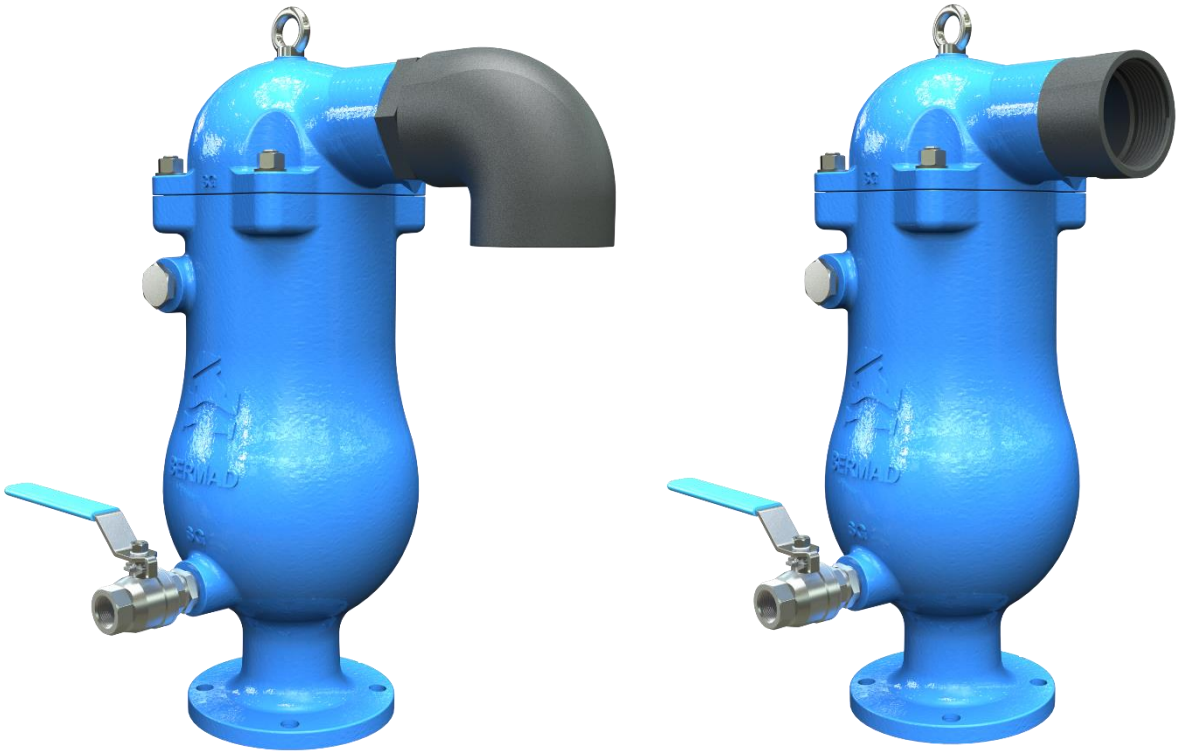
BERMAD
Water Control Solutions

NON-CLEAN, SEWAGE & WASTEWATER

COMBINATION AIR VALVE

Model C80



Installation, Operation & Maintenance Manual (IOM)

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Introduction

Thank you for purchasing the BERMAD Non-clean, Sewage & Wastewater Combination Air Valve model C80, which is a high-quality air valve for various Sewage & Wastewater networks and operating conditions. The C80 evacuates air during pipeline filling, allows efficient release of air and gas pockets from pressurized pipes, and enables large volume air intake in the event of network draining. The elongated body and lower float prevent the fluid to be in contact with the upper mechanism.

This document describes the Installation, Operation, and Maintenance of the C80 Air Valve.

Safety First

General

Since air valves operate in pressurized waste water networks and sewage systems with toxic or corrosive environment, you are required to carefully read this manual before using the valve. Handle the valve with care and make sure to comply with all the relevant required safety instructions and standards, general and local.

During installation, operation or maintenance of the air valve, use always good engineering practices and avoid danger to the workers, the public or to property in the vicinity.

Use only standard and approved tools and equipment, operated by qualified operators, when installing, operating and maintaining the air valve.

Since the air valve is installed in hazardous environment sites and/or underground, make sure that the installation procedures are carried out in accordance with the relevant standards and regulations.

Never use the product for purpose other than its original design and operation environment.

The workers must comply with the occupational safety and health (OSH) instructions and protect themselves with personal safety gear such as helmets, goggles, gloves, and any other personal safety equipmentת required by the regulations, while installing, operating, and maintaining the air valve.

Unpacking, Shipping, handling and installing the air valve

Before starting the installation, make sure that the air valve was not damaged during shipment to the site.

Handel the air valve with care in safe and stable way; when lifting and moving it use only approved equipment, operated by licensed operators.

Carefully comply with the installation process stages described in this IOM document and follow all the relevant safety instructions.

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Maintenance

Prior to any maintenance work to be done on the air valve make sure that:

- Before any maintenance or non-regular operation, close the Isolation / ball valve, which is installed below the air valve.
- Comply with and follow all the standards and regulations for handling the fluids on which the air valve is operated.
- The work must be done only by professionals trained for this type of work.
- Slowly open the drainage valve, or the ball valve, located on the lower side of the air valve body, make sure that the pressure is released; take extra care while releasing the hazardous, high energy, compressed gas.
- Make sure that the air valve is completely empty from liquids before starting the maintenance process.
- Disassembling the air valve from the pipeline must be done only after verifying that the internal pressure is released.
- Comply with all the local standards and regulations when cleaning of the air valve with water jets or steam, follow the cleaning instructions and avoid harming people or the environment.
- Check the air valve's safety labels (for example the "Non-Drinking" label) and replace them when needed.

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Pre-Installation Requisites

Post Shipment

Make sure that till the actual installation the valve remains dry and clean in its original package.

- Unpack the valve and make sure that all the wrapping materials are removed.
- Before installation it is necessary to inspect that no damage to the valve had occurred during shipment; do not install a damaged valve!
- Verify that the valve to be installed meets the design specifications of the specific installation site; take extra care and make sure that the expected system pressure complies with the pressure rating of the valve.
- Make sure that the lifting-eye is tightly connected to the air valve.

Site Preparation

- Air Valves located above ground should be protected from freezing and vandalism.
- If the valve is to be installed in a pit, make sure that the pit has proper drainage and sufficient dimensions for servicing the valve.
- Flush the pipeline prior to the air valve installation in order to prevent damage to the valve internals due to large debris carried by the water during startup.

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Installation Instructions

The usage of air valves is very important for efficient operation of all sewage and wastewater systems' types; correct Sizing and precise Installation locations of the air valves along the system is crucial for protecting the system.

This chapter describes only the very basic requirements for air valve installation; for designing the required number, size and locations of air valves in your system please refer to Bremad's "Air-Control - WW-Engineer Guide_v13.pdf" document.

Raiser

- Install the air valve as close as possible to the pipe, in vertical position (within 5 degrees of vertical alignment with its inlet facing down).
- Non-vertical Installation will disturb the regular performance of the air valve. The diameter of the raiser should be equal or bigger than the diameter of the air valve inlet.

Shutoff valve

- To allow easy inspection and maintenance of the air valve, a shutoff valve must be installed between the pipeline and the air valve. During operational mode, this valve has to be fully opened.

Drainage pipeline

- When required, a drainage pipeline should be fitted to the valve's outlet. The diameter of the drainage pipeline should be at least equal or bigger than the diameter of the air valve. Smaller diameter will decrease the air flow capacity of the air valve.

The following pictures depict some typical installations of the C80 air valve (Please refer to Bremad's "Air-Control - WW-Engineer Guide_v13.pdf" document):

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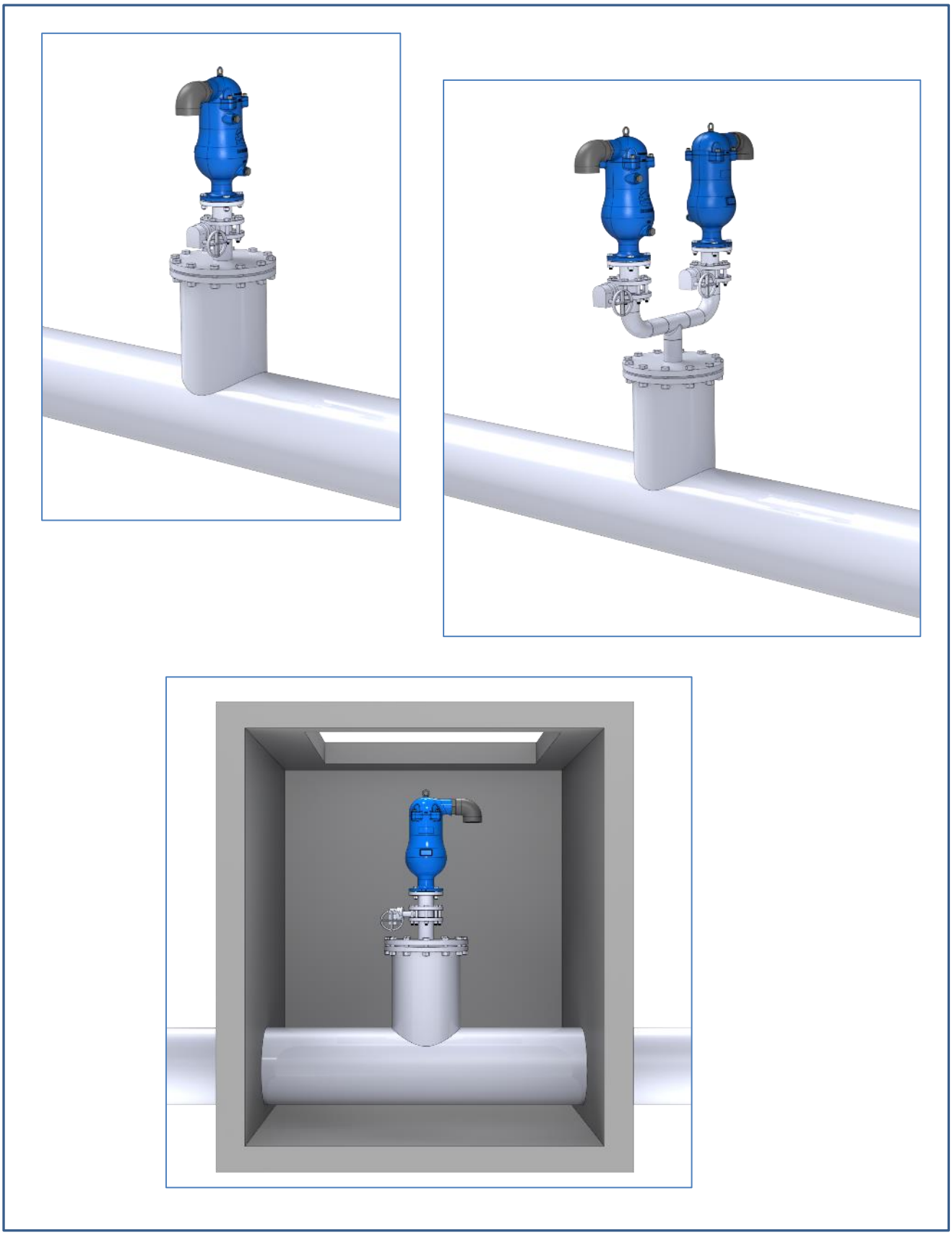

