Installation, Operation & Maintenance

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A.R.I. D-26 2”-3” Polymeric

Combination Air Valve

The following is a step-by-step narrated description of the A.R.I. D-26 combination air valve installation, operation and maintenance processes.

The D-26 air valve is designed for systems that operate within the pressure and temperature framework of the model's specifications table. Please consult Aquestia for products designed for other hazardous liquids systems.

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1. Safety Instructions

Safety Instructions - General

1. Aquestia products always operate as components in a larger system. It is essential for the system designers, installers, operators and maintenance personnel to comply with all the relevant safety standards.
2. Installation, operation or maintenance of the product should be done only by qualified workers, technicians and/or contractors using only good engineering practices, complying with and observing all conventional safety instructions in order to minimize risk and/or danger and/or hazard to workers, the public or to property in the vicinity in accordance with all relevant local standards.
3. Extra safety considerations should be taken with hot and hazardous liquids or in hazardous environments' applications to avoid bodily/physical harm and damage to public or private property.
4. All individuals installing operating and/or handling the products including all workers should at all times adhere to the occupational safety and health (OSH) instructions and wear safety helmets, goggles, gloves, and any other personal safety equipment required by the local standards and regulations.
5. Use only appropriate standard tools and equipment operated by qualified operators when installing, operating and maintaining the product.
6. Prior to installation, operation, maintenance or any other type of action carried out on the product, read carefully the safety, installation and operation instructions of the product.
7. Please note:
   - Pressurized fluid and/or gas may be discharged from the product without prior warning. Make sure that the product's outlet port is not directed toward electrical elements (pumps) or people.
   - The pressurized fluid and/or gas that can be discharged from the product may create high noise levels. Take this into consideration when installing the product in areas sensitive to noise.
8. Always open and close valves slowly and gradually.
9. Please note that the maximum working pressure indicated at the product’s specifications table doesn't include pressure changes caused by water hammer and pressure surge effects. Use the product only according to its designated pressure rate specifications.
10. Use the product only for its intended use as designed by Aquestia. Any misuse of the product may lead to undesired damages and may affect your warranty coverage. Please consult with Aquestia prior to any non-regular use of this product and make no change or modification to the product without a prior written consent to be provided by Aquestia at Aquestia's sole discretion.
11. Please note that Aquestia shall NOT assume any liability with respect to any damage losses and/or expenses caused to any person and/or property whatsoever unless the product has been duly installed and thereafter maintained in strict compliance with its designated maintenance Instructions and/or any other installation and operation manuals provided by Aquestia for the product and/or applicable ordinances and/or codes.

Safety Instructions - Handling

1. Shipping and handling the product must be done in a safe and stable manner and in accordance with the relevant standards and regulations.
2. Storage should be in the original delivery crates or cases. Storage should be off the ground in a clean, dry indoor area.
3. For lifting and positioning the product, use only approved lifting equipment operated by authorized employees and contractors.
4. Prior to the installation visually verify that the product was not damaged during shipment to the installation site.

Safety Instructions - Installation

1. Install the product according to the detailed Installation Instructions provided with it by Aquestia and according to the description given in this manual.
2. The user should install a manual Isolation Valve under the product's inlet port.
3. In all installation sites, the user should enable good visibility and verify that the work and auxiliary equipment used are done in accordance with the relevant local authorized standards. Extra safety considerations should be taken on hazardous environment sites.
4. Check and re-tighten the bolts connecting the product to the pipeline during commissioning and before operating the product for the first time.

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Safety Instructions - Commissioning and Operation

1. Read carefully the operation instructions prior to any attempt to operate the product.
2. Observe the safety stickers on the product and never perform any operation contradicting the instructions given.
3. In order to achieve maximum performance and smooth operation of the product, it is crucial to perform the startup and first operation procedures exactly as described in this manual.
4. In cases where formal commissioning procedure is required, it should be done by an authorized Aquestia technician prior to the first operation of the product.

