

INSTRUCTIONS ON INSTALLATION, OPERATION AND MAINTENANCE FOR KIRLOSKAR BUTTERFLY VALVES



Enriching Lives



KIRLOSKAR BROTHERS LIMITED
MANUFACTURING UNIT, KONDHAPURI (PUNE)

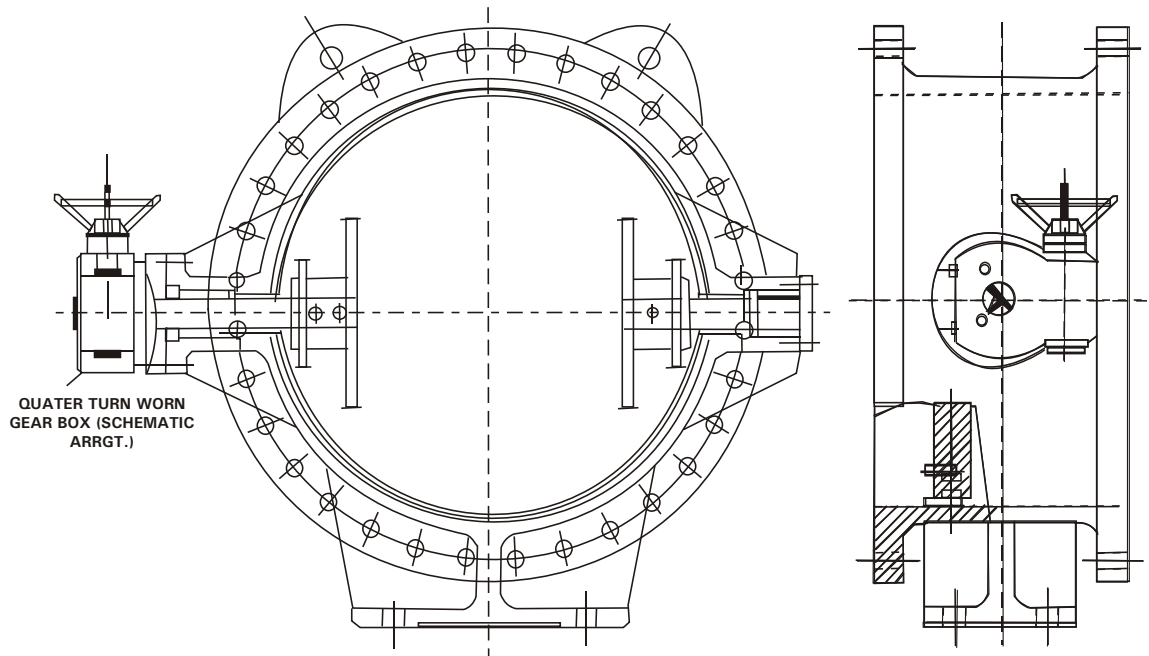
**INSTRUCTIONS ON INSTALLATION,
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KIRLOSKAR
BUTTERFLY VALVES**

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1. INTRODUCTION



**Butterfly Valve
Typical View**

Figure 1

Kirloskar Butterfly Valves generally conform to BS 5155 (BSEN 593) / IS 13095 / AWWA C504 standards for dimensions, materials of construction and constructional features, as per the need of the application. These Butterfly Valves are Quarter Turn, Resilient Seated type with a choice of Single / Double Eccentricity of Disc, different type of operators and accessories and have proven performance.

The disc is mounted on a pair of stub shafts supported in self-lubricated bronze bearings housed in bearing housing integral with the valve body. The drive to disc is affected by the drive shaft which is connected to the valve operator by Keys and to the disc by Shear pins / Keys. Both DE and NDE shafts are provided with special sealing arrangement. Body seat ring is fitted in the body. Rubber seal ring is fitted on the periphery of the disc and is clamped in position by a clamping ring. Clamping ring allows setting of seal ring compression to a desired extent by adjustment of setting grub screws and tamper proof hexagonal head screws / hexagonal Socket head cap screws.

The special feature of valve is that the disc is mounted eccentrically in valve body. Due to this the rubber seal on disc does not rub against the body seat ring in crack open position. The shaft axis is offset to the sealing plane. The body seat ring is in the form of the frustum of a cone. The disc and the seal are so dimensioned that in fully closed position the disc seal comes in the contact with the body seat ring, thus giving drop tight shut off in both flow direction.

The salient features of these valves are as follows:

1.1 SINGLE / DOUBLE ECCENTRIC DISC SEAL SEAT GEOMETRY

1.1.1 SINGLE ECCENTRICITY: (Figure 2)

In single eccentric design the valve shaft is located in such a way that it is offset to the plane of disc seal seating contour. This offset (eccentricity e_1) geometrically ensures detachment of the resilient seal from the body seat ring the moment the valve begins to get crack open. This separation enables the resilient seal to travel over Seat Rings with minimum length of physical contact and consequent rubbing, thereby increasing its wear life and at the same time achieving leak tightness in fully closed condition. Besides this, quick separation of resilient disc seal from body seat ring reduces the torque requirement to rotate the disc from crack open to full open condition.