Figure 1 - Installation options

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Adding Additional Feature to the C80 Air Valve

Surge Protection Device:

Please refer to the following picture for adding a Surge protection device to the C80 Air Valve:

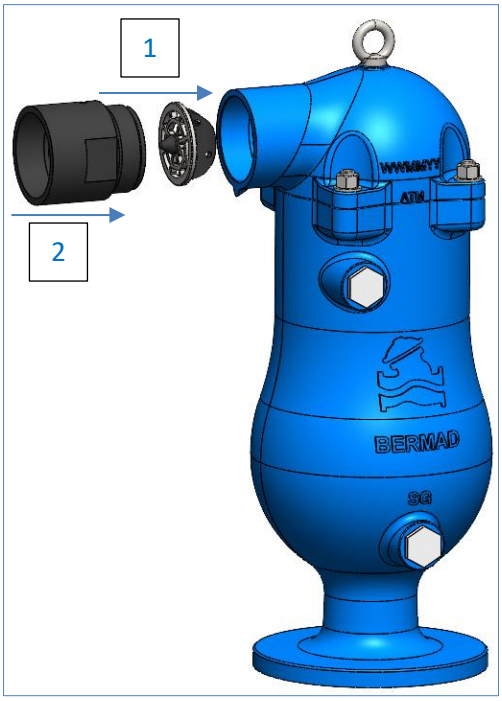

Figure 2 – SP Picture

Assisted Closing Device:

Please refer to the following picture for adding an Assisted Closing device to the C80 Air Valve:

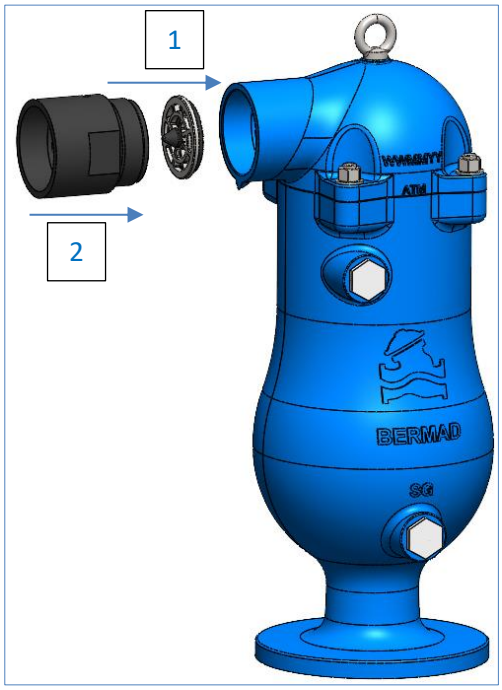

Figure 3 - AC Picture

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Inflow Prevention Device:

Please refer to the following picture for adding an Inflow Prevention device to the C80 Air Valve:

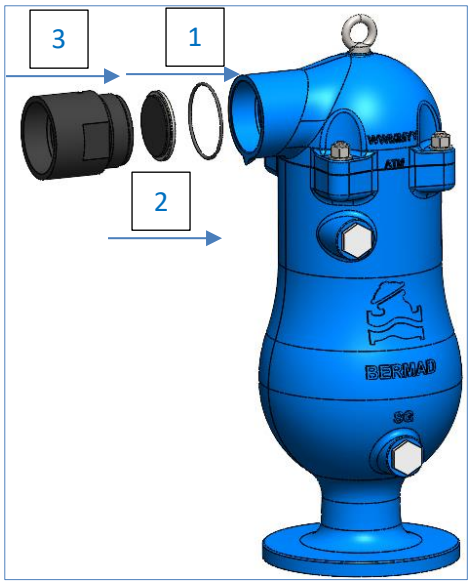

Figure 4 - IP Picture

First startup

- Open the Isolation / ball valve and verify that the air valve connections are not leaking; if needed follow the troubleshooting instruction section of this document.
- Please note: At the first time the valve is filled up, some limited quantity of water may exit through its outlet port.
- Prevent water hammer during startup and pipeline filling, by maintaining the velocity lower than 0.5m/sec (1.6 feet/sec).
- It is recommended adding Surge Protection devices in systems where higher velocity is expected.

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Operation and Monitoring

Principles of operation

Pipeline filling

During the filling process of a pipeline, high air flow is forced out through the kinetic orifice of the air valve. Once water enters the valve's chamber, the float buoyed upwards causes the kinetic orifice to close. The unique aerodynamic structure of the valve body and float ensures that the float cannot be closed before water reaches the valve.

Pressurized operation

During pressurized operation of the pipeline, air accumulates in the upper part of the air valve chamber, causing the float to gravitate downwards. This in turn causes the automatic orifice to open, releasing the accumulated air. Once the air is discharged, the water level and float rise and the automatic orifice closes.

Pipeline draining

When a pipeline is drained, a negative differential pressure is created, causing atmospheric air to push the float down. The kinetic orifice stays open and air enters the valve chamber, preventing vacuum formation in the pipeline.

Surge protection (anti-slam)

The anti-slam device is fitted to the air valve outlet. In the event of a pressure surge it partially closes the valve's outlet. The approaching water column decelerates due to the resistance of the rising air pressure in the valve.

Inflow prevention

The inflow prevention mechanism is a Normally Closed check device fitted on the valve's outlet and preventing flow of atmospheric air into the valve.

Important note: avoid getting closer to the air valve's exhaust opening while vacuum conditions are present.

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Monitoring

The air valve is built for operation with sewage and wastewater liquids, that contain foreign objects, oils and other materials. Therefore, during pumps startup and pipelines filling, check that the air valve reliefs the large volume of air from the pipelines through its outlet, and admitting large volume of air to the pipelines during pumps shutdown.

Also, check that the air valve releases small volume of air from its outlet, due to air pockets accumulated in the pipeline, during regular operation.

Quick maintenance

The C80 air valve's body has two service ports (upper and lower) that allow the user, when needed and depend on the dirt-load, to perform a quick flushing of the valve's internal body (See the following picture):

1. Make sure that you are familiar with all the relevant safety instruction for this type of work; read the Safety-First chapter of this document.
2. Before any maintenance or non-regular operation, close the Isolation / ball valve, which is installed below the air valve.
3. Slowly open the drainage valve, or the ball valve, located on the lower side of the air valve body, make sure that the pressure is released; take extra care while releasing the hazardous, high energy, compressed gas.
4. Make sure that the air valve is completely empty from liquids before starting the maintenance process.
5. Connect a pressurized clean water hose to the upper service port of the air valve.
6. Connect a suitable drainage line to the lower service port of the air valve; make sure to comply with all the relevant safety instructions and regulations required for protecting people and the environment.
7. Flush the valve by discharging pressurized clean water into its upper service port till clean water exits through the lower service port.
8. Close the service ports and reopen the isolation valve.

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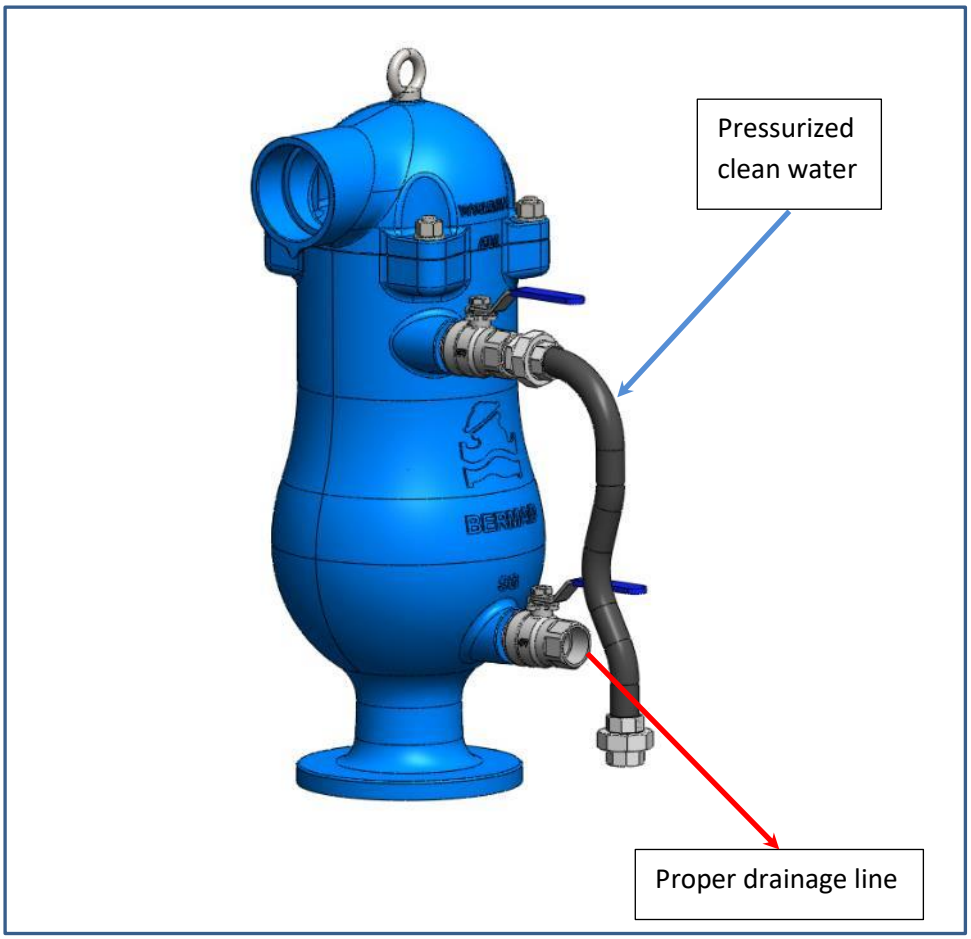

Figure 5 - Quick flush

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Periodic maintenance

A periodical inspection of the seals and flushing of the valve are recommended for removing debris, foreign objects, and grease that might interfered with the regular operation of the air valve.

The valve's flushing and cleaning frequency depends on sewage and wastewater characteristics and dirt-load.

The periodic maintenance procedure includes the following stages:

1. Make sure that you are familiar with all the relevant safety instruction for this type of work; read the Safety-First chapter of this document.
2. Before any maintenance or non-regular operation, close the Isolation / ball valve, which is installed below the air valve.
3. Slowly open the drainage valve, or the ball valve, located on the lower side of the air valve body, make sure that the pressure is released; take extra care while releasing the hazardous, high energy, compressed gas.
4. Make sure that the air valve is completely empty from liquids before starting the maintenance process.
5. Flush the internal components of the air valve: (See the following pictures.)
    - Verify that the pressure is released and the air valve body is empty.
    - Using key number 22, unscrew the 4 nuts of the air valve cover assembly.

