



VANESSA SERIES 30,000 TRIPLE OFFSET VALVE (TOV)

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Product application: Gaseous Oxygen (GOX)



APPLICABLE PRODUCT RANGE

- Series 30,000 basic configuration, double flanged body style, which can be installed by connecting each valve flange to each pipe flange with the applicable bolting.
- Series 30,000 basic configuration, lug body style with threaded holes, which shall be bolted to both pipe flanges.
- Series 30,000 basic configuration, wafer body style, which can be installed between two pipe flanges with the applicable studs or bolts.
- Range:
 - NPS 6 to 24 - ASME Class 300
 - DN 150 to 600 - EN PN 40 (valve in Stainless Steel)
 - NPS 6 to 24 - ASME Class 600 and 900 (valve in Monel)

SAFETY INFORMATION

- This document provides all the necessary safety information related to handling and storage, installation, use and maintenance of Vanessa Series 30,000 Triple Offset Valves for Gaseous Oxygen (GOX) applications.
- On-site personnel handling Vanessa Series 30,000 TOVs for oxygen service must be duly informed, qualified and experienced in order to preserve the products cleanliness level.

- Safety statements have been purposely placed throughout this manual whenever operating or maintenance procedures, practices or conditions are considered critical to the protection of personnel (WARNING) or to prevent valve damage (NOTICE and CAUTION).

WARNING

The factory has no control over any operation or any possible contamination occurring during handling, storage or installation on site, and therefore expressly disclaims any liability in connection thereto.

PRODUCT SPECIAL FEATURES

The cleaning, inspecting, assembly, testing, protection and labelling of Vanessa Series 30,000 Triple Offset Valves (TOVs) for Gaseous Oxygen (GOX) applications are completed in compliance with the relevant factory specification in a designated location (ensuring a hydrocarbon contamination level below 65 mg/m^2 on the valve internal wetted surfaces). Upon the completion of all the cleaning, inspection and testing operations, the valve openings are closed and the ends protected to ensure integrity of faces and seating surfaces. The end flange covers are made of elastomeric material and are adhesive on RF profile. All threaded connections are plugged or capped. Pipe nipples and other weak connections not permanently braced are braced and blocked to prevent damage during shipment and handling. Each valve is equipped with a special label affixed on each end flange elastomeric/plastic cover (see an example at the end of the paragraph).

All the operations described above are carried out by expert personnel, specifically trained and equipped, and aware of the related risks.

The special cleanliness levels of the valve shall be preserved before, during and after the installation.



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SECTION 1 - VALVE STORAGE

1.1 Storage and preservation before installation

In case valves have to be stored before installation, segregate them and maintain packaging integrity during storage to preserve the original cleanliness level.

1.2 Handling requirements

On-site personnel handling Vanessa Series 30,000 TOVs for oxygen service must be duly informed, qualified and experienced in order to preserve the products cleanliness level.

Crates: The lifting and the handling of valves packed in crates shall be carried out by a forklift truck, by means of appropriate fork hitches.

Cases: The lifting of valves packed in cases shall be carried out from the lifting points and the center of gravity position which have been marked accordingly.

The transportation of all packed material must be carried out safely and following local safety regulations.

CAUTION

For valve handling and/or lifting, the lifting equipment (fasteners, hooks, etc.) must be sized and selected by taking into account the valve weight indicated on the packing list and/or delivery note.

Lifting and handling must be carried out only by qualified personnel.

Fasteners must be protected by plastic covers in sharp corner areas.

Caution must be given during handling to avoid that equipment passes over workers or any other place where a possible fall could cause damage. In any case, the local safety regulations must be followed.

NOTICE

In the upper side always fasten the valve from the bracket.

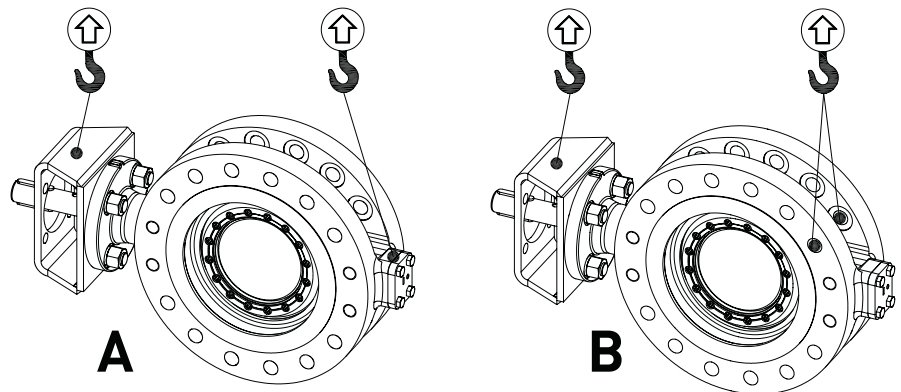
Solutions A and C in figure 1 are applicable when the protrusion of the bottom hub from the flange or body is sufficient to position securely the lifting strap.

Solutions B and D in figure 1 are applicable when the protrusion of the bottom hub from the flange or body is NOT sufficient to position securely the lifting strap. In such cases use the flange holes close to the bottom hub and fasten the valve securely.

WARNING

Additional attention shall be paid in case of valves equipped with gear or actuator. For actuated valves it is suggested to use actuator eyelet to balance the center of gravity. Refer to the product technical documentation provided with the relevant supply.

