VANESSA SERIES 30,000 TRIPLE OFFSET VALVE (TOV)

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Basic configuration - Body style double flanged, wafer, lug and buttweld



APPLICABLE PRODUCT RANGE

- Vanessa Series 30,000 TOV basic configuration, double flanged body style (to be installed by connecting each valve flange to each pipe flange with the applicable bolting).
- Vanessa Series 30,000 TOV basic configuration, lug body style with threaded holes (to be bolted to both pipe flanges).
- Vanessa Series 30,000 TOV basic configuration wafer body style (to be installed between two pipe flanges with the applicable studs or bolts).
- Vanessa Series 30,000 TOV basic configuration, buttweld ends, which must be welded to the line.

SAFETY INFORMATION

- This document provides all the necessary safety information related to handling and storage, installation, use and maintenance of Vanessa Series 30,000 TOV.
- 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 for the product integrity (NOTICE and CAUTION).

⚠ WARNING

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

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SECTION 1 - VALVE STORAGE

1.1 Storage and preservation before installation

In case the valve has to be stored before installation, it shall be placed in a segregated, protected, dry and clean environment.

1.2 Handling requirements

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 and handling of all packed material must be carried out safely and in compliance with local safety regulations.

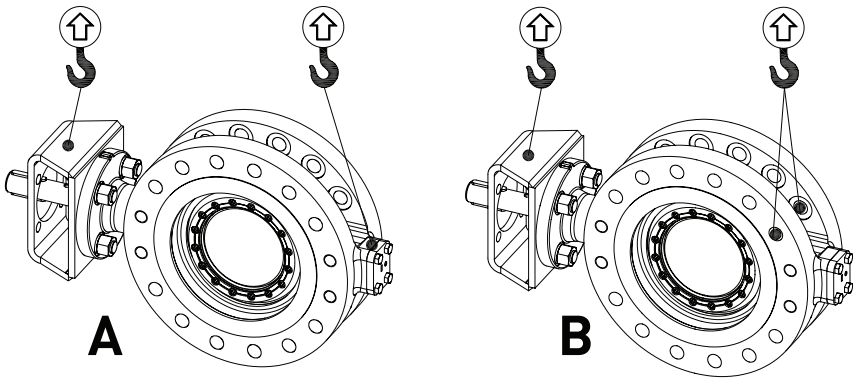
⚠ CAUTION

Lifting and handling equipment (crane, hooks, belts, etc.) must be selected by taking into account the valve and actuator weight reported in the relevant delivery documents.
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 material handling to prevent the equipment from passing over workers or locations where a fall could cause damage.
In any case, the local safety regulations must be followed.

NOTICE

For horizontal shaft installation, fasten the valve from the bracket and bottom flange areas as shown in Figure 1.
Apply bottom flange lifting solutions A and C (Figure 1) when the extension of the bottom hub is sufficient to securely place the lifting strap around it.
Apply lifting solutions B and D (Figure 1) when the extension of the bottom hub is NOT sufficient to securely place the lifting strap around it. In this case, use the flange drillings near the bottom hub and fasten the valve securely.
For vertical shaft installation, lift the valve from the bracket as shown in Figure 2.

