8801.85/EN

ORBINOX
VALVE SOLUTIONS IN MORE THAN 70 COUNTRIES

INSTALLATION, OPERATION & MAINTENANCE MANUAL

MODEL VG



ORBINOX SPAIN Pol.Ind. s/n-20270 ANOETA. Tel:+34 943 698030 Fax:+34 943 653066 e-mail:orbinox@orbinox.com

SPAIN, UK, GERMANY, FRANCE, CANADA, USA, BRAZIL, CHILE, PERU, INDIA, CHINA, SOUTH EAST ASIA

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0.- DESCRIPTION

The VG model knife gate is a wafer valve designed for a wide range of industrial applications. The double-seated design provides bi-directional shut off. The design of the valve body and the two rubber sleeves (3) makes the VG valve well suited for handling abrasive slurries.

The two sleeves (3) are in permanent contact with each other when the valve is open. While the valve is either open or closed, the media does not come into contact with the interior of the body. Minimal leakage may occur from the bottom of the valve during opening and closing cycles.

Some leakage will occur from the bottom of the valve during operation. This allows solids to be flushed from the body cavity and will ensure the full stroke of the valve.

General recommendations

- The VG valve is recommended for slurry applications where resistance to abrasion and erosion is critical. Slurry is defined as a liquid with relatively small particles, held in suspension.
- The VG valve is not recommended in applications where erosion/abrasion is not critical.
- In the event that a 100% tight seal to the outside is required, a conventional leak proof packing system shall be provided in addition to a lower splash guard. The lower splash guard must be adapted to the discharge system using the connections supplied to avoid accumulation of solid materials that might damage the sleeves. This solution is strongly recommended in applications with fluids that are very corrosive.
- Discharge from VG valves must be taken into consideration when exposure would be hazardous to personnel or to the environment. Safety precautions, such as splash guard, must be utilized to redirect the hazardous discharge to a safe location.

The VG valve complies with the following European directives:

- DIR 2006/42/EC (machines)
- DIR 2014/68/EC (PED) Fluid: Group 1 (b), 2 (Cat. I, mod.A)

It may also comply with the directive:

- DIR 2014/34/EC (Explosive Atmospheres)

The VG valve may comply with the directive regarding equipment and protective systems for their use in explosive atmospheres. In these cases, the logotype Ex shall appear on the identification label of the valve. This label shows the exact classification of the zone where the valve can be used. The user will be liable for its use in any other zone.
This directive only applies in the following atmospheric conditions:

0,8 bar (11,6 PSI) ≤ P ≤ 1,2 bar (17,4 PSI)
-20ºC (68 ºF) < T < 60ºC (140 ºF)

Any increase in temperature due to frictional warmth is negligible, since the relative speed of the moving parts is extremely low.
The risk analysis associated to this directive does not take into account the fluid that goes through the valve, even when such fluid produces an explosive atmosphere. The user must take into account the risks that the fluid generates, such as:

- heating of the valve surface.
- generation of electrostatic charges caused by displacement of the fluid.
- shock waves caused by the installation (water hammer), internal crashes generated by the pellets or the risks due to foreign bodies susceptible of being present in the installation.

1.- HANDLING

When handling an Orbinox valve please pay attention to the following points:

- **Do NOT attach lifting gear to the valve actuators or gate guards**. They are not designed to bear the weight, and could easily be damaged.
- **Do NOT lift the valve by the valve bore**.
  This can cause damage to the seating surfaces and seals.
- Check that selected lifting gear is rated to carry the weight of the valve.
- The valve can be handled using eyebolts, soft straps or slings.
- Eyebolts: make sure the eyebolts have the same thread as the boltholes and they are all well secured. Ideally when using lifting gear to move an Orbinox valve, it should be supported by two or more eyebolts screwed into the tapped fixing holes in the valve body.
- Soft straps: with the valve in the closed position, the straps should be placed between the gland area and the bore such that the valve is balanced.

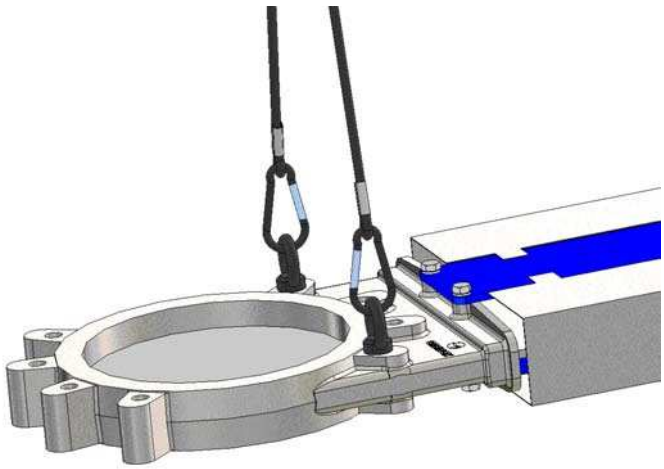


Fig. 1- Handling with eyebolts.

