

INSTALLATION OPERATING MANUAL CARBON STEEL TRIPLE OFFSET BUTTERFLY VALVE

Carbon steel triple offset butterfly valve lug PN40 for steam, heating, geothermics, industrial cold, shipbuilding and petrochemical.

Butterfly valve with firesafe certificate ISO 10497 to reduce risks in case of fire.

Fugitive emission according to EN 15848-1 :2006 C Class for an excellent tightness on the stem and to prevent external leakage.

Compatible with explosive atmosphere, ATEX Zone 1&21 and Zone 2&22.

Handling possible with gearbox.

Thanks to the ISO 5211 plate, an actuator can be installed on the valve.



Certificate
3.1



Size : DN100 to DN300

Connection : Between flanges PN40

Min Temperature : -39°C

Max Temperature : +349°C

Max Pressure : 40 Bars

Specifications : Fugitive emissions

ISO 5211 mounting pad

Fire safe ISO 10497:2010

ATEX

100% tightness

Materials : Carbon steel ASTM A216 WCB

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SPECIFICATIONS :

- 100% tightness
- Lug type
- Between PN40 flanges
- Triple offset
- Bidirectional with preferential flow direction indicated by the arrow (30 bars maximum if the flow is not according to the arrow)
- Fire safe according to ISO 10497 : 2010
- ISO 5211 mounting pad
- Stainless steel CF8M disc
- Full crossing stem
- **Bare shaft (possible with gear box Ref.1191)**
- Inorganic zinc rich primer, gray color, 10 µm thickness
- Finish painting heat resisting aluminum Silver color RAL 9006, 30 µm thickness

USE :

- Heating, geothermics, industrial cold, shipbuilding, petrochemical
- Steam : 30 bars maximum
- Min and max Temperature Ts : - 39°C to + 349°C
- Max Pressure Ps : 40 bars (see graph), 30 bars if valve installed in reverse flow direction indicated by the arrow
- When using at dead end of pipeline, reverse preferential flow direction
- Max pressure at dead end of pipeline is 30 bars

RANGE :

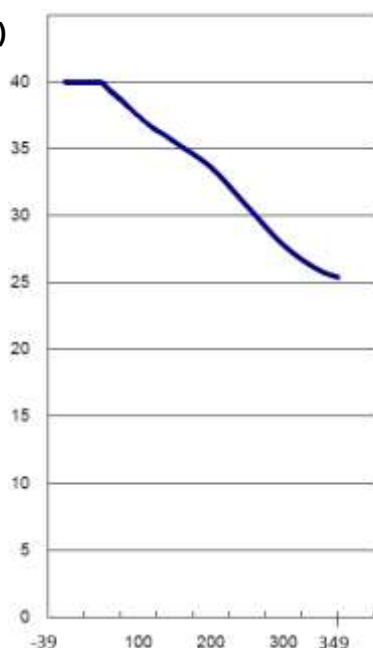
- Triple offset Lug butterfly valve type PN40 **bare shaft Ref. 1118** DN 100 to DN 300
- Gear box **Ref. 1191** from DN 100 to DN 300

ENDS :

- Between PN40 flanges

PRESSURE / TEMPERATURE GRAPH :

PRESSURE (Bar)



TEMPERATURE (°C)

Relation Pressure / Temperature	
Temperature (°C)	Pressure (Bar)
0	40
50	40
100	37.4
150	35.5
200	33.6
250	30.7
300	27.8
349	25.9

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TORQUE VALUE (in Nm with safety coefficient of 30 % included) :

DN	100	150	200	250	300
Torque (Nm) at 12.5 Bar	226	429	504	930	1317
Torque (Nm) at 25 Bar	226	429	529	930	1354
Torque (Nm) at 40 Bar	326	719	1058	1826	2707

GEARBOX SPECIFICATIONS :

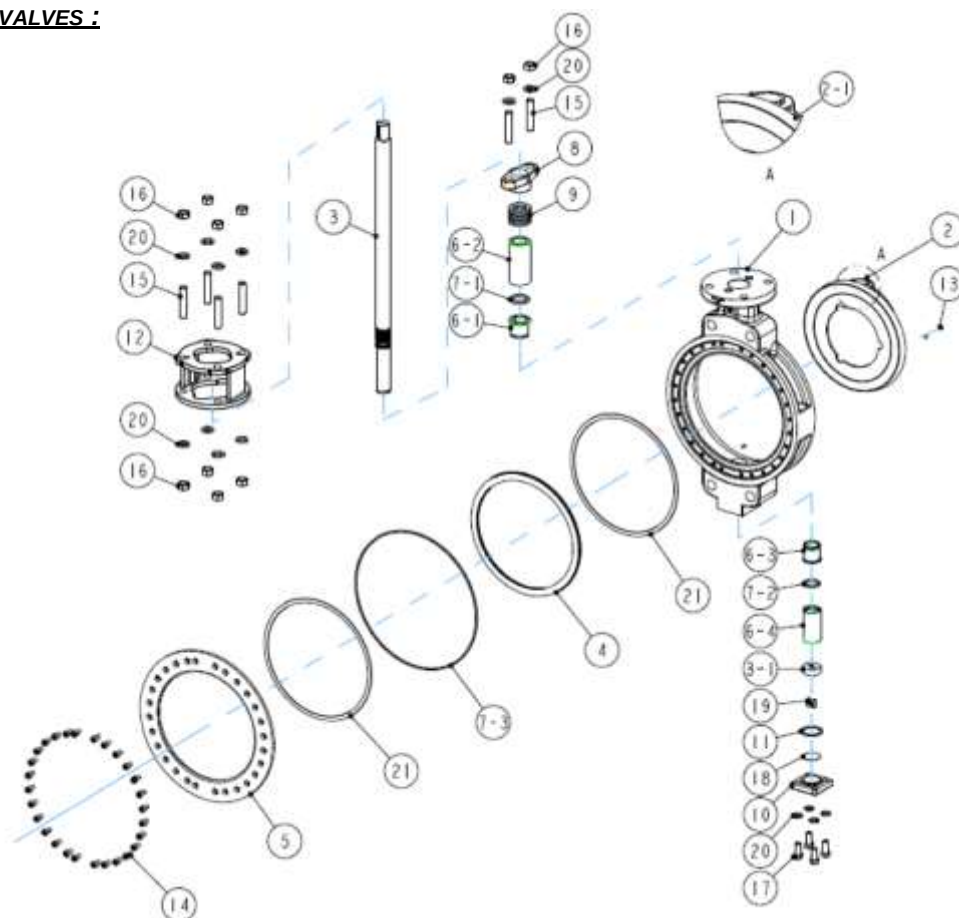
DN	100	150	200	250	300
Ref.	1191003	1191004	1191005	1191006	1191007
Ratio factor	1 : 32	1 : 32	1 : 36	1 : 62	1 : 70
Number of cycles for opening or closing	8	8	9	16	18
Input torque (Nm)	61	61	109	127	225
Output torque (Nm)	490	490	980	1960	3922