LIFTING AND HANDLING OF VALVES INSTALLED IN HORIZONTAL PIPELINES



LIFTING AND HANDLING OF VALVES INSTALLED IN VERTICAL PIPELINES

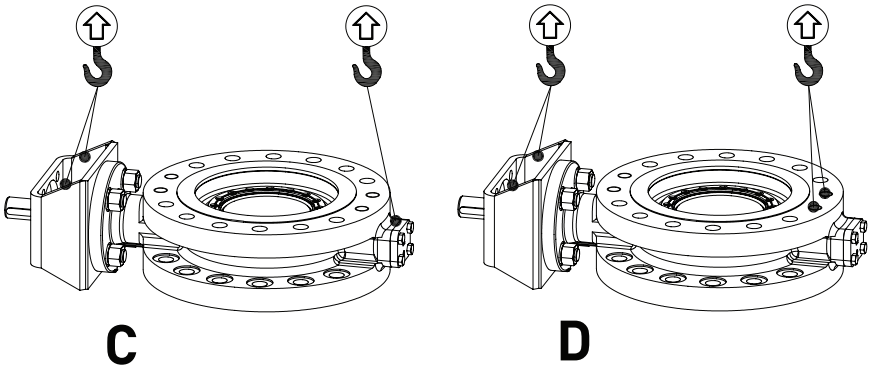


FIGURE 1

⚠ WARNING

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

LIFTING POINT

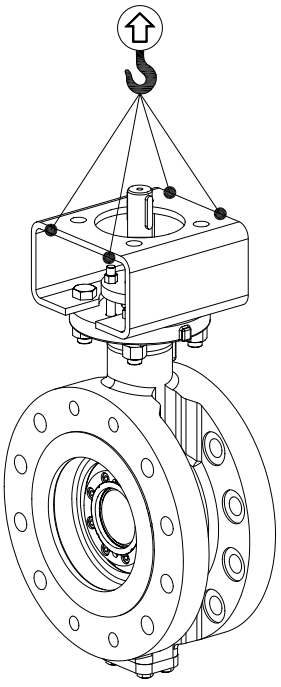


FIGURE 2

SECTION 2 - INSTALLATION

2.1 Valve inspection

1. Carefully remove the valve from the shipping package (box or pallet) avoiding any damage to the valve or, in case of automated valves, to the electric or pneumatic / hydraulic actuator or instrumentation.
2. The valves are shipped with the ends protected with caps and a thin layer of protective grease (where applicable according to the valve material selection). Before installing the valve, remove the caps and clean carefully, then degrease both surfaces with a solvent. Clean the inside of the valve using an air line. Ensure that there are no solid objects such as pieces of wood, plastic or packing materials inside the valve or on the valve seat.
3. Inspect the seal ring to ensure that it was not damaged during handling. This is especially important in case of valves shipped with the disc set in the open position and with "fail-open" actuators.
4. Ensure that the packing gland-adjusting nuts against the packing flange cannot be loosened by hand.

⚠ WARNING

Ensure that the materials of construction listed on the valve nameplate (refer to Figure 14 on page 12) are appropriate for the intended service 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

Check the pipe flanges and verify that they match with the valve end connections in terms of:

- face-to-face length;
- flange dimensions;
- flange finish for gasket installation.

Never pressurize if one or more flange bolts are missing.

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 for manual operated valves, never install the valve with the top flange oriented in any direction lower than the horizontal (Figure 3).

Unless otherwise recommended, the valve should be installed with the disc in the closed position to ensure that the seal ring is not damaged during installation. Particular care shall be given to the 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 Vanessa Series 30,000 TOVs 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 and damage to the valve thread.

NOTICE

It is recommended to perform piping flushing before installation of valve.
When this is not possible, valves must be set with the disc in full open position before starting the flushing operation.

⚠ WARNING

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", see Figure 3. The valve trim shall not be used as the only means of protection against the hazard caused by the pressure upstream of the closed valve. In this case, additional precautions shall be taken into consideration by the end users based on their own piping risk assessment.

If the valve has welded ends, perfectly clean and degrease the ends to be welded (of both valve and pipe), using a cloth with acetone or a similar product. Insert correctly the valve between the edges of the pipe to be welded by taking into consideration the plate that indicates the preferential side for sealing. Carry out an initial accurate spot welding verifying the perfect alignment of the edge and axis of the valve.
Carry out the welding of the edge by proceeding in alternate way on both sides to reduce the tensions introduced by the welding. It is important to follow the relevant preheating and interpass temperature prescriptions.

Isolation applications

The installation direction affects valve operating torques and sealing performances. An indication plate "ΔP" (Figure 4) 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.

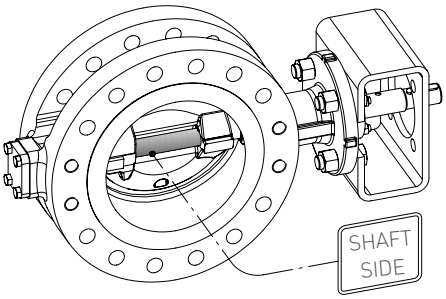


FIGURE 3

Control applications

For control valve applications, perfect sealing is normally 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.

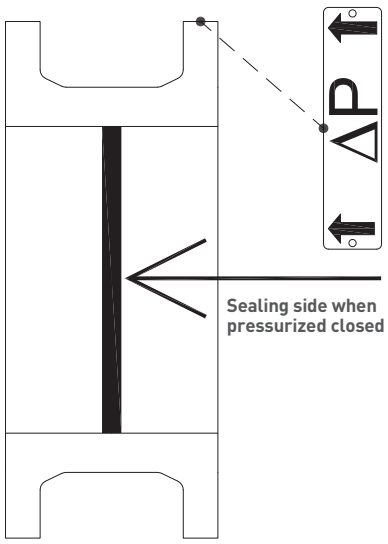


FIGURE 4

2.3 Valve verification

1. To prevent shaft leakage check the packing box (see Figure 6, on page 6) tightening in accordance with Table 1B on page 11. Restore the nominal torque if needed. Be mindful that over-tightening will reduce packing components lifetime 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) shall rotate clockwise from a position in line with the pipe (Figure 5A) to a position parallel to the pipe flanges (Figure 5B).

