DOCUMENT TITLE.	INSTALLATION, MAINTENANCE & REPAIR PROCEDURES FOR BUTTERFLY VALVES

REV'NO.	DATE	REVISION DESCRIPTION	PREPARED BY	REVIEWED BY	APPROVED BY
A	2002.03.10	FIRST ISSUED			

I .Butterfly Valve Function

1. **Butterfly Valve Seat/Disc Function** - Before reviewing the proper installation, maintenance, and repair procedures for butterfly valve, let's discuss the seat-disc function of a butterfly valve, whether like CRB-series or hard back in design, generally has molded o-rings on the flange face of the seat. As a result, no gaskets are required as these o-ring serve the function of a gasket. Before installation, the flange face and molded o-rings of the seat extend beyond the body face-to-face to ensure sealing at the flange faces.

The seat material which extends past the face is compressed in installation and flows toward the center of the valve seat I.D. In crease, the elastomer seat acts as a liquid, and the displaced elastomer moves toward the point of least resistance. As one may recall, the seat I.D. of all resilient-seated butterfly valves is smaller than the disc O.D. This difference, the disc-seat interference, has been engineered by all reputable manufacturers so as to be the basis for pressure rating capability and the related seating/ unseating torques. Any change in this interference due to improper installation directly affects the pressure rating and seating/unseating torques.

Finally, unlike many valve types, the butterfly valve's disc actually extends beyond the face of the valve body at given angles of opening (say, 30°or more) when installed between flanges. Therefore, it is very important before installation to ensure the critical chord dimension of the at the full open position is less than the adjacent pipe flange I.D.

Given this brief discussion on the butterfly valve seat and disc, the following is a discussion of recommended procedures to ensure proper installation and maintenance of KLAUS UNION butterfly valves.

II. Shipment & Storage

A. The seat, disc, stem, and bushing of the butterfly valve should be coated with silicone lubricant as recommended.

B. The disc should be positioned at 10°open.

C. The faces of each valve should be covered with cardboard, plywood, plastic plates, etc. to prevent damage to the seat face, disc edge , or butterfly valve interior.

D. Valves should be stored indoors with face protectors intact. Temperature should preferably be 5℃ to 30℃.

E. When valves are stored for a long time, open and close the valves once every 3 months.

F. Ship and store valves so that no heavy loads are applied to the bodies.

III. Installation Considerations- Piping and valve Orientation and Placement

A. Piping and Flange Compatibilities - The Series CRB, CTB, CHB. butterfly valves have been designed to be suitable for all types of JIS 5K, 10K, 16K, BS 4504 PN 10/16, ANSI 125/150 and BS 10 TABLE D/E flanges, wether flat-faced, raised-face, slip-on, weld-neck, etc. These valves have been engineered so that the critical disc chord dimension at the full open position will clear the adjacent inside diameter if mist types of piping, including Schedule 40, lined pipe, heavy wall, etc. If in question, one should compare the minimum pipe I.D. with the published disc chord dimension at full open.

B. Valve Location and Orientation in piping

1.Valve Location

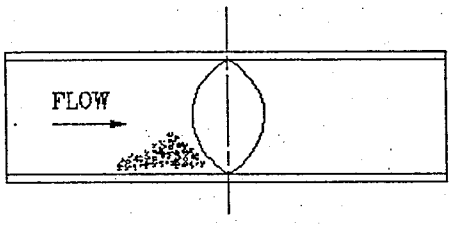
a. Butterfly valves should be installed if possible a minimum of 6 pipe diameters from other line elements, i,e., elbows, pumps, valves, etc. Of course, 6 pipe diameters are not always practical, but it is important to achieve as much distance as possible.

b. Where the butterfly valve is connected to a check valve or pump, use an expansion point between them to ensure the disc does not interfere with the adjacent equipment.

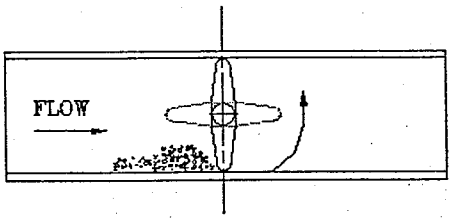
2. Valve Orientation

a. In general, KLAUS UNION recommends the valve be installed with the stem in the vertical position and the actuator mounted vertically above the valve, however, there are those applications as discussed below where the stem should be horizontal.

b. For slurries, KLAUS UNION recommends the valve be installed with the stem in the horizontal position with the lower disc edge opening in the downstream direction.



