KINETIC AIR VALVE

INSTRUCTION MANUAL ON INSTALLATION OPERATION AND MAINTENANCE

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INTRODUCTION -

DVPL Kinetic Air Valves generally conforms to IS 14845 standard for dimensions, materials of construction and constructional features. These kinetic air valves are double ball, resilient seated type. Supply of additional isolating sluice valve with non rising spindle operation is as per the requirement of the customer.

Kinetic Air valves are commonly used in air venting / admission service in water pipelines and are designed to operate with floating balls inside. The valve has been designed to offer reliable service over a long period of time.

FUNCTION AND PRINCIPLE FOR OPERATION -

A Kinetic Air Valve is a combination of large orifice and small orifice air valves and which overcomes the risk and thereby the inconvenience of standard large orifice air valve have the problem of the ball being caught in escaping air flow and close the orifice premature when the pipe is being filled at high rate. In kinetic design, this occurrence is avoided by controlling the movement of the ball in such a way that the valve cannot be blown shut by discharging air or even with mixture of air and water regardless of very high air velocity. The valve can be closed only with solid rising water. The kinetic principle, in case of double air valves is meant to remove accumulated air during working. These valves are installed at all humps in the water mains for this purpose. Many times, this accumulated air, if not removed, forms a constriction in the pipeline increasing the flow velocity in the pipe line in that region.

The ball in the large orifice chamber rises with water when the water mainly is being filled and large volume of air escapes through the large orifice. The large orifice is sealed shut with the ball having raised to that level by rising water. After this, small orifice chamber comes into action by allowing the air through small orifice. The ball rises to seal the small orifice with rising water and remains in that position till the accumulated air pressure

above the ball causes the ball to drop down unsealing the small orifice and allowing the air to escape. The ball again reseals the orifice because of the rising water occupying the space vacated by the escaped air. This action will recur time and again during working to allow entrapped air out to atmosphere.

The valve will breathe in or out, when the pipeline is being emptied or is being filled. The large orifice chamber serves this purpose and is called low pressure chamber. The small orifice chamber also called high pressure chamber mainly serves the purpose of evacuating accumulated air during working.

MECHANICAL CONSTRUCTION

Kinetic Air Valve comprises of two chambers namely low pressure and high pressure. Low-pressure chamber houses a large float ball (with vulcanite coating) and large orifice with a natural rubber seal. The high-pressure chamber has a relatively small float ball (with rubber coating) and a small orifice made in bronze. Integrally cast and machined guides are provided in HP chamber for guiding the ball. A cast iron cowling is provided over the large orifice for protection against ingress of foreign matter.

ISOLATING VALVE FOR THE AIR VALVE -

Along with the Air Valve, normally an isolating valve is provided most of times that is Sluice Valve. All the times the isolating sluice valve is kept 'OPEN' only when the Air Valve is to be isolated or removed from pipeline for maintenance or some other purpose, the isolating valve is closed to isolate the Air Valve or to blank-off the pipe extension piece.

INSPECTION ON RECEIPT AND HANDLING -

- At receipt of the product, ensure that there is no transit dames to the product received, especially on valve flanges, on operating mechanism of isolating valves, if any.
- Ensure that parts and Accessories are received as per ordered scope of supply
- Ensure that adequate numbers of fasteners (if in scope of supply) are received for mounting the air-valve assembly on pipeline.

- While unloading the product, please use the provision of lifting made on the valve (e.g. - Lifting Lugs, Lifting eye bolts).
- Use the safe lifting devices (e.g. sling, hoists, hooks etc.) of adequate capacity.
- Do not pass the slings through the weak parts of the product / accessory (e.g. Hand Wheels, Gear Box body- when it is coupled with the valve, threaded portion of the rising spindles).
- Support the valve properly during transportation to avoid toppling.
- Handle the product carefully – do not push, drag or drop from height. If damages, short supply or wrong supply are observed, report the same immediately to the contact person mentioned in this manual.

STORAGE & PRESERVATION -

If the valve has to be stored at site before installation

- Store it on horizontal level surface in dry and clean atmosphere.
- Store the products in well-covered sheds, protected from sun, rain and dust.
- In the instance if the valve is required to be stored for long duration, ensure that rust preventive is applied on the machined & corrodible surfaces.
- It is advisable to give a coat of grease on seat rings of the isolating sluice valve during the storage period and keep the valves in party open position so that the seat surfaces do not gall. Keep the seat rings away from dusty atmosphere.

