
INSTALLATION AND MAINTENANCE INSTRUCTIONS **TANK BLANKETING REGULATORS** BKRI2, BKVI2, BKR2, BKV2

GENERAL

- These instructions must be carefully read before any work involving products supplied by VALSTEAM ADCA ENGINEERING S.A. is undertaken.
- If the equipment is Ex certified the specific IMI ATEX, should be consultant as a complementary information.
- The installation procedure is a critical stage in a life of the equipment and care should be taken to avoid damage to the equipment.
- Current regional safety regulations should be taken in to account and followed, while doing the installation and maintenance work.
- Handling, installation and maintenance work must be carried out by trained personnel. A supervisor must follow and check all activities.
- For the problems that cannot be solve with the help of this instructions, please contact the supplier or the manufacturer.

1. SAFETY NOTES

- This equipment is intended to be used exclusively in industrial installations and is not prepared for use in domestic applications.
- Tank blanketing regulators are designed for accurate control of pressure, giving their maximum performance only when the equipment's associated with them are correctly sized and installed in accordance with our recommendations.
- Personal injury, equipment damage, or leakage due to escaping accumulated gas or outside bursting of pressure-containing parts may occur if the gas blanketing system is over pressurized or installed outside the limits given in the specifications section and on the valve's nameplate, or where conditions exceed the ratings of the adjacent piping or piping connections.
- Tank blanketing regulators are not substitute of safety valves or vacuum relief valves and must not be considered as a safety device.
- All work must be carried out by a suitably competent person, and a supervisor must follow and check all activities. Installation and operating personnel should be trained to properly use this equipment according to this Installation and Maintenance Instructions – IMI. Where a formal "Permits to Work" system is implemented it must be complied with.
- Provisions should be taken to avoid unauthorized personnel to enter in contact with the equipment.
- This equipment is designed to work within the working temperature and pressure limiting conditions stated in the nameplate and Information Sheet (IS). Check that the product is suitable for the application, to avoid failures.
- Do not remove the nameplate/laser marking of the equipment. Serial number and other useful information are written on it.
- If malfunction of any other equipment, or system operation failure, may result in a dangerous overpressure, over temperature or even vacuum condition, a safety device must be included in the system to prevent such situations.

- The equipment is not intended to withstand external stresses that may be inducted by the system to which it is being connected to. The installer should assess the risks of the stresses and possible hazardous environment around the equipment (e.g. temperature, explosion risk areas) and take adequate precautions to minimize them.
- The complete system (before and after the equipment) should be assessed as well as the different stages of functioning (e.g. closing of some shut-off valve) to ensure this will not bring additional risk to the persons and equipment.
- Do not touch the equipment without appropriate protection during working operation because it may conduct heat if the process fluid is at high temperature.
- Depending on the normal operation conditions the equipment may have hot external surfaces and may contain fluid at a high temperature. If that risk is the case, it is advisable to thermally insulate all tubes and equipment's to avoid the risk of burns.
- Before starting work ensure that all suitable tools and/or consumables are available. Use only genuine ADCA replacement parts.
- Before starting maintenance, work ensure that the equipment is not pressurized or hot, even if the gauge indicates otherwise, care should be taken.
- Correct installation of the equipment is full responsibility of the contractor.

2. GENERAL INFORMATION

2.1 Description

Tank blanketing regulators are commonly used in tank storage systems to prevent and protect against explosions (avoiding flammable gases from being vented from the vessels), to control product contamination against external air that may fill the vapour space, to reduce evaporation losses (and consequently, production losses), to reduce internal corrosion (caused by air and moisture) and to prevent vacuum condition.

The blanketing process consists in covering the stored medium, usually a liquid, with a gas, usually an inert gas such as nitrogen. Blanketing normally takes place in the pressure range from 10 to 50 mbar.