Safety Instructions - Maintenance

Before any maintenance or non-regular operation, please read the following:

1. Servicing the product should be done only by qualified technicians for this type of work.
2. Make sure that you know the exact type of the system fluid. Act accordingly and comply with all the relevant standards and regulations set for handling this type of fluid.
3. Before disconnecting the product from the system and before releasing the residual pressure do NOT:
   - loosen or unscrew the product bolts;
   - remove any protection cover;
   - open any service port.
4. Before any maintenance or non-regular operation, shut off the Isolation valve and release the residual pressure:
   A. For air valves with a pressure release outlet, slowly open the pressure release plug or the ball valve and make sure that all pressure is released. Please note that some air release valves, especially the waste water models, may contain a significant volume of compressed gas with accumulated energy!
   B. For air valves without a pressure release outlet, slowly unscrew the flange bolts until all the pressure is released from the valve.
5. Make sure the air valve is empty of all liquid prior to commencing maintenance.
6. Remove the product from the line only after ensuring that internal pressure has been released.
7. Place warning signs around the work area as required by the local standards and procedures.
8. Inspect the product’s safety stickers and replace any damaged or faded sticker.
9. Manual cleaning of the product and/or its components using high water pressure or steam should be performed in accordance with its specific cleaning instructions, the local standards and regulations and without endangering the operator or the vicinity
10. Manual cleaning of product and/or its components using acid or other chemical agents should be performed in accordance with the specific cleaning instructions, the relevant safety instructions for using that chemical as given by its supplier, the local standards and regulations and without endangering the operator or his vicinity.
11. For products used in potable water systems, if it is required to disinfect the product, do so according to the local water authority standards and regulations before putting the product into service.

Safety Instructions - Before returning to regular operation

1. Re-assemble any protection covers or protection mechanisms removed during service or maintenance operations.
2. Make sure that all the tools, ladders, lifting devices, etc. used during the maintenance procedures are taken away from the product area and stored.
3. Remove grease and fat material residues in order to avoid slipping.
4. In order to return the product to regular operation, follow the First Start-up Operation instructions as detailed in your user manual.

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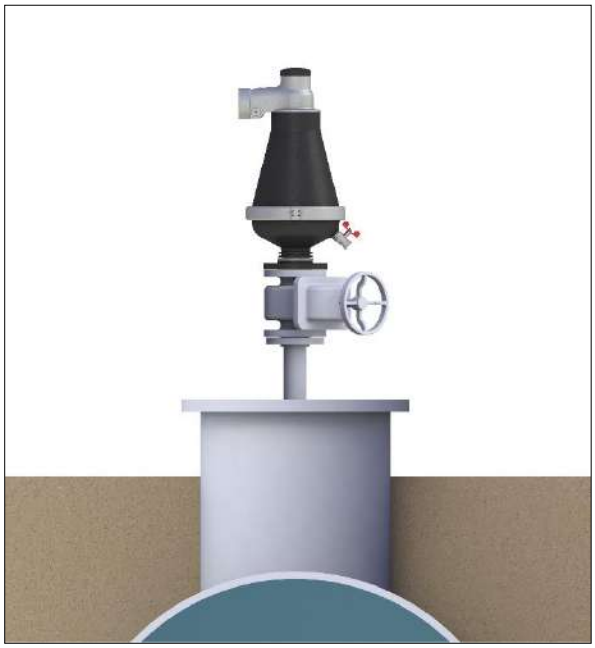
2. Installation

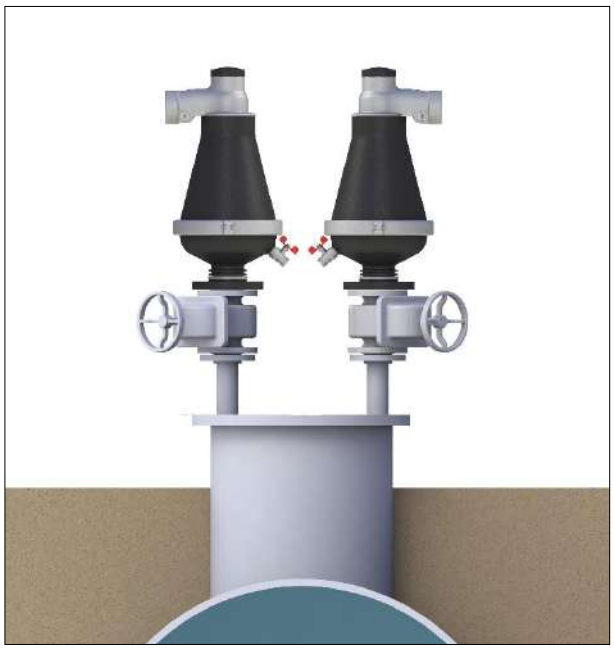
Important: Before performing any work on the air valve make sure that all workers on site are familiar with the safety instructions and the relevant local and general safety instructions and work regulations.