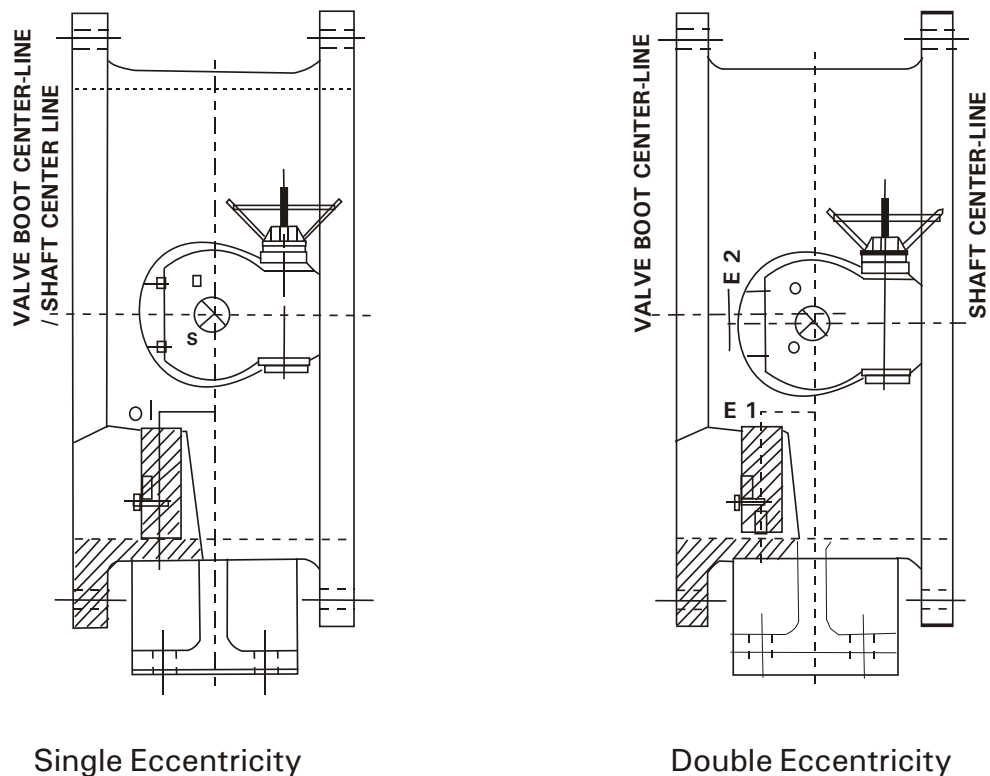


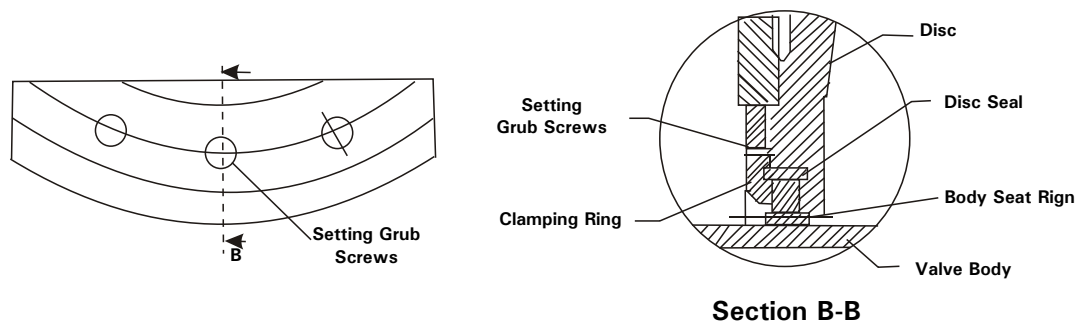
Figure 2

1.1.2 DOUBLE ECCENTRICITY: (Figure 2)

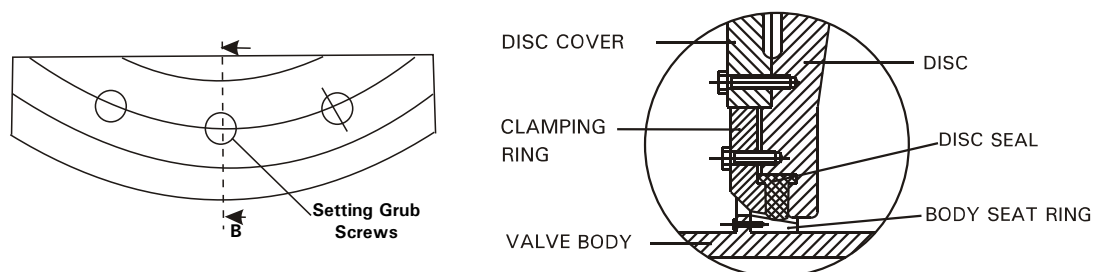
The double eccentric design does have the feature of single eccentric design, which offsets the centre of rotation of disc from the plane of disc seal contour (eccentricity e_1). In addition, this design has one more eccentricity i.e. the offset of the center of rotation of the disc from the valve body center line (eccentricity e_2). With this feature tendency of disc over travel is minimized and seal becomes non jamming type. The feature of double eccentricity is provided in the valve if categorically specified by the customer.

1.2 CLAMPING RING FOR DISC SEAL ARRANGEMENT (Figure 3 a & b)

Kirloskar Butterfly Valves are provided with 'T' shaped disc seal rings which are secured on the periphery of the disc with help of machined grooves provided in the disc as well as in the clamping ring and held in position with the help of holding and setting screws provided on the clamping ring. Desired protrusion of disc seal over the disc circumference is achieved by use of tightening bolts and setting screws on the clamping ring. For this, a provision in clamping ring is made as follows:



Setting Grub Screws
Figure 3 (a)



Clamping Ring
Figure 3 (b)

In between every two clamping ring screw holes, tapped holes are provided for of setting grub screws (also called as grub screws or setting screws). These grub screws are used to set and maintain required clearance between the clamping ring and the disc. This clearance is essential to make the resilient seal amenable for further radial expansion for achieving leak tightness even after its wear and tear due to prolonged use in operation. This setting is done while assembling the valve at Factory and also during replacement or re-setting of the disc seal at site.