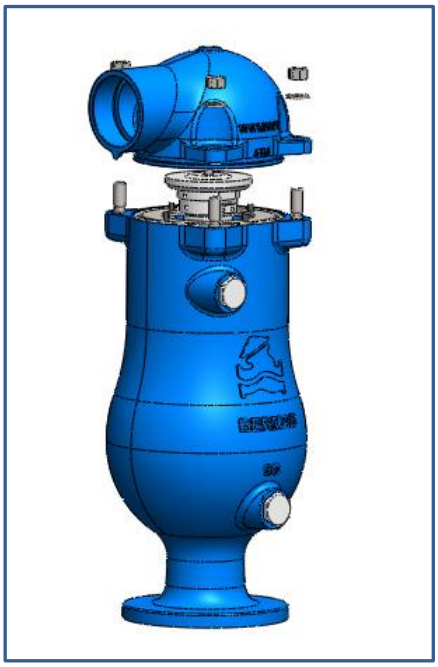

Figure 6 - Periodic maintenance A

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- Pull out the internal assembly of the air valve.

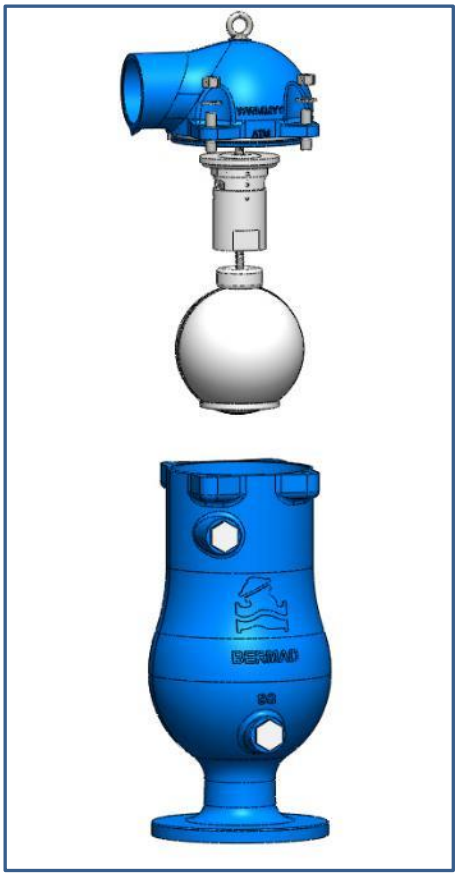

Figure 7- Periodic maintenance B

- Using 3/32” Allen key, disconnect the locking screw of the automatic mechanism, and separate the upper float assembly from the rest of the internal mechanism.

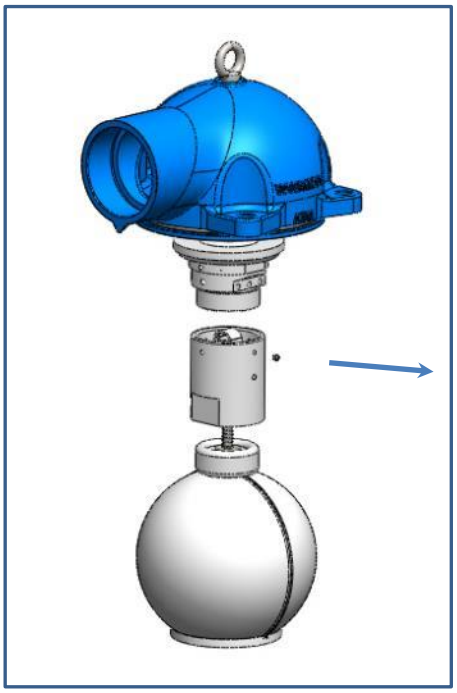

Figure 8 - Periodic maintenance C

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- Remove any foreign objects
- Flush and clean the automatic orifice seals

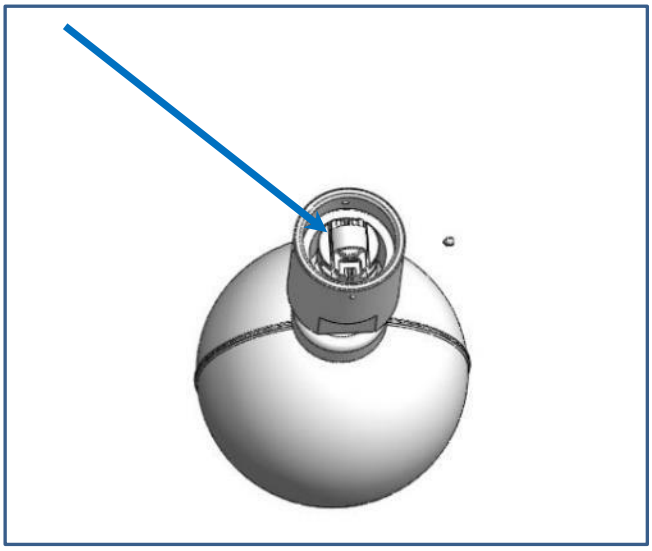

Figure 9 - Periodic maintenance D

- Flush and clean the kinetic orifice and its seal.

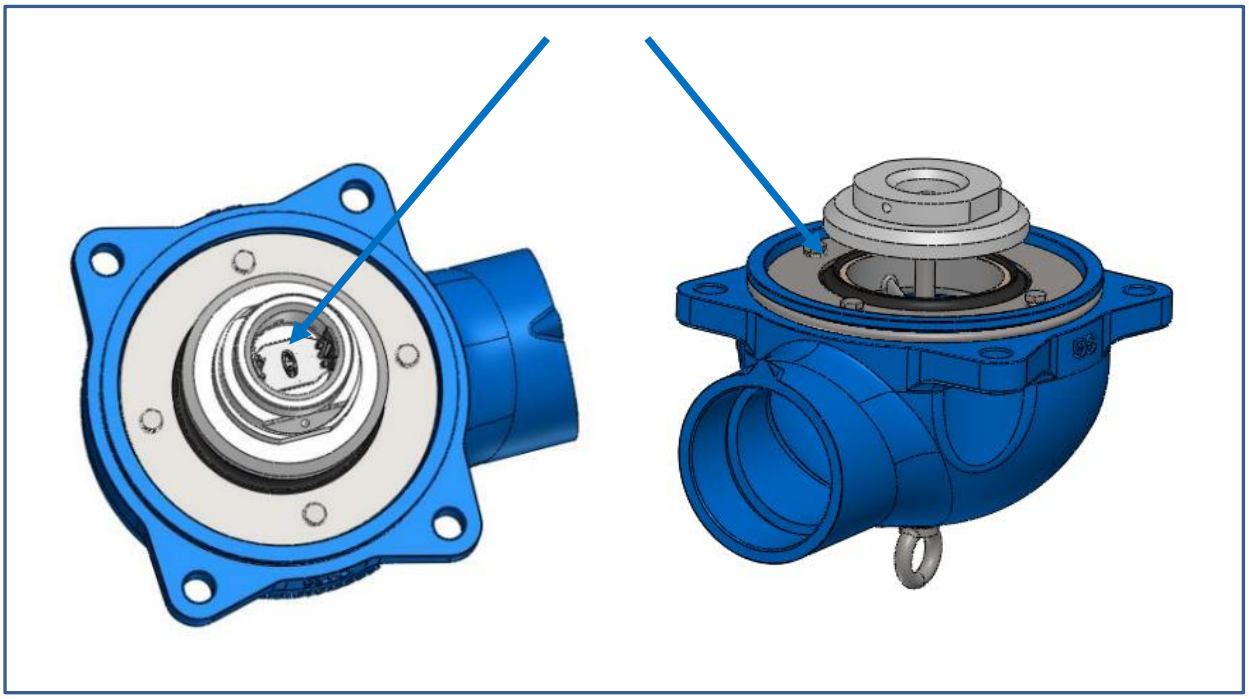

Figure 10 - Periodic maintenance E

- Check for signs of wear and tear or any damaged parts.

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- If needed replace the automatic seal and the kinetic seal.
- Replace the automatic seal: Remove the old seal [A], insert one side of the new seal to its designated slot [C], insert the other side of the seal to the opposite side slot, and cut the excessive rubber rods [D].

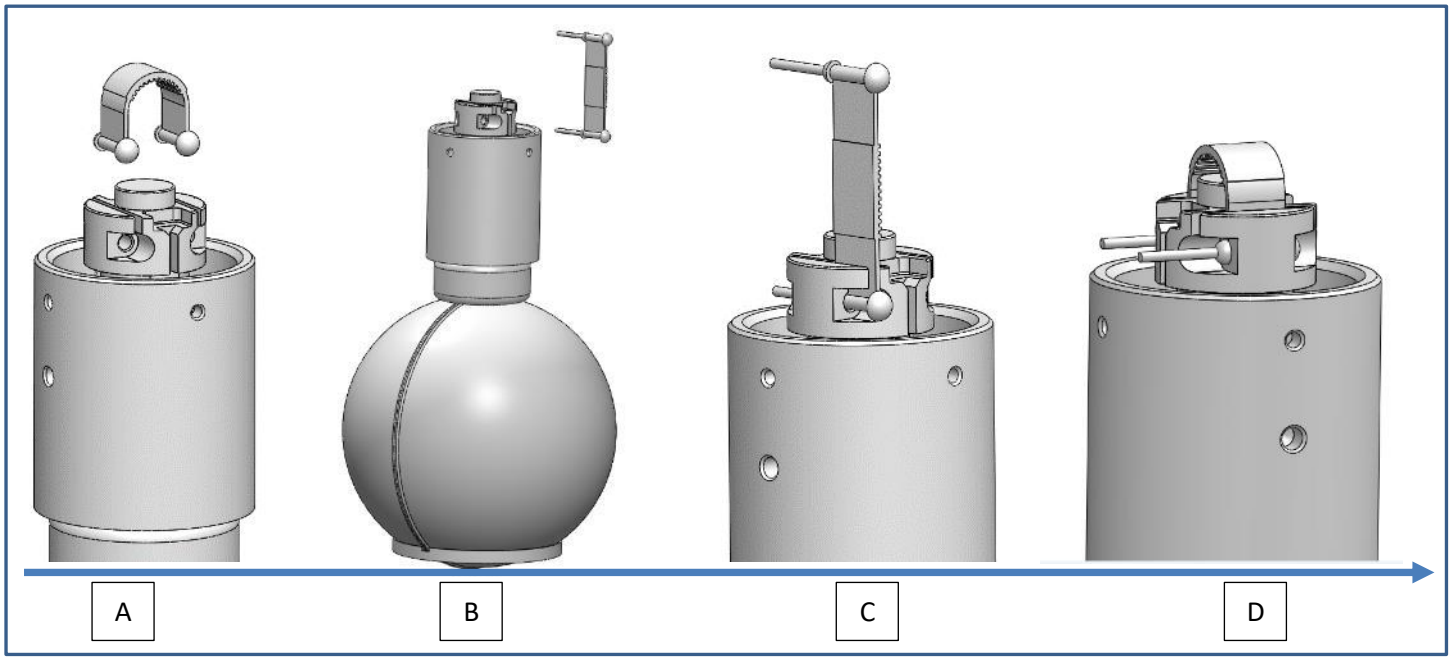

Figure 11 - Replacing the seals - A

- Replace the Kinetic seal; unscrew the four bolts, remove the locking ring and replace the seal