FLOW COEFFICIENT Kv (m3 / h) :

DN		100	150	200	250	300
Percent of rated travel	10%	11.2	25.9	40.6	81.3	130.6
	20%	34.6	84.8	134.9	200.7	326.1
	30%	60.5	145.3	247.4	358.1	550.9
	40%	96.9	206.7	363.3	665.1	813.9
	50%	114.2	270.7	503.4	945.3	1114.8
	60%	139.2	328.7	588.1	1021.4	1415.8
	70%	160.9	379.7	723.9	1252.4	1817.1
	80%	178.2	445.4	857.1	1510.1	2159.6
	90%	175.6	507.7	997.2	2051.5	2381.9
	100%	169.5	519.8	1072.5	2076.6	2419.1

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MATERIALS VALVES :



Item	Designation	Materials
1	Body	ASTM A216 WCB
2	Disc	ASTM A351 CF8M
2-1	Disc seat	Stellite Gr.6 Weld overlay
3	Shaft	UNS S32205
3-1	Shaft stop	
4*	Laminated seat	A479 XM-19 + Graphite
5	Retainer	ASTM A351 CF8
6-1*	Bushing	AISI 316 + RTFE
6-2*		
6-3*		
6-4*		
7-1*	Gasket	Graphite
7-2*		
7-3*		
8	Gland	ASTM A351 CF8
9*	Gland packing	Graphite
10	Bottom cover	ASTM A216 WCB
11*	Bottom cover gasket	Graphite
12	Yoke	Ductile iron A536 Gr.65-45-12

Item	Designation	Materials
13*	Stop stud	A193 B8M
14	Socket bolt	A193 B8
15	Stud	
16	Nut	A194 8
17	Bolt	A193 B8
18*	Lock plate	AISI 316 + RTFE
19	Socket bolt	A193 B8
20	Spring washer	A240 304
21*	Gasket	Graphite

(* : spare parts)

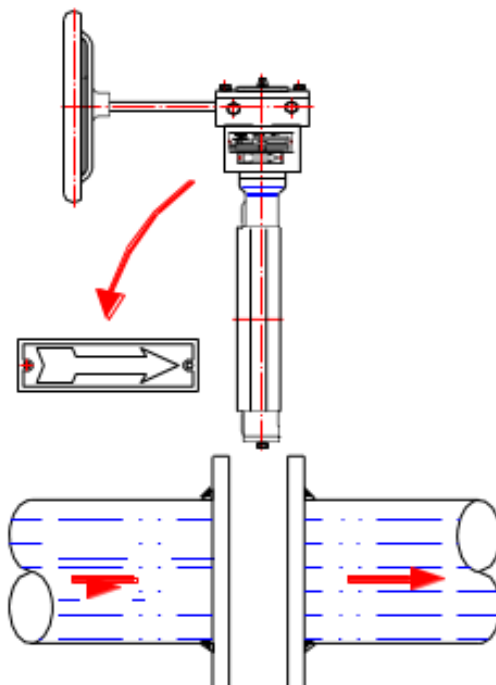
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GENERAL GUIDELINES :

- Ensure that the valves to be used are appropriate for the conditions of the installation (type of fluid, pressure and temperature).
- Be sure to have enough valves to be able to isolate the sections of piping as well as the appropriate equipment for maintenance and repair.
- Ensure that the valves to be installed are of correct strength to be able to support the capacity of their usage.
- **Installation of all circuits should ensure that their function can be automatically tested on a regular basis (at least two times a year).**

INSTALLATION INSTRUCTIONS :

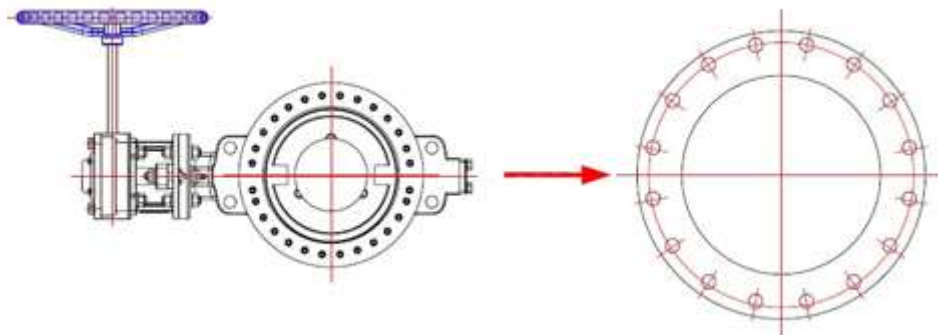
- **Before installing the valves, clean and remove any objects from the pipes** (in particular bits of sealing and metal) which could obstruct and block the valves.
- **Ensure that both connecting pipes either side of the valve (upstream and downstream) are aligned** (if they're not, the valves may not work correctly).
- **Make sure that the two sections of the pipe (upstream and downstream) match, the valve unit will not absorb any gaps. Any distortions in the pipes may affect the tightness of the connection, the working of the valve and can even cause a rupture.** To be sure, place the kit in position to ensure the assembling will work.
- **If sections of piping do not have their final support in place, they should be temporarily fixed. This is to avoid unnecessary strain on the valve.**
- **The valve should be inserted between flanges in closed position to avoid damages on the disc:**



The shaft side of the disc is considered the high-pressure side of the valve, (as indicated on the drawings by a flow arrow) meaning the best closure performance is obtained on this side of the valve, and a determination as to the best installation should be made, to utilize this feature. This may not necessarily be the normal flow direction of the system.