There are generally two valves installed in a tank blanketing application:

- A valve responsible for reducing gas pressure and feeding it into the tank, called a low-pressure blanketing regulator (BKR2 and BKRI2).
- A valve responsible for venting the excess gas from inside the tank, called a low-pressure venting valve or relief valve (BKVI and BKVI2).

For further details such as components list, limiting conditions and sizes consult the datasheet of the product, available at www.valsteam.com.

2.3 Certification

This product has been designed for use with compressed air, nitrogen and other gases which are in Group 2 of the European PED-Pressure Equipment Directive in use and it complies with those requirements.

The product falls within category SEP and must not be CE marked, unless other directives are applied.

CE MARKING (PED – European Directive)	
PN16	Category
DN 15 to 25	SEP

3. HANDLING



- Handling and lifting of materials should be made with adequate equipment and following the indications of these instructions.
 - The manufacturer doesn't assume the responsibility of damaged equipment's due to inappropriate handling during transportation and storage.
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- The equipment should only be moved after draining all the fluid from inside the equipment's and pipping.
 - The equipment should be carefully handled, to prevent any damage on the machined surfaces.
 - Equipment's should be protected from impacts and forces during transportation and storage.

4. INSTALLATION



- Account for over pressure conditions, according with the local laws or standards.
- The equipment must not be used for other purposes than the one it was built for.
- For the problems that cannot be solve with the help of these instructions, please contact the supplier or the manufacturer.

4.1 Installation area requirements

- The installation area should have easy access and provide enough space for maintenance and removing operations.
- The installation area should have the necessary firing system to prevent damage of the equipment due to over temperature/pressure caused by fire.
- The installer should analyze the transfer of vibration to the system generated by the place where it is being installed in.
- The pipework before the valve must be sized in order to avoid that the maximum flow speed recommended, for the fluid in question, is exceeded.
- This valve is designed to be applied in places protected from exposure to weather. We recommend special constructions or protective measures for applications on the outside or in adverse environments like corrosion-promoting conditions (sea water, chemical vapors, etc.).

4.2 Installation procedure

- Prior to its installation confirm that the product is suitable for the intended application: materials and pressure/temperature rating.
- If the valve is Ex compliant, consider that the maximum surface temperature on the valve mainly depends on the temperature of the operating fluid, plus a margin to overcome the maximum self-heating temperature marked on the body of 15°C to limit the class temperature. This will mean that the ignition temperature of the explosive gases should be above fluid temperature + 15°C internally and externally.

- External stresses that may be induced by the system due to pipe expansion, etc., can affect this product. The necessary precautions are recommended during the systems design and equipment assembly.
- The valve pipework should be properly supported and free from strain and it should not be subjected to undue surges of pressure. The start-up condition should be considered.
- Before installation remove plastic, covers placed on flanges or connection ends. The equipment has an arrow or inlet/outlet designations. Be sure that it will be installed in the appropriate direction.
- The installer must check to ensure that there are no foreign bodies inside the pipelines and ancillaries. These should be thoroughly cleaned before the installation process begins.
- Take care with jointing materials and sealing compounds to ensure that none may be permitted to block or enter the valve. In case of using Teflon tape (for screwed connections), avoid rolling it till the edge, because it can get cut and migrate to the valve interior, blocking or causing a defective sealing.
- An ADCA pipeline strainer or filter should be installed upstream of the valve to protect it from dirt which could damage the valve or cause mal-functioning.
- Pressure gauges should be installed upstream and downstream of the valve to aid during adjustment, monitorization and troubleshooting.
- All pipelines connected to the valve should have full bore shut-off valves so that the unit can be isolated and depressurized for maintenance work.
- For installations where condensate can be present, it is strongly recommended to install proper drainage of the system and the valve should be positioned in a way that avoids condensation accumulation inside it. Vertical installation of the valve is recommended (to allow drainage) or horizontal as close to the process as possible to prevent long pipe sections and flow restrictions -see Figure 1 and Figure 2.
- If the valve is fitted with the optional ¼" external sensing pipe connection, then a tubing or pipe with an I.D. of at least 8mm should be used. The sense line must be sloped toward the tank and should not contain low points (or traps) that could catch liquid. The sensing line must enter the tank above the liquid level at a point that senses the vapor space pressure and is free from turbulence. The line should not be so long as to lead to a pressure drop in the line.
- If the valve is fitted with the optional ¼" diaphragm cover leakage connection Figure 3, it should be forwarded to a "safe place or line". The definition of a "safe place or line" is related to the installation requirements and is responsibility of the installer to determine. **If the valve is EX certified, the leakage line is required for its normal safe operation, don't forget to install it.**

