

Installation, Operation and Maintenance Manual of Double Block and Bleed Valves



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Note

This manual shall be read in conjunction with manual LTV-DEP-566, "Instruction, Operation and Maintenance Manual - Important Points"



L&T Valves

L&T Valves Limited (formerly Audco India Limited) is a wholly-owned subsidiary of L&T and one of the largest valve manufacturers in the world.

The company has three modern manufacturing facilities, in Chennai (Manapakkam), Coimbatore and Kancheepuram, in Tamil Nadu, India. The company leverages its world-class capabilities in design, quality assurance and manufacturing to ensure that their products consistently meet customer expectations.

Product Range:

- Gate, Globe & Check Valves
- Valves for Power
- Pipeline & Process Ball Valves
- Triple-offset Butterfly Valves
- Rubber lined Butterfly Valves
- Valves for Water Service
- Double Block & Bleed Valves
- Control Valves
- Customised Solutions

Designs for the valves are created by an experienced team of valve experts who have a deep understanding of user-industry processes. An extensive manufacturing and quality assurance infrastructure ensure that world-class designs are transformed into high performance products. Every phase of manufacture is governed by an institutionalised environment, health and safety policy.

L&T Valves distribution network spans across the globe, partnering some of the largest valve distribution companies in the world. In India, L&T Valves has a presence in every industrial centre through a network of offices, stockists, automation centres and service franchisees

Double Block and Bleed Valve

The Double Block and Bleed valves are Non lubrication type of valves that allow flow in either direction. They are ideally suited for pump house applications where both sides of the discharge valves are expected to be pressurized with different fluid medium.

Double block and bleed valves are offered in cast construction. Valves are reduced bore design with flanged end (with raised face).