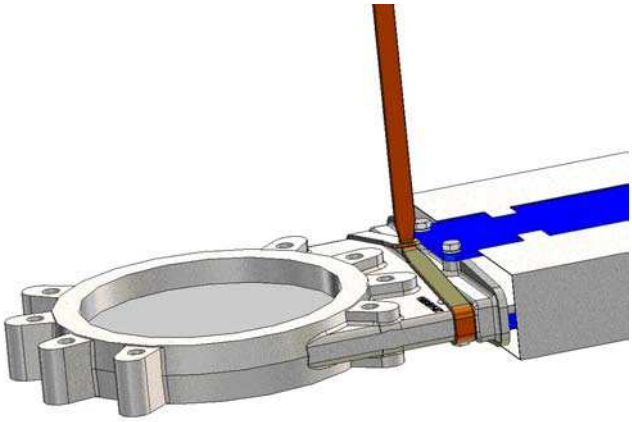


Fig. 2 - Handling with soft straps.

2.- INSTALLATION

To avoid personal injury or damage to property from the release of process fluid:

- Those in charge of handling and maintenance of the valve must be qualified and trained in valve operations.
- Use appropriate personal protection equipment (gloves, safety shoes, etc).
- Shut off all operating lines to the valve and place a warning sign.
- Isolate the valve completely from the process.
- Release process pressure.
- Drain the process fluid from the valve and insert the open-closed lockout (if the valve has it).
- According to **EN 13463-1 (15),** during installation and maintenance operations, use hand tools **(non electric)** with Working Allowance.

Before installation, inspect the valve body and components for any damage that may have occurred during shipping or storage. Make sure the internal cavities within the valve body are clean. Inspect the pipeline and mating flanges, making sure the pipe is free of foreign material and that the flanges are clean.

The valve is bi-directional, and consequently permits installation without considering the flow direction. **Always install and keep the valve in the fully open position until it starts normal operation.**

Special care should be taken to maintain the correct distance between the flanges and to ensure that they are parallel to the valve body.

Use caution to not cause damage to the sleeves by forcing the valve into an opening that is too narrow when the valve is being positioned between the pipe flanges. It is possible to use a lubricant (non-petroleum-based lubricant such as silicone or ordinary liquid soap) to help slip the valve between the pipe flanges.

Incorrect alignment of the valve can cause deformations, which can lead to difficulties in operation.

The following table gives the different valve face to face requirements before and after installation.

Dimensions (Metric)

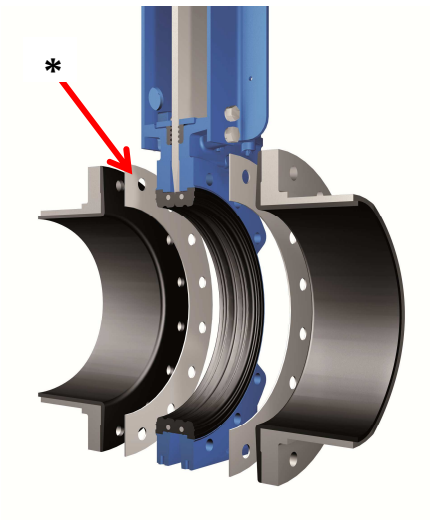
		DN																
		50	80	100	125	150	200	250	300	350	400	450	500	600	700	750	800	900
Face to face	Before installation	60	63	63	69	69	83	83	89	90	102	103	129	129	190	195	214	234
	After installation	54	57	57	63,5	63,5	76	76	82,5	82,5	95	95,5	121	121	181	187	206	226

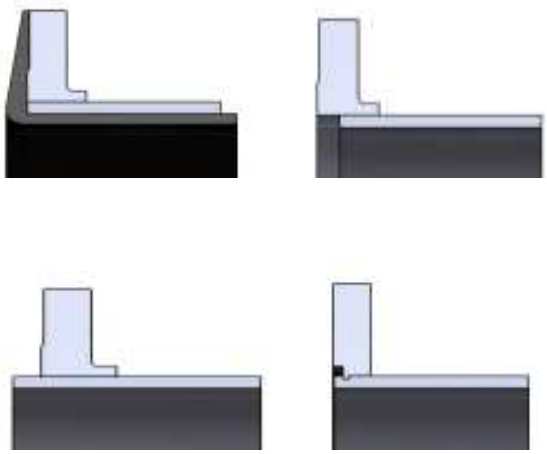
Dimensions (Imperial)