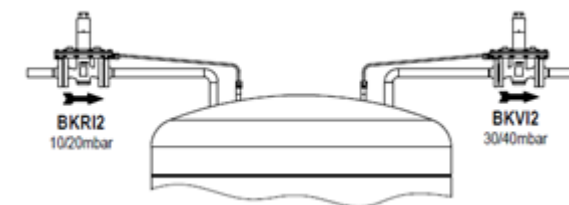


Figure 1 – Typical installation

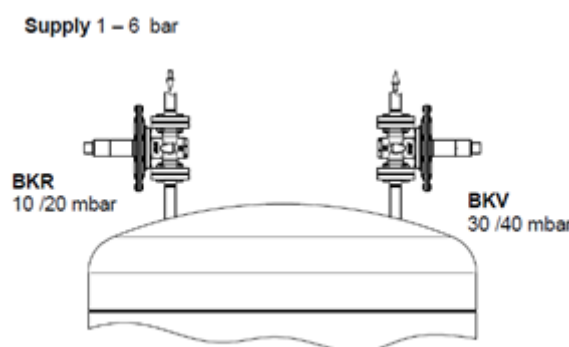


Figure 2 - Typical installation with overpressure

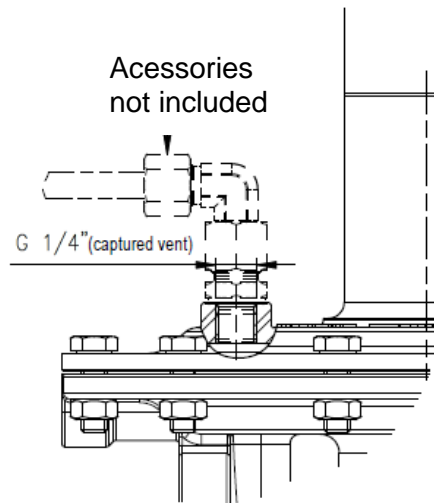


Figure 3 - Leakage line connection

5. START-UP



- Current regional safety regulations should be considered and followed.
- Protective insulation and warning notices may be required.
- Until the start-up of an existing or a new plant, the following must be checked:
 - All works are completed.
 - The equipment is correctly installed.
 - All the necessary safety devices have been installed.
- At start-up, the presence of small particles in the motive fluid (dirt, scale, weld splatters, joint particles, remains of Teflon tape, etc.) may cause an imperfect closure of the valve. If this occurs, proceed to an accurate cleaning.
- Protection varnishes from pipes and flanges, fats, leftover paint, graphite, etc., should also be carefully clean, because they can be dissolved in the fluids (like steam) blocking the regulation elements after the first service stop.
- A safety check should be undertaken by qualified personnel, prior to every use, according to the instructions of periodical checking.

5.1 BKR2/BKRI2 Start-up procedure

All shut-off valves should be closed and the valve regulating spring must be relaxed. If not, release tension by turning the adjusting nut counter-clockwise. If the valve has a "top cap" option, it must be removed to allow access to the regulating screw.

1. Fully open the downstream shut-off valve.
2. Slowly open the upstream shut-off valve.
3. If the valve has the top cap cover option, read the 5.3 for removal and installation procedure. Adjust the regulation spring by turning the adjustment nut or screw clockwise, while observing the downstream pressure gauge, until the desired pressure set point is reached. There must be some consumption on the downstream side during this process.
4. Readjustment of the regulating spring may be needed once the system's consumption is stable. To change the controlled pressure, turn the adjusting screw clockwise to increase pressure and counter-clockwise to decrease

pressure. Final adjustments should be made in the direction of increasing pressure to obtain the most accurate set point.