2.1. Installation Recommendations



Single Air Valve on an Isolating Valve at 45° to Air Valve outlet

Two Air Valves on a shared Isolating Valve. Air Valves outlets face outward and the Isolating Valve at 45° to Air Valve outlets



Two Air Valves on an Air Trap with separate Isolating Valves. Air Valve outlets face outward and the Isolating Valves at 45° to Air Valve outlets

Underground Installations

- Underground installations require a venting pipe from the manhole
- Use an angular installation to bypass an obstacle directly above the pipeline.

2.2. Conventions and Measurements

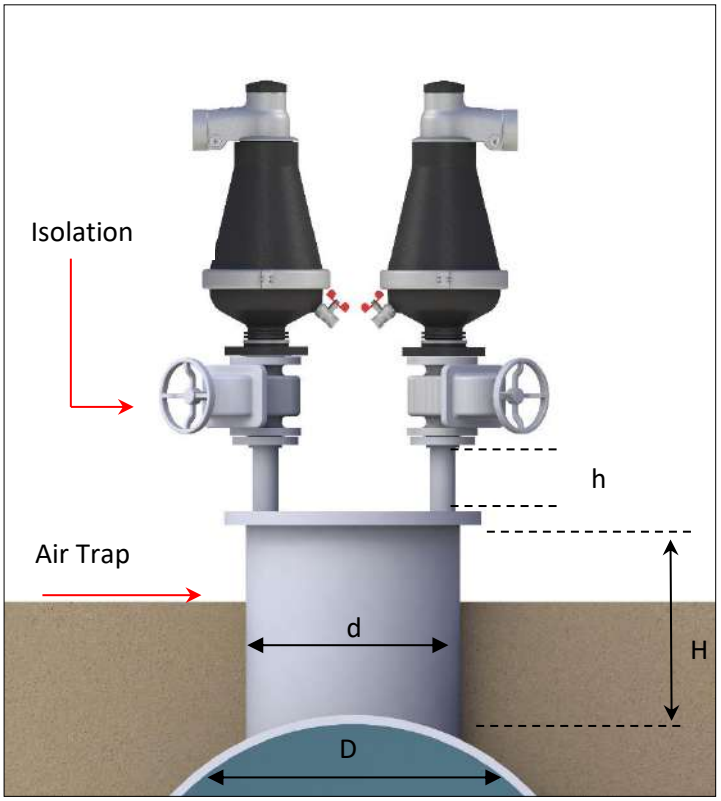
This paragraph presents and explains the terms and measurements used for the Installation process.

D = Diameter of pipeline

d = diameter of riser

H = Height of riser on the pipeline

(Measured from crown of pipeline)



- For pipelines up to 12" (300mm) in diameter (D), the Air Trap diameter (d) should be the same as the pipeline diameter.
- For larger pipelines of up to 60" (1500mm) in diameter (D), the Air Trap diameter (d) should be 60% of the pipeline diameter.
- For larger than 60" (1500mm) pipelines (D), the Air Trap diameter (d) should be 35% of the pipeline diameter.
- The Air Trap length (H) should allow easy access to the air valve from below and should be at least 6" (150mm).

2.3. Installation Instructions

1. Flush the system before installing the air valve to avoid any debris or sharp objects getting into the air valve.
2. Carefully remove the air valve from the shipping package. Unload all air valves carefully to a sturdy level surface taking care not to drop them.
3. Air valves fitted with hoist rings should only be lifted and conveyed using these hoist rings.
4. Install an isolating valve below the air valve, connected by a Riser to the crown of the pipe.
5. Mount the air valve carefully on the rubber gaskets of the isolating valve.
6. Place washers on each of the bolts & nuts that connect the air valve flange to the isolating valve flange.
7. Tighten all the bolts and nuts using the crossover method.
8. The closure tightness of the bolts and nuts shall be according to the standard torque for their specific size.
9. Use ring wrench keys for the closing and opening of all bolts of the air valve (including the flange bolts).

2.4. Directions for Discharge Outlet

1. Recommended to leave the discharge outlet completely open and unhindered:
2. Avoid directing the discharge outlet opening in the direction of workers, bystanders or animals.
3. Avoid directing the discharge outlet opening in the direction of vulnerable equipment that can be damaged, such as electrical equipment, unstable structures, etc.