		2	3	4	5	6	8	10	12	14	16	18	20	24	28	30	32	36
Face to face	Before installation	2.36	2.48	2.48	2.72	2.72	3.27	3.27	3.5	3.54	4.01	4.05	5.08	5.08	7.48	7.68	8.42	9.21
	After installation	2.13	2.24	2.24	2.5	2.5	2.99	2.99	3.25	3.25	3.74	3.76	4.76	4.76	7.13	7.36	8.11	8.9

VG valves have been designed to be used with full flat or raised face metal flanges. Additional flange gaskets are not required as the outer face of the sleeve acts against the outlet flange to provide a tight seal.

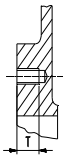
When installed between rubber lined flanges or slip on flanges (if the pipe protrudes past the flange face or the flange protrudes past the pipe) a metal plate (*) shall be located between the sleeve and the mating flange. (Please consult the technical department at Orbinox).





Sufficient space should be left between the flanges to permit ease of movement for the valve gate with sleeves installed, without damaging them.

The following table gives the maximum torque values for the valve flange bolts. Also shown is the maximum depth (T) allowed for the tapped blind boltholes drilled into the valve body.



Dimensions (Metric)

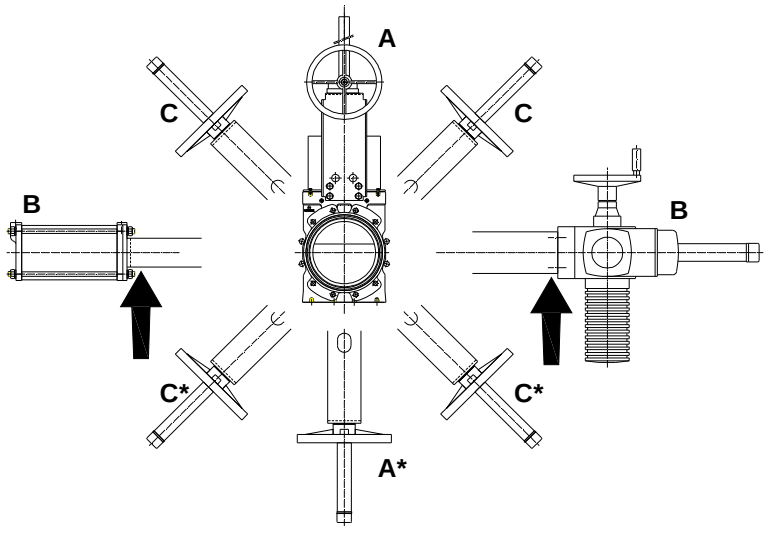
DN	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	750	800	900
T (mm)	10	12	12	12	14	14	16	16	20	20	20	20	25	24	45	31	35	33
Kg.m	5	5	5	5	7	9	9	15	15	22	22	32	32	32	46	46	46	82

Dimensions (Imperial)

Size	2	2.5	3	4	5	6	8	10	12	14	16	18	20	24	28	30	32	36
T (in)	0.375	0.5	0.5	0.5	0.56	0.56	0.62	0.62	0.75	0.75	0.75	0.75	0.93	0.95	1.75	1.25	1.37	1.3
Ft/Lbs	37	37	37	37	52	66	66	110	110	162	162	236	236	236	339	339	339	605

The valve can be mounted in any position with regard to the pipe. However, it is advisable to place it vertically in horizontal pipeline (A) if the installation allows it. (Please consult the technical department at Orbinox).

With larger diameters (> 300 mm/>12”), heavy actuators (pneumatic, electric, etc.), or with the valve installed horizontally (B) or at an angle (C) on a horizontal pipeline, the installation will require the construction of suitable supports. (See the following diagram and consult the technical department at Orbinox).



** For these positions please consult Orbinox.*

In vertical pipelines, the construction of suitable supports is always required (for further information please consult the technical department at Orbinox).

The VG valve shall be installed between flanges. A counter flange is needed for a dead end service.

Once the valve is installed, test that the flanges have been fastened correctly and that all electrical and/or pneumatic connections have been properly made.

Valves installed in an orientation with the actuator in or below horizontal may require flushing to prevent the build-up of solids in the cavity. (Please consult the technical department at Orbinox).

IMPORTANT. Valves equipped with flushing shall also be equipped with a conventional leak proof packing and a lower splash guard.