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Please install the valve stem horizontally as figure below, thus could prevent sand and some chips collect around bottom bushing and seat and damage the valve.



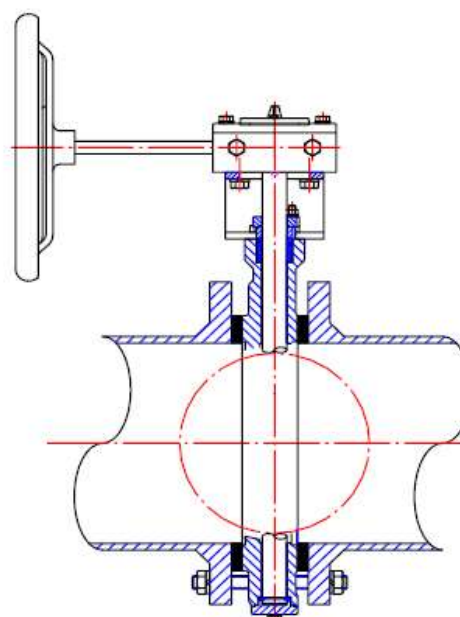
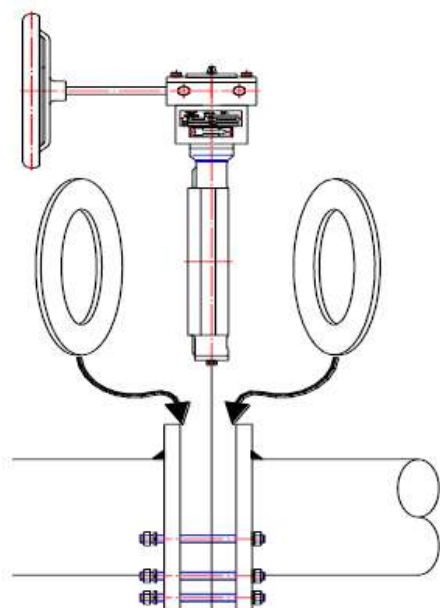
RECOMMENDED

ACCEPTABLE

NO



Insert flange gaskets compatible with the use, each side of the valve as below :

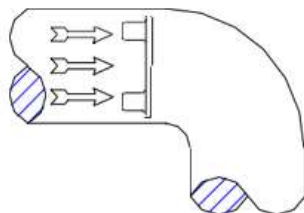


Make sure the valve to installed between flanges and concentrically with flanges, thus could prevent the disc damaged by the interfering with flange and pipeline

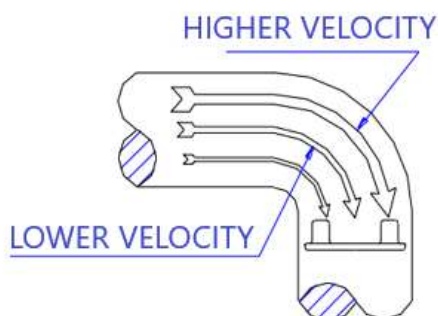
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The typical installation for the butterfly valve connected to an elbow would be to align the shaft axis to allow equal flow on each side of the shaft, minimizing dynamic torque requirements for the valve.

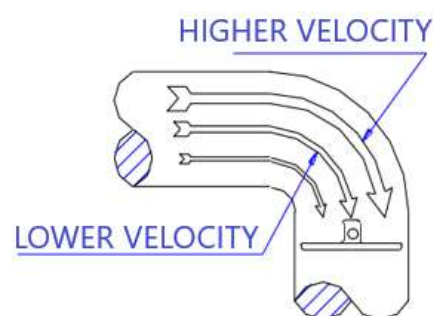
RECOMMENDED



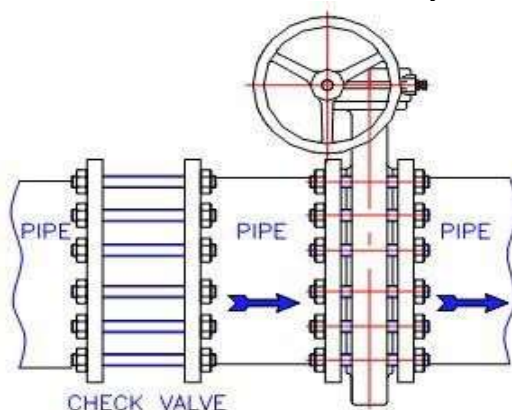
ACCEPTABLE



NO



Using an extension tube between wafer check valve and butterfly valve, never connect them directly



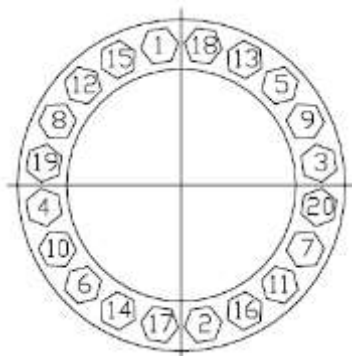
FLANGE CONNECTING AND BOLTING :

- Keep valve protection boards until installation.
- Make sure the material and size of gaskets could be suitable for the service, check the faces of flange and valve are smooth and flat. Sandpaper the faces if there was any harm.
- Check all the bolts and nuts shall be in good condition.
- Apply lubricant such as Molybdenum to all the bolts and nuts before fix them.
- The pipe support(s) may now be required to be partially disengaged. A determination as to pipe flange alignment and space between the pipe flange and the valve face must be made at this time. The optimum spacing would be such as to only allow the flange gasket to be installed, at the maximum, and the flange bolt holes would be concentric.
- The opposite connecting pipe flange face may not be more than 1/4 inch away from the valve flange face. Alternate methods of alignment, other than using the flange bolts, must be utilized to conform with this requirement.
- Install all studs, maintaining uniform clearance between the studs and the mating bolt holes. Additionally the studs spanning the valve assembly should not contact the valve body.
- Seat the flange by alternate tightening of four equally-spaced flange bolts no more than 1/4 turn per bolt, until the flange faces seat. During this operation, it is advisable to continually check the relative distance between the flange faces. Torque the bolts to approximately 25% of the final torque value (see table next page).
- Inspect the remaining bolts and assure correct alignment. Tighten to the same level as the first 4 bolts.