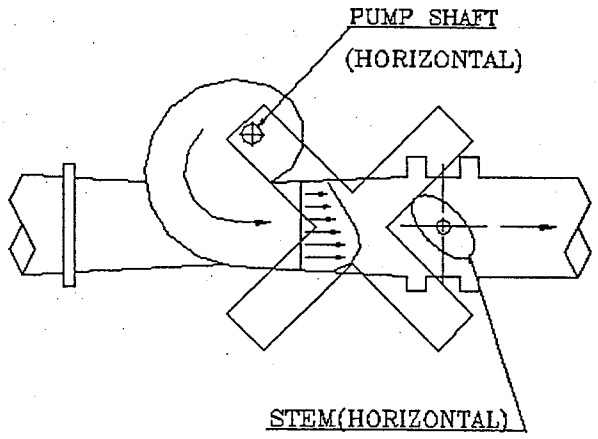
INCORRECT INSTALLATION



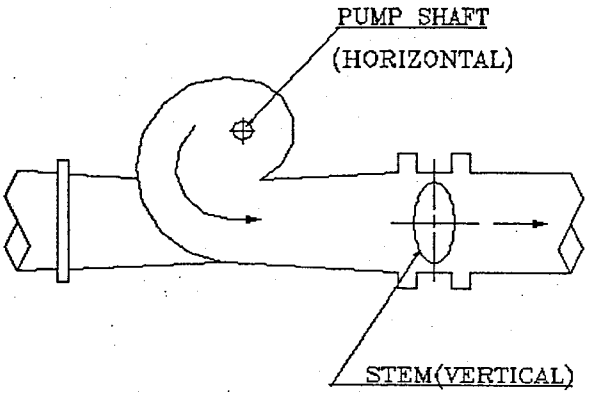
CORRECT INSTALLATION

c. Butterfly valves located at the discharge of a pump should be orientated as follows:

i .) For Centrifugal Pump - Pump shaft horizontal and stem vertical

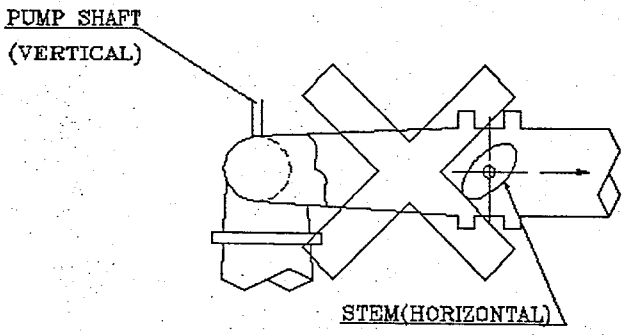


INCORRECT INSTALLATION

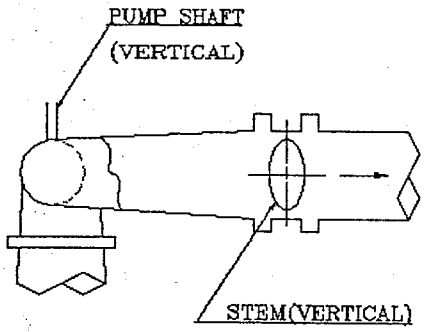


CORRECT INSTALLATION

ii .) Centrifugal Pump - Pump shaft vertical & stem horizontal

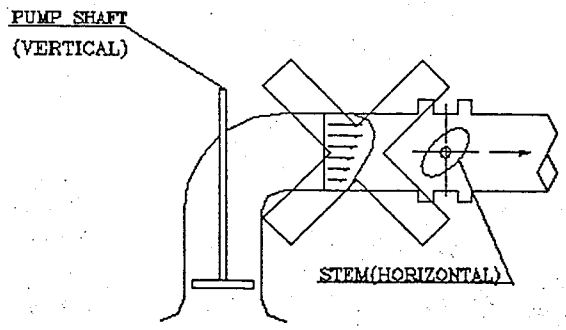


INCORRECT INSTALLATION

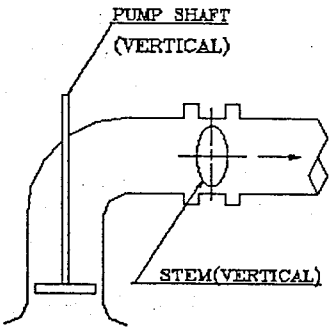


CORRECT INSTALLATION

iii .) Axial Pump - Pump shaft vertical & stem vertical



INCORRECT INSTALLATION

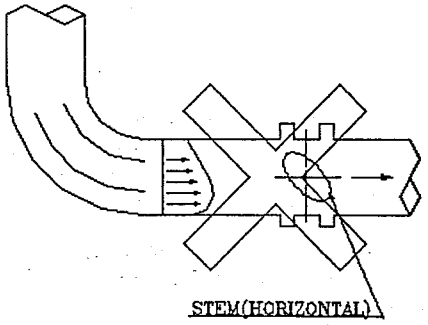


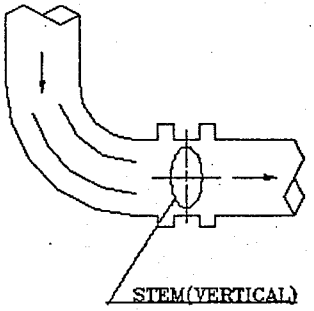
CORRECT INSTALLATION

d. Butterfly valves located downstream of a bend or pipe reducer should be orientated as follows :