3. Operation

The Air & Vacuum component, with the large orifice, discharges air at high flow rates during the filling of the system, and admits air into the system, at high flow rates, during system’s drainage and at water column separation. High velocity air does not blow the float shut. Water lifts the float which seals the valve.
At any time during system operation, if the internal pressure of the system falls below the atmospheric pressure, air enters the system.
The smooth discharge of air reduces pressure surges and other destructive phenomena.
The intake of air in response to negative pressure protects the system from destructive vacuum conditions, and prevents damage caused by water column separation. Air entry is essential to efficiently drain the system.

The automatic air release component releases entrapped air in pressurized systems.

As the system starts to fill, the valve functions according to the following stages:

1. Air in the pipeline is discharged by the valve.
2. Liquid enters the valve, lifting the float which pushes the sealing mechanism to its sealing position.
3. Entrapped air, which accumulates at peaks and along the system, rises to the top of the valve, which in turn displaces the liquid in the valve’s body.
4. The float descends, unsealing the rolling seal. The air release orifice opens and the accumulated air is released.
5. Liquid enters the valve and the float rises, pushing the rolling seal back to its sealing position.

When the internal pressure falls below the atmospheric pressure (negative pressure):

1. The floats drop down, immediately opening the Air & Vacuum and the air release orifices.
2. Air enters the system.

4. Periodic Maintenance

Please note that the periodic maintenance of the air valve is an integral part of the proper pipeline maintenance regime; it should be maintained at least once a year in accordance with the quality and composition of the fluid in the system.

Important: Before performing any work on the air valve, make sure that all workers on site are familiar with the safety instructions as appear chapter of this document and with all the relevant local and general safety instructions, standards and work regulations.

4.1. Preparation

Releasing Pressure

- Shut the isolating valve located on the riser under the air valve.
- Open the Ball Valve to release pressure and drain the air valve [19].
- Important: Discard liquid in compliance with local regulations.

4.2. Periodic Maintenance

Refer to the drawing on the next pages.

Frequency of periodic maintenance depends on suspended solids and grease load conditions. In high load of suspend solids and/or grease, the frequency can be once a month. In low loads, it can be once a year.

First Stage Maintenance – used when a small leak is detected from the Cover (2) orifice and clogging or debris in the sealing mechanism is suspected.

Second Stage Maintenance – used if the first stage doesn't solve the leak, or if one of the seals or inner parts need replacement (6) or for periodic maintenance to thoroughly clean the valve.

4.3. First Stage Maintenance

1. SAFETY WARNING:

   Prior to maintenance, perform the following steps:

   a. Shut the isolating valve underneath the air valve.

   b. Open the Tap (27) to release pressure and drain the liquid from the valve body. Leave it open.
2. Follow the local guidelines for disposal of this liquid.
3. Manually, with two hands, unscrew the Cover (2) from the valve Body (17).
4. Lift up the Cover and Float Assembly (1-14, 18-21) until the Cover is completely clear of the valve Body.
5. Attach a Locking Plier to the lower part of the Float Rod (21) to prevent the assembly from falling back into the Body.
6. Thoroughly wash the entire Seal Assembly (6) and the inside sealing area of the Cover with a strong stream of water to remove debris. Pay special attention to the surfaces of the Air & Vacuum Seal and Air Release Seal, found inside the Seal Assembly.
7. Examine the Air & Vacuum Seal (10) and Air Release Seal (11). If torn or cracked, continue directly to Second Stage Maintenance - Step 4.
8. Remove the Locking Plier and insert the assembly into the Body.
9. Manually screw in the Cover in a clockwise direction until firmly closed.
10. Close the Tap.
11. Slowly open the isolating valve and check for leaks.
12. If leaks are still detected from the Cover orifice, proceed to: Second Stage Maintenance.

4.4. Second Stage Maintenance

1. SAFETY WARNING:

   Prior to maintenance, perform the following steps:

   a. Shut the isolating valve underneath the air valve.

   b. Open the Tap (27) to release pressure and drain the liquid from the valve body.