LIFTING AND HANDLING OF VALVES INSTALLED IN HORIZONTAL PIPELINES



LIFTING AND HANDLING OF VALVES INSTALLED IN VERTICAL PIPELINES

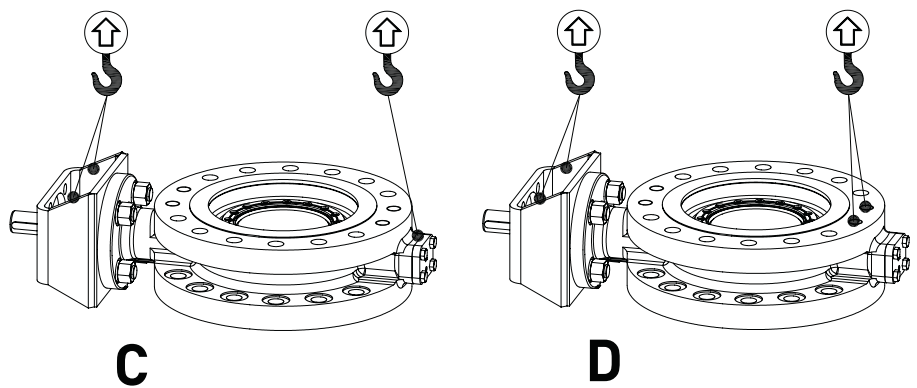


FIGURE 1

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SECTION 2 - INSTALLATION

Handling and lifting of the valves during installation MUST be performed by following the same criteria and instructions described in previous points "1.1 Storage and preservation before installation" and "1.2 Handling requirements".

2.1 Valve inspection

1. Carefully remove the valve from the shipping package avoiding any damage to the valve or, in case of automated valve, to the electric or pneumatic/hydraulic actuator or instrumentation.
2. The valve is clean and sealed. Minimize contamination during installation.
3. Ensure that the packing stud nuts against the packing flange cannot be loosened by hand (see figure 4, detail 5d, on page 6).

WARNING

Ensure that the materials of construction listed on the valve nameplate (figure 16 on page 13) are appropriate for the service intended and conform to the contractual specifications/requirements. Also ensure that the valve pressure/temperature limits shown on the valve nameplate are suitable for the process conditions. If in doubt contact your nearest Emerson sales office.

2.2 Valve installation

Vanessa double flanged, lug and wafer valves are suitable to be installed in accordance with ASME B16.5, ASME B16.47 or EN 1092.1 requirements. Flange finish and face dimensions are fully in accordance with the applicable standard, without gasket seating surface interruptions (which are allowed instead by API 609 par. 5.7).

The optimal installation is setting the valve with the shaft in the horizontal plane. The second best option is to have the shaft at an angle to minimize problems associated with solid particles present in the fluid that otherwise could deposit in the lower bearing area. Unless otherwise recommended, the valve should be installed with the disc in the closed position to ensure that the seal ring in the disc is not damaged during installation. Particular care should be given to those valves equipped with 'fail-open' actuators. For operating temperatures above 200 °C (392 °F) thermal insulation of the valve body is recommended.

WARNING

If the valve has threaded tapped holes in the hub areas, it is recommended to use stud bolts with nut to connect the valve in this zone. The depth of the tapped holes in the bodies of all Series 30,000 valves is specified in the product technical documentation provided with the relevant supply. Failure to use the correct studs dimensions may result in serious injuries, flange leakage, damage to the valve thread.

NOTICE

The valve trim is designed to withstand and to seal against the design differential pressure marked on the valve nameplate (refer to the nameplate template provided on page 12). When positive isolation is required including isolation for safe access to downstream line, as a minimum the valve shall be installed with high pressure facing the preferred isolation side of the valve, the so-called "positive isolation side" or "shaft side". The valve trim shall not be used as a sole protective mean against the hazard caused by the closed valve upstream pressure. Additional precautions against pressure hazard risks shall be taken into consideration by end users based on their own piping risk assessment.

Isolation applications

The installation direction affects valve operating torques and sealing performances. An indication plate "ΔP" (figure 2) is applied on the high pressure shutoff side when valve is closed as a reference for the direction of the installation.

The best sealing performance, also for bidirectional services, is ensured when pressure acts on the shaft side of the valve, and is recommended when the service tightness requirements are more stringent in one specific direction.

Control applications

Perfect sealing is not required. The "ΔP" plate indicates the installation direction. Adhere to the direction of installation indicated on the relevant flange as the selection of the actuator has been made for that specific direction of installation.

CAUTION

Whenever the pipe is internally lined, the disc must not come into contact with the lining during its stroke.

Such verification is critical especially in case of lug and wafer body style in order to avoid any damage to the valve.