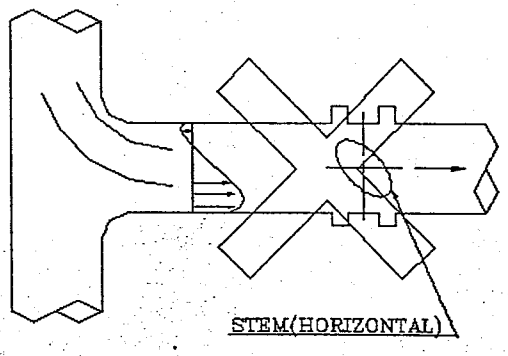
INCORRECT INSTALLATION **CORRECT INSTALLATION**

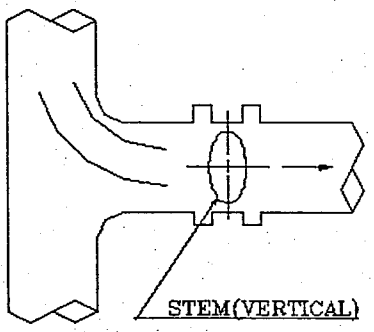
i .) Bend



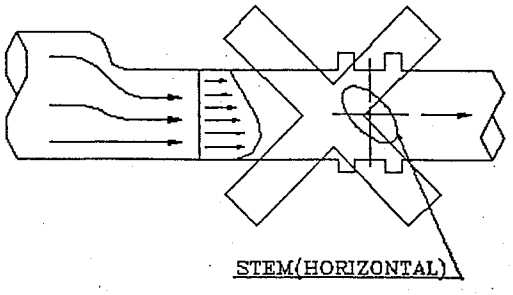


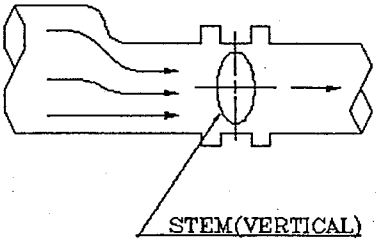
ii .) Tee



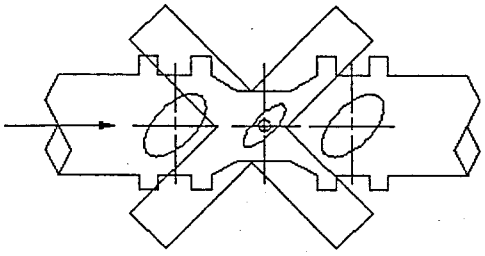


iii .) Pipe Reducer



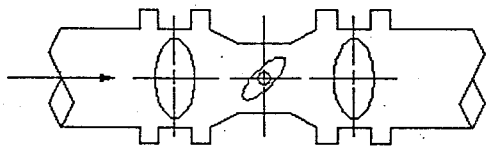


e. Butterfly valves in combination for control/isolation applications should be installed as follows :



INCORRECT INSTALLATION

Combination with all valve stem in the same direction accelerates possible noise, vibration, & erosion problems.



CORRECT INSTALLATION

Combination with the stem of the control valve at right angle to those of other valves tends to cancel the drift of the fluid, and reduces noises, vibration and erosion.

iv.) Installation Procedure

A. General Installation

1. Make sure the pipeline and pipe flange faces are clean. Any foreign material such as pipe scale, metal chips, welding slag, welding rods, etc., can obstruct disc movement or damage the disc or seat.

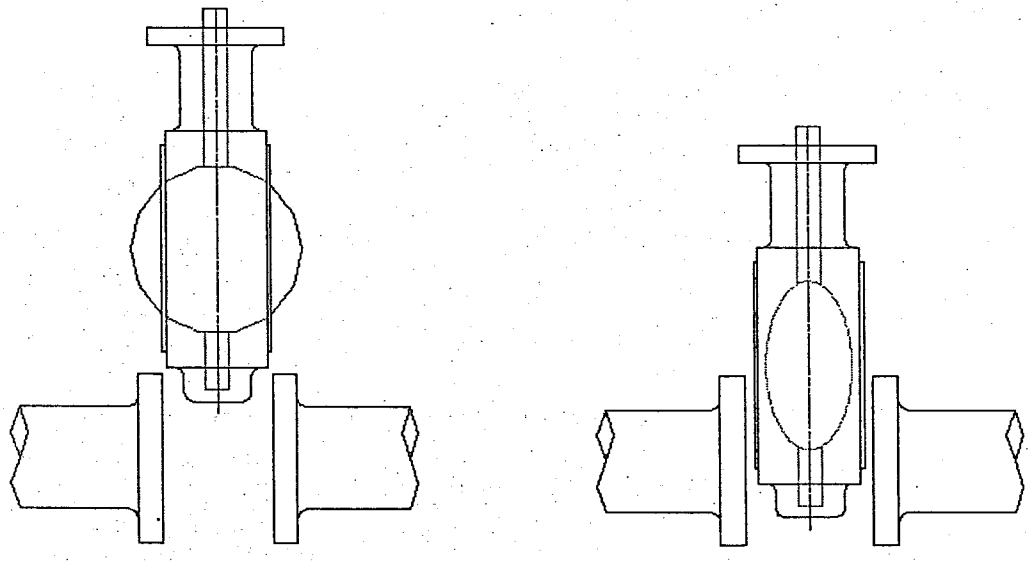
2. The KLAUS UNION elastomer seat has molded o-rings on the face of the seat. As a result, no gaskets are required as these o-rings serve the function of a gasket.