2.4 Commissioning

1. Whenever the piping system is pressurized with water for testing or in case it has been shut down after testing for a long time, the following recommendations should be adopted:

   a. Use corrosion inhibitor with water to pressurize the piping system.
   b. After testing, the piping system should be depressurized and the test water completely drained.
   c. After testing, the valve must be operated through a complete opening/closing cycle and the disc should be left in half-open position. Apply a film of protective oil in the packing area by means of a paintbrush. The protective oil must fill the area between shaft and packing bushing.

2. The valve is fully metallic and typically withstands the cleaning agents used for metallic pipelines.

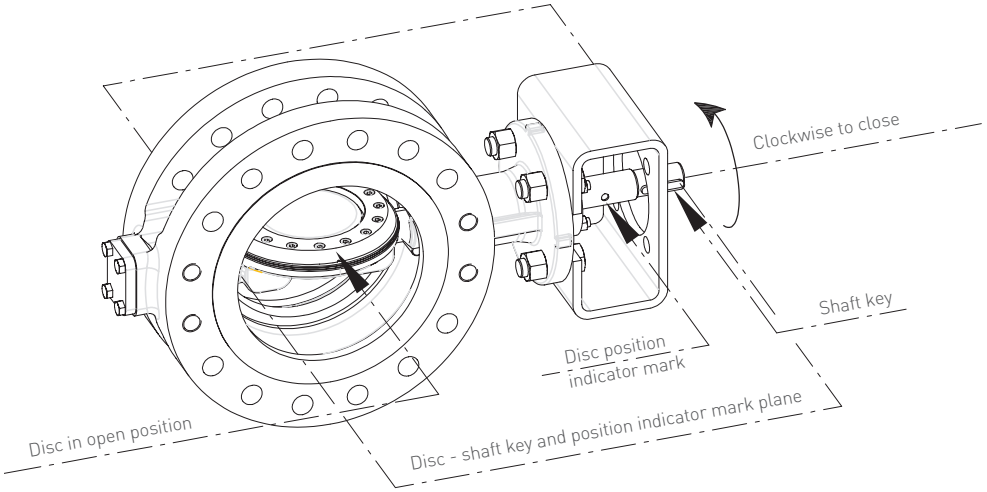


FIGURE 5A

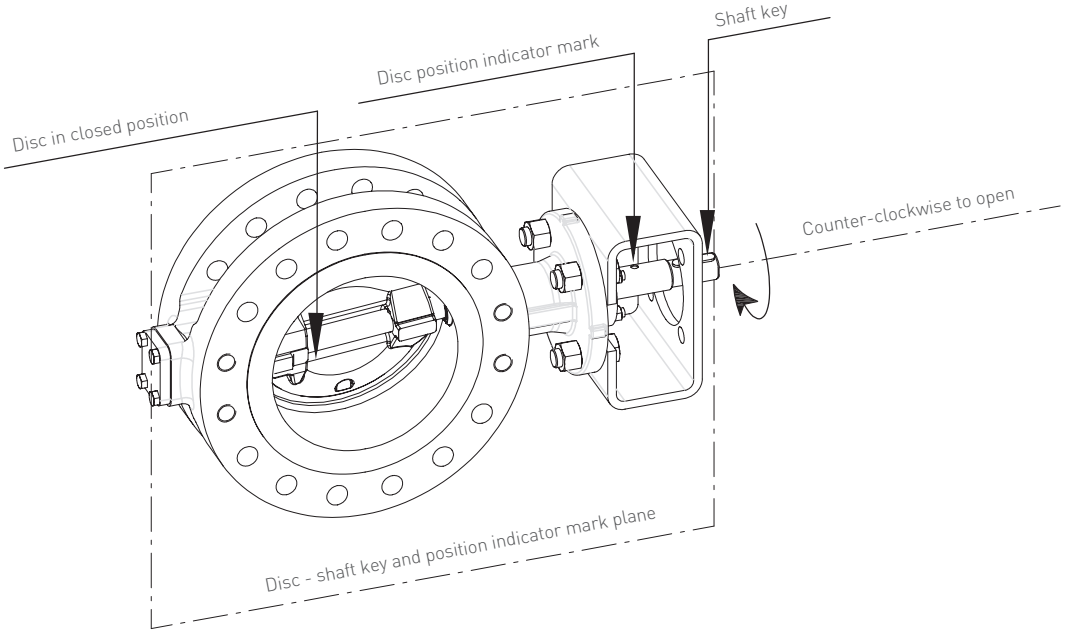


FIGURE 5B

SECTION 3 - USE

3.1 Valve use

Vanessa Series 30,000 TOVs 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 TOVs 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. 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 TOV needs either an actuator or manual gear operator to be operated. To operate the valve, 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	1. Loosen the packing flange stud nuts
	2. Actuator has failed	2. Replace or repair
	3. Valve is packed with debris	3. Flush or clean the valve to remove debris
	4. Shaft key has sheared	4. Determine the cause of shearing and correctly replace the key
	5. Fluid solidification between bearings and shaft	5. Flush the bearings through the flushing holes (if present)
Leakage from packing	1. Packing flange stud nuts are too loose	1. Tighten the packing flange stud nuts slowly and evenly until the leakage stops. Do not exceed the torque value of Table 1A.
	2. Packing is damaged	2. Replace the packing - see Paragraph 4.1
Leakage from bottom gasket	1. Pressure bolts are loose	1. Tighten the bottom pressure bolts
	2. Bottom gasket is damaged	2. Replace the gasket - see Paragraph 4.3
Valve seat leakage	1. Valve is not fully closed	1. Close the valve
	2. Debris is trapped in valve	2. Cycle and flush (with the valve disc open) to remove debris
	3. Actuator mechanical stops are improperly set	3. Remove the stop for closure and reset properly