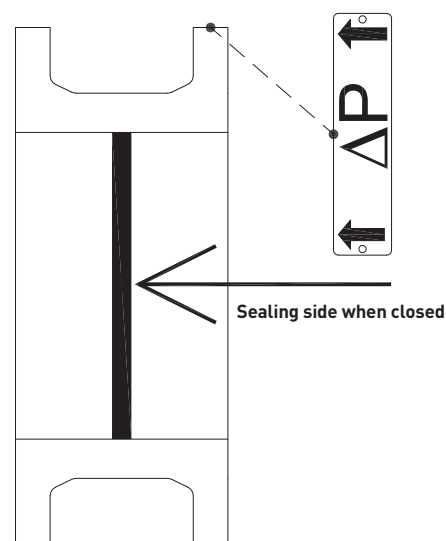


FIGURE 2

VANESSA SERIES 30,000 TRIPLE OFFSET VALVE (TOV)

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2.3 Valve verification

1. To prevent shaft leakage check the packing box (see figure 4, on page 6) tightening in accordance to table 1 on page 12 in order to restore the nominal torque. Be mindful that over-tightening will decrease packing component life and increase operating torque.
2. Check the operability of the valve by stroking it to "full open" and "full close". To verify the valve orientation, the disc position indicator mark on the shaft (during the normal open to close cycle) should rotate clockwise from a position in line with the pipe (figure 3A) to a position parallel to the pipe flanges (figure 3B).

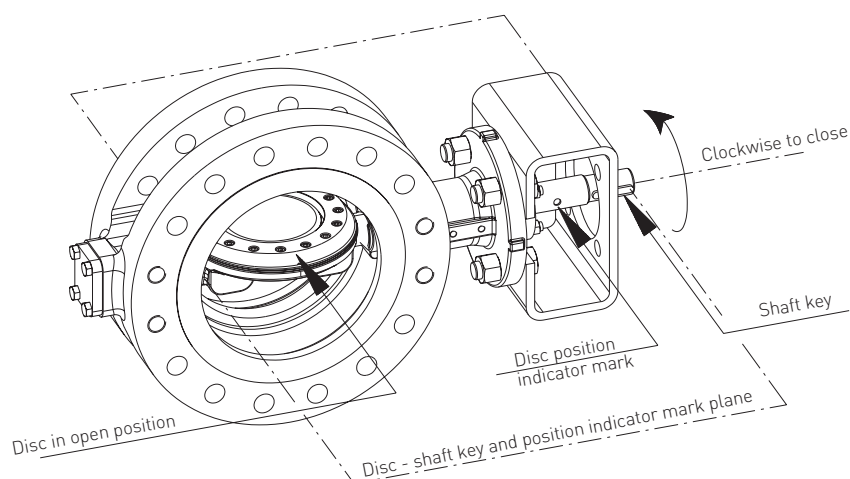


FIGURE 3A

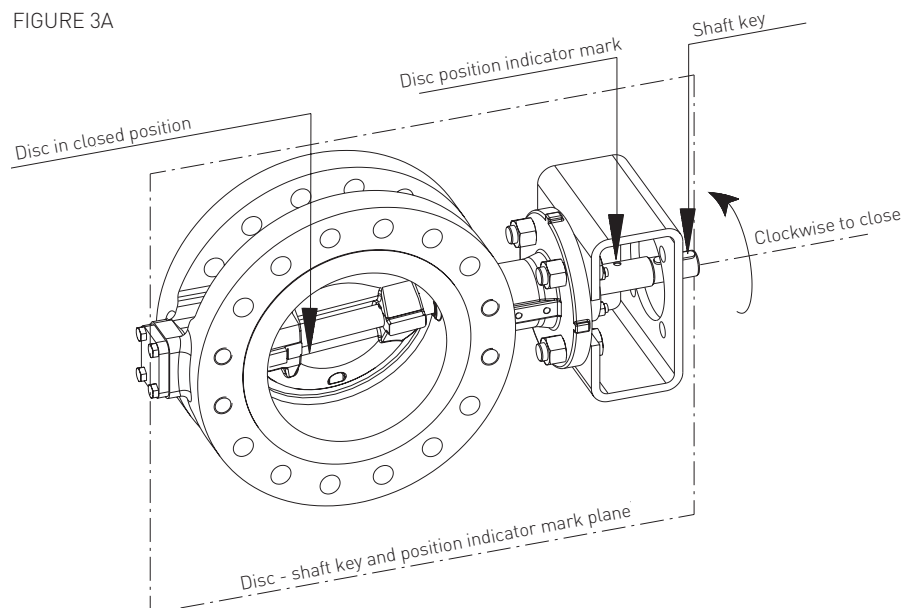


FIGURE 3B

VANESSA SERIES 30,000 TRIPLE OFFSET VALVE (TOV)

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SECTION 3 - USE

3.1 Valve use

Vanessa Series 30,000 valves do not feature cavities where the process fluid may be trapped and isolated from the main line. Therefore, any overpressure is not possible as long as the system to which the valve is connected remains protected against overpressure by a suitable device. Vanessa Series 30,000 valves do not generate hot / cold surfaces through their own operating function. Hot or cold surfaces of the valve are generated by the process temperature of the system, where the valve is installed. Hence its protection shall follow the requirements of the system itself. The valve bracket does not need to be protected.

The valve body is more resistant than the pipe to which it is connected, being of simple cylindrical-shape with outward cylindrical branches and thickness much higher than the pipe itself. Therefore, the valve body cannot be taken as a limiting factor for the maximum allowable loads transmitted by the pipe.

3.2 Operating procedures

A Vanessa Series 30,000 needs either an actuator or manual gear operator to be operated. Follow the applicable instructions provided by the actuator or gear manufacturer. The valve closes by turning the shaft clockwise when observed from the bracket top end.