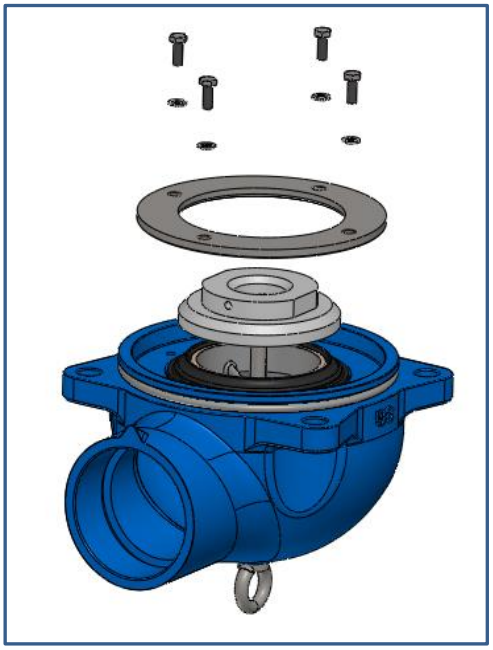

Figure 12 - Replacing the seals - B

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- Pull out the seal assembly [A] and replace the seal [B].

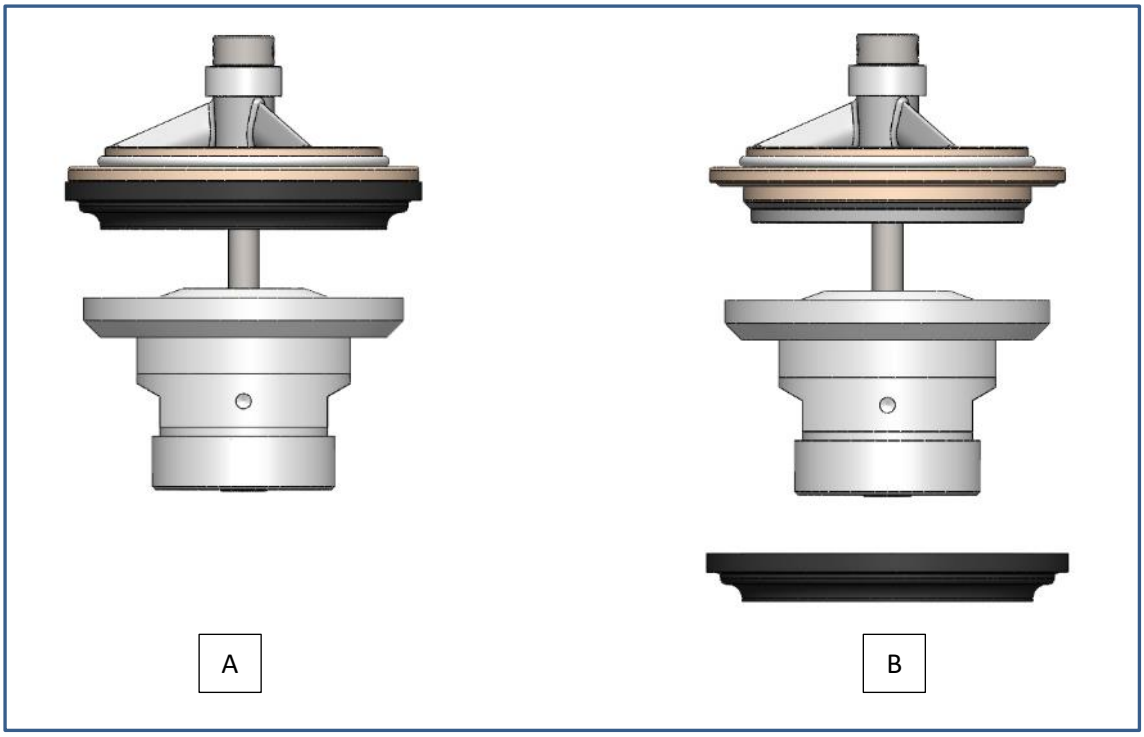

Figure 13 - Replacing the seals - C

- Reassemble the air valve in reverse order.
- Tighten the four side cover bolts to 25 N-m torque.
- Reopen the isolation valve.

If during the periodic maintenance procedure, signs of wear and tear are found on the air valve components, please refer to the Disassembling the air valve chapter of this document.

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Troubleshooting

Symptom	Action
Leakage at the inlet connection	Tighten the valve inlet connection, use thread sealant. Check whether any part/seal is damaged.
Leakage from the connection between the valve's cover and body	Tighten the valve's cover
Leakage at the valve's outlet	Close the isolation valve. Then, at first, connect a clean water pipe to the upper service port of the valve and open its drainage valve. Flush the valve to remove debris. In case the symptom remains, dissemble and inspect the valve's orifices, floats and seals. Remove any foreign objects, clean the orifices and seals. Check and replace any damaged part.
Valve does not release air or allow air intake	Verify that the operating pressure does not exceed the valve's rated working pressure. Check and remove foreign objects. Clean the valve's internal parts, replace if necessary. Consult Bermad if the symptom continues.

Disassembling the air valve

Perform the following stages when a complete disassembly of the air valve is required:

1. Make sure that you are familiar with all the relevant safety instruction for this type of work; read the Safety-First chapter of this document.
2. Before any maintenance or non-regular operation, close the Isolation / ball valve, which is installed below the air valve.

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3. Slowly open the drainage valve, or the ball valve, located on the lower side of the air valve body, make sure that the pressure is released; take extra care while releasing the hazardous, high energy, compressed gas.
4. Make sure that the air valve is completely empty from liquids before starting the maintenance process.
5. Start by removing the air valve cover, pulling out the internal assembly and disconnecting the locking screw of the upper float assembly. (See the Periodic Maintenance chapter of this document.)

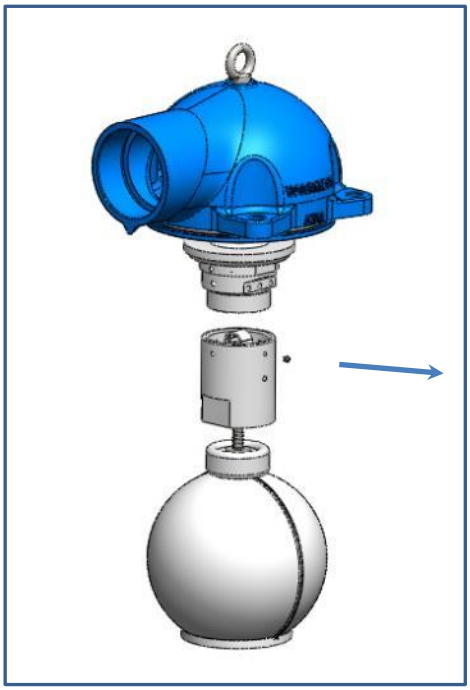

Figure 14 - Disassembling the air valve - A

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6. Disassemble the lower float from the automatic subassembly by unscrewing the screw. Unscrew and disconnect the float from the lower float rod.

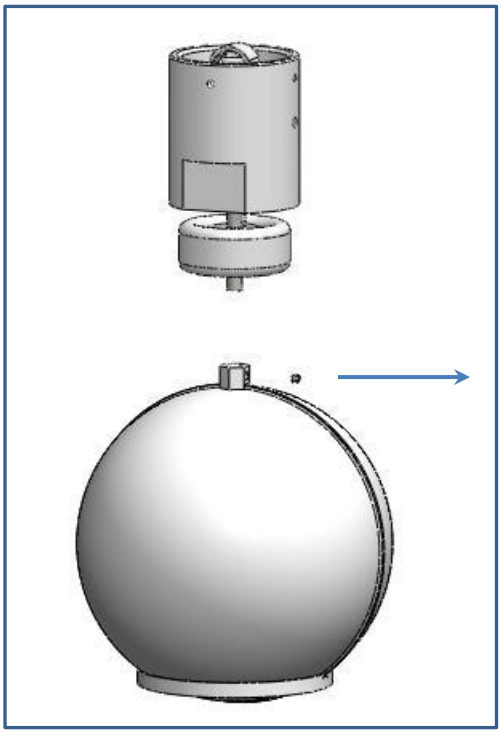

Figure 15 - Disassembling the air valve - B

Replacing the seals

1. Disassemble the roll seal; remove the automatic subassembly housing and disassemble the roll seal seating nut.

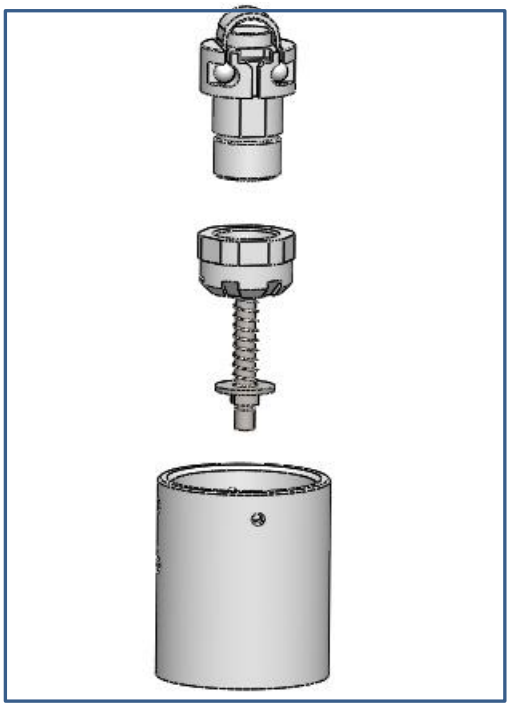

Figure 16 - Replacing the seals - A

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2. Disassemble the spring by unscrewing the locking nut of the spring assembly.