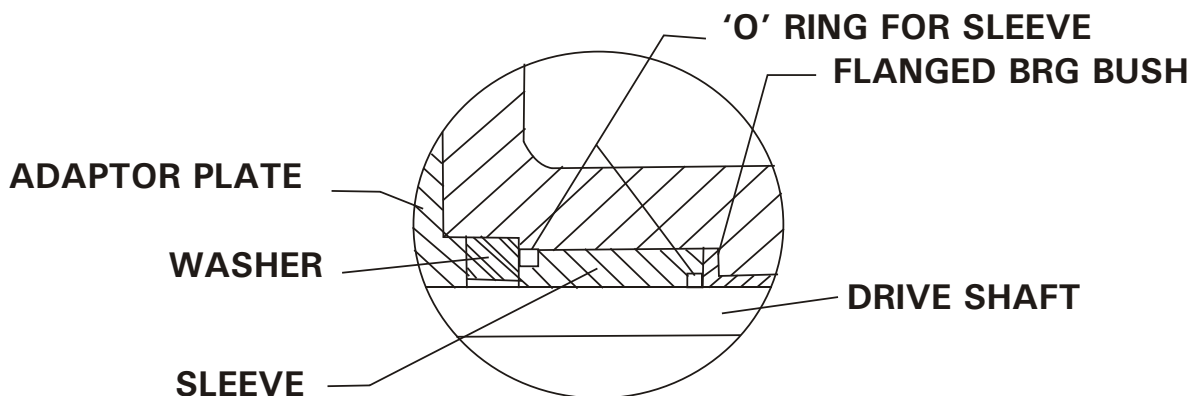
The clamping ring is normally in a single piece for small sizes of valves (upto size 1100mm) and segmented for easy fitment and removal for larger valves (against specific requirement in the order). However, segmented and integral design can be offered to any size of valve as desired by the customer.

1.3 SHAFT BEARINGS AND SHAFT SEALS

The shaft bearing is Journal type, which is designed to withstand the loads due to full differential pressure on the disc when closed. The bearings are made from material having self-lubrication characteristics.

The shafts are sealed to prevent leakage of water through annular clearances at the drive end.

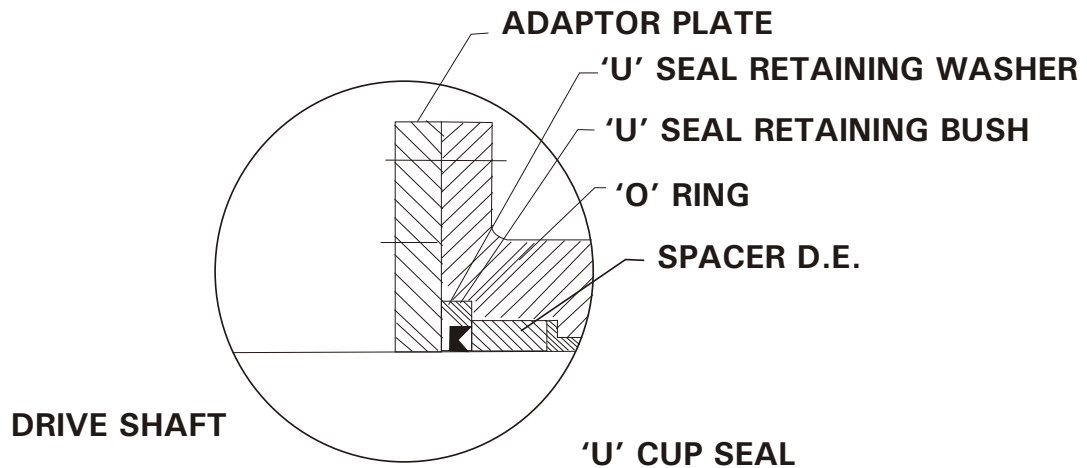
For valves up to 500mm size, the sealing is done with help of set of two 'O' rings one between the shaft and the bearing bush, another between the bearing bush and body. **(Figure 4)**



Shaft Sealing Arrangement with "O" Rings
Figure 4

For larger sizes, the sealing is achieved by combination of 'U' cup seal fitted between the shaft and retaining washer, and 'O' ring fitted between retaining ring and body. **(Figure 5)**

The shaft seal assembly is replaceable at site.



Shaft Sealing Arrangement with "U" Cup Seal + "O" Ring
Figure 5

1. INSPECTION ON RECEIPT, HANDLING, STORAGE & PRESERVATION

1.1 INSPECTION ON RECEIPT AND HANDLING

- a. At receipt of the product, ensure that there are no transit damages to the product received, especially on valve flanges, operating actuators etc.
- b. Also ensure that Parts and Accessories are received as per ordered scope of supply.
- c. Special operators (if any), like Electric Actuators / Pneumatic Actuators / Hydraulic Actuators & their accessories (if any) are sent loose alongwith the product for their safe transportation. Examine them for freedom from damages. Also ensure that adequate numbers of fasteners for mounting accessories are received.
- d. While unloading the product, please use the provision of lifting made on the valve (e.g. Lifting Lugs, Lifting eye bolts).
- e. Use the safe lifting devices (e.g. slings, hoists, hooks etc.) of dequate capacity.

- f. Do not pass the slings through the weak parts of the product / accessory (e.g. Hand Wheels, Gear Box Body when it is coupled with the valve, threaded portion of the rising spindles).
- g. The valve should be transported so that the side flanges remain in horizontal position.
- h. Support the valve properly during transportation to avoid toppling.
- i. Handle the product carefully do not push, drag, drop from height.

If damages, short supply or wrong supply are observed, report the same immediately to the contact person mentioned in this manual.