INSTRUCTION FOR INSTALLATION -

CHECKS ON THE VALVE ASSEMBLY BEFORE INSTALLATION

- Before taking the Air Valve for pipe installation, make sure that it is cleaned from inside and outside and there are no foreign or metallic objects sticking on to its sealing elements. Also clean the valve interior passages to remove any foreign matter & rust preventive on machined surfaces.
- While installing the operating element, make sure that the isolating Sluice Valve, the operating element and the intermediate gearbox, if any of these are in fully closed position.
- Ensure that the entire rust preventive on the machined surface in the flow area is

removed. The valve is put in pipe-line.

- Note the name plate details on valve body and valve pressure rating adequacy with respect to operating pressure.
- Air Valves are to be mounted only in vertical position.
- Operation the isolating Sluice Valve manually from full close to full open and full open to full close, with the operation/hand wheel. Ensure that there is no undue resistance/friction in the operation.
- Before mounting the valve & pipe flange, ensure that flanges match with respect to dimensions & mating surfaces. While fitting the valve in pipeline, ensure that diagonally opposite bolts are simultaneously & uniformly tightened.

CHECKS FOR THE PIPE-LINE BEFORE INSTALLATION

- Clean the pipeline thoroughly so that it does not contain any solid matters, which may find entry into the valve and damage the valve internals.
- The pipe piece, on which the Air Valve is to be mounted, should be adequately supported and anchored (if required).
- For the valve supplied with isolating Sluice Valve of Rising Spindle type, ensure that there is adequate space available to accommodate the rising spindle when valve is in fully Open condition.
- It is advisable to use a screen of non corrosive metal between bottom flange of the isolating valve and flange on the pipe piece provided for mounting the air valve. This is to avoid entrance of any solid floating foreign matters into the isolating valve or air valve, which could cause malfunction of the air valve.

COMMISSIONING -

PRE-COMMISSIONING CHECKS

a. Ensure manually that the isolating valve operates smoothly.
b. The entire pipe flange bolting is properly tightened.
c. Ensure that the isolating Valve is OPEN.

COMMISSIONING CHECKS

a. Charge the pipe-line with water.

b. Ensure that the Air escapes out of air valve and once the air valve is filled with water, it does not leak through its orifices.

c. Allow the flow to stabilize in main pipeline for 10 to 15 minutes. See if the small orifice can escape the trapped air from high pressure chamber. (Note: If there is no entrapped air or very little amount of entrapped air in the high-pressure chamber, this test may indicate negative results).

d. Ensure that there is no leakage through flange gaskets and stuffing box-gland packing of the isolating sluice valve.

e. Empty the pipeline and ensure that the air valve allows inward passage of air into the main pipeline. Now the valve is commissioned for its operation.

OPERATION -

a. Keep the isolating valve OPEN all the times, unless the air valve is to be isolated.

b. The air valve itself functions automatically according to the operation principle explained above.

MAINTENANCE INSTRUCTIONS -

Maintenance Check Points:

Sr.	Parameter to check	Method of Checking	Weekly	During Overhaul
Kinetic Air Valve				
01	Leakage through gasket for small orifice nipple	Visual	*	
02	Leakage through rubber seal in low pressure chamber	Visual	*	
03	Air valve allows air to enter into or escape out of the pipeline.	*	During fill up or emptying pipeline	
04	Eventual passage of air through vent In small orifice plug(for High Pressure Chamber)	Visual	*	
05	Condition of Float Balls, Rubber Seal in low pressure chamber	Visual		*
06	Continuous leakage through the low	Visual	*	

	pressure (large) orifice / high pressure (small) orifice			
Isolating Sluice Valves				
01	Leakage through stuffing box/gland, body-dome, dome-stuffing box and side flange gaskets	Visual	*	
02	Noise / Vibrations while opening or closing the valve	Feel	During opening / closing	
03	Condition of body seat ring/wedge seat ring faces-scratches, dent marks, intactness	Visual & feeler gauge		*
04	Condition of spindle & spindle nut / yoke sleeve threads	Visual		*

DVPL Kinematic Air Valves required very little maintenance if maintenance check points are attended to during periodic inspection & during overhaul. However valves could malfunction in unusual conditions of usage, water contamination and may require maintenance as below:

TROUBLE SHOOTING OF DVPL KINETIC AIR VALVES -

Sr. No.	Problem	Probable Reason	Action Required
Trouble shooting Kinematic Air Valve			
01	Leakage through gasket for small orifice nipple	Gasket for the small orifice nipple is damaged	Replace the gasket for small orifice nipple.
02	Leakage through Rubber Seal in low pressure chamber	a. Solid materials caught between the low pressure float and the rubber seal. b. Damaged rubber seal or the low pressure float ball.	a. Remove the solid after isolating the air valve and opening the cowl. b. Replace the rubber seal/float ball-as needed.
03	Air valve does not allow air to enter into our escape out of the pipeline	a. Isolating valve is closed. b. Low pressure ball has got struck with the low pressure rubber seal	a. Open the isolating valve. b. Open the cowl and release the low pressure ball, which has struck the rubber seal.
04	There is continuous leakage through the low pressure (large) orifice / High Pressure (Small)	Damaged lining on the Ball or Seats of orifice	Replace the damaged balls or seats of orifices.