3. Align the piping and then spread the pipe flanges a distance apart so as to permit the valve body to be easily dropped between the flanges without contacting the pipe flanges (See Figure 1).

4. Check to see that the valve disc has been positioned to a partially open position with disc edge about 6.3mm to 9.5mm from the face of the seat, approximately 10°open (See figure 1).

5. Insert the valve between the flanges as shown below, taking care not to damage the seat faces. Always pick up the valve by the actuator or operator mounted on top of the valve.

Figure 1- Insert Butterfly Valve Between Flanges



WRONG

Pipe not spread, disc opened beyond valve body face; Results: Disc edge damaged when it hits pipe flange.

RIGHT

Pipe spread & aligned, disc rotated; Result; No undesirable beginning seating/unseating torque, disc edge protected.

6. Place the valve between the flanges, center it, and then span the valve body with all flange bolts, but do not tighten the bolts. Carefully open the disc to the full open position, making sure the disc does not hit the adjacent pipe I.D. Now systematically remove jack bolts or other flange spreaders, and hand-tighten the flange bolt as shown in figure 2. Very slowly close the valve disc to ensure disc edge clearance from the adjacent pipe flange I.D. Now open the disc to full open and tighten all flange bolts per specification as shown in Figure2. Finally, repeat a full close to full open rotation of the disc to ensure proper clearances (See Figure 3 & 4).

Figure 2 - Recommended Bolt Tightening Sequence

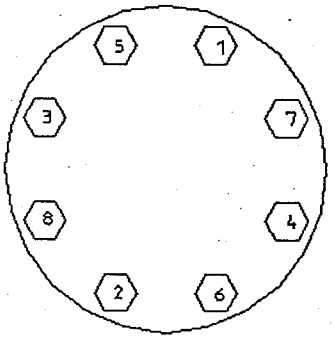
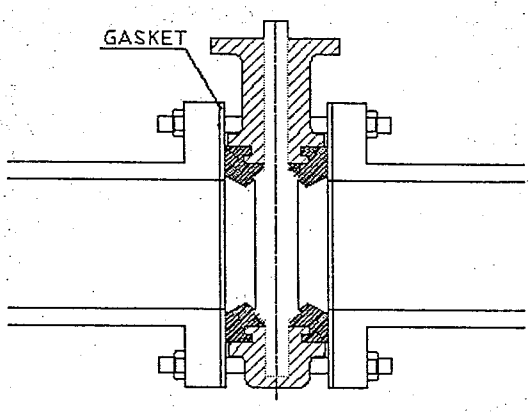
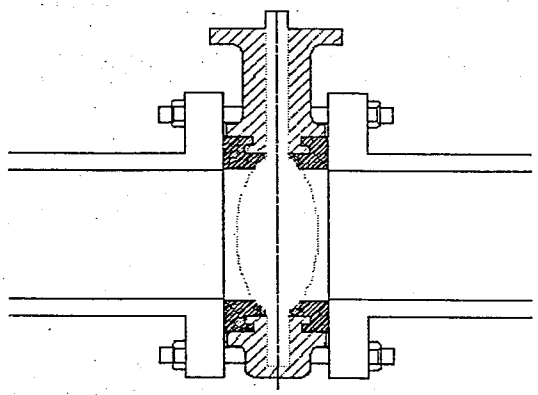


Figure 3 - Initial Centering & Flanging of Valve



WRONG

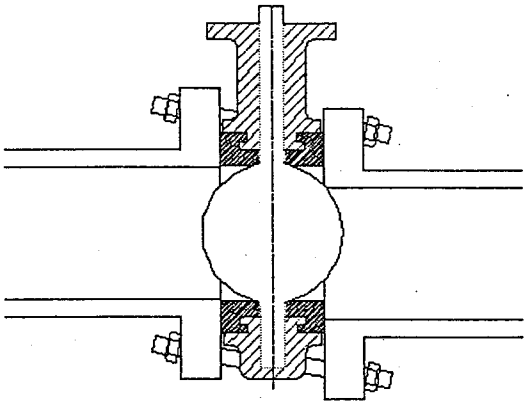
Piping misaligned; Results Disc O.D. strikes pipe I.D. causing disc edge damage, increased torque & leakage. Seat face o-ring seal improperly without engagement.