5. The valve is ready.

5.2 BKV2/BKVI2 Start-up procedure

All shut-off valves should be closed and the valve regulating spring must be relaxed. If not, release tension by turning the adjusting nut counter-clockwise. If the valve has a “top cap” option, it must be removed to allow access to the regulating screw.

1. Fully open the downstream shut-off valve.
2. Slowly open the upstream shut-off valve.
3. Adjust the regulation spring by turning the adjustment nut or screw clockwise, while observing the upstream pressure gauge, until the desired pressure set point is reached.
4. Readjustment of the regulating spring may be needed once the system’s consumption is stable. To change the controlled pressure, turn the adjusting screw clockwise to increase back pressure and counter-clockwise to decrease back pressure. Final adjustments should be made in the direction of increasing pressure to obtain the most accurate set point.
5. If the valve is fitted with the optional top cap cover, secure the adjustment screw with the lock nut.
6. The valve is ready.

5.3 Top cap removal and installation procedure

If the valve is supplied with the top cap cover option, it must be removed to allow access the regulating screw, according to the following procedure and Figure 4:

1. Secure the top spring cover (position 7) with a suitable wrench and unscrew the top cap (position 8).
2. Adjust the regulation spring by turning the adjustment nut or screw clockwise, while observing the downstream pressure gauge, until the desired pressure set point is reached. There must be some consumption on the downstream side during this process.
3. Before reassembling confirm the integrity of the O-ring (position 5). If necessary, substitute by original manufacture part.
4. Re-assemble the top cap with a suitable wrench and tighten with the specified torque.

If the valve is EX certified, the top cap is required for its normal safe operation, don’t forget to re-install it.

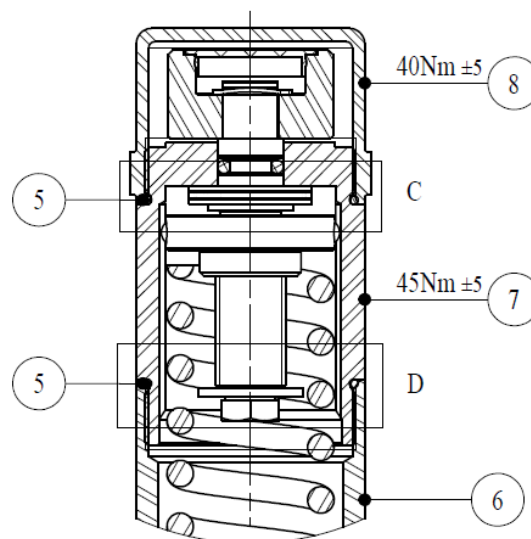


Figure 4 – O-rings seals of the top covers

5.3 Periodical checking

- 24 hours after the start-up, it is recommended to check pipe connections for leaks and retighten the connections if necessary.
- A safety check should be undertaken by qualified personnel, prior to every use. It should check for leaks, structural damage and integrity of components and piping connections.

6. STORAGE AND SHUTDOWN

If the equipment will be shut down for a large period of time, care should be taken to avoid exposure to critical low temperatures. It should also be isolated from dust accumulation.

6.1 Shutdown procedure

- Fully close the upstream shut-off valve.
- Allow discharge of the remaining content of the piping and valve to ensure that it will not remain with fluid inside.
- Relax the regulating spring.
- Close the downstream shut-off valve.