Sferaco 90 rue du Ruisseau 38297 St Quentin Fallavier Tel: + 33 (0) 474.94.15.90 Fax: + 33 (0) 474.95.62.08 Internet: www.sferaco.com E-mail : info@sferaco.fr

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- Complete the tightening of all flange bolting in a minimum of four increments to the final determined torque value.
- Test cycle the valve to be sure that there is no interference or binding.



DN	Bolting size	Max torque (Nm)
100	M20 (3/4")	270
150	M24	450
200	M27	700
250-300	M30	950

REMOVAL PROCEDURE :

To remove your valve from the pipeline, please follow these simple steps:

- Ensure the valve is in the closed position.
- Ensure the line is depressurized.
- Use protective clothing and equipment to prevent injury.
- If your valve is equipped with a fail-open actuator, manual to close the valve or disconnect the actuator then close the valve before removal.
- Attach nylon slings to the body shoulders of the valve and around the body of the actuator.
- Remove the bolts holding the valve to the pipeline flanges.

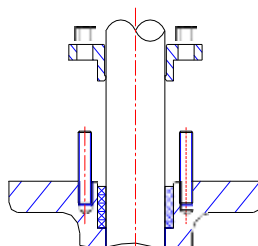
LUBRICATION SCHEDULE :

We recommend your valve to be inspected at least every three months to determine lubrication and other maintenance requirements under your specific service conditions.

STUFFING BOX MAINTENANCE PROCEDURE :

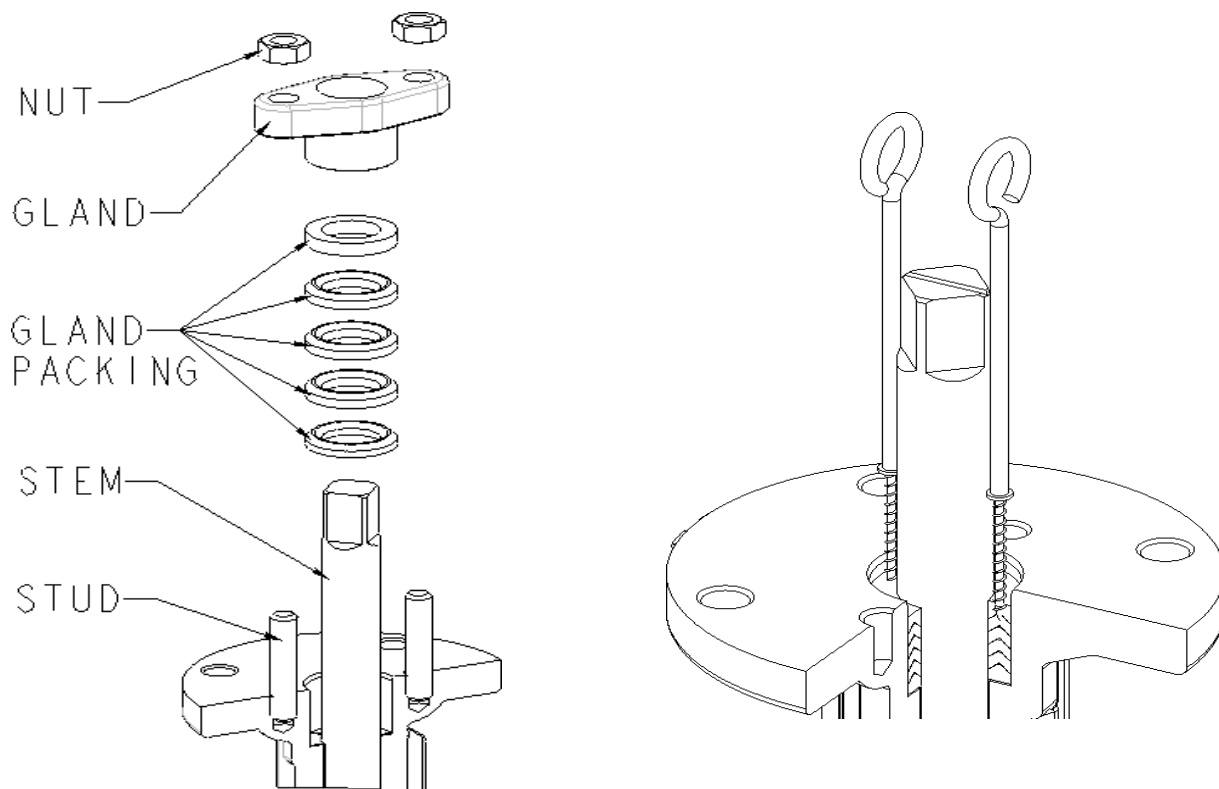
Routine maintenance of the stuffing box consists of tightening the packing gland periodically. If leakage around the stuffing box is discovered, first tighten the hex-nuts on the gland follower (more than 2/3 compression) as this may reduce packing life. If the leakage still persists, replace the packing according to the following procedure. (For clarity, the actuator and bracket are not shown in the following diagrams. It is not necessary to remove the actuator or bracket before performing this procedure).