2.2 STORAGE & PRESERVATION

If the valve has to be stored at site before installation,

- a. Store it on horizontal level surface in dry and clean atmosphere.
- b. Store the products in well-covered sheds, protected from sun, rain and dust.
- c. In the instance if the valve is required to be stored for long duration, ensure that rust preventive should be applied on the corrodible surfaces.
- d. It is advisable to give a coat of silicone grease on rubber seals during the storage period and keep the valves in partly open position so that the seals remain in un-stressed condition. Keep the seal away from direct sunlight and dusty atmosphere.
- e. Gear Box, Electrical / Hydraulic / Pneumatic actuators & accessories should also be stored away from dust, dirt or any rainfall or water.

3. INSTRUCTIONS FOR INSTALLATION

3.1 CHECKS ON THE VALVE ASSEMBLY BEFORE INSTALLATION

- a. Before taking the Butterfly Valve for pipe installation, make sure that it is cleaned from inside and outside and there are no foreign or metallic objects sticking on to its sealing elements. Also clean the valve interior passages to remove any foreign matter & rust preventive on machined surfaces.
- b. While installing the operating element, make sure that the Butterfly Valve is in fully closed position.
- c. Do not attempt to force Electric actuator assembly on the Gear Box connecting shaft. In case of any difficulty in proper fitment of the key ways, please de-burr the bore, key ways & keys with polish paper. In any case, do not hammer the actuator surface to drive it in. If difficulty persists, contact KBL.

- d. Ensure that the entire rust preventive on the machined surface in the flow area is removed, before the valve is put in pipe-line.
- e. Do not tighten or loosen the rubber seal for any reason. The rubber seal is factory set.
- f. Note the name plate details and arrow flow mark on valve body and install the valve in right orientation with respect to pressure gradient. Arrow on valve body should point from high pressure side to low pressure side of the pipeline. Recheck valve pressure rating adequacy with respect to operating pressure.
- g. Valves should be installed in the pipeline, only after verifying the sealing ability of rubber seal. This can be done by examination of the seals for freedom from surface damages, cracks / dent marks, embedded foreign particles as well as uniform clearance between the seal & body ring. If abnormalities of this type are observed, replace the seal.
- h. Butterfly Valves are designed to operate with Valve Shafts in HORIZONTAL orientation, unless otherwise specified at the time of ordering. In any case, do not install the Butterfly Valve with vertical orientation of the shafts, unless that was originally specified in order and accepted by KBL for such design. Valves required to operate with shafts in vertical orientation have different design.
- i. Operate the Butterfly Valve manually from Full Close to Full Open and Full Open to Full Close, with the operator hand wheel. Ensure that there is no undue resistance / friction in the operation. **Ensure that the factory setting of Limiting Stopper Bolts in the Gear Box is not disturbed, for the respective limit positions. If so, adjust the same.**
- j. Before connecting valve & pipeline flanges, ensure that they do not have parallel, angular and radial gaps. While fitting the valve in pipeline, ensure that diagonally opposite bolts are simultaneously & uniformly tightened.
- k. Butterfly Valves should not be used at end of pipeline open to atmosphere. In this location, the pressure gets suddenly dropped to atmospheric level and consequently velocities created due to throttling are very high. This further leads to two unfavorable phenomena. Torque requirement of the valve to move the disc becomes unstable and high velocities lead to cavitation and erosion damage of valve interiors.

3.2 CHECKS FOR THE PIPE-LINE BEFORE INSTALLATION

- a. Clean the pipeline thoroughly so that it does not contain any solid matters which may damage the valve internals.
- b. Avoid parallel, radial and angular mismatch between connecting flanges of valve and the pipeline.
- c. Upstream and downstream piping should be adequately supported and anchored (if required) in such a way that the piping system does not impose any forces & moments on the valve body and the hydraulic thrust arising due to valve closure is carried & sustained by valve supports. Valve flanges are not designed to carry any external loads and moments arising due to pipe expansions / contractions. It is advisable to use Flange Adapter Assembly, after the valve to facilitate valve dismantling and to prevent any loads being transmitted to valve flange.
- d. For the valves having integral foot, provide suitable concrete block with foundation bolts for supporting the valves.
- e. Where the valve does not have integral foot, it is advisable to install a support for the valve at bottom to prevent any sagging to be caused by weight of the valve.
- f. Ensure that pipeline flanges are parallel and are mating the valve flange without leaving any parallel or oblique gap between the flanges. Do not over-tighten the flange bolts / nuts to make the flanges parallel forcefully. That may develop undue stresses in the valve flanges & body leading their deformation & malfunctioning.
- g. If the Butterfly Valves are supplied with By-pass arrangement (against specific order requirement), mount the by-pass arrangement on the pipe-line, across the valve.
- h. Butterfly should not be located immediately before or after a pipe bend. Due to flow disturbances in a bent pipeline, the flow characteristics of the valve are affected.
- i. Butterfly valve should be located in a straight length pipe, at least 1.5 D to 2 D lengths of the pipe downstream of any fitting and at least 3 D lengths upstream of pipe fitting, where D is the nominal diameter of the valve.
- j. For the valve sizes 900mm and above, it is good engineering practice to provide accessibility to valve interiors for inspection / repairs by installing an expansion joint or pipe piece with oblique joint on clamping ring side of the valve.
- k. Butterfly Valve disc, in fully open position projects beyond the flange faces. It is necessary to ensure that pipe coatings and

reducers used, if any, do not interfere with swept volume of the disc.

- l. Maximum flow velocity in the pipe-line should not exceed 4 m/s.
- m. The valves are mainly designed for handling clear water with maximum impurities of 5000 PPM.