RIGHT

Bolts spanned, disc edge within body face-to-face, no flange gaskets ; Results - No disc edge damage, proper sealing allowed.

Figure 4 - Final Aligning & Tightening of Flange Bolts



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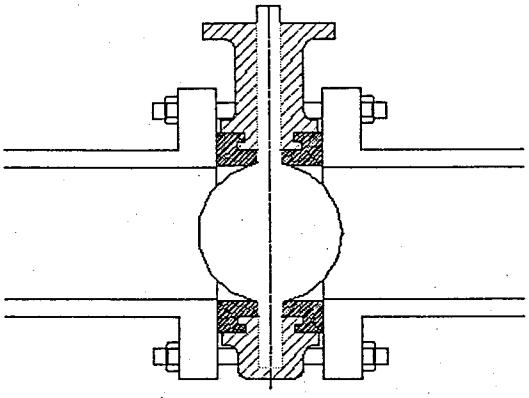
Piping misaligned; Results Disc O.D. strikes pipe I.D. causing disc edge damage, increased torque & leakage. Seat face o-ring seal improperly without engagement.



RIGHT

Piping aligned properly when bolts tightened, disc in full open position; Results-disc clears adjacent pipe I.D., seat face seals properly, no excessive initial torque.

B. Installation with Flange Welding - When are to be installed between ANSI welding type flanges, care should be taken to abide by the following procedure to ensure no damage will occur to the seat :

1. Place the valve between the flanges with the flange bores and valve body bore aligned properly. The disc should be in the 10°open position.

2. Span the body with the bolts.

3. Take this assembly of flange-body-flange and align it properly to the pipe.

4. Tack weld the flanges to the pipe.

5. When tack welding is complete, remove the bolts and the valve from the pipe flanges and complete the welding of the flanges. Be sure to let the pipe and flanges cool before installing the valve.

NOTE : Never complete the welding process (after tacking) with the valve between pipe flanges. This causes severe seat damage due to heat transfer.

v. Maintenance and Repair

The many KLAUS UNION features minimize wear and maintenance requirements. No routine lubrication is required. All components - stem, disc, seat, bushing, stem seal, etc., are field replaceable, no adjustment is required. If components require replacement, the valve may be removed from the line by placing the disc near the closed position, then supporting the valve and removing the flange bolts.

VI. Disassembly and assembly

A. Disassembly

1. Series CRB/CTB/CHB - Remove handle, manual gear box or actuator mounting flange. Remove the body bolts and pull the lower body half away from the seat. Pull the seat and disc and disc stem from the upper body half. Remove bushing and seal from the upper body. Push the seat into an oval shape and remove the disc stem by withdrawing the short stem end first.

2. Series CRB/CTB/CHB -Remove the handle, gear operator, or actuator from actuator mounting flange. Remove the packing gland ring and the packing stem retainers from the stem hole, then remove the stem, bushing and seal. Remove the disc from the seat, protecting disc edge at all times. Push the seat into an oval shape, then remove the seat from the body.

B. Assembly

1. Series CRB/CTB/CHB - Push the long stem end of the disc stem into the seat, then push the seat over the disc stem short stem. Place the disc stem and seat into the upper body half. Align the lower body bolt lugs with the upper body lugs and position lower body in the seat. Replace the body bolts and tighten.

   Install the stem seal, then the stem bushing. Replace handle, manual gear box or actuator on the actuator mounting flanges. Note: The body halves have a matching casting node on one side only to ensure to correct assembly of body halves.

2. Series CRB/CTB/CHB - Push the valve seat into an oval and push it into the body with seat stem holes aligned to body stem holes. Insert stem seal and bushing. Push stem into the stem hole of body until the bottom of the stem is flush with the inner top edge of the seat. Install a light coating of silicone or grease on the I.D. of seat. Insert the disc into the seat by lining up the disc hole with the stem hole of the seat. With a downward pressure and rotating the stem back and forth, push the stem until the stem touches the bottom of the body stem hole. Make certain that when pushing stem through disc bottom, the pin hole of stem and disc are aligned.
   Replace the stem bushing and two stem retainers, then replace the packing gland ring back into position.