In order to gain access to the packing, remove the gland follower and slide it up to the actuator. See the diagram below:

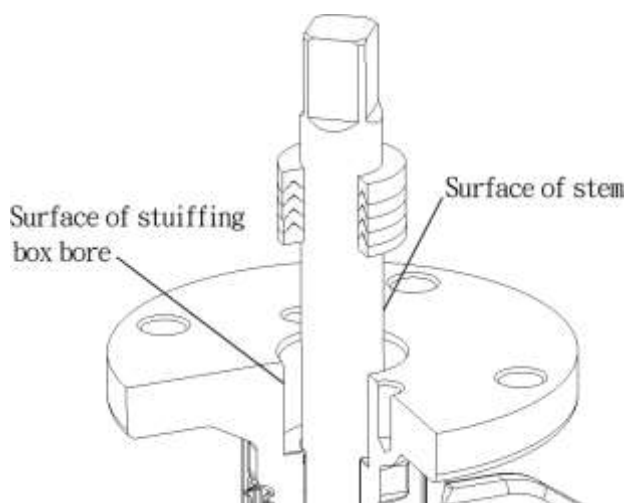


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Remove all of the packing in the stuffing box using a flexible screw hook. For stuffing boxes that contain a lantern ring, use a puller with 10-32 threads to remove the lantern ring. Save the lantern ring for reuse, but discard the other packing material. Please replace all the gland packing no matter the gland packing is made of Graphite.

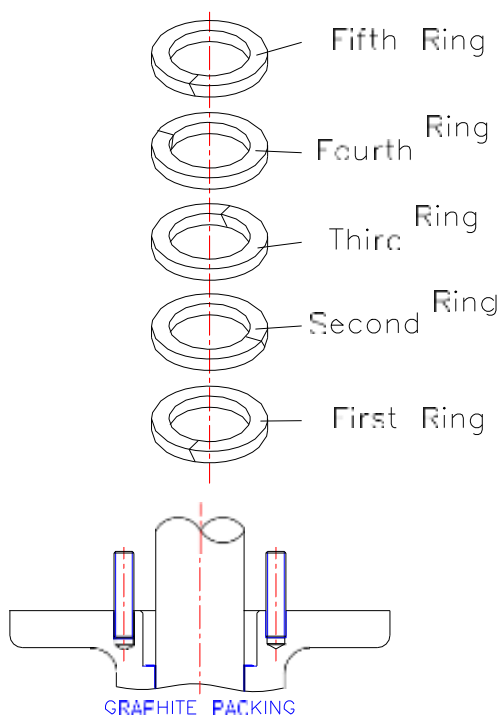


Inspect the drive shaft, bore of the stuffing box, and the gland follower. These surfaces should be relatively scratch free. If there is any damage, polish the surface to 32 rms finish. If any part has severe damage, contact us.



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Install each new ring of packing, use the gland follower to push each ring of packing evenly into position after starting it in the stuffing box bore. Stagger the splice-joints of each packing ring so they are as far as possible from each other (see example above). Usually, rotating each ring until the splice is at 90° from the previous splice is sufficient.



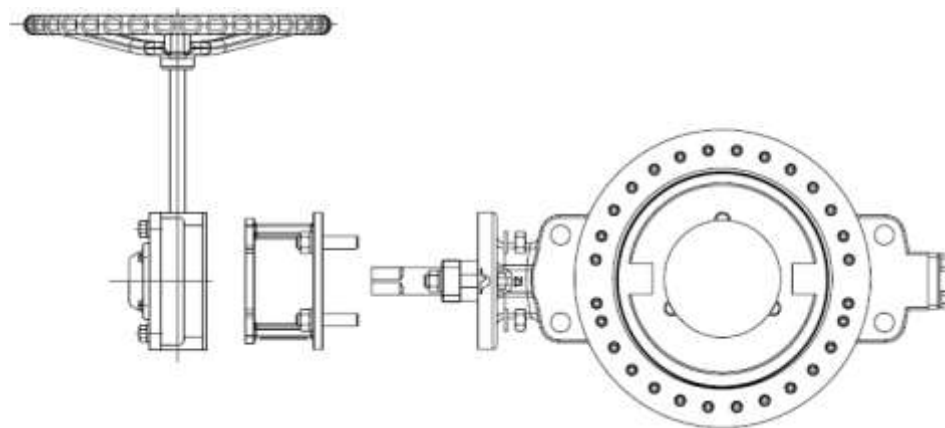
Install the gland follower and tighten it to firmly seat the packing. DO NOT compress the gland follower too much. Over-tightening may dramatically reduce the life of the packing and may make it more difficult to operate the valve. The maximum torque of the gland screw as below

Graphite packing	
Size	Max torque (Nm)
M8	10.8
M10	11.8
M12	13.7
M16	44.1
M20	63.7

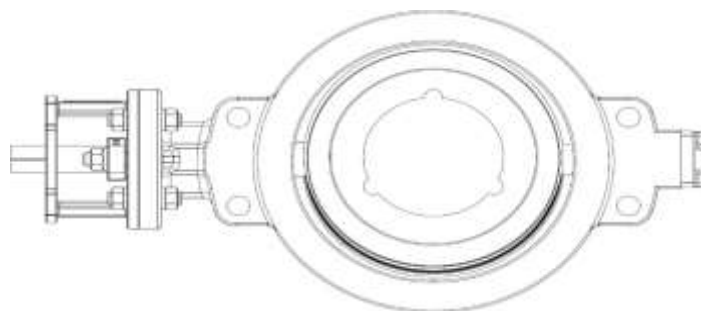
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REPLACE BODY SEAT :

To make a mark for reassemble on the operator, yoke and body mounting flange before disassembling.



It's easier to loosen and remove the bolts and take off the retainer, gasket and body seat. To make a mark for reassemble on the retainer and body before disassembling.

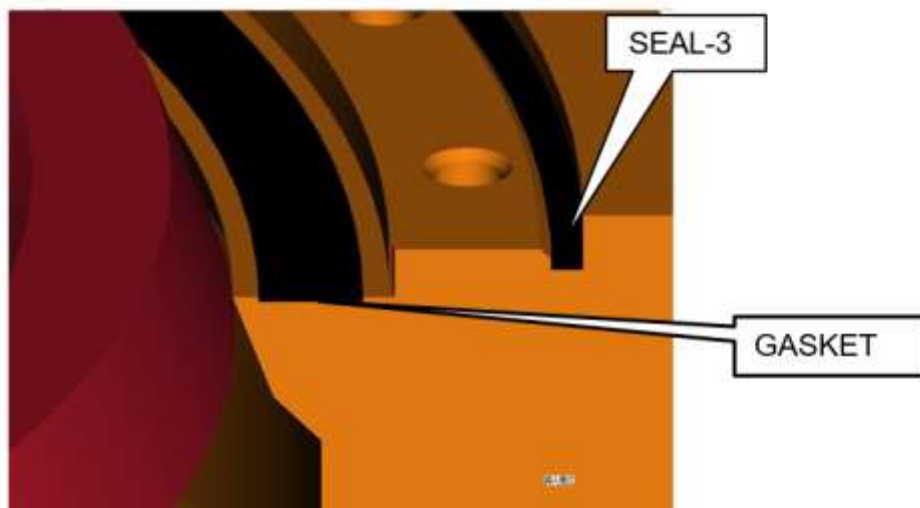


Loosen all bolts from the retainer by hexagonal wrench.