These instructions must be observed when installing an Orbinox knife gate valve in an ATEX zone:

- Make sure the valve is ATEX marked according to the requested zone and it includes all anti-static devices.
- Check continuity between the body of the valve and the pipe (test in accordance with EN 12266-2 Standard, annex B, points B.2.2.2. and B.2.3.1).
- This check must be done every time the valve has been removed from the line, serviced, and put back to the line.

The operation of automated valves is limited only with fitted gate covers (Optional in North America).

First, operate the valve with no flow in the pipeline. Then test operation and valve seal with flow running. During start up, make sure that there is no excess in the pipes. Once performance has been tested, the valve can be put into operation.

Standard VG valves have no packing but are supplied with elastomer gasket seals. All valves are delivered pre-treated with silicone lubricant. Prior to putting into service, check that the valve has been well lubricated. All valves are equipped with a lubrication device.

If a conventional leak proof packing system is provided (*optional*), it should be noted that the packing material might settle in shipping/storage, which can cause minor leakage. This can be solved by tightening the gland follower (5) during installation. The nuts should be tightened gradually and crosswise until the leakage stops (see the next figure). Check that there is no metal contact between the glandfollower (5) and the gate (2).



If the glandfollower nuts are overtorqued, the force needed to operate the valve will increase, the valve function will be affected and the box packing lifetime will be shortened.

The table below shows the recommended maximum torques for the gland follower nuts.

DN	Torque (N.m)
50 - 100	20
125 - 200	30
250 - 1200	35

Size	Torque (Ft/Lbs)
2 - 4	15
5 – 8	22
10 - 48	26

IMPORTANT. Those valves equipped with conventional leak proof packing shall also be equipped with a lower splash guard. The splash guard must be adapted to the discharge system using the connections supplied so as to avoid accumulation of solid materials that might damage the sleeves and foul the valve.

ATTENTION: DO NOT CLOSE BOTH ENDS OF THE LOWER PLATE



Once performance has been tested, the valve can be put into operation.

Approximate weight of the handwheel-operated valve (rising stem):

Weights (Metric)

DN	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	800	900
Kg	7	8	9	11	15	18	30	44	58	96	124	168	192	245	405	512	680

Weights (Imperial)

Size	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	800	900
Lbs	15	18	20	24	33	40	66	97	128	212	273	370	423	540	893	1129	1499

3.- ACTUATORS

3.1. - Handwheel
To open the valve, turn the handwheel counter clockwise. To close, turn the handwheel clockwise.

3.2. - Bevel gear
Bevel gear designed to get a pull force below 30 Kg.
To open the valve, turn the handwheel (10) counter clockwise. To close, turn the handwheel clockwise.

3.3. - Pneumatic
Valves are usually supplied with a double acting pneumatic actuator although, upon request, we can supply single-acting actuators. In either case the supply pressure can vary between 3,5 and 10 Kg/cm^2. However, the size of the actuator for each valve has been designed for an air supply of 6 Kg/cm^2. The cylinder stroke is a fixed length and does not require any adjustments.

It is essential for a good maintenance of the cylinder that air should be well dried, filtered and lubricated.

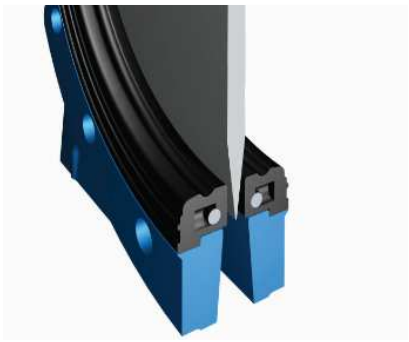
It is recommended to actuate the cylinder 3-4 times before the start up, once it is installed in the pipeline.

3.4. - Electric actuator

Depending on the type or make of the electric actuator, specific instructions (i.e. a manufacturer's manual) will be provided.

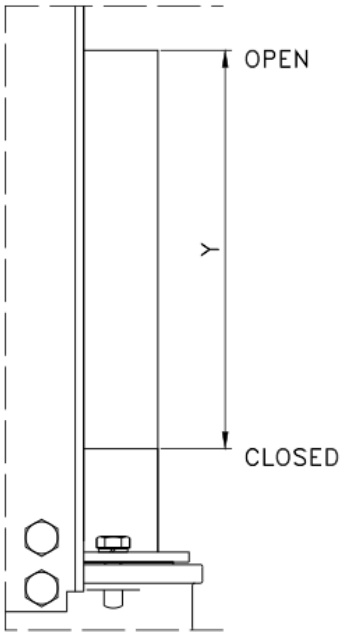
Open/close limit switches setting

1) When operating the valve stand clear of any moving parts such as the stem and /or gate assembly.
2) Maximum travel speed of the gate must equal or below 25 mm/s (1 in/s).
3) Care should be taken to ensure that electrical motors are wired correctly to the power source. Incorrect phasing of 3-phase wiring may cause valve/motor damage.
4) VG valves are position seated and should never be torque seated. Do not use the motor torque settings to seat the valve.
5) Close position setting. Operate the valve manually to the fully close position until the end of the gate is at the same level than the outside diameter of the sleeves and set the close limit switch. See below figure.