	4. Seal ring is damaged	4. Replace the seal ring - see Paragraph 4.2
Jerky operation	1. Packing is too tight	1. Loosen the packing stud nuts, cycle the valve, retighten
	2. Actuator supply pressure is inadequate	2. Increase the supply pressure or change the actuator
	3. Actuator/shaft adapter is misaligned	3. Remove the actuator mounting and realign

SECTION 4 - MAINTENANCE

4.1 Packing maintenance

Depending on the cycle rate of the valve, regularly check the packing nuts and tighten in accordance to the nominal torque value reported in Table 1B on page 11.

⚠ WARNING

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

To replace the packing rings proceed as follows and refer to Figure 6:

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 reassembly 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 if present (5g), and the packing bushing (5c).
4. Remove the packing rings (5a). If the valve features the packing flush option, also remove the lantern ring (5h).
5. Carefully clean the packing cavity and shaft (4a).
6. Apply a thin film of lubricant on each new packing ring (5a) surface (lubricant should be in accordance with Table 3). Insert new packing rings, being mindful of inserting the two braided rings at the bottom and top of the entire packing. If the valve features a packing flush option, insert the lantern ring (5h) in the same original sequence (or as indicated in Figure 6). 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 if present (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 the stud nuts (5d) by hand without tightening (after applying a thin film of lubricant on the threads of the stud bolts, in accordance with Table 3).
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. With the valve disc at an opening angle of about 10°, tighten the stud nuts (5d) in accordance with Table 1A on page 11. Apply the torque by steadily increasing the load and maintaining the flange parallel to the top body flange surface.
11. Unscrew the stud nuts (5d) by about 1/2 a turn, then re-tighten in accordance with Table 1B on page 11, always keeping the flange parallel to the top body flange surface.
12. Cycle the valve.
13. Pressurize again the line.
14. If a leakage is detected, tighten the stud nuts slowly and evenly until the leakage stops. Do not exceed the torque value of Table 1A.