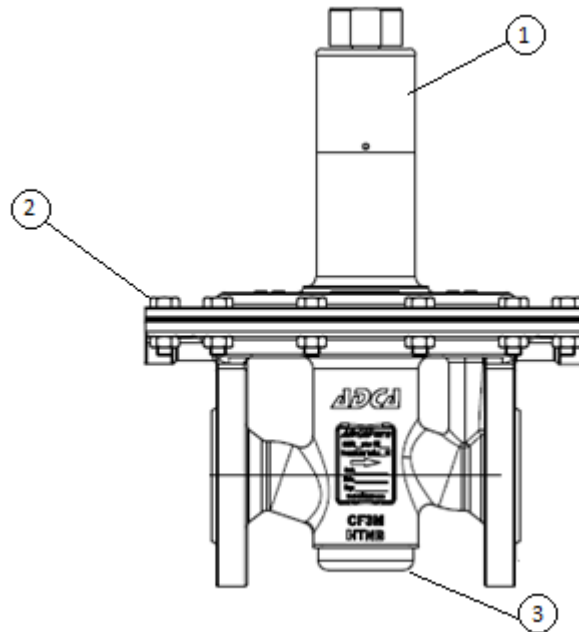
7. MAINTENANCE



- Before any maintenance work is performed read the “Safety notes” in section 1
- Pressure regulators should be serviced as necessary, and checked periodically (at least yearly), to verify that they are operating correctly and to clean the internal parts.
- Before starting maintenance be sure that the equipment is not pressurized. Even if upstream and downstream isolating valves have been closed care should be taken.
- Strainers should be cleaned.
- Corrosive fluids will compromise the lifetime of the equipment's and can lead to premature failure. We recommend an appropriate inspection at least yearly depending on the presence of corrosion conditions.
- Precautions should be taken to avoid the entrance of foreign bodies during maintenance service.
- When reassembling ensure that all gasket faces are clean. Always use a new gasket. Tighten bolts uniformly in a diagonal sequence.

7.1 Maintenance procedure

- Follow the shutdown procedure described on these instructions.
- Ensure the valve is depressurized and has cooled down.
- Remove the equipment's to assess, care should be taken with any residual fluid which remains inside the valve.
- Execute the maintenance work.
- Always perform a visual inspection to the internal sealings of the valve and replace them when its integrity is not granted.
- Close the valve,
- Reinstall the valve in the correct position, confirming the fluid directions on the body (Don't forget to replace, gaskets and PTFE seals where applicable).
- Follow the start-up procedure.



RECOMMENDED TIGHTENING TORQUES	
POS. N°	Nm
1	45
2	20
3	40

Remarks: Tighten cover bolts uniformly.

8. TROUBLESHOOTING



- If the malfunctions cannot be solved with the help of the following chart, please consult the manufacturer.

TROUBLESHOOTING CHART

FAULT	POSSIBLE REASON	SOLUTION
The valve does not open.	No fluid supply upstream.	Inspect the fluid supply source and supply line.
	The valve stem or diaphragm assembly is stuck.	Check if the diaphragm assembly is intact. Replace diaphragm if necessary.
		Stem can be stuck on stem guide. Inspect and replace relevant parts.

	Spring is jammed or broken.	Check if spring is in its position well set on the lower spring guide. Verify spring integrity. Replace spring if necessary.
Reduced pressure not maintained when flow approaches maximum but is correct at low-flow and no-flow conditions.	Regulator undersized.	Replace with a larger valve or consider fitting another valve in parallel (assuming that the pipework is sized for larger capacities).
	Pressure differential across the regulator is too small.	None, unless inlet or reduced pressure can be adjusted to give increased differential.
	Downstream pipework and fittings undersized.	None, unless change is made to the pipework.
	Upstream pressure is unstable.	Stabilize inlet pressure.
Reduced pressure corrects on large flow and no-flow conditions but is erratic on small flows.	Valve is oversized.	Replace with smaller valve. Use two regulators in parallel.
Large reduced pressure fluctuations under all flow conditions.	Inlet pipe and/or fittings are undersized.	If undersized replace pipework and/or fittings.
	Inlet flange gasket restricting flow to the valve.	Rectify gasket.
	Valve oversized.	Fit a smaller valve.
The valve plug does not reseat or is leaking continuously.	There is a leak in the sense line or in the tank.	Pressurize the tank and verify if it is leaking. Check and fix sense line leakage.
	Setpoint of valve is too high (BKR2 and BKRI2) or too low (BKV2 and BKVI2).	If the setpoints of the pressure reducing valve is above the vent valve, then neither valve will ever close. Perform start-up procedure.
	The valve stem or diaphragm assembly is stuck.	Check if the diaphragm assembly is intact. Replace diaphragm if necessary. Stem can be stuck on stem guide. Inspect and replace relevant parts.
	A sealing has been damaged.	Verify integrity of sealings such as O-rings, diaphragms, etc.
	Solid particles holding the valve open.	Open valve, clean, replace relevant parts and reassemble.
	The plug O-ring has blown out from its groove.	Replace plug.