Klaus Union	BUTTERFLY VALVES TECHNICAL DATA	DOC. NO.: KU-PR-D01 REV. NO : 0 PAGE : 1 OF 8

DOCUMENT TITLE.	INSTRUCTION, INSTALLATION, MAINTENANCE & REPAIR PROCEDURES-(HF Series) FOR BUTTERFLY VALVES

REV'NO.	DATE	REVISION DESCRIPTION	PREPARED BY	REVIEWED BY	APPROVED BY
0	MAR.20 2002	FIRST ISSUED	Walter Glass	M. Huth	

INDEX

1. INSTRUCTIONS STOCKING

1.1 The Klaus Union valves are packed in compliance with the customers instruction for preservation and/or packing.

1.2 Where no particular requirements apply, Klaus Union will pack the valves in wooden boxes or pallets, protected with wooden plate.

1.3 Rubber-seated valves are preserved with grease on seat to avoid fixing of rubber to metal face.

1.4 The valves shall be stocked under cover from humidity (rain, snow, ice), heat from direct sunshine, and/or polluted atmosphere (dust/sand).

1.5 Special attention shall be paid to avoiding stocking and/or transportation in areas where sandblasting is carried out.

1.6 Sand particles will destroy valve seats.
Such damage is under no circumstance subjected to guarantee terms

1.7 Whenever crates are broken and valves are stocked individually, the valves shall be covered from humidity, heat and dust.

2. INSTRUCTIONS HANDLING

2.1 The Klaus Union valves have been tested on leakage and function before leaving works.

2.2 Whenever a valve is transferred from stock to site of installation, caution must be paid to handling.

2.3 The valves is precision-instrument and it is sensitive to shocks and pollution.

2.4 Improper handling can cause leakage and malfunctioning.

2.5 If installation requires lifting by crane, the lifting straps or hooks shall be fitted in lifting bolt or around valve neck.

2.6 Special caution must be paid to valves coated by epoxy or other special surface protection.

2.7 Scratches or blanking of a coated area can cause galvanic corrosion, and shall be repaired before valve is finally installed.

3. MANUAL ACTIONING

3.1 The opening and closing of the valve are carried out by turning the handwheel command with gearbox (gear).
On the top of the gear a mechanical position indicator, indicating open of Closed is fitted.
The valve closing is done by rotating the handwheel, in clockwise direction, while the opening is in anticlockwise direction.

4. REMOTE CONTROL

4.1 The valve can be operated automatically with remote control by means of a pneumatic, hydraulic or electric actuator.

4.2 If the valve is required with Klaus Union actuator there are no assembly problems, as it is supplied already fitted with the actuator.

4.3 Normally, on the valve, no limit switch is mounted as it is part of the actuator.

5. INSTALLATION INSTRUCTIONS

General information regarding the HF series butterfly valve.

5.1 For the shipment, the surface of the body's seat and the stems are lubricated with grease. if this is not considered necessary, it can be removed with solvent. Should the valve be destined for oxygen, hydrogen or chlorine service, it is perfectly cleaned and degreased.

5.2 General information for on-site assembly

5.3 The valve is Flow directional can be mounted on the pipe. However it is important, where possible, to assemble the valve with the stem in horizontal position, with the inferior edge of the disc that opens towards th downstream pressure.

The reason of this recommendations are :

a) The disc's and the stems weight is held by radial bearings instead of axial bearings

b) In horizontal pipelines the solid material that can accumulate in the lower part, when the valve is in closed position, does not obstruct the disc movement In opening position.

5.4 Before the installation, the pipelines must be cleaned from impurities, dirt and welding residuals, otherwise it is possible to damage the rubber seal ring.

5.5 The pipeline must free form electric voltage

5.6 The HF series valve, Wafer or Flanged type can be fitted between flanges inserting two gaskets between the valve's body and the flange to guarantee an efficient seal towards the outside.

5.7 On-line installation (on existing pipeline) of a HF series valve Wafer of Flanged type

5.8 Check that the distance between the flanges corresponds th the valves's face to face dimension.

5.9 separate the flanges with special tools, so it is easier to insert the valve.

5.10 Insert between th flanges at least two bolts in the inferior part.

5.11 Close the valve's disc so that the disc's profile is inside the body.

5.12 Insert the valve between the flanges, with the two gaskets, that will be retained by two bolts fitted previously in the lower part of the flanges.

5.13 Screw the screws in the centering holes of the valve's body.

5.14 Insert all the remaining bolts aligning th valve with the flanges and screwing the nuts manually.

5.15 Maintaining the valve aligned, gradually removed the flange spacers and partially tighten the nuts.

5.16 Check that the valve's opening and closing operations are easy.

5.17 Open the valve and complete tightening the nuts evenly crossed until the adequate torque value is reached.

5.18 For the valve installation, proceed as per Wafer and Flanged type, using screws instead of nuts and bolts.

5.19 On-line installation (on new pipeline) of HF series valve Wafer of Flanged type.

5.20 Close the valve's disc so that disc is in the valve's body.

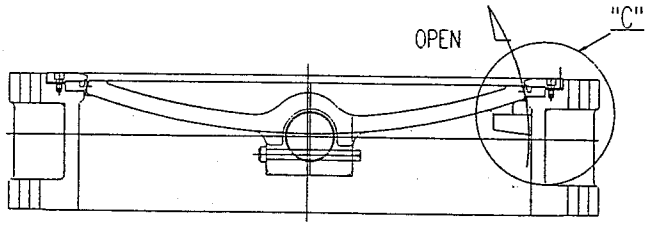
5.21 Center the two flanges with valve's body after having positioned the two gaskets.