4. COMMISSIONING

4.1 PRE-COMMISSIONING CHECKS

- a. Ensure manually that the valve operates smoothly.
- b. The entire pipe flange bolting is properly tightened.
- c. Direction indicated on the valve matches with the pressure gradient convention mentioned under clause 3.1
- d. Electrical Actuator (if any) is properly earthed.
- e. Counter weight & Lever (in case of Hydraulic operated valve), Cylinder & its linkages (in case of pneumatic operated valves) are properly assembled / duly bolted and protective guard cage is provided for them.
- f. Surge protection devices (if any) are operative.
- g. Butterfly valves should be operated when both upstream & down stream pipes are filled with water. In commissioning stage, filling of water could be done by use of by-pass (if provided) and / or keeping the disc crack opened and venting-off air by suitable devices provided in the pipeline.

4.2 COMMISSIONING

- a. Open the By-pass Valve across the valve (if provided).
- b. Charge the pipe-line with water.
- c. Ensure that there is no leakage through flange gaskets and shaft seals.
- d. After charging the pipeline, operate the valve gradually from Full Close to Full Open. Allow the flow stabilize for 10 to 15 minutes. Operate the valve from Full Open to Full close. Ensure that there is no any abnormal noise and vibrations during full travel of the disc.

Now the valve is commissioned for its Operation.

5. OPERATION

- a. By-pass valve (if provided) keep it open while every opening / closing cycle of the Butterfly Valve.
- b. Once the Butterfly Valve is closed, the By-pass valve may be kept closed till next operation of the butterfly valve.

- c. In case the manually operated Butterfly Valve demands excessive force to operate, ensure that there is no mechanical obstruction in pipeline or in the operating mechanism.
- d. Do not use means like levers on hand wheel to exert addition force. These hand wheels are designed to be weak links to protect other expensive parts in operators.

6. MAINTENANCE INSTRUCTIONS

Maintenance Check Points:

Sr.	Parameter to Check	Method of Checking	Weekly	During Overhaul
01	Leakage through DE / DNE ends, side flange gaskets	Visual	●	
02	Noise / Vibrations while Opening or Closing the Valve	Feel	●	
03	Condition of resilient Disc Seal for cuts, deformation & resilience	Visual & feeler gauge		●
04	Condition of Shaft Seals - for cuts, deformation & resilience	Visual		●
05	Condition of Shaft Bearings	Visual		●

Kirloskar Butterfly Valves require very little maintenance if maintenance check point are attended to during periodic inspection & during overhaul. However valves could malfunction in unusual conditions of usage, water contamination and may require maintenance as below:

7. TROUBLE SHOOTING OF KIRLOSKAR BUTTERFLY VALVES

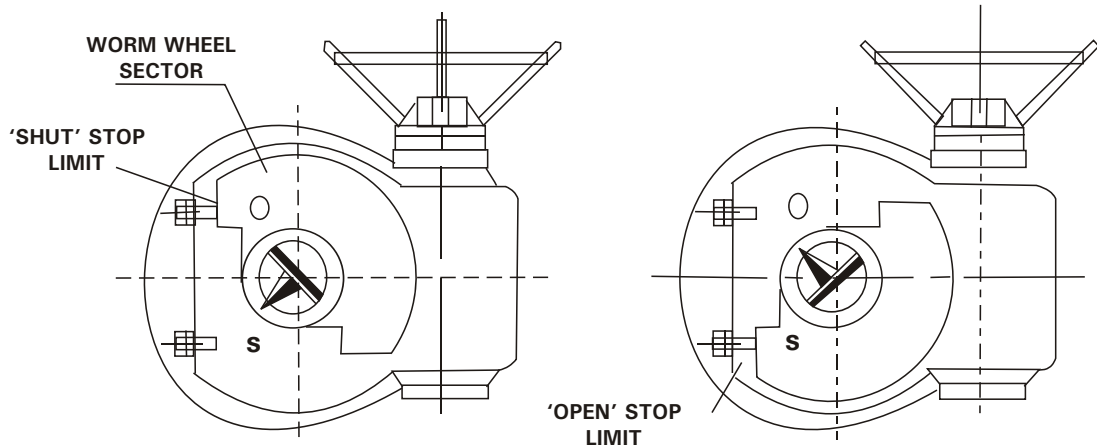
Sr.	Problem	Probable Reason	Action Required
01	Leakage through the valve in fully closed condition	<ul style="list-style-type: none"> a. By-pass connection open (if by-pass arrangement is provided) b. External object caught between disc & body ring c. Disturbed setting of limiting stoppers in gear box for open / close position not allowing the disc to close fully. d. Worn out disc seal e. Deformed or damaged disc seal 	<ul style="list-style-type: none"> a. Close By-pass valve b. Try to flush away the external object by opening & closing the valve & creating flow to flush it away. If it does not work, open flanged joint to reach the object and remove it manually. c. Set the limiting stoppers. (See Procedure 7.1) d. Re-set the disc seal (See procedure 7.2) e. Replace the disc seal (See procedure 7.3)
02	Leakage through DE shaft & body	Worn out / damaged 'O' rings and / or 'U' cup seal	Replace 'O' rings and / or 'U' cup seal
03	Leakage through NDE Cover	Damaged gasket for NDE shaft cover	Replace gasket for NDE shaft cover
04	Leakage through side Flanges	<ul style="list-style-type: none"> a. Inadequate tightening of flanged joint b. Damaged gasket c. Parallel / angular gap between valve and pipe flanges 	<ul style="list-style-type: none"> a. Re-tighten the flanged joint b. Replace gasket c. Remove parallel / angular gap between valve and pipe flanges
05	Noise / vibrations while opening or closing valve	Inadequately supported / inadequately fixed piping / valve	Support / fix upstream / downstream piping & valve (with foundation bolts where applicable)

IMPORTANT: All these procedures require emptying the upstream and downstream piping and removal of the valve from the pipeline. If the piping system provides access to clamping ring side of the valve (e.g. by dismantling of expansion joint), removal of valve from piping is not necessary.