Take off the retainer, gasket (body retainer), body seat. gasket (body seat) and seal-3 in sequence.

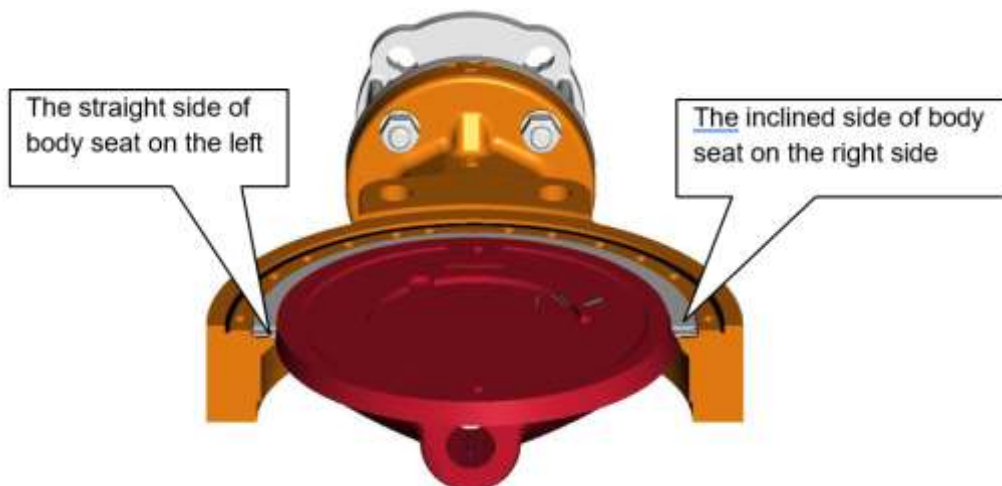
Clean the body seat and all components of body, disc and retainer.

Put a new seal-3 and gasket into the groove of the body seat

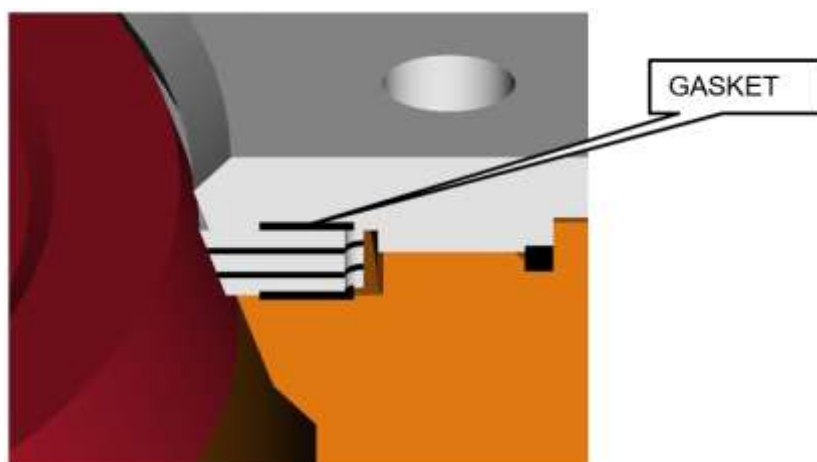


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Please refer below for assembling the body seat.



Please refer to Fig.19 for putting new gasket (seal-3) into the body groove



Please refer to Fig. below for assembling the retainer. Firstly, put back the bolts into the holes of retainer and tighten the bolts a slightly. After turning the disc anti-clockwise towards the opening direction, turn around the valve and tighten the bolts in a diagonal sequence



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CHANGE BOTTOM COVER GASKET :

Loosen and remove the bolts from the body bottom cover and take off the bottom cover and gasket (11).

Replacing the gasket (11) with a new one, put back the bottom cover and the bolts, and tighten the bolts in a diagonal sequence.



ASSEMBLY AND DISASSEMBLY :

Assembly

Clean all valve components and free from oil, grease and dust.

Inspect all components for damage before starting to assemble. Look especially for damage to the disc seal ring and body seat surface, and wear in the bearing areas of the body and drive shaft.

Insert the shaft and the disc into the body inner diameter, holding it at the opened position. The disc is double eccentric and closes clockwise. Ensure the eccentricities of the disc and body will be in the same position when close.

(The top mounting position should be side up when doing shaft assembly. Direction indicated hole in the left side when face to retainer side. The square shaft/key way paralleled the disc)

Insert the drive shaft bearing and bottom shaft bearing into the body.

Open the disc nearly 180°. In this position it is possible to assemble the seal ring, and the seal ring retainer.

Position the seal ring on the body, then place the seal ring onto the body.

Place the seal ring retainer onto the body. Insert the lock washers and hex-socket cap screws into the seal ring retainer and lightly tighten them.

Turn the disc anti-clockwise into the opened position, then tighten the hex-socket cap screws fully.

Insert the packing retainer and packing ring into the drive side packing gland.