5.22 Close the valve's body between some bolts and partially tighten the bolts, and complete tightening the nuts eventually crossed.

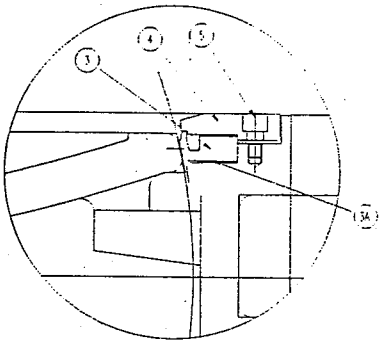
5.23 Use the assembled block, flange-valve-flange, for the pipeline preparation and center.

P No.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	A216WCB	1	
2	DISC	A351CF8	1	
3	SEAT	PTFE	1	
3A	BACK SPRING	PTFE	1	
4	RETAINER	A36	1	
5	GLAND BOLT	A193-B8	-	
6	MAIN SHAFT	A276T304	1	
7	MAIN BUSH	DU-BUSH	1	
8	STUB BUSH	DU-BUSH	1	
9	LOCK PIN	A276T304	4	
10	END COVER	A216WCB	1	

P No.	PART NAME	MATERIAL	Q'TY	REMARK
11	BOLT/W	A193-B7	1	
12	GASKET	GRAPHITE	1	
13	SPACE COLLAR	A276T304	1	
14	SPACE BUSH	BRASS	1	
15	PACKING	GRAPHITE	1	
16	GLAND RING	BRASS	1	
17	GLAND PLATE	SUS304	1	
18	B/N/W	SUS304	2	
19	STAND	A36	1	
20	B/N/W	SUS304	4	



SECTION A-A



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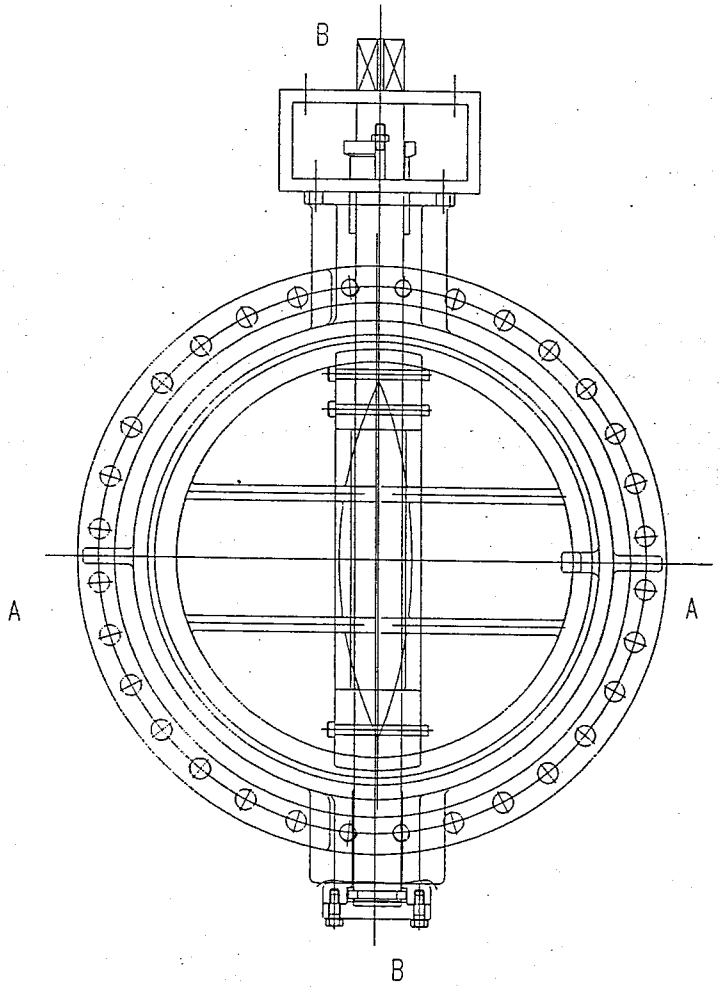