9. SPARE PARTS

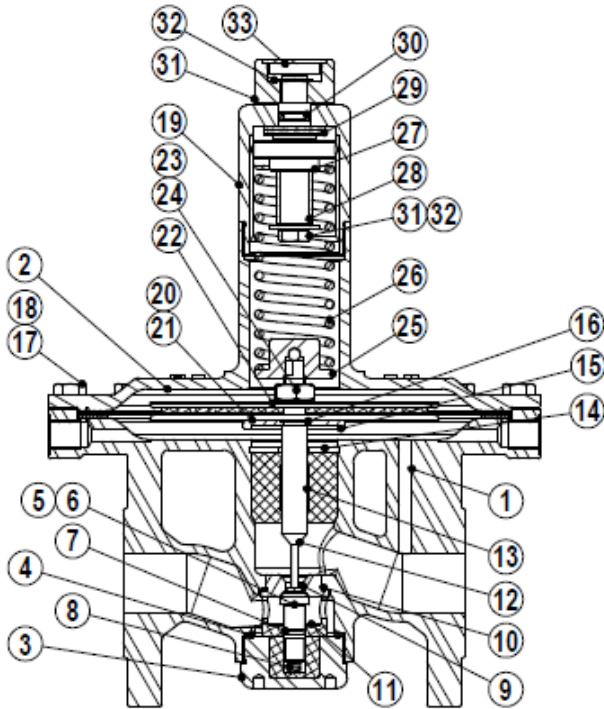


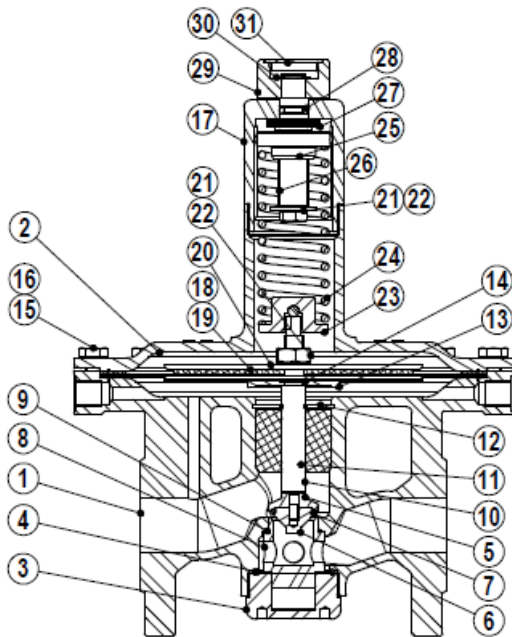
Table 1 – Parts list for BKR2 / BKRI2

BKR2 / BKRI2 MATERIALS		
POS. N°	DESIGNATION	MATERIAL
1	Valve body	CF3M / 1.4409
2	Diaphragm top cover	CF3M / 1.4409
3	Seat cover	AISI 316L / 1.4404
4	* O-ring	EPDM
5	* Piston	AISI 316L / 1.4404
6	* Valve head	AISI 316L / 1.4404
7	* O-ring	EPDM
8	* Valve Spring	AISI 302 / 1.4300 (Polished)
9	Seat	AISI 316L / 1.4404
10	* O-ring	EPDM
11	Piston guide	PTFE
12	Stem	AISI 316L / 1.4404
13	Stem guide	PTFE
14	Retaining ring	Stainless steel A2
15	Diaphragm plate	AISI 316L / 1.4404
16	* O-ring	EPDM
17	Bolts	Stainless steel A2-70
18	Nuts	Stainless steel A2-70
19	Spring cover	AISI 316L / 1.4404
20	* Lower diaphragm	PTFE (Gylon)
21	* Upper diaphragm	EPDM
22	Diaphragm plate	AISI 316L / 1.4404
23	Nut	Stainless steel A2-70
24	Washer	AISI 316 / 1.4401
25	Lower spring guide	AISI 316L / 1.4404
26	* Regulating spring	AISI 302 / 1.4300
27	Top spring plate	AISI 316L / 1.4404
28	Adjustment screw	Brass
29	Bearing	Corrosion resistant steel
30	* O-ring	NBR
31	Regulating nut	AISI 316L / 1.4404
32	Ext. bowed shaft ring	Stainless steel
33	Cover nut	Plastic

* Available spare parts;

FDA / USP Class VI seals certificate on request.

All valves have a serial number. In case of non standard valves, this number must be supplied if spare parts are ordered.



MATERIALS		
POS. Nº	DESIGNATION	MATERIAL
1	Valve body	CF3M / 1.4409
2	Diaphragm top cover	CF3M / 1.4409
2A	Diaphragm lower cover	AISI 316L / 1.4404
3	Seat cover	AISI 316L / 1.4404
4	* O-ring	EPDM
5	Plug disc	AISI 316L / 1.4404
6	* Valve head	AISI 316L / 1.4404
7	* O-ring	EPDM
8	Seat	AISI 316L / 1.4404
9	* O-ring	EPDM
10	Stem	AISI 316L / 1.4404
11	Stem guide	PTFE
12	Retaining ring	Stainless steel A2
13	Diaphragm plate	AISI 316L / 1.4404