7.1 Setting of Limiting Stoppers

Close the valve manually till movement of disc is stopped by limiting stopper in the gear box. Check whether the seal ring engages uniformly with body ring. If not, loosen the limiting stopper bolt of "Shut" side of the gear box, move the disc till the contact line of the seal and body ring is parallel to edge of the body ring. Set the limiting stopper bolt on "Shut"

side so that it touches the worm gear sector (**figure 6**) in the gearbox. Lock the limiting stopper bolt in this position with the help of check nut provided.



Setting of limiting Stoppers in Quarter Turn Worm Gear Box.
Figure 6

Open the valve manually till disc movement is stopped by limiting stopper on "Open" side of the gearbox. Measure the angular movement of the position indicator, which should be 90 degrees. If not, move the disc so that the indicator shows 90 degrees angular movement from "Shut" position. Set the limiting stopper bolt on "Open" side so that it touches the worm sector in the gearbox. Lock this limiting stopper bolt in this position with the help of check nut provided. This completes the setting of limiting stopper bolts.

7.2 Re-setting the Disc Seal

After setting the limiting stopper bolts, it is always advisable to check the seal ring for any wear which will impair its sealing function. If the seal ring touches the body seat ring without any discontinuity (checked with feeler gauge of 0.05mm, which should just pass the joint with little force), then its readjustment is not necessary.

If there is more clearance or discontinuity of contact, re-adjust the seal ring as follows.

Bring the disc to "Closed" position. Loosen all the setting grub screws on clamping ring. Tighten the bolts on clamping ring to compress and expand the seal ring in the areas where clearances exceed the requirement of passing of 0.05mm feeler with light force. After the seal ring makes satisfactory contact all over its periphery with body seat rings, tighten all the setting grub screws. This completes re-setting of the disc seal.

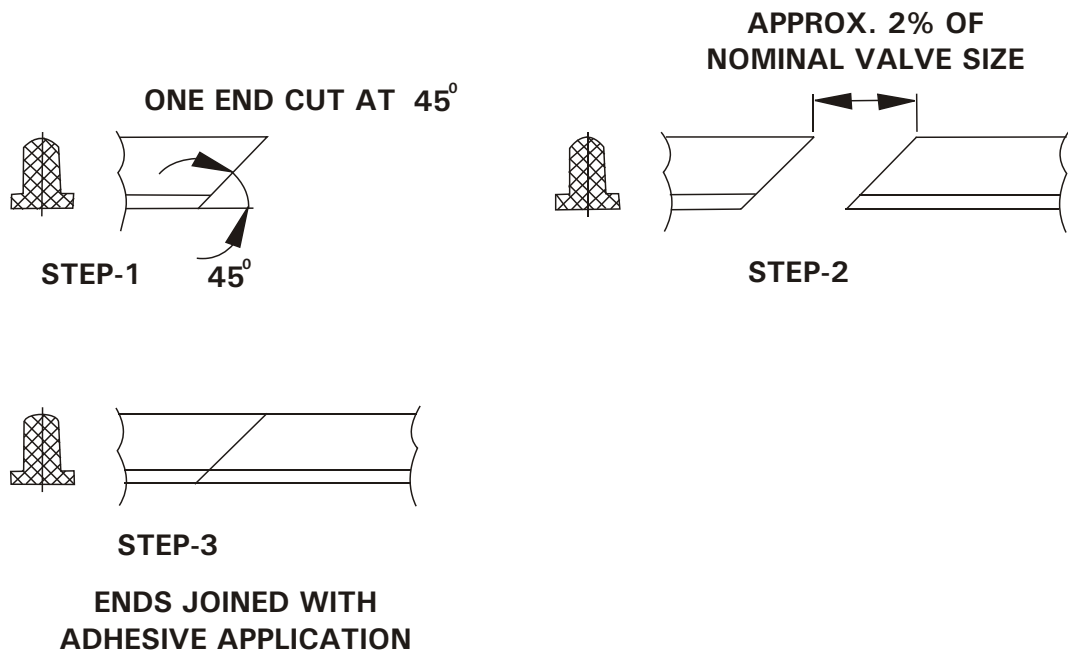
7.3 Replacement of deformed or damaged Disc Seal

If there are visual cracks, permanent deformations or embedded solids in the disc seal ring, an attempt to re-set it should not be done. The seal ring should be replaced.

Bring the disc to "Closed" position.

Remove the clamping ring / clamping ring segments after loosening the setting grub screws and removing bolts on the clamping ring. Mark position of each segment of clamping ring (if the clamping ring is segmented) w.r.t. each other and w.r.t. disc by numbering / mach marking before removal. This match marking is to be used for re-fitment of clamping ring / clamping ring segments at the same location & with the same orientation as before.

After removal of the clamping ring, take out the damaged / deformed disc seal from the disc. Clean the groove provided on the disc for fitting the disc seal, the periphery of the disc where the new seal is to be fitted.



Seal Joint
Figure 7

Take the new genuine Kirloskar disc seal cord. Cut ONE end of the cord at angle of 45 degrees (**Figure 7**). Lay the disc seal cord on entire periphery of the disc, engaging its one side of 'T' edge into the groove provided on the disc. While laying the disc seal over the disc periphery, ensure that there is no gap between the disc periphery and the disc seal, all over the circumference. Mark the another end of the disc seal (which one is not cut at 45 degrees) for the 45 degrees cut to be taken at this end. While

marking note that the linear gap between two ends (after the cut) should be approximately 2% of the nominal valve size (e.g. for Valve size 1000mm, the distance between the ends should be 20mm, after the cut.) This gap is kept to create stretch / tension in the seal after joining the two ends and when it is fitted on the disc.