	orifice.		
05	Small orifice nipple is not functioning to release the air	Solid foreign particle(s) got struck into the nipple holes.	Open the nipple cap and clean the same for making the orifice holes through.
Trouble Shooting of Isolating Sluice Valve			
01	Leakage through the valve is fully closed condition	a. External object caught between body ring & wedge ring b. Worn out / deformed or damaged seat rings	a. Try to flush away the external object by opening & creating flow to flush it away. It it does not work, open flanged joint to reach the object and remove it manually (**). b. Replace the body/wedge seat rings (%%).
02	Leakage through stuffing box/gland	a. Loose gland packing. b. Old gland packing rings, due for replacement.	a. Tighten the gland gradually and uniformly. b. Replace the gland packing rings (##).
03	Leakage through body-dome/Dome-stuffing box gaskets.	a. Loose bolting of body-dome/dome-stuffing box fasteners. b. Old gaskets due for replacements.	a. Tighten the joint fasters gradually and uniformly. b. Replace the gasket (**).
04	Leakage through side flanges	a. Inadequate tightening of flanged joint b. Damaged gasket	a. Re-tighten the flanged joint. b. Replace gasket (**)
05	Noise/Vibrations while opening or closing valve.	Inadequately supported / inadequately fixed piping / valve	Support / fix piping & valve with proper support / anchoring.
06	'LOOSE" rotations of the spindle of Non Rising spindle sluice valve, without causing the valve to open / close.	a. Damaged / worn-out threads in spindle or spindle nut. b. In case of gear box operation, possibility of worn-out or damaged gear teeth.	a. Replace spindle nut. Spindle also may be replaced if the threads as excessively. Worn-out or damaged (**). b. Repair / replace the gear box components as required

IMPORTANT -

(**): All these procedures require emptying the piping and removal of the valve from the valve from the pipeline.

(##): If repacking/Back Seat Bush arrangement is not provided in the valve, then the stopping the pump in the valve, then stopping the pump operation or depressurizing is not provided in the valve, then pipe-line is necessary before removing the gland packing for replacement.

(%%): As the Body Rings/Wedge Rings require very precise machining & wedge rings. We strongly recommend that this operation be performed at DVPL factory.

RECOMMENDED SPARES OF KINETIC AIR / ISOLATING SLUICE VALVES

Product Cross-Sectional and General Assembly Drawing attached with this manual indicates the components of the respective valves, along with the recommended spares. We strongly recommend keeping the spares handy all the time to be able to eliminate delays in attending the operation troubles and scheduled replacements/ overhauls.

SAFETY INSTRUCTIONS WHILE HANDLING, STORAGE AND USAGE -

1. Before fitting the valve in pipeline, ensure that pressure Rating of the valve is suitable for maximum Working pressure/surge pressure that may arise in the pipeline.
2. Electrically Operation Valves –
   a. It is to be ensuring before operation that proper earthing connection is provided to the actuators.
   b. While wiring the actuator in circuit, ensure that direction of actuator rotation which ‘Opens’/ ‘Closes’ the valve is according to ‘Open’/’Close’ switch.
3. In case of manual operated valves, avoid excessive torque at valve hand wheel/hand lever. Do not use extra leverage to Open/Close the valves.
4. User shall prevent any unauthorized person to mount, dismantle or remount, operate and repair the Valves.
5. During repairs/maintenance of the valve at site, the user shall take minimum following precautions:

a. Provide adequate working platform near the valve.

b. Make pipelines pressure less and harmless i.e. switch off the pumps, empty the pipelines, remove and switch-off all electric connections(in case of electric operated valves).

c. If work is carried-out in vicinity of the valve, which leads to dusty atmosphere (e.g. concrete work, masonry, painting, sandblasting etc.) the valve / valve components must be covered effectively.

6. Improper installation, operation or maintenance of DVPL product could result in injury or death.

INTIMATING PRODUCT / PERFORMANCE COMPLAINT -

While communicating product complaint please information to be sent our H.O or Branch Offices mentioned in this manual to help us to resolve the problem promptly.

Our Contact office & e-mail id:
H.O & WORKS – PH-033-26778088, E-MAIL- kolkatta@durgavalves.com
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