6) Open position setting. Operate the valve to the fully open position until the gate moves the distance "Y" as shown in figure below and set the open limit switch.

DN (mm/")	Y (mm)	Y (in)
50/2"	80	3,15
80/3"	110	4,33
100/4"	130	5,12
125/5"	160	6,3
150/6"	185	7,28
200/8"	240	9,44
250/10"	290	11,4
300/12"	345	13,58
350/14"	395	15,55
400/16"	450	17,7
450/18"	500	19,68
500/20"	560	22,05
600/24"	655	25,79
700/28"	765	30,12
750/30"	815	32,09
800/32"	870	34,25
900/36"	975	38,38



3.5. - Hydraulic

The valve is sized based on 100bar (1450 PSI) hydraulic supply pressure. The cylinder stroke is a fixed length and does not require any adjustments.
Typically the actuator travel speed is around 250 mm/min (9.8 in/min) or 0.005 m/s (0.164 in/min).

- Allowed actuators for ATEX zones: Hand wheel, Chain Wheel, Bevel Gear, Lever, Pneumatic Actuator (double acting **ONLY**) and Electric Motor.
- Make sure these actuators are ATEX marked according to the requested zone.
- Maximum travel speed of the gate must equal or below 0,05 m/s (2 in/s).

4.- MAINTENANCE

The valve must not undergo any modifications without a previous agreement with ORBINOX. ORBINOX shall not be liable for any damages that may arise due to the use of non original parts or components.

To avoid personal injury or damage to property from the release of process fluid:

- Those in charge of handling and maintenance of the valve must be qualified and trained in valve operations.
- Use appropriate personal protection equipment (gloves, safety shoes, etc).
- Shut off all operating lines to the valve and place a warning sign.
- Isolate the valve completely from the process.
- Release process pressure.
- Drain the process fluid from the valve and insert the open-closed lockout (if the valve has it).
- According to **EN 13463-1 (15),** during installation and maintenance operations, use hand tools **(non electric)** with Working Allowance.

The only maintenance required is to change the packing seal (4) and the two rubber sleeves (3) as well as the use of the grease nipples (7) for regular lubrication.
The life of these elements will depend on the working conditions of the valve such as: pressure, temperature, abrasion, chemical action, number of operations, etc.

To allow optimal operation, the lower part of the valve, accessible through the splashguard (11) should be cleaned regularly.
If the gate is brushed and cleaned regularly, the wear of the sleeves (3) can be minimised.

4.1. - Replacement of the packing seal (4):

Should one or both sleeves (3) be damaged, the slurry might injure maintenance personnel during this replacement. For that reason, the valve should be removed first from the pipeline.

1) Place the valve in close position and insert the open-closed lockout (if the valve has it).
2) Remove the gate guards (for automatically actuated valves only).
3) Release the spindle or stem (8) from the gate (2).
4) Loosen the screws of the yoke (6), extract the open-closed lockout (if the valve has it) and remove the yoke (without removing the actuator).
5) Loosen the bolts of the gland follower (5) and remove it.
6) Remove the gate (2) and the old packing seal (4) and clean the stuffing box.
7) Insert the new packing seal (4) lubricated (put silicone-based grease inside of the seal). Radiused edges go in first.
8) Insert the gate (2) and tighten the gland follower (5).

9) Reinstall the yoke (6) (with the actuator).
10) Fix the stem (8) to the gate (2).
11) Reinstall the gate guards.
12) Carry out some operations with a loaded circuit.

VG with conventional leak proof packing (optional): (See page 14)
Depressurise the circuit and place the valve in close position.
1) Remove the gate guards (for automatically actuated valves only).
2) Release the spindle or stem (8) from the gate (2).