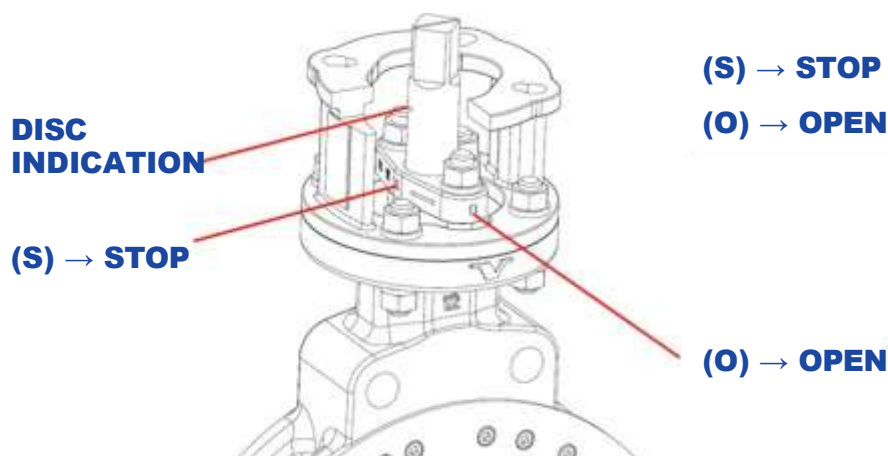
Insert the studs into the threaded holes in the drive side packing gland.

Install the packing filler and tighten it into position with the hex nuts. Do not tighten on hex nut further than the other.

Install the blind flange with gasket and tighten it into position with the hex-socket cap screws.

The valve is now ready for actuator mounting. The disc is held quite securely in position, so the actuator may be pushed onto the shaft then moved to the desired fail position. Please consult the actuator's literature for further details.

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Disassembly

Place the valve on a bench or other suitable working surface with the drive shaft side of the valve up. Remove the actuator and actuator bracket from the valve.

Separate the packing follower by removing the hex-nuts from the studs, then remove the studs.

Remove the packing using a flexible screw-hook.

Remove the packing retainer, being careful not to damage the finish of the packing gland bore or the drive shaft.

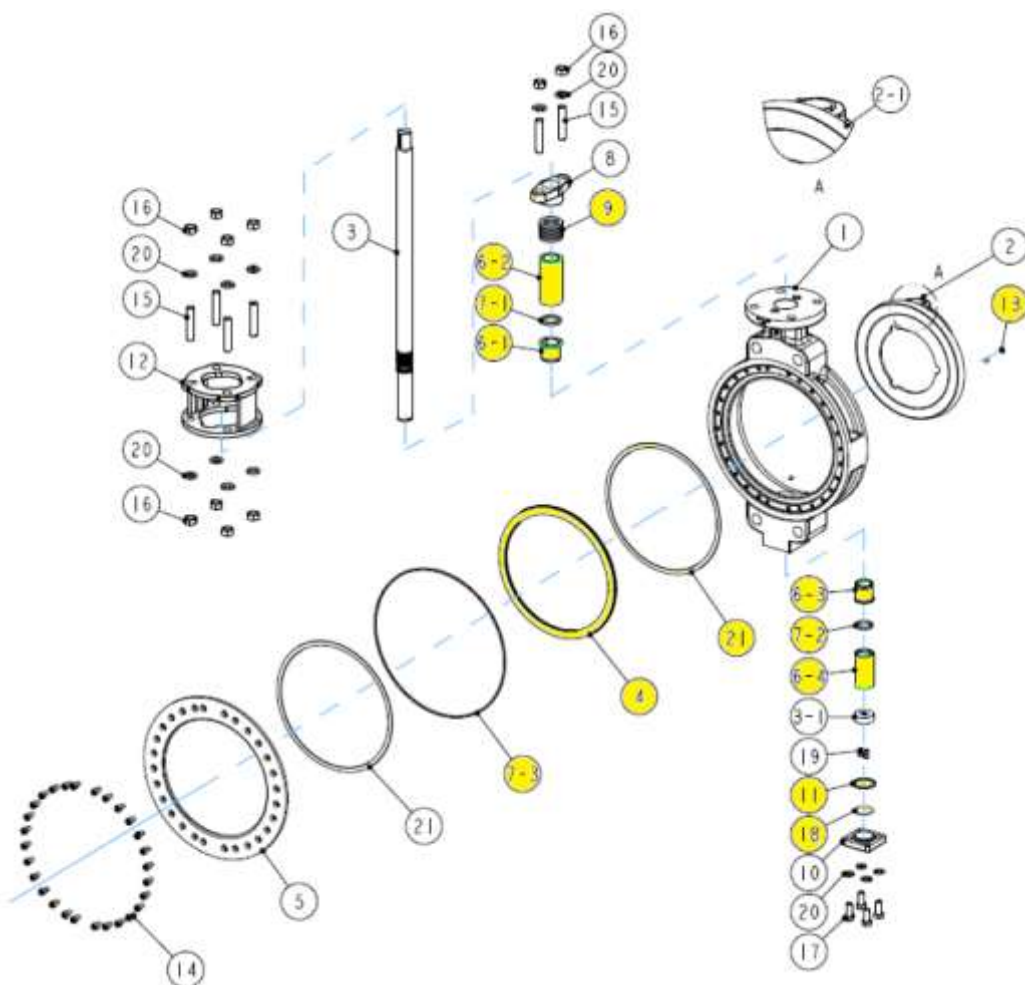
Open disc at 90° then separate the seal ring retainer, and seal ring the body.

Close the disc, and support the opposite side of the disc to prevent damage to the shafts while drilling out the shaft stop(3-1) and stop stud(13).

Pull out the stem and remove the disc from the body. Disassembly is now complete.

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SPARE PARTS :



Item	Designation	Materials
1	Body	ASTM A216 WCB
2	Disc	ASTM A351 CF8M
2-1	Disc seat	Stellite Gr.6 Weld overlay
3	Shaft	UNS S32205
3-1	Shaft stop	
4*	Laminated seat	A479 XM-19 + Graphite
5	Retainer	ASTM A351 CF8
6-1*	Bushing	AISI 316 + RTFE
6-2*		
6-3*		
6-4*		
7-1*	Gasket	Graphite
7-2*		
7-3*		
8	Gland	ASTM A351 CF8
9*	Gland packing	Graphite
10	Bottom cover	ASTM A216 WCB
11*	Bottom cover gasket	Graphite
12	Yoke	Ductile iron A536 Gr.65-45-12

Item	Designation	Materials
13*	Stop stud	A193 B8M
14	Socket bolt	A193 B8
15	Stud	
16	Nut	A194 8
17	Bolt	A193 B8
18*	Lock plate	AISI 316 + RTFE
19	Socket bolt	A193 B8
20	Spring washer	A240 304
21*	Gasket	Graphite

(* : spare parts)

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TROUBLESHOOTING GUIDE :

Please try the following procedures before contacting us.