3.3 TROUBLESHOOTING GUIDE

Symptom	Possible cause	Resolution
Valve does not rotate	1. Packing is too tight 2. Actuator has failed 3. Connecting key is sheared	1. Loosen the stud nuts 2. Replace or repair 3. Determine the cause of shearing and correctly replace the key
Leakage from packing	1. Packing flange stud nuts are too loose 2. Packing box is damaged	1. Tighten the packing flange stud nuts 2. Replace the packing box - see Paragraph 4.1
Leakage from bottom gasket	1. Pressure bolts are loose 2. Bottom gasket is damaged	1. Tighten the bottom pressure bolts 2. Replace the gasket - see Paragraph 4.3
Valve leakage	1. Valve is not fully closed 2. Actuator mechanical stops are improperly set 3. Seal ring is damaged	1. Close the valve 2. Remove the stop for closure and reset properly 3. Replace the seal ring - see Paragraph 4.2
Jerky operation	1. Packing box is too tight 2. Air supply is inadequate 3. Actuator/shaft adapter is misaligned	1. Loosen the packing stud nuts, cycle the valve, retighten 2. Increase the air supply pressure and/or volume 3. Remove the actuator mounting and realign

SECTION 4 - MAINTENANCE

WARNING

- Depressurize the line before starting any maintenance. Failure to do so may result in serious personnel injury and/or equipment damage.
- All the operations described below shall be carried out by specialized personnel, specifically trained and aware of the related hazards.
- Maintenance shall be carried out in a clean dedicated area.
- Tools and equipment used for the operations described below shall be kept clean and separate from other tools.
- Any other pieces of equipment (e.g.: test caps for gas testing) that may be applied to a valve shall be assembled in "clean conditions".
- Spare parts are supplied in a sealed plastic bag. Do not break protection outside the clean room.
- Only lubricants tested for oxygen service shall be used. Do not exceed the quantity capable of facilitating valve assembly and operation.

Other special lubricant and specific solvent combinations may be used based on customer experience in oxygen plant maintenance.

In order to leave a layer of lubricant as thin as possible, the surfaces to be lubricated shall be wetted with oxygen compatible lubricant and wiped with a clean, dry, lint-free cloth. Wrong lubricants used in oxygen service, or where the lubrication is incompatible with the process media, can lead to the sudden explosion of media due to the oil/oxygen mixture, that may result in personnel injury or property damage.

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4.1 Packing box maintenance

Depending on the cycle rate of the valve, regularly check that the nominal torque corresponds to the values in table 1 on page 12.

To replace the packing rings proceed as follows and refer to figure 4:

1. Remove the gear/actuator and the relevant connecting keys (4f). Keep record of the gear/actuator position in relation to the valve position for a later correct re-assembly of the gear/actuator.
2. Remove the stud nuts (5d). If present, remove the Belleville springs (5n), and keep record of their quantity and assembly configuration to reassemble them correctly (point 7).
3. Remove the packing flange (5f), the anti blowout ring (5g), and the packing bushing (5c).
4. Remove the packing rings (5a).
5. Carefully clean the packing cavity and shaft (4a).
6. Insert new packing rings, being mindful of inserting the two braided rings at the bottom and top of the entire packing. If the packing rings are of the split type, install with splits staggered at 180° from each other.
7. Reassemble the packing bushing (5c), the anti blowout ring (5g), and the packing flange (5f). If present, assemble the Belleville springs (5n), following the assembly configuration noted in the previous point 2, then assemble by hand the stud nuts (5d) without tightening (after applying a thin film of lubricant on the threads of the stud bolts).

8. Reassemble the connecting keys (4f) on the upper shaft end.
9. Reassemble the gear/actuator and close the valve.

CAUTION

Do not force the actuator on the shaft! This should be a loose fit.

10. Tighten the stud nuts (5d) in accordance to Table 1 on page 12.
11. Cycle the valve.
12. Pressurize again the line.
13. If a leakage is detected, tighten the stud nuts slowly and evenly until the leakage stops.