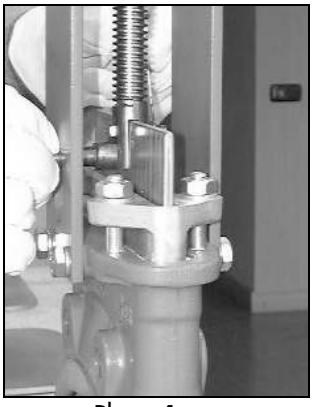


Photo 1

3) Loosen the screws of the yoke (6) and remove it (without removing the actuator).
4) Loosen the nuts of the gland follower (5) and remove it. (Photo 3)
5) Remove the old packing rings (4) and clean the stuffing box.
6) Insert the new packing rings (4), making sure that the ring joints alternate (the first on one side of the gate, the next on the other and so on). (Photo 4)
7) Once the necessary packing rings (4) have been inserted, proceed with a steady initial tightening of the gland follower (5).(Photo 3)
8) Reinstall the yoke (6) (with the actuator).
9) Fix the stem (8) to the gate (2).
10) Reinstall the gate guards.
11) Carry out some operations with a loaded circuit and then re-tighten the gland follower (5) to prevent leakage.

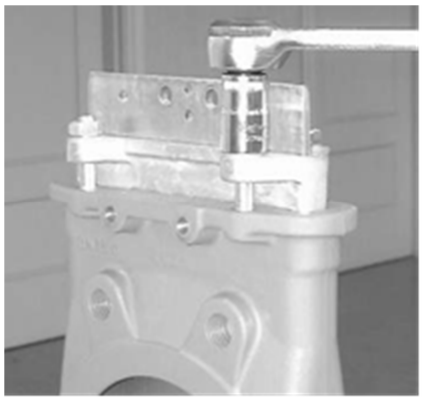


Photo 2

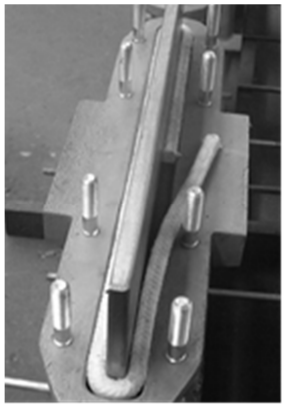


Photo 3

4.2.- Replacement of the sealing sleeves (3):

1) Remove the valve from the pipeline.
2) Remove the sealing sleeves (3).
3) Set the gate (2) in the open position.
4) Clean within the bodies (1), filling the inner part of the body with silicone based grease.
5) Lubricate the new sleeves (3) with the same grease (silicone-based) and install them.
6) Reinstall the valve in the pipeline.
7) Tighten the flanges.
8) Operate the valve a couple of times before leaving it in the position required for the process.

4.3. - Lubrication:

A silicone-based lubricant is recommended and may be applied using the fittings provided in the body. The gate may also be lubricated by spraying directly.
At a minimum VG valves should be lubricated every 100 strokes for 2" – 10" sizes and every 50 strokes for 12" – 48" sizes. If valves cycles very infrequently, less than once per month, lubrication prior to each stroke is recommended.
Under no circumstances should a hydrocarbon-based lubricant be used.

Twice a year, it is recommended to fill up the stem protector (9) halfway with a calcium-based grease with the following characteristics: highly water resistant, low ash content, and excellent adherence.

Special requirements for ATEX valves:

- The maintenance personnel must be made fully aware of the risks of explosion, and it is advisable that they receive specific training regarding ATEX.
- Periodicity of check and evaluation of graphite packing status and valve electrical conductivity must be determined by end user according to valve working conditions. In any case, once the valve is put into operation, the packing area must be revised after the valve has been stroked 100 times or after 3 months of operation, whatever happens first. After this preliminary check, new checking periods must be determined by end user based on the results of this first check.
- Clean the valve periodically to prevent dust accumulation. Do not sweep or dump the dust. Always use a vacuum cleaner system
- Dead en service is not allowed.
- Do not apply any new coating to the valve. Should it require new coating, please contact our closest representative.
- Allowed seals: NR, EPDM, VITON and NITRILE.
- Allowed packing: NR, EPDM, VITON, NITRILE and ST.
- Any other materials but those above are not allowed to be used in ATEX zones.
- In order to keep the ATEX approval, always use original spares from Orbinox.
  - Washer → DIN 6798A (This washer guarantees continuity among carbon steel parts, coated in epoxy, yoke and body and stainless steel guards for coating thicknesses up to 200 microns)
  - ST and GR packing →
    - ORBINOX ST: Synthetic packing impregnated with PTFE
    - GR: Graphite packing → MONTERO Ecograflex 780R
- After any maintenance of ATEX valves, it is mandatory to check that the valve is grounded through the pipe, and there is continuity among the different valve components, such as the body, the gate, the supports, and guards (test in accordance with EN 12266-2 Standard, annex B, points B.2.2.2. and B.2.3.1).