2. Follow the local guidelines for disposal of this liquid.
3. Manually, with two hands, loosen the Cover (2) from the valve Body (17).
4. Unscrew the two Bolts (26) from the Clamp (25).
5. With the aid of a flat head screwdriver, pry open the two parts of the Clamp from the valve Body and Base (24).
6. Holding the valve Body in both hands, push from side to side until the Body separates from the Base.
7. Remove the valve Body with the attached Cover, Float and Seal Assemblies. Place this part on a clean working surface.
8. Open the Domed Nut (4) on the valve Cover.
9. Pull out and safely store the Bolt (9), 2 Bushings (7), 2 Washers (8) and Domed Nut (4).
10. From inside the valve Body, with one hand, push in on the two sides of the Spray Guard (16) until it is released from the valve Body. Allow the part to fall freely.
11. Remove the entire connected Float and Sealing Assembly by pulling it out from the bottom of the Body.
12. Pull open the slit of the Spray Guard and remove it from the Float Rod (21).
13. Thoroughly wash the Float Assembly, Sealing Assembly, Disc Arm (5), Body and Cover, making sure to remove all grime and debris. Pay special attention to the inside of the Sealing Assembly.
14. **NOTE:** NS Non-Slam Component Maintenance [for NS models only].

    a. Wash the inside and the outside of the Non-Slam Component with a strong stream of clean water to remove debris or buildup on the parts.

    b. From the outer side of the Non-Slam Component, push down on the Disc to check for free movement of the Disc and Spring. If hindered by debris, wash out with clean water.

15. Examine the Sealing Assembly for tears or cracks or debris stuck in the Air & Vacuum Seal, Air Release Seal, Sealing Assembly housing. Replace the entire Sealing Assembly, if required.

    Sealing Assembly Replacement

    a. Remove the Disc Arm (5) from the Sealing Assembly by unscrewing the Bolt, Washer and Nut. Securely store the parts.

    b. Insert a 2-pronged adjustable spanner wrench into the two holes in the Stopper (19) and unscrew until released.

    c. Separate the Float Assembly (18-21) from the Sealing Assembly.

    d. Replace the Sealing Assembly with a new one.

e. Insert the 2-pronged adjustable spanner wrench into the two holes in the Stopper and screw the Float Assembly into the bottom side of the new Sealing Assembly.

f. Attach the lower Disc Arm to the Sealing Assembly by inserting the Bolt and Washer into the holes of the Sealing Assembly and tightening the Nut.

16. Insert the Spray Guard (16) over the Float Rod.
17. Insert the combined Float and Sealing Assembly into the valve Body (17) from below, with the Disc Arm extending into the valve Cover (2).
18. With one hand inside the valve Body, push in on the two sides of the Spray Guard, insert the upper part into the slot on the top of the valve Body, and release pressure, making sure the Spray Guard sits tightly inside the valve Body.
19. Screw the Cover into the valve Body.
20. Make sure the O-ring (15) is intact and sits tightly in its slot on the Cover. Replace, if necessary.
21. Insert the Bolt (9), Washer (8) and Bushing (7) into the hole in the Cover and through the 2 holes of the upper Disc Arm. Insert the second Bushing into the hole on the opposite side of the Cover, slide the second Washer over the Bolt and tighten with the Domed Nut.
22. Examine the O-ring (23) for tears or cracks. Replace, if necessary.
23. Insert the valve Body into the Base, making sure the O-ring is in place and there is no gap between the sections.
24. Attach the two parts of the Clamp (25) on the closure between the valve Body and Base.
25. Screw the two Bolts (26) and Nuts (22) into the Clamp and tighten accordingly.
26. Close the Tap (27) and open the isolating valve. Check that there are no leaks.