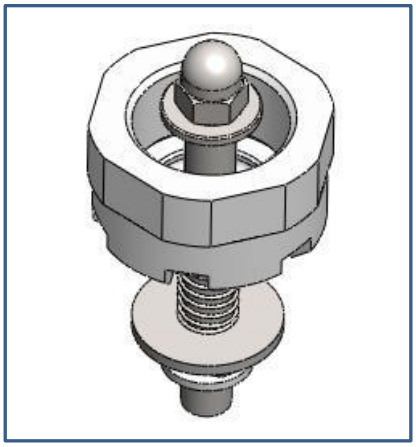

Figure 17 - Replacing the seals - B

3. Disassemble the automatic orifice seat by unscrewing the locking bolt of the orifice seat.

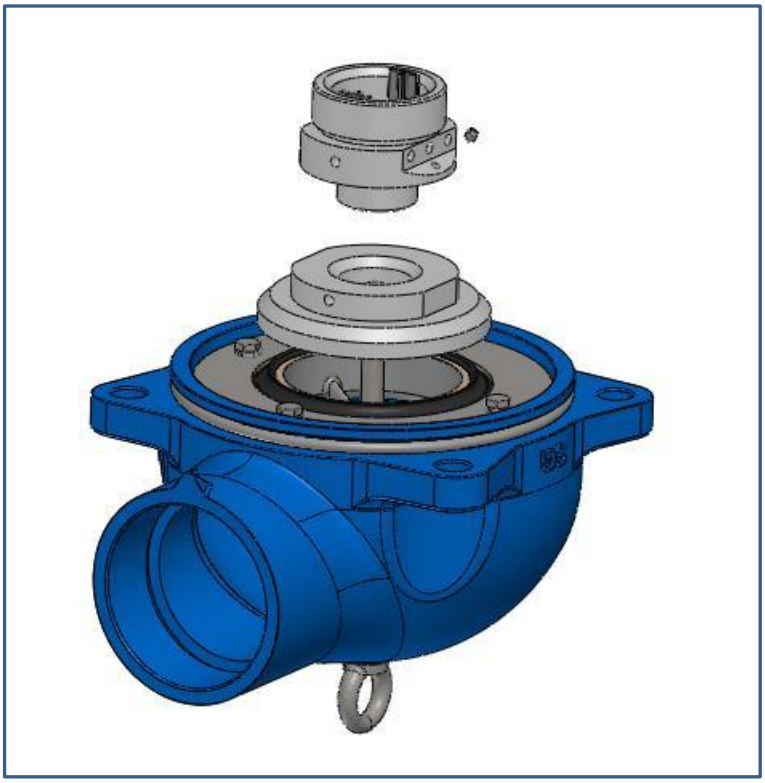

Figure 18- Replacing the seals - B

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4. Disassemble the automatic orifice by pulling out the orifice assembly from its seat.

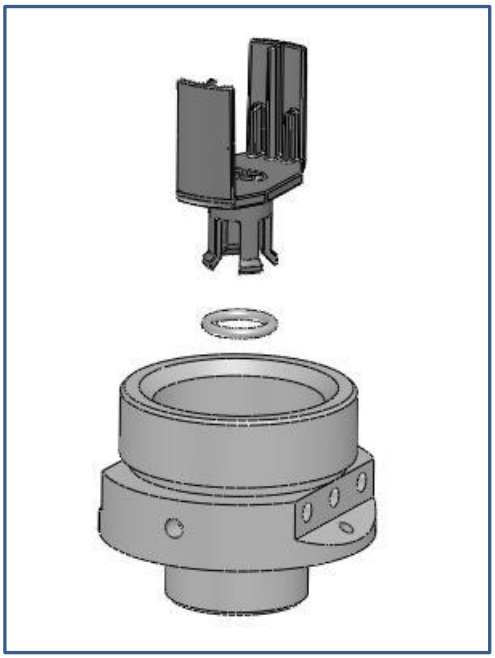

Figure 19 - Replacing the seals - C

5. Disassemble the kinetic seal assembly by unscrewing the 4 bolts and removing the locking ring.

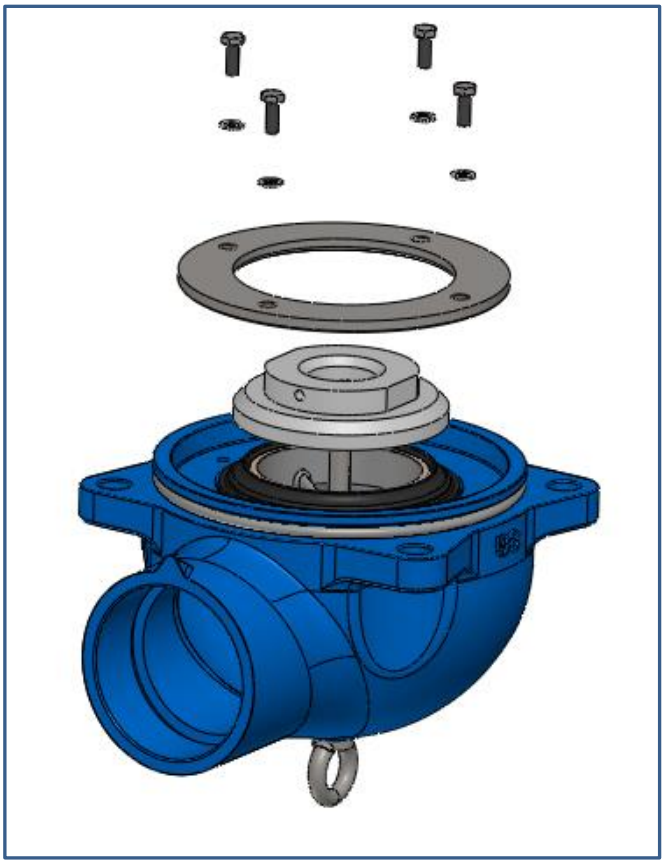

Figure 20 - Replacing the seals - D

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6. Remove the kinetic sealing subassembly from the side cover.

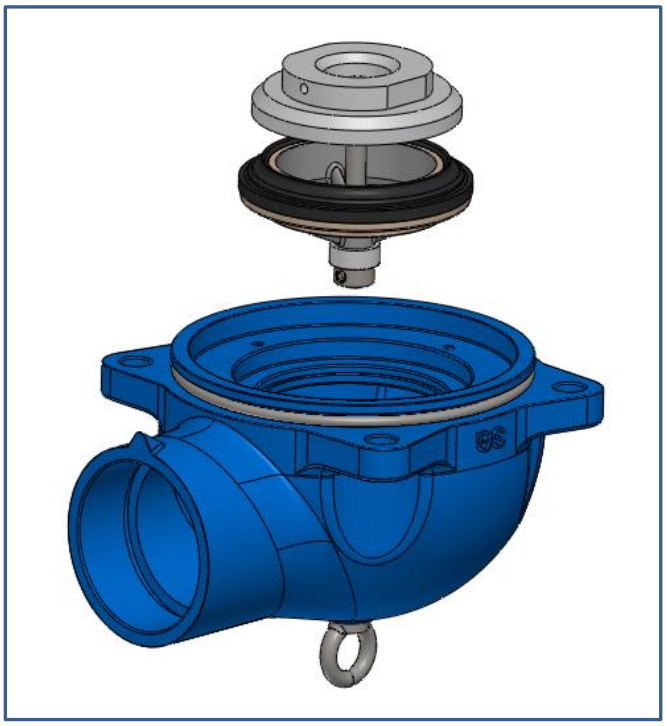
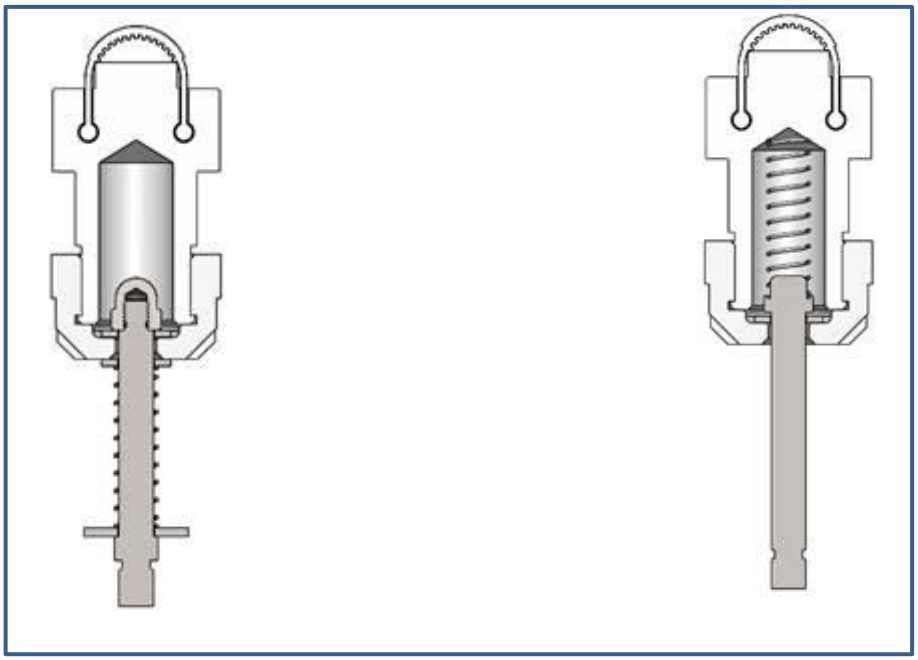


Figure 21 - Replacing the seals - E

7. Disassemble the Spring subassembly.

   Important note:

   The Cover subassembly of the C80 Air Valve has two versions, Earlier [A] and Later [B]:



Version A

Figure 22 - Versions

Version B

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Therefore, disassembling the spring assembly is different in version A from version B

Please refer to the BOM drawings ahapter of this document:

Version A [Earlier] disassembly

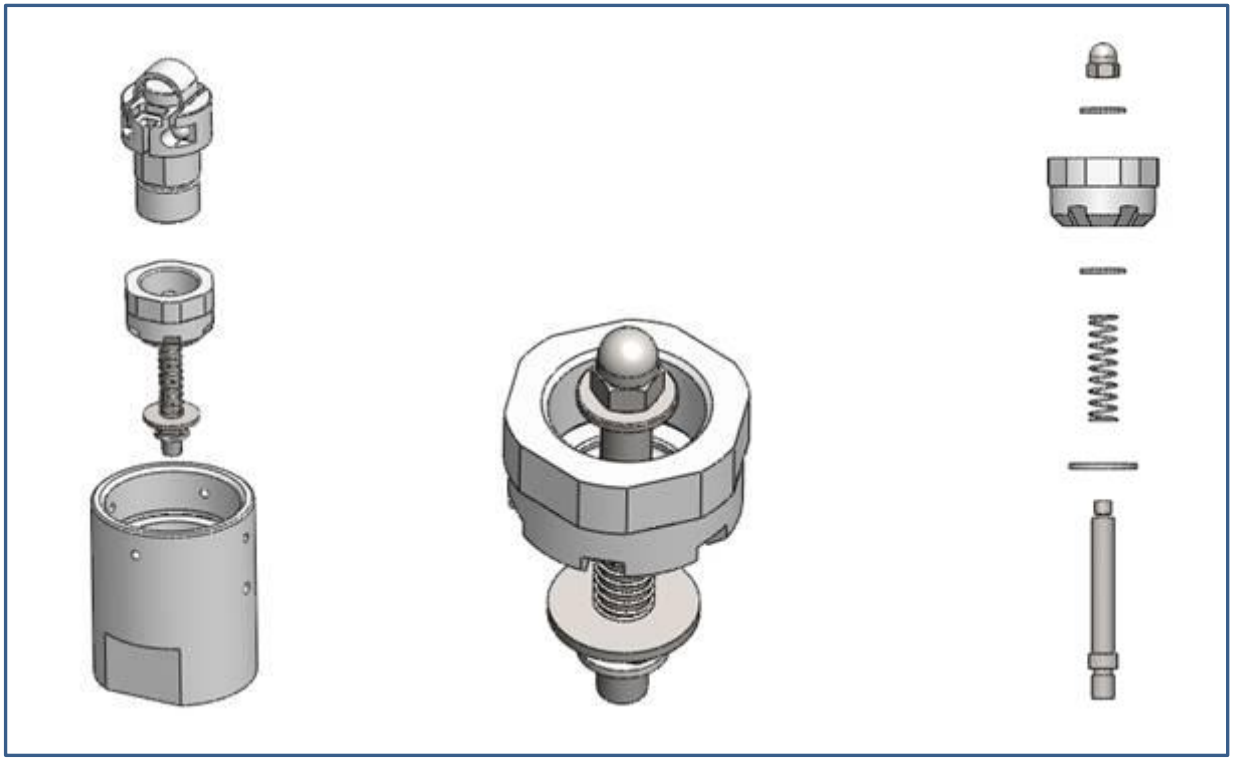

Figure 23 - Version A

Version B [Later] disassembly

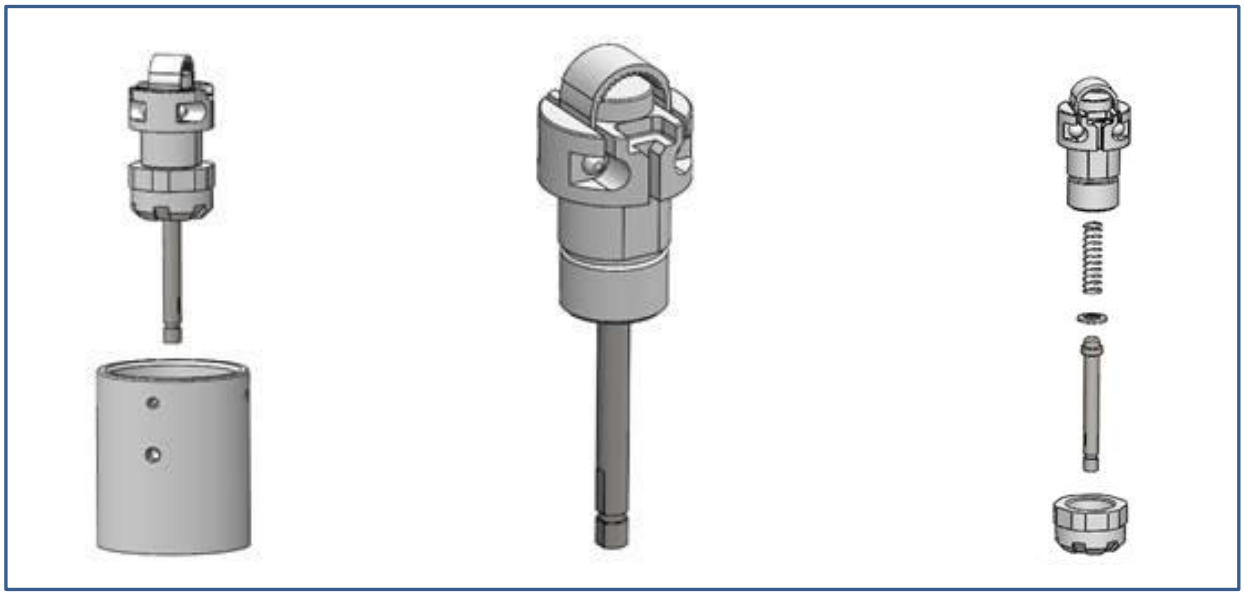

Figure 24 - Version B

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Reassembly and returning to service

Reassemble the air valve in reverse order.

1. Reassemble the spring subassembly, Version A [Earlier].

   Apply Loctite on the threads before screwing and screw the Nut with M6 Key by hand force only.

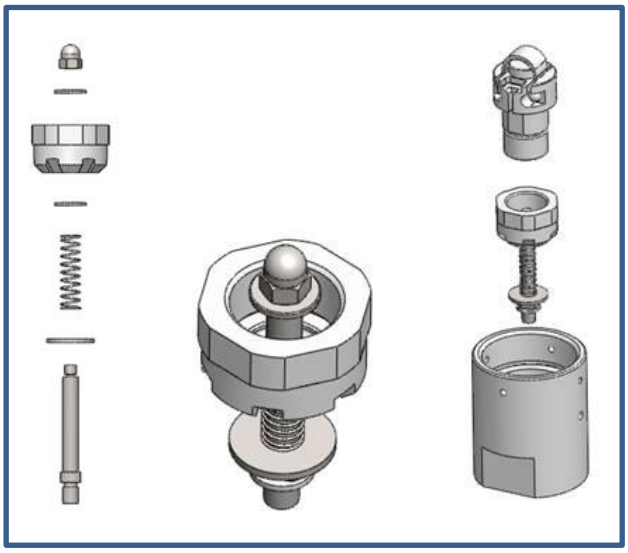

Figure 25 - Reassembling - A

Reassemble the spring subassembly, Version B [Later].

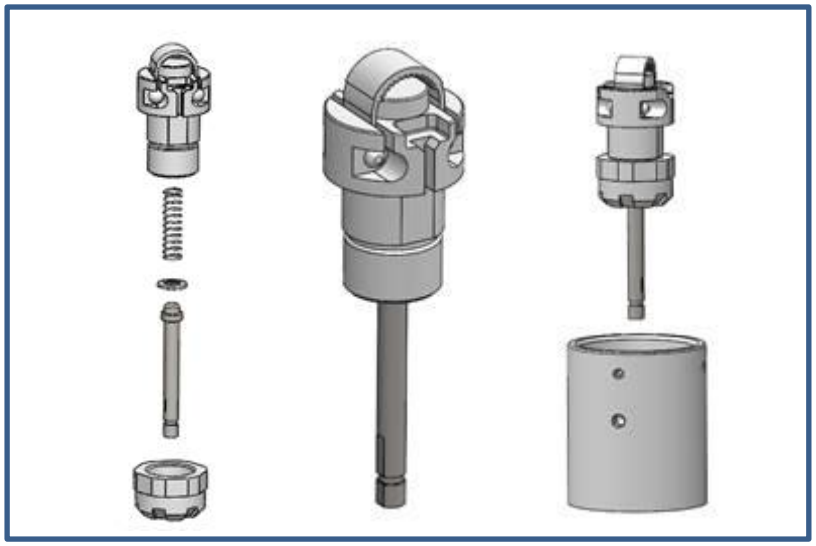

Figure 26 - Reassembling - B

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2. Install the kinetic sealing subassembly to the cover.

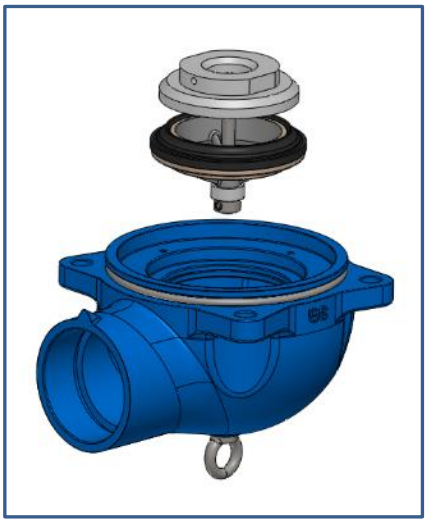

Figure 27 - Reassembling - C

3. Reinstall the locking ring.

   Apply Loctite on the threads before screwing and screw the Nut with M6 Key by hand force only.

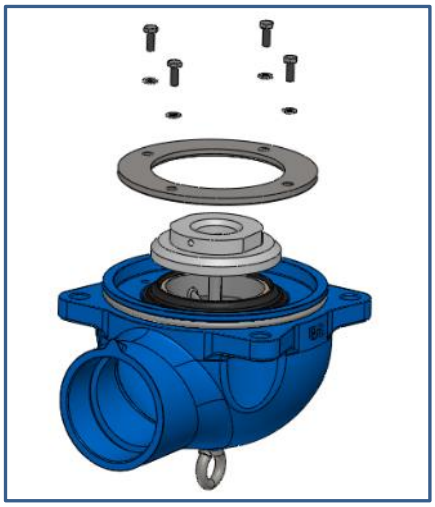

Figure 28 - Reassembling - D

4. Reassemble the automatic orifice.

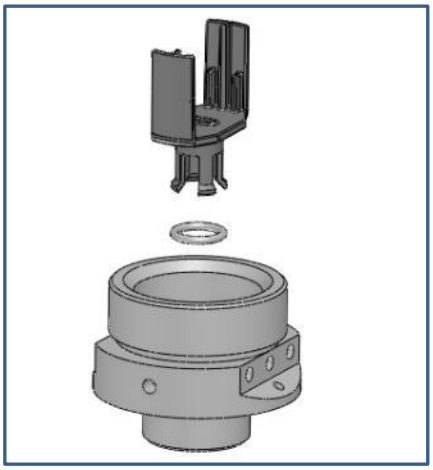

Figure 29 - Reassembling - E

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5. Using 3/16” Allen key, screw the locking bolt of the automatic orifice seat.

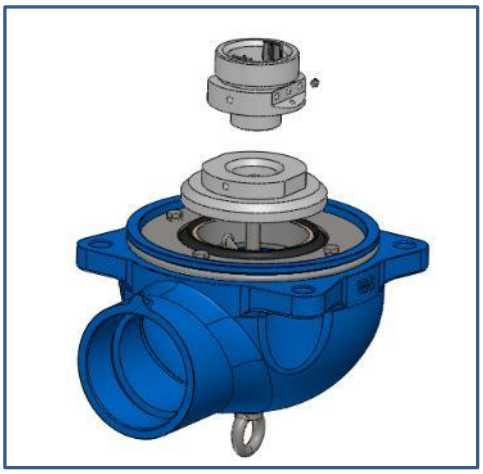

Figure 30 - Reassembling - F

6. Reconnect the lower float to the automatic subassembly with the locking screw.

   Use 2mm Allen Key.

   Apply Loctite on the threads.