LEAKAGE FROM STUFFING BOX

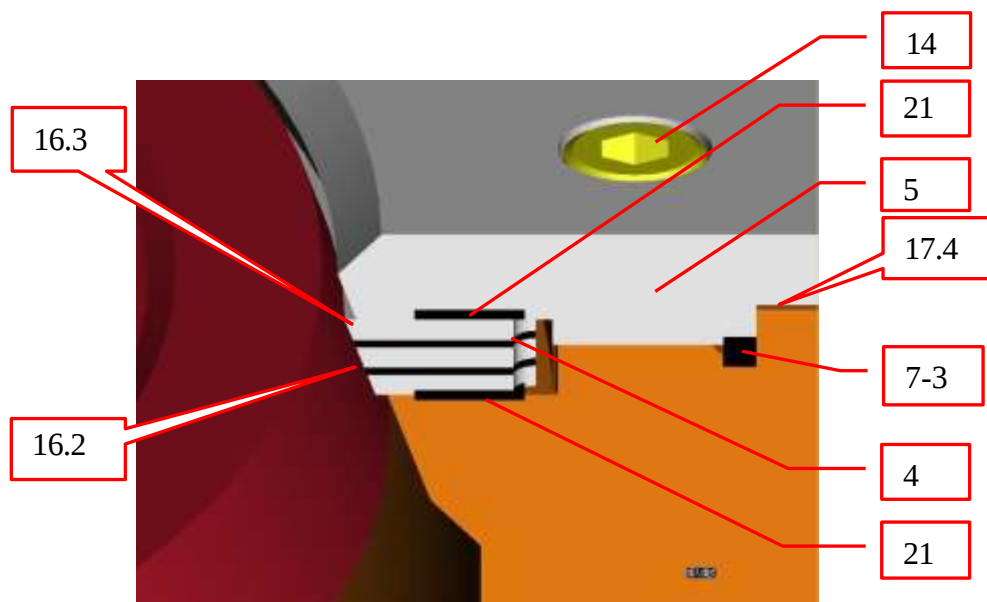
If leakage around the stuffing box is discovered, first tighten the nuts on the gland follower to stop the leakage. Do not over tighten the gland follower (more than 2/3 compression) as this may reduce packing life. If the leakage still persists, replace the packing according to the procedure in the “ Stuffing Box Maintenance Procedure” section.

LEAKAGE BETWEEN BODY SEAT AND DISC

Inspect Seal Ring for damage or excessive wear. If necessary, the Seal Ring may be lightly hand polished using wet 400grit sandpaper. If leakage persists, or if not damage is evident, open and close the valve 4 to 5 times, shutting it TIGHTLY each time. Re-check for leakage. If the valve still leaks in this area, strike the back of the disc near the perimeter with a lead bar (or similar soft headed instrument to prevent damaging the disc) to firmly seat the disc. Be sure to apply the force in a direction that will assist in closing, not opening the disc. If leakage in this area persists, check the Seal Ring for roundness. If the Seal Ring is out of round greater than its diameter times 1.00×10^{-3} ($D \times 0.001$), orient the seal ring with the longest dimension perpendicular to the valve shaft, and re-test for leakage. If leakage still preexists, contact VALUE VALVES for repair.

LEAKAGE BETWEEN BODY SEAT AND SEAL RING (5) OR DISC

Firstly, ensure the bolts of retainer (14) were tightened in a diagonal sequence. If leakage persists, please disassemble the retainer (5) and inspect the gasket (21). If found the damage, please replace the gasket.



LEAKAGE BETWEEN BODY SEAT AND BODY.

Firstly, ensure the bolts of retainer (14) were tightened in a diagonal sequence. If leakage persists, please disassemble the retainer (5) and inspect the seal-3 (7-3). If found the damage, please replace the gasket.

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On Service :

Do not touch the valve body when it is on service.

Do not loose flange bolts, valve bolts when valve is on service.

The valve must be supported when pipeline vibration, so that pipeline stresses are not transmitted to the valve and actuator.

Do not use a "F" wrench to operate the hand wheel of gear box.

If there are any problems could not be eliminated during service , Please contact Value Valves Co., Ltd. and describe damage condition then we could serve you as sooner as we could. (Fig.31)

Maintenance

Maintenance man should be trained before doing the repair.

Do not replace the gaskets when the pipeline was working or pressured.

Repainting the valve when it rusted.

If finding the parts of valve has been corroded, please replace a new one.

Please measure the thickness of the body when maintaining to realize the body is still workable or not. Please see tab below.

Pay attention the abrasion of stem, disc and seats and realize they are still workable.

Do very clear mark and protection procedure when the flow medium is poison.

Please mark sure the piping no pressure and the temperature must be lower than 37°C before remove the valve.

DN	Wall thickness (mm)
100	7.7
150	9.4
200	11
250	12.7
300	14.3

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STANDARDS :

- Manufacturer certified ISO 9001 : 2015
- DIRECTIVE 2014/68/UE : For Liquids and Gas of Group 1
 - DN100-300 : Risk Category III, CE0035 marking
- Designing according to API 609
- Marking according to MSS SP-25
- Tightness tests according to ISO 5208, Rate A and ANSI FCI 70-2-2006 Class VI
- Between flanges according to EN 1092-1 PN40
- ISO 5211 mounting pad
- Length according to EN 558 series 109 (API 609 table 2 Class 300)
- Fire safe according to ISO 10497 : 2010
- Fugitive Emissions according to EN 15848-1 : 2006, Class C
- ATEX Group II Category 2 G/2D Zone 1 & 21 Zone 2 & 22 according to directive 2014/34/EU (Optional marking)
- SIL2 according to IEC/EN 61508, SIL 3 possible according to installation

ADVICE : Our opinion and our advice are not guaranteed and SFERACO shall not be liable for the consequences of damages.
The customer must check the right choice of the products with the real service conditions.