Now, cut the another end of the seal cord at angle of 45 degrees, in such a way that after joining the two ends face to face, it would form a continuous cord, without any gap. Check-match the two ends of the seal cord face to face without applying adhesive. Ensure that 45 degrees cuts on both the ends have smooth, plain surfaces without cut marks and that basic 'T' profile of the seal cord is not damaged all along the cut edges. If this is not achieved during cutting process, take another thin slicing cut to correct the angle and quality of the cut. Correct cut will leave no gap between the mating faces and will not show mismatch of profile during check matching of cut edges. After check-matching, separate the cut edges and apply adhesive solution "Fevikwik" on both the cut faces of the cord. Bring the edges together and match the ends & end profiles. Hold the ends together in matched position for two minutes with hand to allow curing of the applied adhesive solution. If adhesive oozes out from joint and flows around the joint, remove the same with polish paper after it hardens. Take care not to damage seal profile while removing excessive adhesive material on the joint. Now the disc seal is ready for assembly.

Clean the disc thoroughly again, especially on machined groove and surface where disc seal is going to fit. Clean the clamping ring / clamping ring segments. Clean all the taps in clamping ring and disc and clean the setting grub screws, clamping bolts. Lubricate the setting grub screws & clamping bolts, tapped holes in disc, clamping ring / clamping ring segments with a thin layer of silicone grease.

Fit the disc seal on periphery of the disc, engaging one side of the "T" shape in the groove provided in the disc. Press the disc seal all over the side so that its one side takes its location in the groove provided in the disc. Mount the clamping ring / clamping ring segments (as applicable) matching the identification numbers / match numbers, on the disc. Engage the clamping ring bolts in the tapped holes for their respective locations. Engage all the setting grub screws on clamping ring keeping gap between their ends & the disc. Tighten the bolts on clamping ring to compress and expand the seal ring in the areas where clearances exceed the requirement of passing of 0.05mm feeler with light force. After the seal ring makes satisfactory contact all over its periphery with body seat rings, tighten all the setting grub screws. This completes replacement of the disc seal.

7.4 Replacement of Shaft Seals

DRIVING END SIDE SEAL ASSEMBLY

Disconnect the valve operator assembly from the valve. Remove adaptor plate / DE cover & U cup seal retaining washer. Now O ring and U cup seal gives direct accessibility to replace the worn-out O Ring / U cup seal.

Remove the old worn U cup seal / O Ring. Clean U cup seal Bush, valve body bore steps and shaft. Fit the new U cup seal / O ring in place. Reassemble the seal. Clean faces of valve body DE boss flange and mating adaptor plate face. Fit the DE cover / Adaptor plate. Reassemble the valve operator on valve. Operate the valve and ensure that there is no leakage through shaft.

NON DRIVING END SIDE SEAL ASSEMBLY

Remove the NDE cover by removing hexagonal screws. Remove the old gasket. Clean the body face and NDE cover surface. Place the new gasket and assemble the NDE cover by tighten the hexagonal screws.

SHAFT BEARINGS

This is a major repair operation of the valve and requires special equipment. Initially the valve should be taken out of pipeline by dismantling the side flange joints. Keep the valve so that the side flanges rest on smooth & clean flat surface.

Crane facility should be made available to hold / lift the valve. Dismantle the valve operator assembly, NDE cover and sealing assemblies on both DE and NDE sides.

Remove the shear pins / keys between disc and shafts. Disengage the shafts from disc. Take the disc out of the valve body. Keep the disc on a clean flat surface. This will leave valve body with bearing fitted in the bores. Using a puller take the bearing bush out of the valve body. Since the bush is collared, never try to push the same in towards the valve body bore but push it outwards from valve body bore side. Remove the bush carefully so that the valve body bore is not at all damaged while removing the bush.

Remove the bushes of both the DE & NDE. Clean the bores in the valve body and fit the new bushes into the valve body bores. Take care to push the bush progressively and squarely in the body bores. Pushers are required to be used to fit the bearing in valve body. Fit the bush so that the collar of bush rests in the valve body step. Clean all the machined steps in the valve body, disc (shaft bores). Put the disc in valve body so that the

rubber seat rests on body seat ring in a plane parallel to side flange face. Clean both shafts and insert them in their respective bores on the disc bosses. Take care to insert correct ends in the respective sides of the disc. Engage the shear pin / key in the disc boss and shaft.

Assemble the sealing assemblies (DE & NDE), valve operator assembly. Utmost care has to be exercised while carrying out all above described operations so as to avoid damage to any of the components, machined faces, bearing surfaces etc. Operate the valve at least twice to ensure that there is no undue friction, vibration etc. Refit the valve in pipeline.

Note: After Maintenance of the Butterfly Valve, and before commissioning the same, please observe all the Pre-commissioning Checks as mentioned in Clause No. 4.0 of this document.

8. Recommended Spares for Butterfly Valves

Product Cross Sectional and General Assembly Drawing attached with this manual indicates the components of the respective valves, alongwith the recommended spares.

We strongly recommend keeping the spares handy all the time to be able to eliminate delays in attending the operation troubles and scheduled replacements / overhauls.