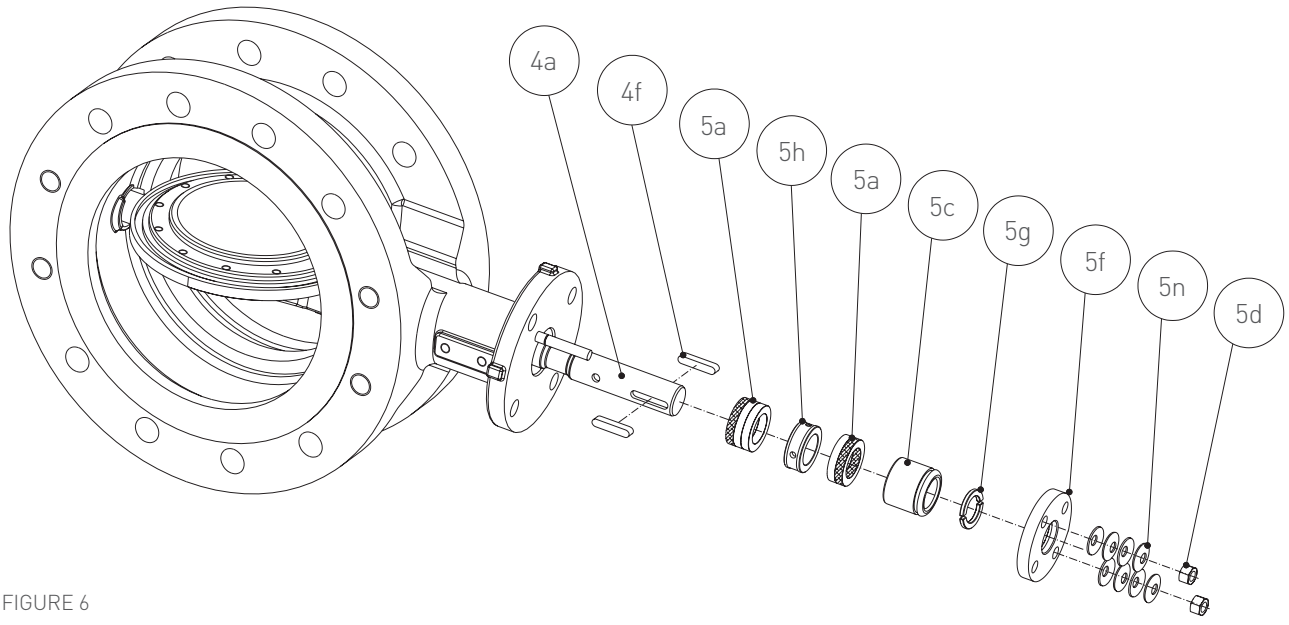


FIGURE 6

4.2 Sealing elements maintenance
To replace the sealing elements proceed as follows and refer to Figure 7 for a correct component identification:

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

1. Remove the valve with the disc in the closed position from the pipeline. Clean the valve according to proper cleaning procedure as outlined by the plant or according to a recommended procedure.
2. Open the valve disc a few degrees.
3. Loosen the retainer flange screws (2c). If screws are secured, unbend the bevel.
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. Carefully remove the retainer flange screws (2c) with security washers (2d) if present, then remove the seal ring retainer flange (2b).
6. Remove the seal ring (3a) and the disc spiral wound gasket (3b).
7. Inspect the body seat. Clean it, if necessary, with fine abrasive paper (600 grade or finer), after having cleaned it perfectly with solvent.
8. Inspect and clean the disc seal ring area and the spiral wound gasket groove. No foreign particles must be present before the disc spiral wound gasket and seal ring assembly.
9. Apply a thin film of lubricant on the surface area of the disc (2a) where seal ring (3a) and disc spiral wound gasket (3b) will be located (lubricant should be in accordance with Table 3).

⚠ CAUTION
Apply only a thin film of lubricant where indicated. Failure to do so will hinder the assembly and may cause damage to the valve.

10. Insert the new disc spiral wound gasket (3b) in the disc groove, without forcing and taking care not to damage it.
11. Replace the seal ring (3a) on the disc through the shaft side of the body. To properly locate the seal ring, refer to Figure 8: align the internal slot of the seal ring (3a) to the reference pin (F).
12. Assemble the retainer flange (2b). Refer to Figure 8: make sure that the slot on the edge of the retainer flange (B) matches the reference pin (F).
13. Insert the retainer screws (2c) in the retainer flange holes. Before doing so, if the retainer screws were not secured by bevels (on the retainer flange near each screw hole), apply the relevant lock washer (2d) and Loctite® 270, or equivalent, on the bottom side of the threads (ensure they are perfectly clean with solvent before applying Loctite®).
14. Hand tighten all the retainer flange screws (2c). Then verify that the seal ring can be moved freely by hand without rotating it.
15. Apply a thin film of lubricant to the body seat and to the external edge (sealing conical surface) of the seal ring (3a). Lubricant should be in accordance with Table 3.
16. Seat and unseat the valve twice.
17. Keep the valve in the closed position without applying torque. Tighten at least two retaining flange screws (2c) to avoid the seal ring moving from the position found.
18. Open the disc a few degrees and tighten all the screws (2c), using a torque wrench. Use a torque value from Table 2. It is recommended to use a cross-pattern tightening sequence to tighten all the retainer flange screws.

IMPORTANT
Refer to Figure 8:
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 12.

19. If the retainer flange screws were secured by bevels (on the retainer flange near each screw holes), use peening tool to re-bend the bevels over each screw and ensure correct and safe screw locking (refer to Figure 9).

