When the volume of air is sufficient to displace the liquid, float (4) will no longer be buoyant and will gravitate downwards thereby opening the small orifice (7) and allowing accumulat ed air to be discharged into atmosphere. As air is discharged the liquid raises the float (4) and re-seals the small orifice (7) and prevents the escape of liquid.

Vacuum relief (air intake) of a draining pipeline

ous drainage of liquid from valve chamber (2) causes floats (4), (5) and (6) to gravitate downwards onto the baffle plate (9), thereby allowing atmos pheric air through the valve to rapidly displace draining liquid in the pipeline and prevent potentially damaging internal negative pressure.



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Surge & Water Hammer Protection

Introduction

Surge Protection - Initial Filling

The Kappa HC air vent the additional floating "Anti-Shock" Orifice which is aerodynamically engineered to throttle air discharge water approach velocity would otherwise become too great and induce an unacceptable pressure rise. The air throttling action increases resistance to the flow of the approaching water which consequently decelerates to a velocity which reduces the pressure rise whe valve closes (see operation of valve on pages 2 & 3). It is an essential precaution for pipeline priming.

Surge Protection - Pump Trip Conditions

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

The Kappa HC air valve takes in air through the unobstructed large orifice when liquid column separation occurs, but controls the discharge of air through the "Anti-Surge" Orifice as the separated column commences to rejoin. The rejoining impact velocity is thereby considerably reduced to alleviate high surge pressures in the system (see operation of valve on page 2 & 3).

Other surge control measures may, dependant on pipeline profile, diameter and operating conditions, be needed to provide the primary surge alleviation function with the Kappa HC air valve forming an integral and valuable addition in a combined strategy for further reducing surge pressures. The benefit of the "Anti-Surge" Orifice can be readily demonstrated by suitable surge modelling software.

Surge Protection - Pipeline Operating

The operation of valves and similar flow control devices can cause high-pressure transients in an operating pipeline.

The unique, single chamber design of the Kappa HC air valve enables a pocket of air to be trapped in the valve chamber. Automatic operation of the small orifice control float regulates the volume of air entrapped.

The volume maintained in the valve will provide a cushioning benefit to the pipeline for short duration transient pressure "spikes". This effect can be modelled by the design engineer using suitable surge software.

Technical and Financial Benefits

1. Improved alleviation of surge behaviour including reduction of:
   - Surge pressure magnitudes by slowing surge velocities.
   - Duration of oscillation following a pump trip, as the air valve continuously absorbs and dissipates the energies of the surge.
2. Potential for reduction in size and/or quantity of conventional surge protection devices such as surge vessels etc.
3. Automatic protection during initial filling when most surge protection devices are not operational.
4. Holistic protection as each sewage air valve installed has design features to automatically damp surges.
5. The valve is virtually maintenance free.

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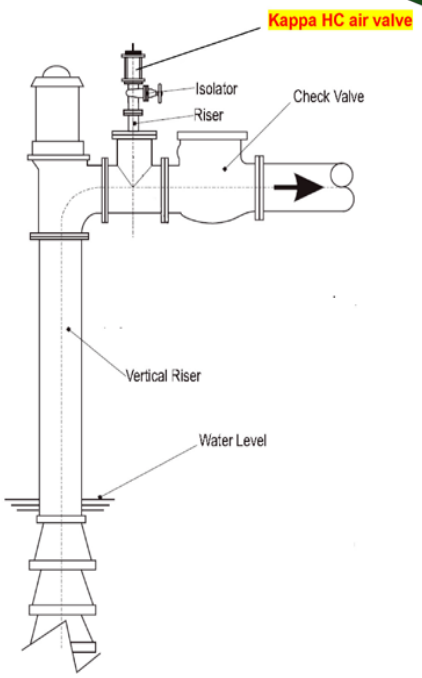
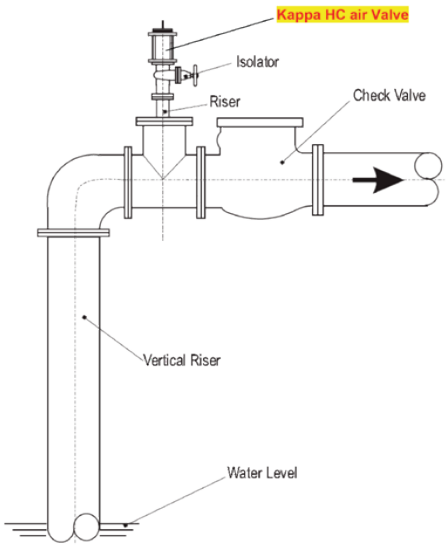
RECOMMENDED INSTALLATION ARRANGEMENTS

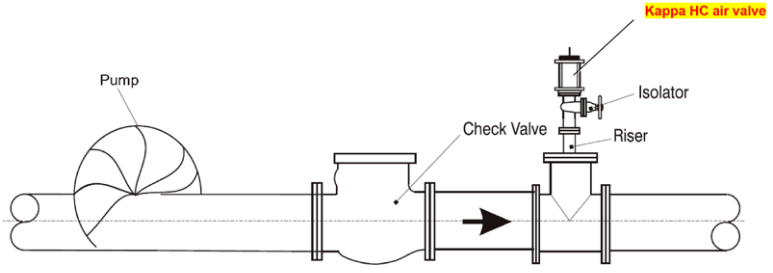
1. Vertical turbine pump application



2. Submersible/Deep well application



3. Centrifugal pump application



ORDERING CODE:

Example: 1000LT-222-1-200

Ball Valve, SS316 CF8M Body, SS316 CF8M ball and stem, RPTFE Seat, NPT Thread, Size 2”

Available Body Material Code:

SS304 CF8 Stainless Steel: 1

SS316 CF8M Stainless Steel: 2

SS316L CF3M Stainless Steel: 3

Available Ball and Stem Material:

SS304 CF8 Stainless

Steel: 1 SS316 CF8M

Stainless Steel: 2 SS316L

CF3M Stainless Steel: 3

Available End Code:

Female NPT Thread: 1

Female BSP Thread: 2

Available Seat Material Code:

PTFE: 1

RPTFE: 2