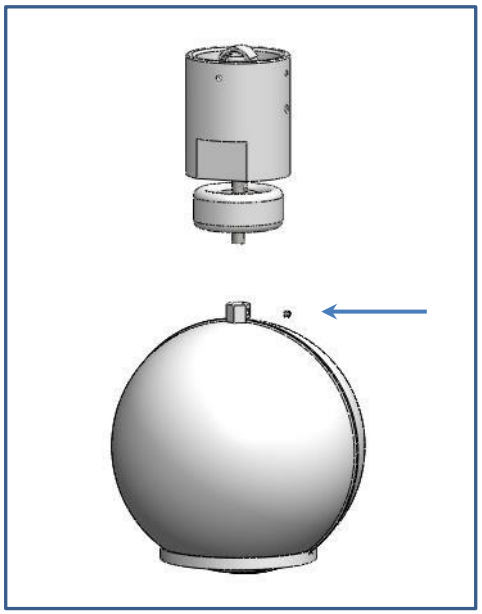

Figure 31 - Reassembling - G

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7. Using 3/16” Allen Key, connect the upper float assembly by tightening the locking screw.

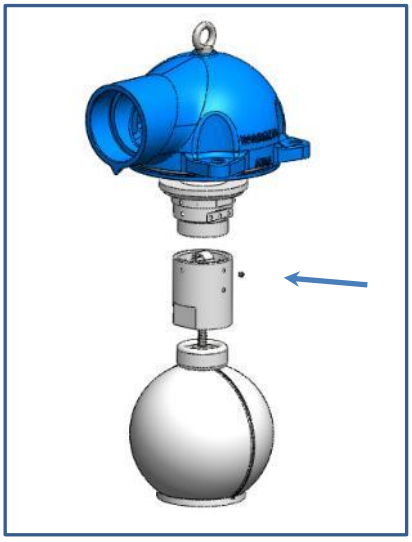

Figure 32 - Reassembling - H

8. Return the cover O-ring, if removed.
9. Insert the internal assembly into the valve body

Figure 33 - Reassembling - I

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10. Using Key number 22, tighten cover nuts with 25Nm force.

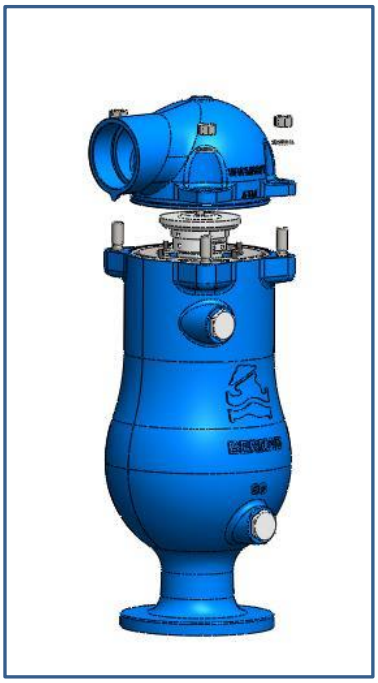

Figure 34 - Reassembling - J

11. Slowly reopen the isolation / ball valve
12. Monitor the air valve's closure

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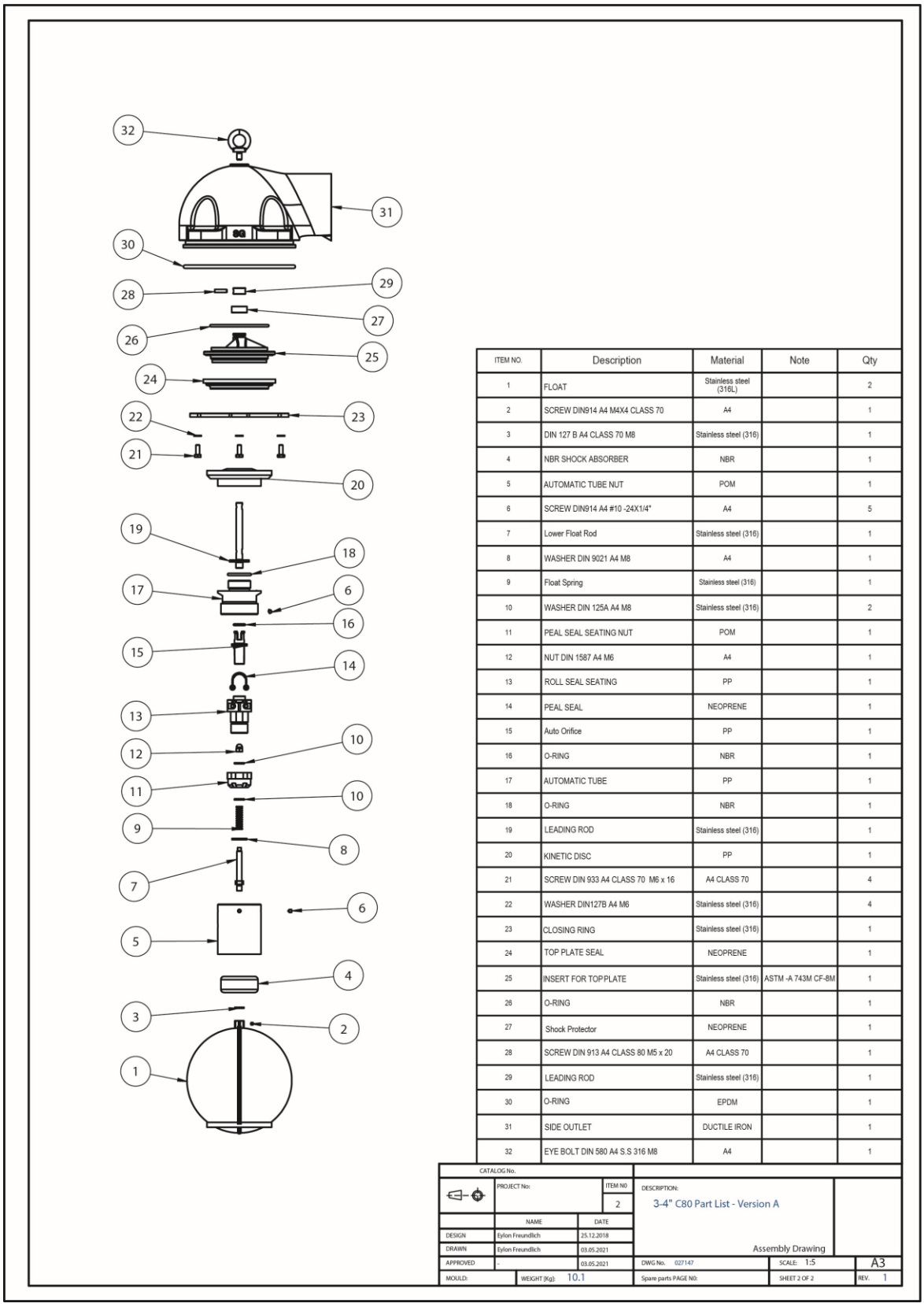
BOM Drawings and tables

Version A



ITEM NO.	Description	Material	Note	Qty
1	FLOAT	Stainless steel (316L)		2
2	SCREW DIN914 A4 M4X4 CLASS 70	A4		1
3	DIN 127 B A4 CLASS 70 M8	Stainless steel (316)		1
4	NBR SHOCK ABSORBER	NBR		1
5	AUTOMATIC TUBE NUT	POM		1
6	SCREW DIN914 A4 #10 -24X1/4"	A4		5
7	Lower Float Rod	Stainless steel (316)		1
8	WASHER DIN 9021 A4 M8	A4		1
9	Float Spring	Stainless steel (316)		1
10	WASHER DIN 125A A4 M8	Stainless steel (316)		2
11	PEAL SEAL SEATING NUT	POM		1
12	NUT DIN 1587 A4 M6	A4		1
13	ROLL SEAL SEATING	PP		1
14	PEAL SEAL	NEOPRENE		1
15	Auto Orifice	PP		1
16	O-RING	NBR		1
17	AUTOMATIC TUBE	PP		1
18	O-RING	NBR		1
19	LEADING ROD	Stainless steel (316)		1
20	KINETIC DISC	PP		1
21	SCREW DIN 933 A4 CLASS 70 M6 x 16	A4 CLASS 70		4
22	WASHER DIN127B A4 M6	Stainless steel (316)		4
23	CLOSING RING	Stainless steel (316)		1
24	TOP PLATE SEAL	NEOPRENE		1
25	INSERT FOR TOP PLATE	Stainless steel (316)	ASTM -A 743M CF-8M	1
26	O-RING	NBR		1
27	Shock Protector	NEOPRENE		1
28	SCREW DIN 913 A4 CLASS 80 M5 x 20	A4 CLASS 70		1
29	LEADING ROD	Stainless steel (316)		1
30	O-RING	EPDM		1
31	SIDE OUTLET	DUCTILE IRON		1
32	EYE BOLT DIN 580 A4 S.S 316 M8	A4		1

CATALOG No.
PROJECT No:
ITEM N0: 2
DESCRIPTION: 3-4" C80 Part List - Version A
Assembly Drawing

	NAME	DATE
DESIGN	Eylon Freundlich	25.12.2018
DRAWN	Eylon Freundlich	03.05.2021
APPROVED	-	03.05.2021

DWG No. 027147 | SCALE: 1:5 | A3
MOULD: | WEIGHT (Kg): 10.1 | Spare parts PAGE N0: | SHEET 2 OF 2 | REV. 1