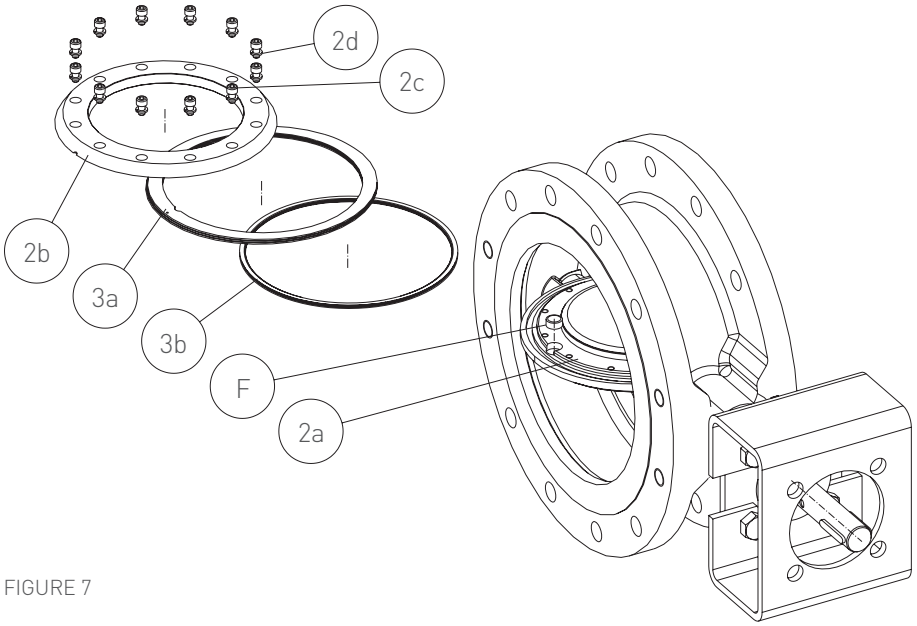


FIGURE 7

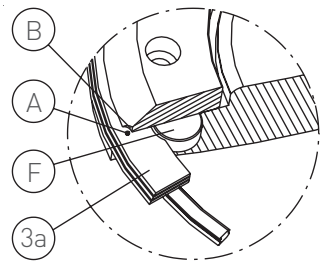


FIGURE 8

4.3 Bottom flange gasket maintenance
If it is necessary to replace the bottom spiral wound gasket, proceed as follows and refer to Figure 10:

1. Remove the bottom flange (6a).
2. Remove the bottom gasket (6c).
3. Inspect and clean the groove of the spiral wound gasket in the body and in the bottom flange.
4. Apply a thin film of lubricant on the bottom spiral wound gasket (6c), then insert it on the bottom flange (6a), centering and positioning all on the body bore (lubricant should be in accordance with Table 3). 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 lubricant on the threads of the pressure bolts (6b), then insert and tighten them using a torque value from Table 2 (lubricant should be in accordance with Table 3).

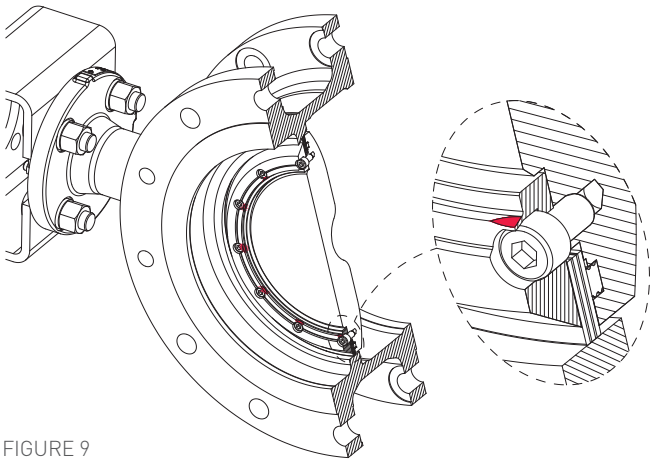


FIGURE 9

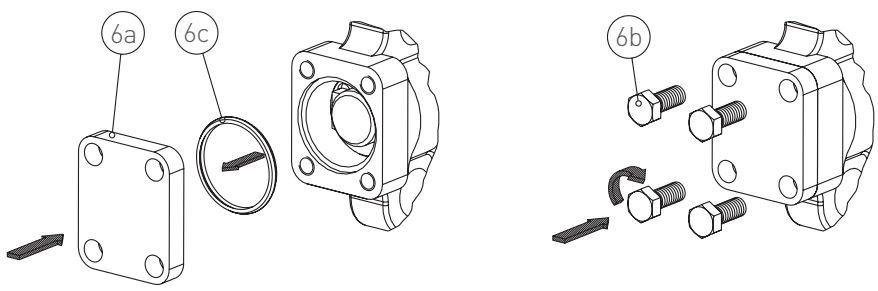


FIGURE 10

SECTION 5 - STANDARD OPTIONS

This section is referred only to Vanessa products configured with the following options:
- bearing and packing flushing,
- live loaded packing.

5.1 Bearing and packing flushing

Bearing flushing

The bearing flushing option is obtained by adding two tapped holes, one in the bottom flange and one in the neck of the valve (see Figure 11). This option includes the introduction of a lantern ring at the bottom of the valve packing. Bearing flushing is recommended when the valve is installed in a service where the particles present in the fluid or the line fluid itself can migrate into the shaft/bearing area causing problems.
A typical example is sulphur recovery services, where the sulphur in a liquid or gaseous state may enter this area and crystallize as a consequence of the plant shutdown.