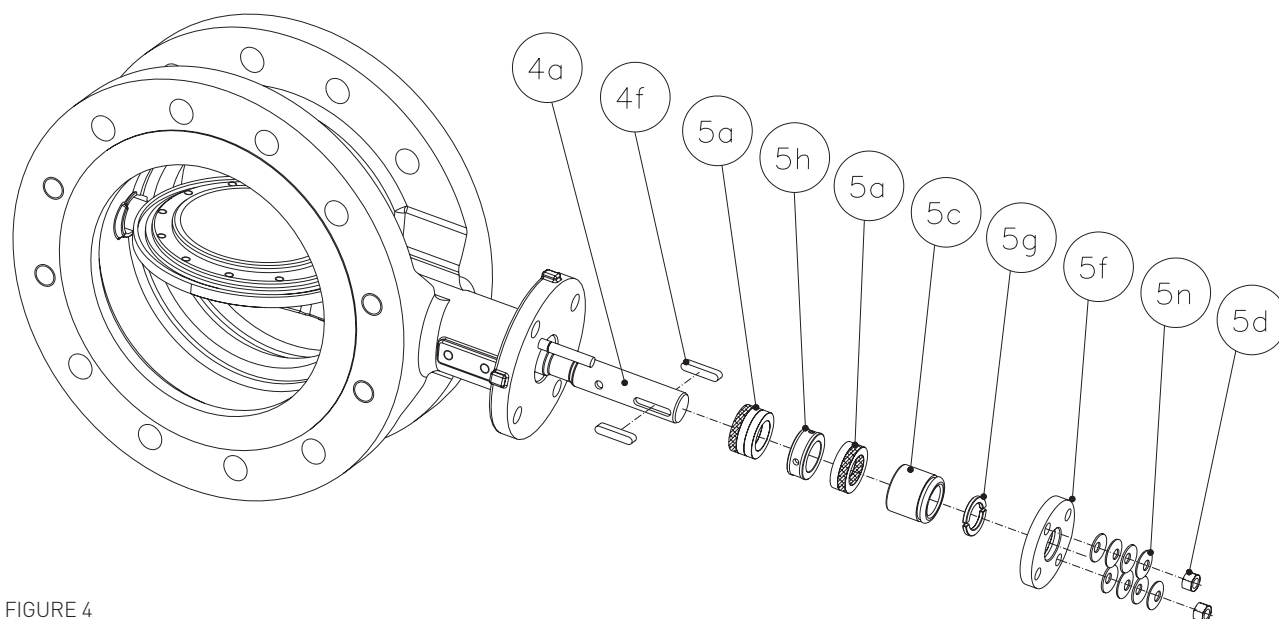


FIGURE 4

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4.2 Sealing elements maintenance

To replace the sealing elements proceed as follows and refer to figure 5 for a correct component identification:

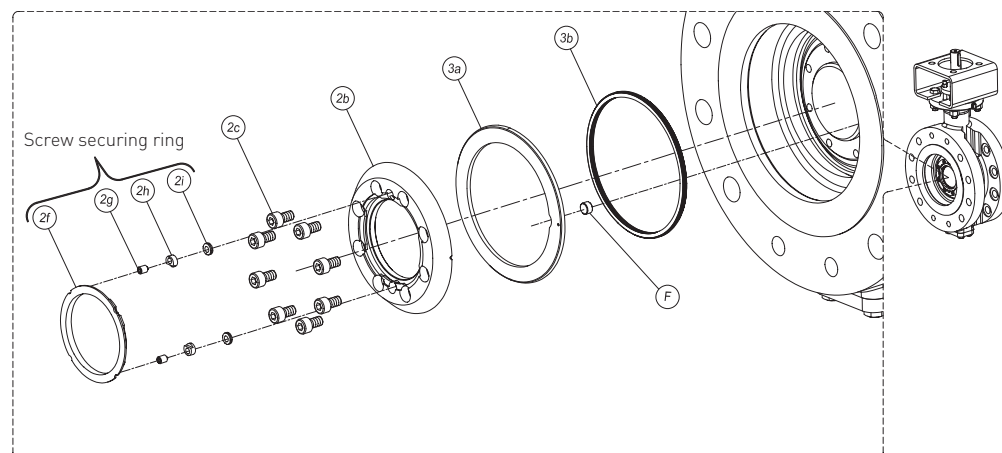


FIGURE 5

WARNING

Depressurize the line before starting any maintenance. Failure to do so may cause serious personnel injury and/or damage to the valve.

1. Open the valve disc a few degrees.
2. Disengage the locking nut (2h) by turning the grub screws (2g) counterclockwise - figure 6:

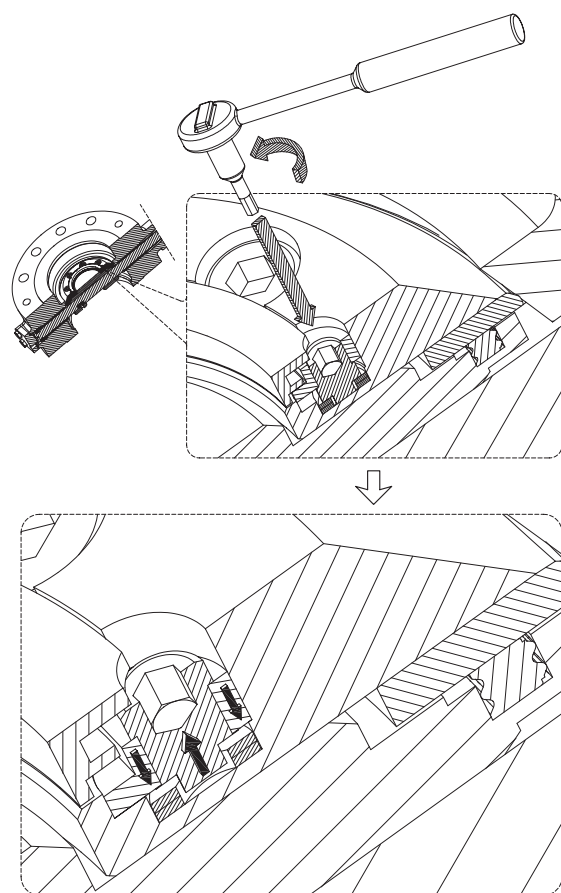


FIGURE 6

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3. Rotate the screw securing ring (2f - hereafter SSG) 45° clockwise, until SSG slots and grub screw holes are aligned - figure 7:

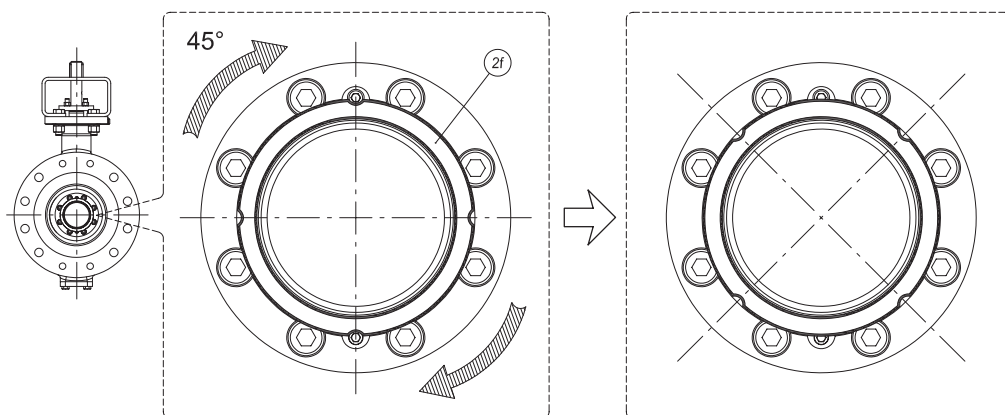


FIGURE 7

4. Open the valve disc to full open position.

NOTICE

In small size valves it may be easier to remove the actuator and rotate the disc beyond the full-open position to provide more space to work with components.

5. Remove the SSG (2f) - figure 8:

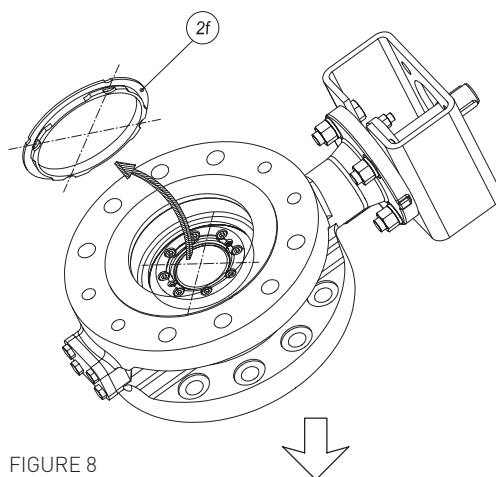


FIGURE 8

6. Remove the locking nuts (2h), with the grub screws (2g) and the loosening washers (2i) - figure 9:

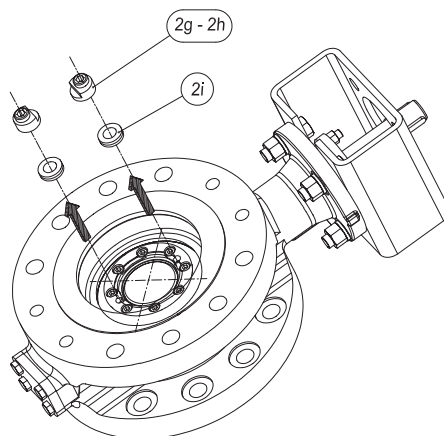


FIGURE 9

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7. Carefully remove the retainer flange screws (2c), the retainer flange (2b), the seal ring (3a), the disc gasket (3b) – figure 10:

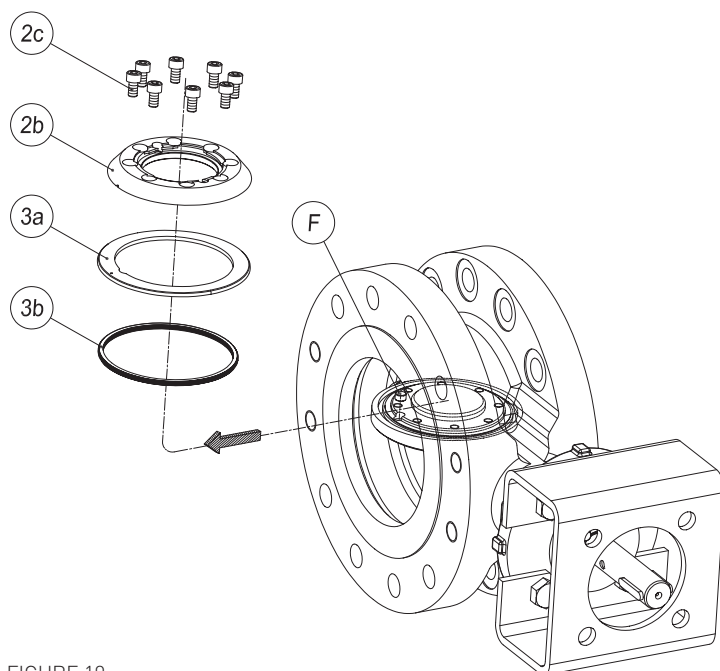


FIGURE 10

8. Inspect and clean the disc seal ring area and the gasket groove.
9. Insert the new disc gasket (3b) in the disc groove, without forcing and taking care not to damage it.
10. Replace the seal ring (3a) on the disc through the shaft side of the body. To properly locate the seal ring refer to figure 11: align the internal slot of the seal ring (3a) to the reference pin (F).