9. SAFETY INSTRUCTIONS FOR “KIRLOSKAR” MAKE VALVES TO BE FOLLOWED BY USER, AT SITE

[These Safety Instructions are the integral part of “Instruction Manual for Installation, Operation and Maintenance of Kirloskar Make Valves”]

PART A: GENERAL INFORMATION & SAFETY REQUIREMENTS

1. The Products supplied by KBL have been designed with safety in mind. Where hazards can not be eliminated, the risk has been minimized by the use of guards and other design features. Some hazards can not be guarded against and the instructions below **MUST BE COMPLIED WITH** for safe operations. These instructions can not cover all circumstances; **USER** of the product is responsible for using safe-working practices at all times.
2. KBL product are designed for installation in designated area, which are to be kept clean and free of obstructions that may restrict safe access to the controls and maintenance access points.
3. Access to the equipment should be kept restricted to the personnel responsible for installation, operation and maintenance and they must

be trained, adequately qualified and supplied with adequate tools for their respective tasks.

4. KBL requires that, all personnel that are responsible for installation, operation or maintenance of the equipment, have access to study the product instruction manual BEFORE any work is done and they will comply with all local and industry based safety instructions and regulations.
5. Personnel protection safety equipment must be worn where local rules apply.
6. Read the instruction manual before installation, operation and maintenance of the equipment.
7. Note that the limit of product application and permissible use of the product is according to the respective product design & testing standard and product pressure rating. Operation of the equipment beyond these limits will increase risk from hazards and may lead to premature and hazardous failure of the valve / accessories.
8. Clear and easy access to all controls etc. must be maintained at all times. Hazardous or flammable materials must not be stored near valves unless safe areas or racking and suitable containers have been provided.
9. IMPROPER INSTALLATION, OPERATION OR MAINTENANCE OF THE KBL PRODUCT COULD RESULT IN INJURY OR DEATH.



PART B: SAFETY INSTRUCTIONS WHILE HANDLING, STORAGE AND USAGE

1. For handling / lifting the valves, use devices of adequate capacities certified by competent authorities. Use lifting provisions e.g. lifting eyebolts, lifting lugs etc. wherever provided on the valves.
2. Before fitting the valve in pipeline, ensure that Pressure Rating of the valve is suitable for maximum working pressure / surge pressure that may arise in the pipeline.
3. Non Return Valves / Reflux Valves with Dash-pot arrangement & Counter weight arrangement: Safety Guard for the counter weight & cylinder arrangement shall be provided by the customer to avoid accidents, as the lever with counterweight falls down rapidly during valve closure. It may come down without warning in case of power failure.
4. Electrically Operated Valves
 - It is to be ensured before operation that proper earthing connection is provided to the actuators.

- While wiring the actuator in circuit, ensure that direction of actuator rotation which 'Opens' / 'Closes' the valve is according to 'Open' / 'Close' switch.
5. User is solely responsible to refer to and follow Instructions stated in 'Instruction & Operation Manual' (I.O.M. manual) of the Gearbox / Electric Actuator / Hydraulic Power Pack. These IOM Manuals are supplied along-with the operator(s), wherever applicable.
 6. Open type Gear Arrangement: Due care shall be taken by user while operating valves with Open type Gear Arrangement. The user shall ensure that no part of body or clothing gets caught between pair of Open type gears.
 7. In case of manual operated valves, avoid excessive torquing at valve hand wheel / hand lever. Do not use extra leverage to Open / Close the valves.
 8. User shall prevent any unauthorized person to mount, dismantle or remount, operate and repair the valves.
 9. During using the valve, ensure that approved technical rules & regulations e.g. trading regulations, regulations for prevention of accidents, steam boiler regulations, regulations of gas mains under high pressure, regulations for combustible fluids, local safety regulations etc. are followed.
 10. During repairs / maintenance of the valve at site, the user shall take minimum following precautions:
 - a) Provide adequate working platform near the valve.
 - b) Make pipelines pressureless and harmless i.e. switch off the pumps, empty the pipelines, remove and switch-off all electric connections (in case of electric operated valves).
 - c) If work is carried-out in vicinity of the valve, which leads to dusty atmosphere (e.g. concrete work, masonry, painting, sandblasting etc.) the valve / valve components must be covered effectively.

10. ORDERING INFORMATION

(To be sent to the Contact Person mentioned in this manual)

Details required to be furnished while ordering Spares

- a. KBL Order Acceptance Number (O/A No. or Sale Order No.)
- b. Product Description Type, Size, Pressure Rating etc.
- c. Product Serial No. (This is hard punch marked on Valve Flange)

- d. KBL SAP Product Code This code is mentioned in the Invoice though which the product has been dispatched.
- e. KBL Cross Sectional Assembly Drawing No. for the product (if provided)
- f. Required Part Name & Part No. as shown in the Cross Sectional Assembly drawing.
- g. Material of construction of the required part, as that appears in the Cross Sectional Assembly drawing.

INTIMATING PRODUCT / PERFORMANCE COMPLAINT

(Information to be sent to the Contact Person mentioned in this manual)

While communicating product complaint, furnish following information to help us to resolve the problem promptly.

- a. KBL Order Acceptance Number (O/A No. or Sale Order No.)
- b. Product Description Type, Size, Pressure Rating etc.
- c. Product Serial No. (This is hard punch marked on Valve Flange)
- d. KBL SAP Product Code This code is mentioned in the Invoice though which the product has been dispatched.
- e. KBL Cross Sectional Assembly Drawing No. for the product (if provided)
- f. Exact nature of complaint

If the complaint is related to Short Supply, Wrong Supply, Transit Damage, it is necessary to communicate the Invoice Number which will help in tracking the cause of the problem.

In case if you need additional information or help, please contact:

Customer Service & Support Sector
Kirloskar Brothers Limited
"Chintan", Mukund Nagar,
Pune – 411 037, (India)
Phone: +91 20 2444 0770
Fax: +91 20 24270879
E-mail: kblin@kbl.co.in