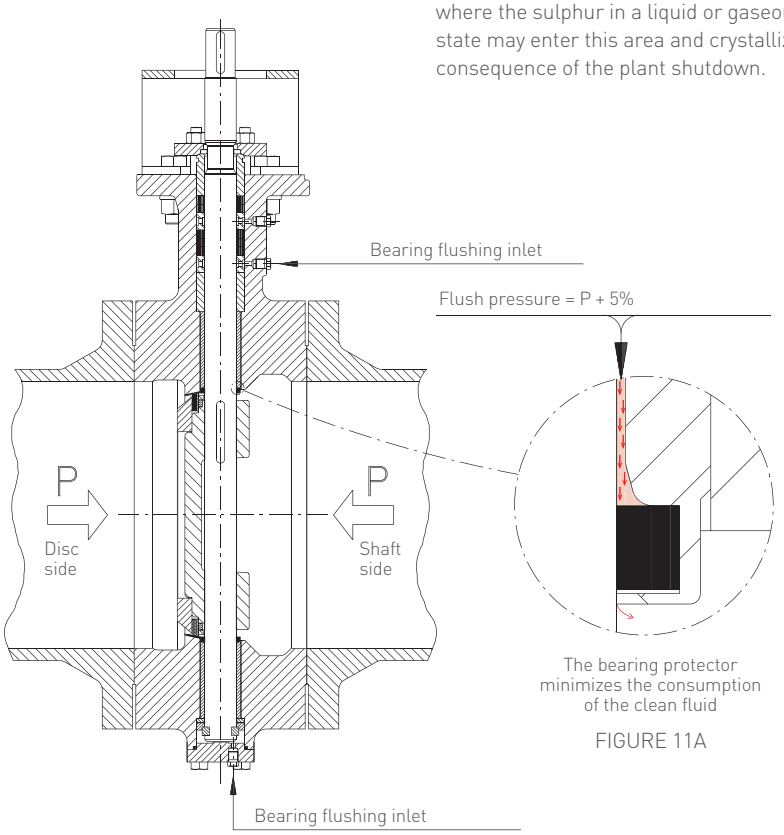


FIGURE 11A

FIGURE 11

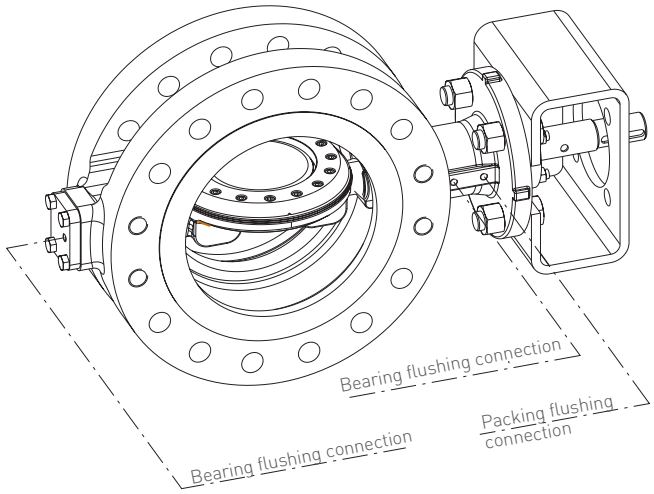


FIGURE 12

This crystallisation may result in an increase in the torque requirement of the valve. Another example may be a fluid that contains particles (e.g. catalyst) that may cause similar problems to those highlighted above.
In these types of situations the bearing flushing may be used to introduce an inert fluid compatible with the process via the bearing flush taps (Figure 12) to create a pressure barrier which prevents the introduction of the unwanted product from the line into the shaft/bearing area. The pressure of the flushing fluid must be slightly higher than the line pressure (approx 5%). This acts as a safety measure and a positive contribution to increase the life expectancy of the valve, as well as maintaining the constant torque requirement and hence operability of the valve.
The bearings may be continuously flushed, this is recommended for critical services such as described above. Periodic flushing may be used for less critical services in order to clean the bearing/shaft interface or in order to prepare the valve for a shutdown of the process.
The bearing flush taps may also be used to introduce a lubricant compatible with the process to the bearing areas for high cycle or dry gas service. The presence of the bearing protector reduces the consumption of the flushing or lubricant by reducing the amount of fluid required to give efficient service (see Figure 11A).
Contact your nearest Emerson sales office for further information.

Packing flushing
The packing flushing option is obtained by the introduction of a tapped hole that communicates directly to the packing box in the neck of the valve via a lantern ring. This option can be used to monitor the rate of emission of the line fluid toward the atmosphere. This flush tap may also be used to capture and evacuate line fluid to prevent any atmospheric loss, with the lantern ring and split packing configuration acting as a double block and bleed unit.

A suitable fluid may also be introduced via the packing flush tap into the packing area so as to eliminate any possible fugitive emissions (Figure 12). By keeping the fluid pressurized at a pressure that is higher with respect to the line pressure, the passage of any line fluid towards the atmosphere can be effectively blocked giving the valve excellent fugitive emissions control. However, the fluid used must be compatible with the line fluid as it may have the possibility of finding its way into the line as well as toward the atmosphere.

As with the bearing flushing option this may also be used to introduce a lubricant compatible with the process.

The selection of the most appropriate type of lubricant for flushing is under the user's responsibility.

5.2 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 nearly constant force supplied by the Belleville springs reduces the maintenance frequency required by the packing (Figure 13).