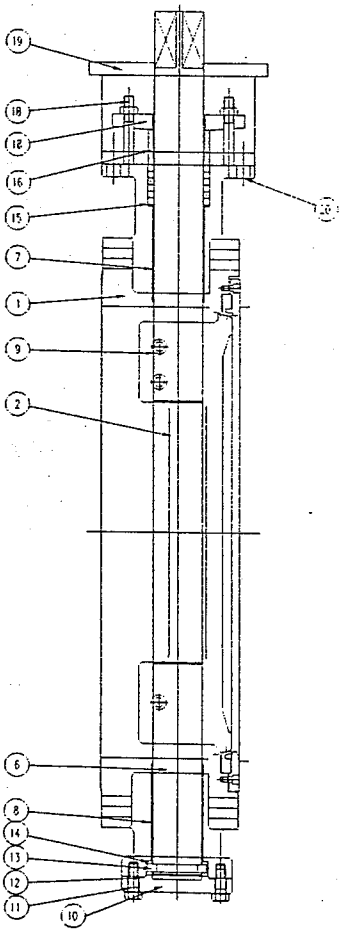

SECTION B-B

8. STEM'S LEAKAGE

8.1 In case of leakage from the stem : tighten the gland's nut 1/2 turn each time while the valve is open until the leakage is eliminated. When the valves are delivery, they are shipped with the gland registered according to the pressure required. After a long storage it is advised to check the sealing and if necessary, tighten the gland's bolts until the requested sealing is obtained.

Attention :

do not over in tighten the gland's bolts, otherwise the valve torque could increase too much, damage the correct functioning of the valve. If the leakage continues, it is necessary to substitute th packing as follows :

8.2 Make sure the is no in-line pressure.

8.3 Remove the actuator with its stand to the valve.

8.4 Remove **Gland bolt (18)**

8.5 Remove the **Gland plate (17)** and **Packing ring(16), packing (15)** let in compressed air in the bottom one of the two grease holes of the valve.

8.6 Clean carefully the packing.

8.7 Insert new packing.

8.8 Assemble the **Packing ring(16)** and tighten the **Gland bolt (18).**

9. COMPLETE DISASSEMBLE OF THE VALVE

9.1 Follow the safety precautions before disassembly of the valve from the pipeline **(see point 6).**

9.2 After having verified that there is no pressure in line, remove all the nuts and then all the flanges bolts, except for the tow lower ones that hold the valve's weight.

9.3 Separate the flanges with special tools and remove the valve from the pipeline.

9.4 Put the valve in open position.

9.5 Remove the actuator from the valve and the **Gland bolts.**

9.6 Remove the **Stand(19)& Bolt/nut(20).**

9.7 Remove the **end cover(10).**

9.8 Remove the thrust **bolt(11).**

9.9 Carefully remove the **gasket(12)** for the stem sealing.

9.10 Remove the **collar bearing(13).**

9.11 Remove the **thrust collar(14).**

9.12 Remove the metal seal ring following the previous instructions **(see points 7.5-7.10)** having the valve in open position.

9.13 Remove the **lock pins(9)** that connects the **disc (2)** to the **shaft (6).**

9.14 Push the stem out of the lower part of the valve.

9.15 Remove the **disc (2).**

9.16 Remove the **bearings (7)(8)** pushing them out with a round wooden spindle, being careful not to damage them.

10. REASSEMBLY OF THE VALVE

10.1 Before reassembling the valve, remove all the seal rings and carefully clean all the components included in the seats of the seal rings and in the area of the lower thrust collar bearing.

10.2 Inspection the body's seat and if there are scratches, polish with slightly abrasive cloth.

10.3 Insert in the upper and lower part of the valve **bearing (7)(8)** by means of a round wooden spindle.

10.4 Partially insert the **shaft (6)** through the upper part of the valve, in such way that the lower part of the stem does not come out from inside the valve.

10.5 Install the **disc (2)** positioning it in open position and meeting perfectly the disc's marked hub with the upper part of the valve. Push the stem down, through the disc, until the holes of the stem and of the disc meet perfectly. Be careful with hole's draft direction.

10.6 Insert the **lock pin(9)** and tighten the bolt with their, unloosening washers.

10.7 Install the thrust **bearing(14)** and sufficiently without tightening until the thrust bearing reach the beat on the lower **collar(13)**.

10.8 To adjust the thrust bearing, close the disc and centre it to the body's seat, measuring the same distance between seat and disc. When the disc is completely centred, complete the **thrust Collar(13)**

10.9 Install the **gasket (12)** on the bottom flange.

10.10 Install the **end cover (10)** with its **Bolt/nut(20)**.

10.11 Insert in the upper part of the valve, the **Packing(15)**.

10.12 Install the **gland ring(16)** tightening **Gland bolts(18)**.

10.13 Install the metal **seal ring(3)**, following the previous instructions **(see points 7.5-7.13)**

10.14 Tighten the **Gland bolts(5)**, being careful not to over tighten otherwise the torque value is increased.

10.15 Install the screws and its washers, and then stall the actuator.