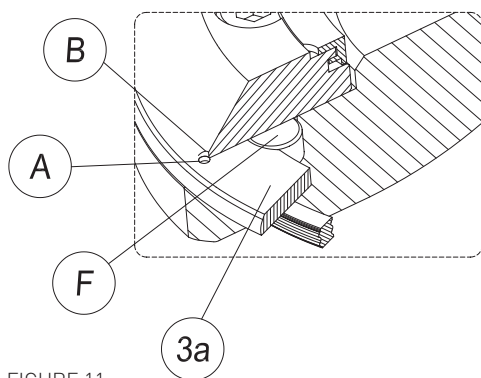


FIGURE 11

11. Assemble the retainer flange (2b). Refer to figure 11: make sure that the slot on the edge of the retainer flange (B) matches the reference pin (F).
12. Hand tighten all the retainer flange screws (2c), then verify that the seal ring can be moved freely by hand without rotating it.
13. Seat and unseat the valve twice.
14. Keep the valve in the closed position without applying torque. Tighten at least two retainer flange screws (2c) to avoid the seal ring moving from the position found.
15. Open the disc a few degrees and tighten - using a torque wrench – all the screws (2c). Use a torque value from Table 2 on page 12. It is recommended to use a cross-pattern tightening sequence to tighten all the retainer flange screws.

IMPORTANT

Refer to figure 11:

The seal ring is supplied with an index marking (A). After the completion of the assembly, verify that the index marking (A) can be seen in the slot (B) of the retainer flange.

Slot (B) and marking (A) have to be perfectly aligned. If not visible or not aligned, loosen the retainer flange screws, re-align the index marking and start again the procedure from point 14.

16. Reinstall the unloosening washers (2i).

17. Reinstall and screw the locking nuts (2h) and the grub screws (2g).

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18. Reinstall the SSG (2f) by aligning the slots on it to the grub screw holes and by turning it of 45° - figure 12:

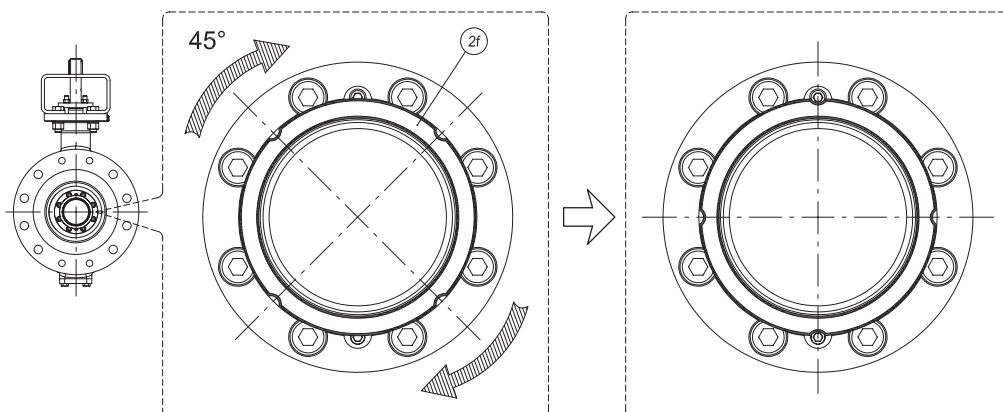


FIGURE 12

19. Engage each locking nut (2h) by turning the grub screw (2g) clockwise until it stops - figure 13:

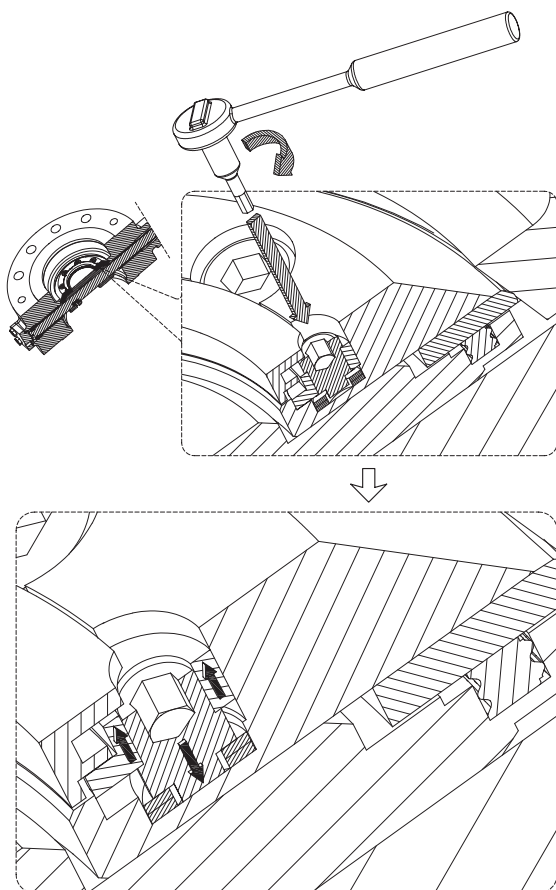


FIGURE 13

4.3 Bottom flange gasket maintenance

If it is necessary to replace the bottom gasket, proceed as follows (see figure 14):

1. Remove the bottom flange (6a).
2. Remove the bottom gasket (6c).
3. Inspect and clean the groove for the gasket both in the body and in the bottom flange.
4. Insert the new gasket on the bottom flange (6a), centering and positioning all on the body bore. Rotate the bottom flange to accommodate the correct position and center the holes with the threaded holes on the body.
5. Apply a thin film of oxygen compatible lubricant on the threads of the pressure bolts (6b), then insert and tighten them using a torque value from Table 2 on page 12.