If maintenance of the valve packing configured as live loaded packing is required, follow the instructions provided at Paragraph 4.1, ensuring care in replacing the Belleville springs as their stack combination shall be kept unchanged.
Figure 13 shows typical set ups for the live loaded packing option.

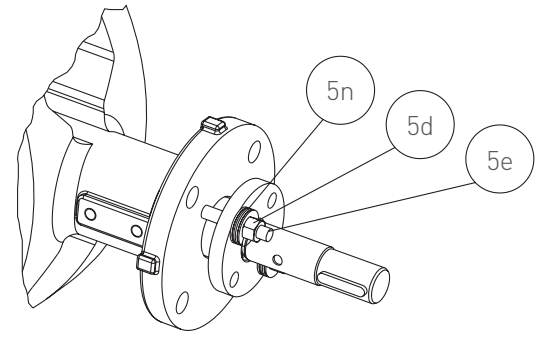


FIGURE 13

TABLE 1A - PRE-ASSEMBLY TORQUE VALUES FOR PACKING FLANGE STUD NUTS

	Nominal pressure	
	ASME CLASS 300 EN PN 40	ASME CLASS 600 - 900 EN PN 63 - 100
	Torque	Torque
Bolt size	N·m	N·m
M10	30	30
M12	45	45
M14	60	60
M16	75	75
M18	90	90
M20	160	160
M24	250	250
M27	315	315
M30	385	400
M33	480	560
M42	-	1000

TABLE 1B - COMPLETION TORQUE VALUES FOR PACKING FLANGE STUD NUTS

	Nominal pressure	
	ASME CLASS 300 EN PN 40	ASME CLASS 600 - 900 EN PN 63 - 100
	Torque	Torque
Bolt size	N·m	N·m
M10	10	15
M12	15	20
M14	20	35
M16	25	50
M18	30	55
M20	80	130
M24	150	225
M27	210	300
M30	265	400
M33	310	560
M42	-	1000

TABLE 2 - GENERAL TORQUE VALUES FOR RETAINER FLANGE AND BOTTOM FLANGE BOLTING

	Torque values
	Torque
Bolt size	N·m
M6	8
M8	18
M10	25
M12	45
M14	70
M16	105
M18	150
M20	205
M22	285
M24	360
M27	525
M30	715
M33	960
M36	1250
M39	1610
M42	2000
M45	2500

TABLE 3 - Lubrication

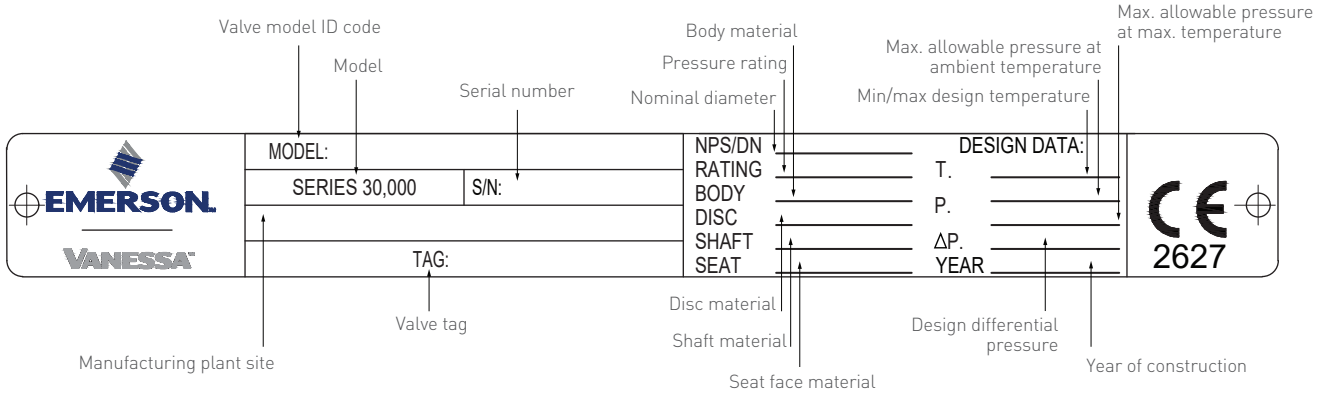
Type	Component to lubricate
Light mineral oil	• Packing rings (5a) • Disc surface areas (2a) for seal ring and gasket location • Bottom gasket (6c)
Molykote® - P74 (grease) or equivalent	• Stud bolts/nuts (5d) • Pressure bolts (6b)
Molykote® spray - 321 R (dry lubricant) or equivalent	• Seal ring (3a) • Body seat

SECTION 6 - DECOMMISSIONING

Instruction for decommissioning

Comply with the national regulations for disposal and recycling.
The comprehensive list of materials is available in the relevant technical literature.

FIGURE 14



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