MAXIMUM FLUID TEMPERATURES

Atmosphere	
Gas/air, steam/air, and mist/air	Dust/air
80% of minimum fluid ignition temperature, minus 10ºK	2/3 of minimum dust cloud ignition temperature minus 85ºK

Note: these maximum fluid temperatures apply to all categories. The differences between categories are the consideration of foreseeable malfunction cases and rare malfunctions cases

MAXIMUM SEAL AND PACKING TEMPERATURES

Max Temperature (ºC) (ºF)	SEAL			
	NR	EPDM	VITON	NITRILE
	80 (176)	120 (248)	200 (392)	120 (248)

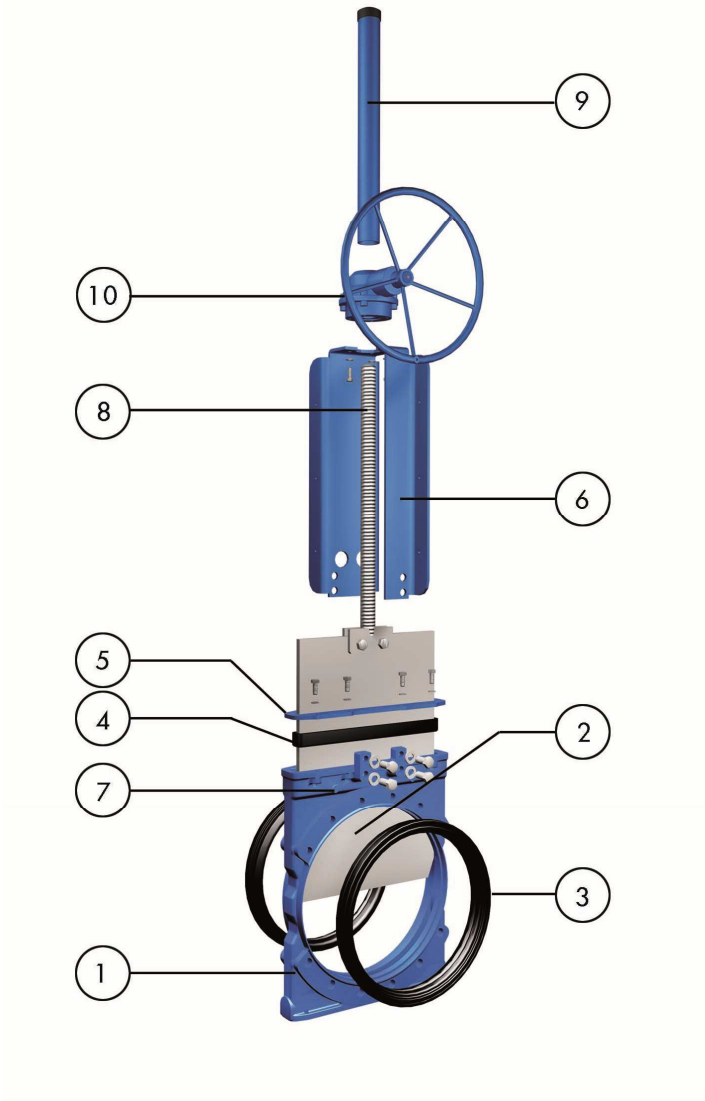
Max Temperature (ºC) (ºF)	PACKING				
	NR	EPDM	VITON	NITRILE	ST
	80 (176)	120 (248)	200 (392)	120 (248)	240 (464)

Note: Most of the times seals maximum temperature capacity is the key limitation factor when evaluating valve maximum working temperatures. In ATEX zones these temperatures must be compared to those above related to limitation of fluids temperatures.
Always consider the most restrictive as maximum valve working temperature.