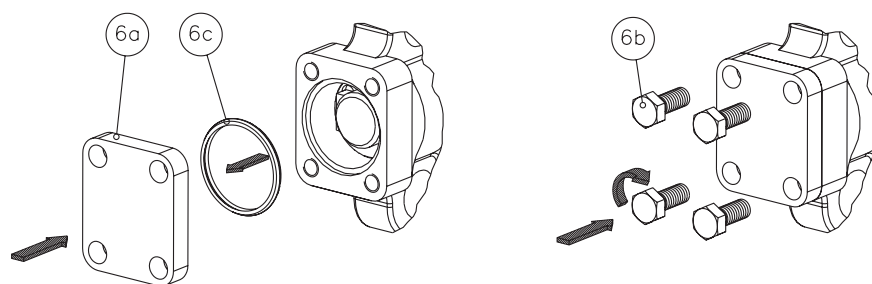


FIGURE 14

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SECTION 5 - STANDARD OPTIONS

This section is referred only to Vanessa products configured with the following option:
- live loaded packing.

5.1 Live loaded packing

The live loaded packing option is designed to supplement the standard characteristics of the Vanessa valve packing. This option guarantees a constant compression of the packing set. The fact that the packing is subject to a near constant force supplied by the Belleville springs reduces the maintenance frequency required by the packing.

Care should be given in replacing the Belleville springs as their order (parallel or in series) should be understood and kept. The packing flange nuts should be tightened in accordance with Table 1.

Figure 15 shows typical set ups for the live loaded packing option.

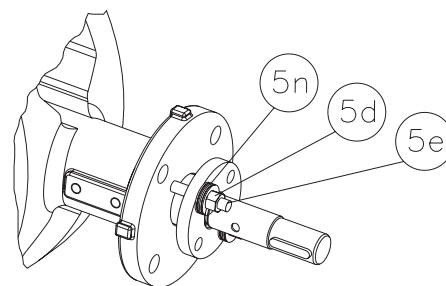


FIGURE 15

TABLE 1 - TORQUE VALUES FOR PACKING FLANGE STUD NUTS

Bolt dimensions	Nominal pressure			
	ASME CLASS 300 EN PN 40		ASME CLASS 600 - 900 EN PN 63 - 100	
	Torque		Torque	
mm	Nm	ft-lb	Nm	ft-lb
M10	10	7	20	15
M12	15	11	25	18
M14	20	15	45	33
M16	25	18	60	44
M18	30	22	65	48
M20	80	59	200	148
M24	180	133	340	251
M27	210	155	375	277
M30	290	214	495	366
M33	310	229	700	517
M42	-	-	1250	923

NOTE

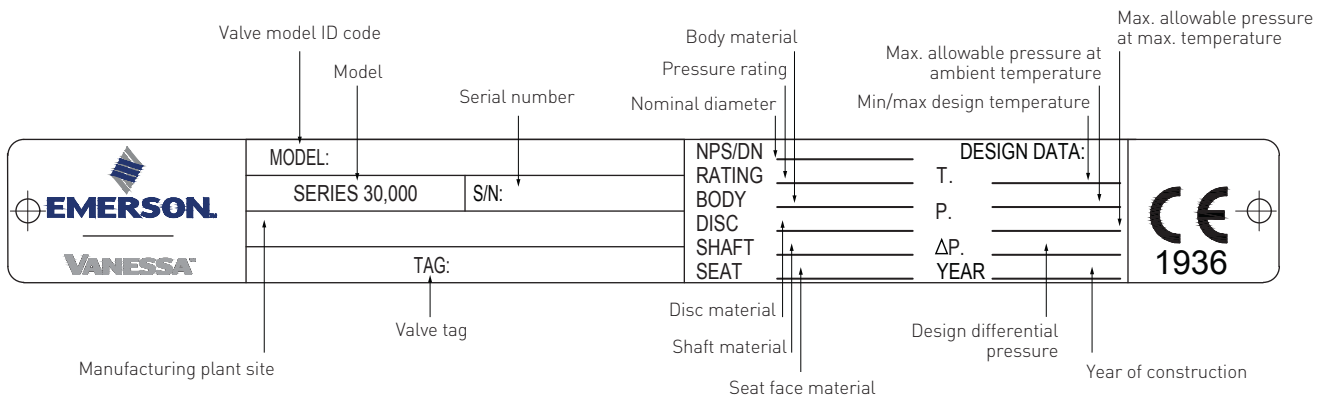
Tighten the packing flange stud nuts slowly and evenly until the leakage stops. The torque values are suggested maximum values.

TABLE 2 - General torque values for retainer flange and bottom flange bolting

Bolt dimensions (mm)	Torque values	
	Torque (Nm)	Torque (ft-lb)
M6	10	7
M8	20	15
M10	45	33
M12	70	52
M14	110	81
M16	175	129
M18	235	173
M20	335	247
M22	370	273
M24	460	339
M27	595	439
M30	760	561
M33	785	579
M36	1010	745
M39	1315	970
M42	1625	1199
M45	2035	1501

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FIGURE 16



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