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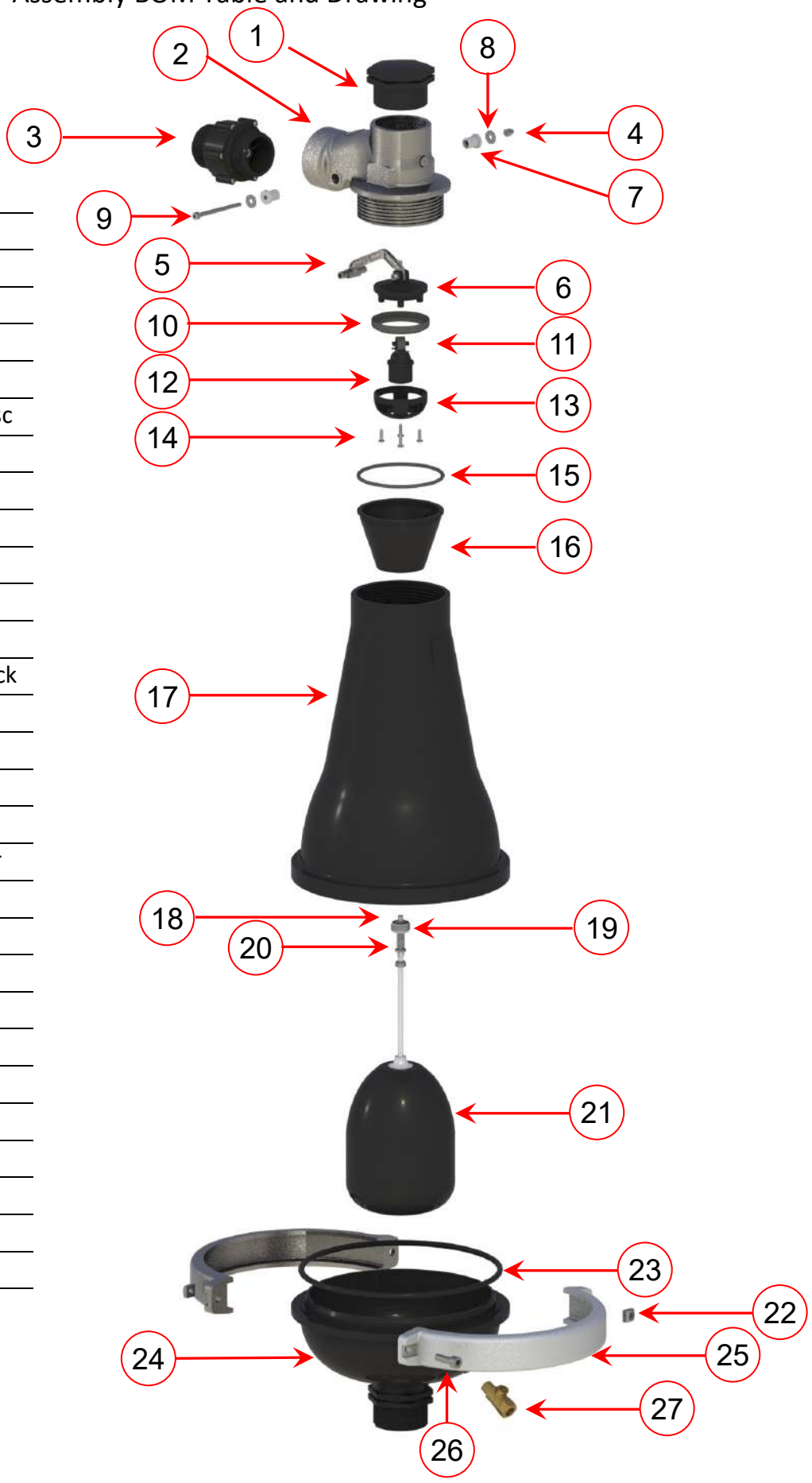
A.R.I. D-26 3” Air valve – Assembly BOM Table and Drawing

1	Threaded Plug
2	Cover
3	NS Component
4	Nut
5	Disk Arm
6	Air & Vacuum Seal Disc
7	Bushing
8	Washer
9	Bolt
10	Air & Vacuum Seal
11	Air Release Seal
12	Air Release Seal Seat
13	Air & Vacuum Seal Lock
14	Screws
15	O-ring
16	Spray Guard®
17	Body
18	Domed Nut & Washer
19	Stopper
20	Spring
21	Float & Rod
22	Nut
23	O-ring
24	Base
25	Clamp
26	Bolt
27	Tap
28	O-ring (optional)
29	Flange (optional)



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5. Troubleshooting

Symptom	Possible Causes	Solution
1. Leaking from the air valve outlet	a. Dirt particles stuck in the orifice. b. Torn Rolling Seal	a. Follow the instructions for: **First Stage Maintenance** b. Follow the instructions for: **Second Stage Maintenance**
2. Non-slam Component is stuck	Non-slam disc doesn’t move freely in the Disc Housing	Dirt particles stuck in the disc housing. Follow steps for: **14. Non-Slam Component Maintenance**