5.- STORAGE

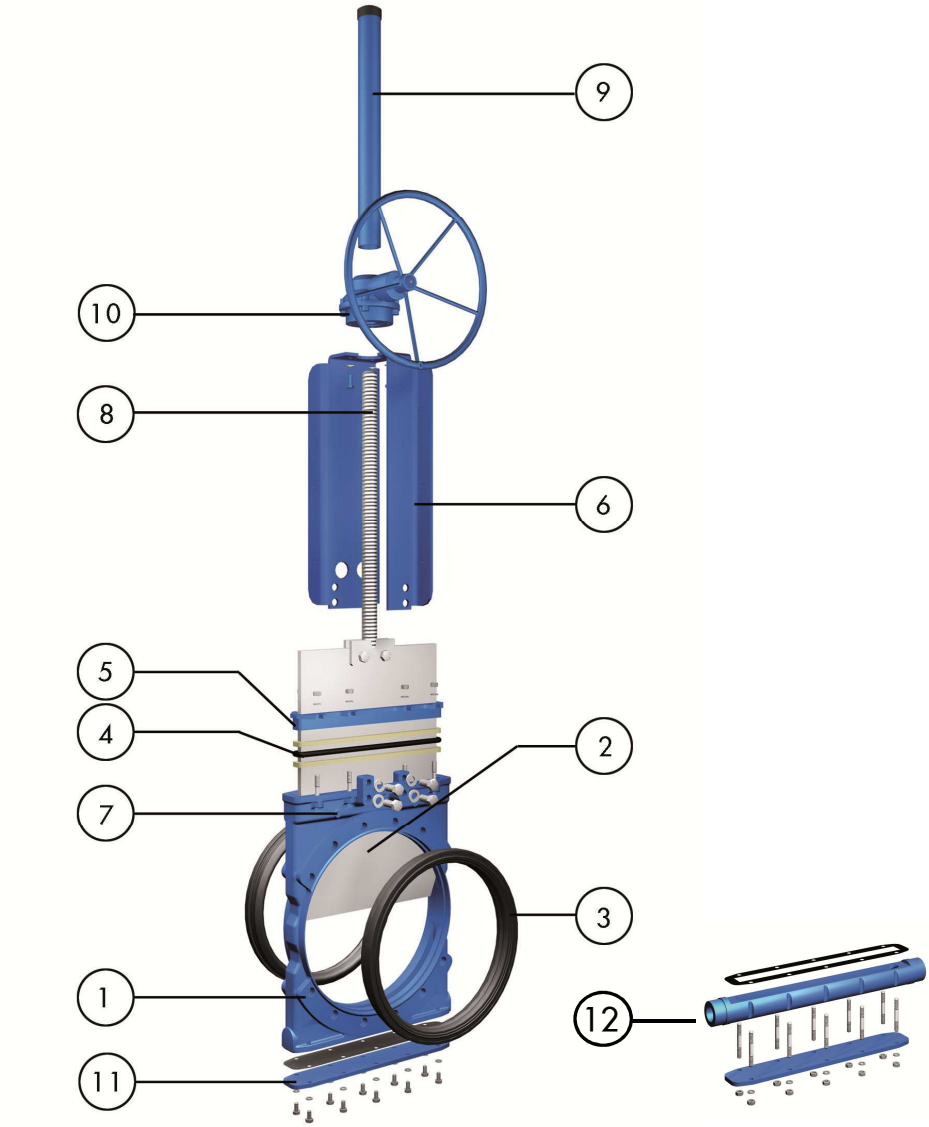
Storage recommendations:
- Drain valves of any and all liquid.
- Indoor storage in a well-ventilated, clean and dry room is recommended, to avoid moisture and condensation on the equipment.
- Valves should not be exposed to temperatures higher than 30ºC, as some soft seal materials can be damaged when exposed to higher temperatures (sleeves, packing, …).
- If outdoor storage cannot be avoided, precautions should be taken to keep valves clean and dry. Cover the valve and protect it from sources of heat or direct sunlight.
- During the storage, the valve must always be kept in the open position.
- The only exception is when the valve is supplied with a spring extend (spring to close) cylinder. In this case the valve will be supplied with the gate in the closed position, with the spring cylinder fully extended. DO NOT STORE the valve with the spring in a compressed, fully energized position. For storage, it is recommended that the valve sleeves are removed from the valve housing and stored separately from the valve. Reinsert sleeves prior to installation.
- Avoid dirt and/or moisture contamination of the stem.
- To prevent contamination in the supply ports of the cylinders: insure actuators have appropriate pipe plugs installed.
- The sleeves must be totally relaxed during the storage and without any heavy objects on them.
- Prior to start-up, clean the gate and apply grease according point 4.3. of this manual.
- For all other components installed on the valves, such as electric motors, solenoids, etc., please, consult their respective operational manuals.

6.1- PARTS LIST & DRAWINGS



1. – BODY
2. – GATE
3. – SLEEVES
4. – PACKING SEAL
5. – GLAND FOLLOWER
6. – YOKE
7. – GREASE NIPPLE
8. – STEM
9. – STEM PROTECTOR
10. – BEVEL GEAR

6.2- PARTS LIST & DRAWINGS (STANDARD PACKING)



1. – BODY
2. – GATE
3. – SLEEVES
4. – PACKING SEAL
5. – GLAND FOLLOWER
6. – YOKE
7. – GREASE NIPPLE
8. – STEM
9. – STEM PROTECTOR
10. – BEVEL GEAR
11. – FLAT PLATE SPLASH GUARD
12. – TUBULAR SPLASH GUARD