14	* O-ring	EPDM
15	Bolts	Stainless steel A2-70
16	Nuts	Stainless steel A2-70
17	Spring cover	AISI 316L / 1.4404
18	* Lower diaphragm	PTFE (Gylon)
19	* Upper diaphragm	EPDM
20	Diaphragm plate	AISI 316L / 1.4404
21	Nut	Stainless steel A2-70
22	Washer	AISI 316 / 1.4401
23	Lower spring guide	AISI 316L / 1.4404
24	* Regulating spring	AISI 302 / 1.4300
25	Top spring plate	AISI 316L / 1.4404
26	Adjustment screw	Brass
27	Bearing	Corrosion resistant steel
28	* O-ring	NBR
29	Regulating nut	AISI 316L / 1.4404
30	Ext. bowed shaft ring	Stainless steel
31	Cover nut	Plastic

* Available spare parts;

FDA / USP Class VI seals certificate on request.

All valves have a serial number. In case of non standard valves, this number must be supplied if spare parts are ordered.

Table 2 – Parts list BKV2 / BKVI2

10. DISPOSAL

Once the unit has reached the end of their working life, it should be sent for disposal in accordance with the prevailing national and local regulations.

During its disposal, pay special attention to the rubbers, resins and polymers used in its construction (PVC, PTFE, PP, PVDF, Viton, etc.).

For further information, please contact Valsteam ADCA Engineering SA.

11. PRODUCTS RETURNING



ATTENTION

- Information regarding any hazards and precautions to be considered because of contaminating fluids and residues or mechanical damage that may represent a health, safety or environmental risk, must be provided in writing by the distributors and costumers when returning products to Valsteam ADCA engineering.
- Health and safety data sheets regarding substances identified as hazardous or potentially hazardous must be provided with the information mention above.



ATTENTION

- **LOSS OF WARRANTY:** Total or partial disregard of above instructions involves loss of any right to warranty.