Figure 35 - BOM Version A

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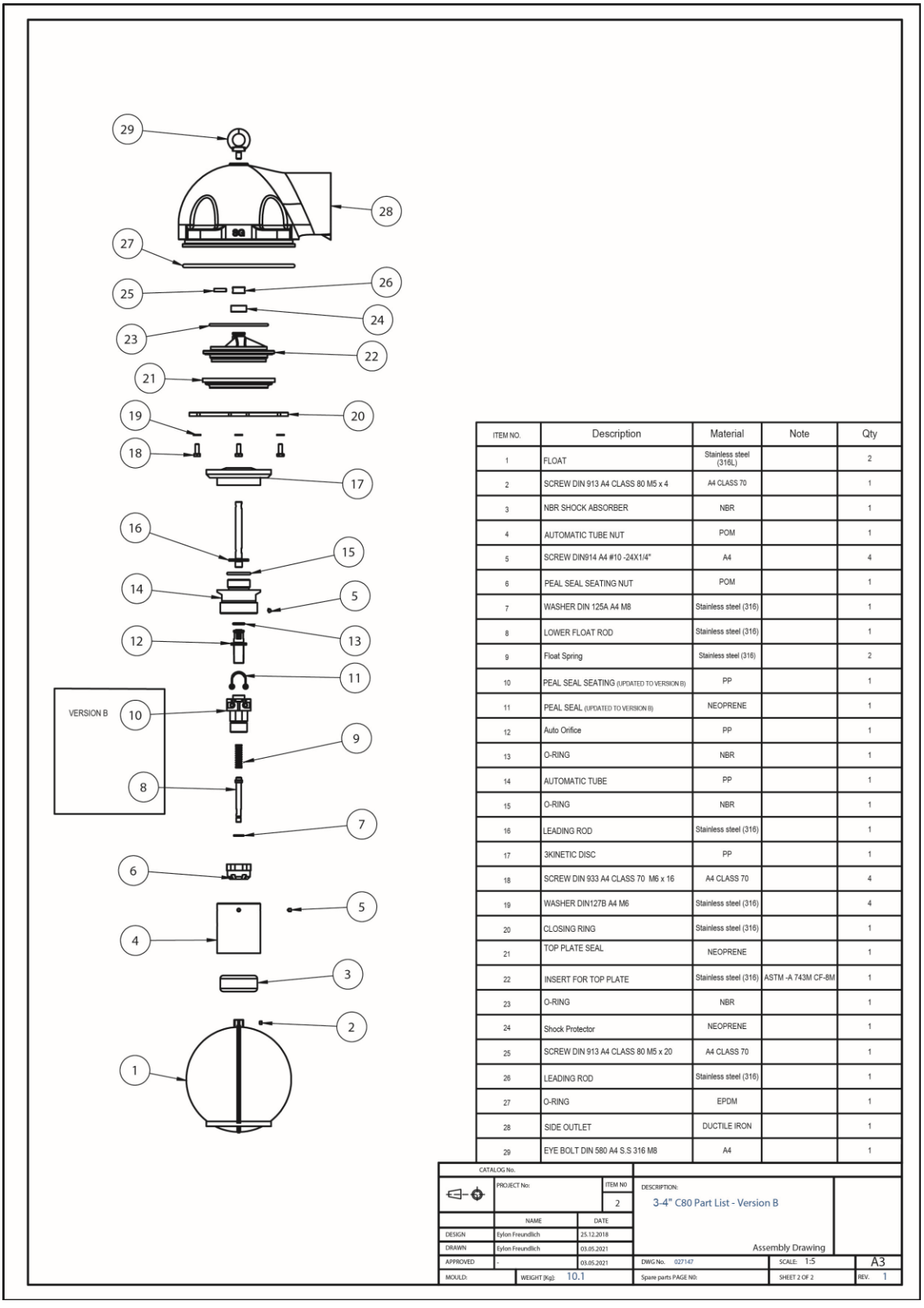
Version B



ITEM NO.	Description	Material	Note	Qty
1	FLOAT	Stainless steel (316L)		2
2	SCREW DIN 913 A4 CLASS 80 M5 x 4	A4 CLASS 70		1
3	NBR SHOCK ABSORBER	NBR		1
4	AUTOMATIC TUBE NUT	POM		1
5	SCREW DIN914 A4 #10 -24X1/4"	A4		4
6	PEAL SEAL SEATING NUT	POM		1
7	WASHER DIN 125A A4 M8	Stainless steel (316)		1
8	LOWER FLOAT ROD	Stainless steel (316)		1
9	Float Spring	Stainless steel (316)		2
10	PEAL SEAL SEATING (UPDATED TO VERSION B)	PP		1
11	PEAL SEAL (UPDATED TO VERSION B)	NEOPRENE		1
12	Auto Orifice	PP		1
13	O-RING	NBR		1
14	AUTOMATIC TUBE	PP		1
15	O-RING	NBR		1
16	LEADING ROD	Stainless steel (316)		1
17	3KINETIC DISC	PP		1
18	SCREW DIN 933 A4 CLASS 70 M6 x 16	A4 CLASS 70		4
19	WASHER DIN127B A4 M6	Stainless steel (316)		4
20	CLOSING RING	Stainless steel (316)		1
21	TOP PLATE SEAL	NEOPRENE		1
22	INSERT FOR TOP PLATE	Stainless steel (316)	ASTM -A 743M CF-8M	1
23	O-RING	NBR		1
24	Shock Protector	NEOPRENE		1
25	SCREW DIN 913 A4 CLASS 80 M5 x 20	A4 CLASS 70		1
26	LEADING ROD	Stainless steel (316)		1
27	O-RING	EPDM		1
28	SIDE OUTLET	DUCTILE IRON		1
29	EYE BOLT DIN 580 A4 S.S 316 M8	A4		1

CATALOG No.

PROJECT No: | ITEM N0 2

DESCRIPTION: 3-4" C80 Part List - Version B

	NAME	DATE
DESIGN	Eylon Freundlich	25.12.2018
DRAWN	Eylon Freundlich	03.05.2021
APPROVED	-	03.05.2021

Assembly Drawing

DWG No. 027147 | SCALE: 1:5 | A3

MOULD: | WEIGHT [Kg]: 10.1 | Spare parts PAGE N0: | SHEET 2 OF 2 | REV. 1

Figure 36 - BOM Version B

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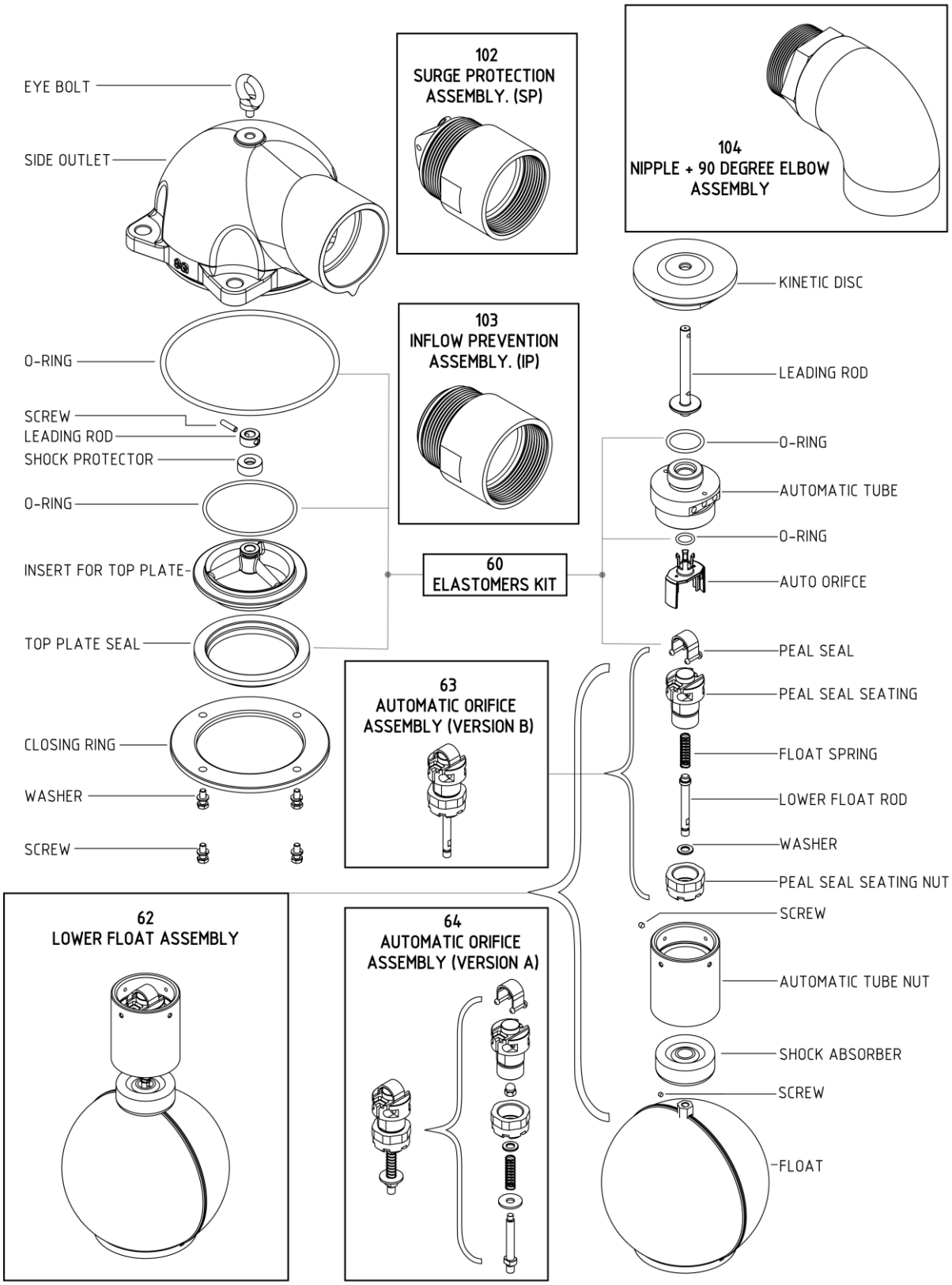
Spare parts list

AV SERIES
C80 COMBINATION AIR VALVE INLET SIZES 3-4";DN80-100



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ITEM NUMBER	ITEM CODER	DESCRIPTION
60	8230040060-KIT	ELASTOMER KIT
62	8230080092	3" + 4" (C80), LOWER FLOAT ASSEMBLY
63	8230080093	3"-4" (C80), GREY PP PEAL SEAL ASSY. FOR SEWAGE –VERSION B
64	8230080094	3"-4" (C80), GREY PP PEAL SEAL ASSY. FOR SEWAGE – VERSION A
102	8230C90350	SURGE PROTECTION ASSEMBLY
103	8230C90250	INFLOW PREVENTION ASSEMBLY
104	9906000232	NIPPLE + 90 DEGREE ELBOW ASSEMBLY

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Water Control Solutions

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General Conditions

This warranty shall be valid only if the product is installed, handled and maintained in accordance with BERMAD's written or verbal instructions and/or recommendations, if such has been provided.

This Warranty does not cover defects or damages resulting from accident, inappropriate physical or operational environment, failure of electrical power, improper installation, maintenance, service, repair, transportation, storage, modification, operation, use, negligence or fault by any party other than BERMAD.

This Warranty shall run solely to and in favor of the customer that purchased the defective product directly from BERMAD, and it does not extend to any other purchaser or user of the product.

Claims, Notifications and Compensation

Every warranty claim must be notified in writing to BERMAD as soon as reasonably possible after the discovery of the defective product, enclosing the original sales receipt and this warranty.

The claimant must allow BERMAD to inspect the product involved and the installation site itself, while the product is still in its original position and has not been removed or altered in any way, and/or return the product to BERMAD for testing. BERMAD reserves the right to investigate independently the cause of any failure.

If a claim under this Warranty is properly notified within the Warranty Period and found to be justified by BERMAD, then BERMAD, at its sole option, shall: (i) replace such product; or (ii) repair such product; or (iii) repay to the BERMAD customer any amounts actually paid to BERMAD for such product.

In any way, BERMAD's liability shall not exceed the amounts actually paid by the BERMAD customer to BERMAD for the defective products.

Limitations

This Warranty is the sole warranty in respect to the products.

Under no circumstances shall BERMAD be liable for any indirect, special or consequential damages, and including, without limitation, for any loss of profit, loss in connection with business interruption, loss of use, loss of revenues or damage to business or reputation.

This warranty does not cover any costs and expenses of removal and installation of the product or shipping cost or taxes or any other direct or indirect loss(es) which may result from the product failure, and BERMAD shall not be liable for such costs and expenses.

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