Range

Size, NPS	Class Rating
2R to 30R	150
2R to 30R	300

Exploded View

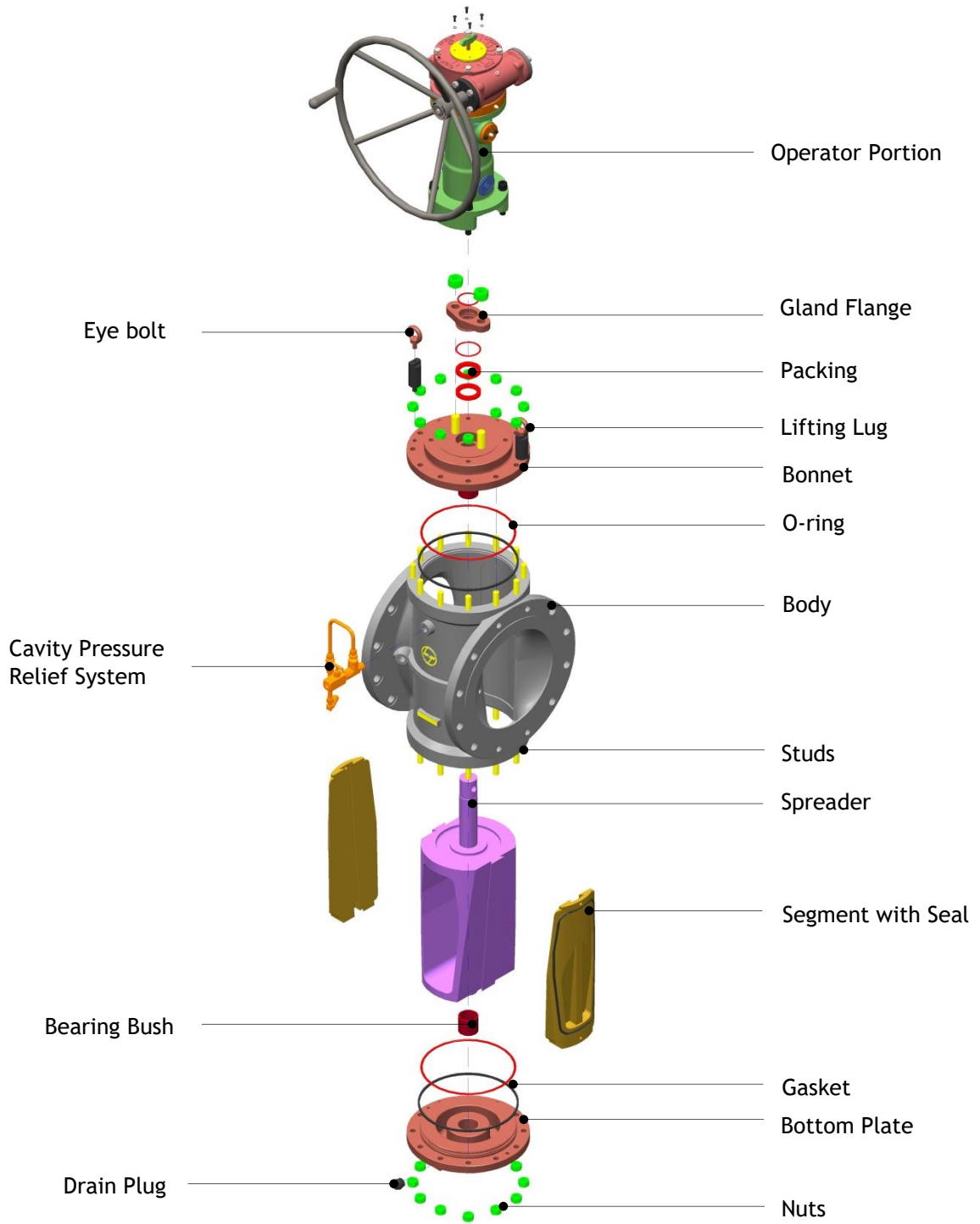


Fig. 1 Exploded view - Double Block and Bleed Valve (Valve Portion)

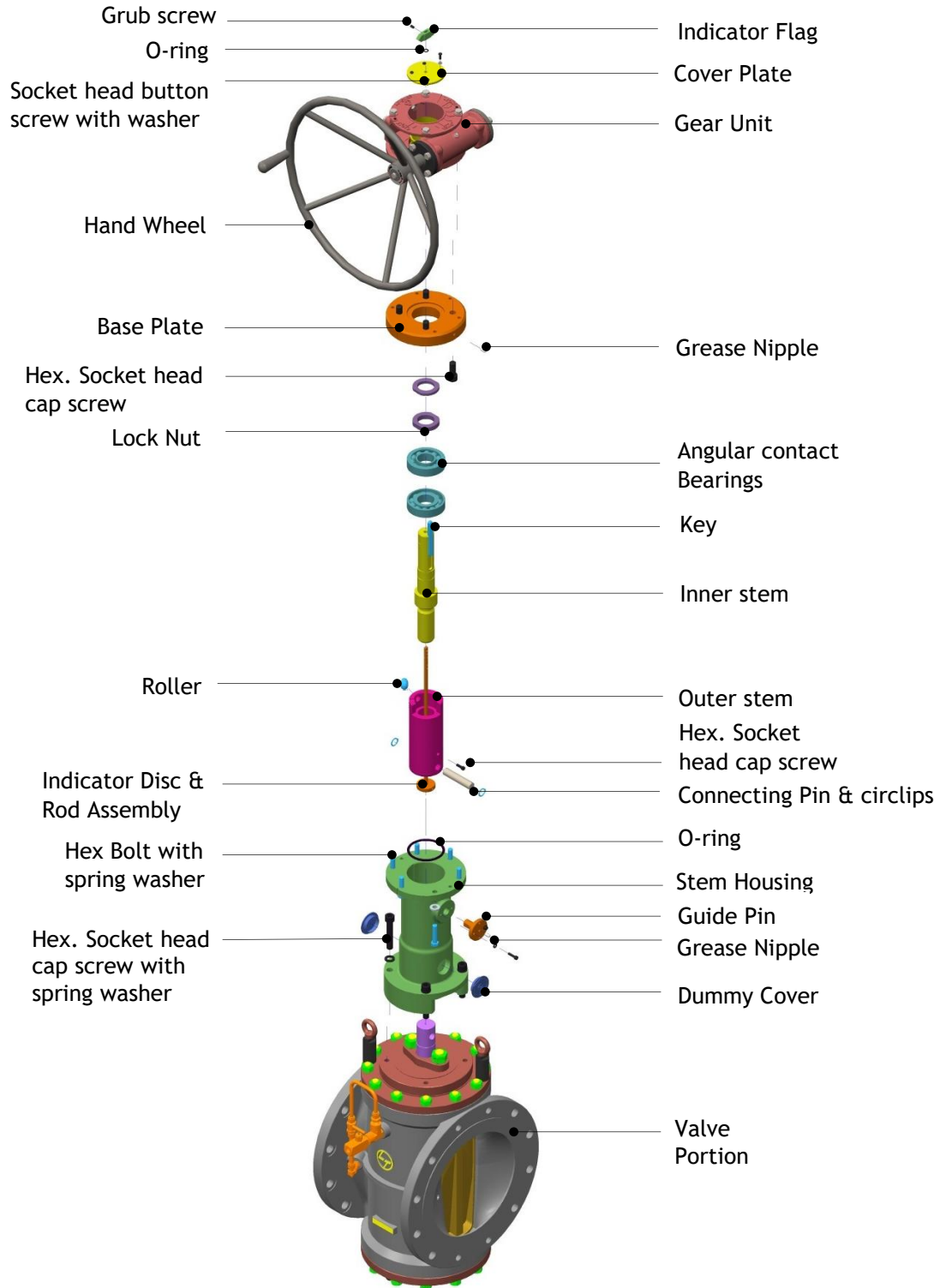


Fig. 1a Exploded view - Double Block and Bleed Valve (Operator Portion)

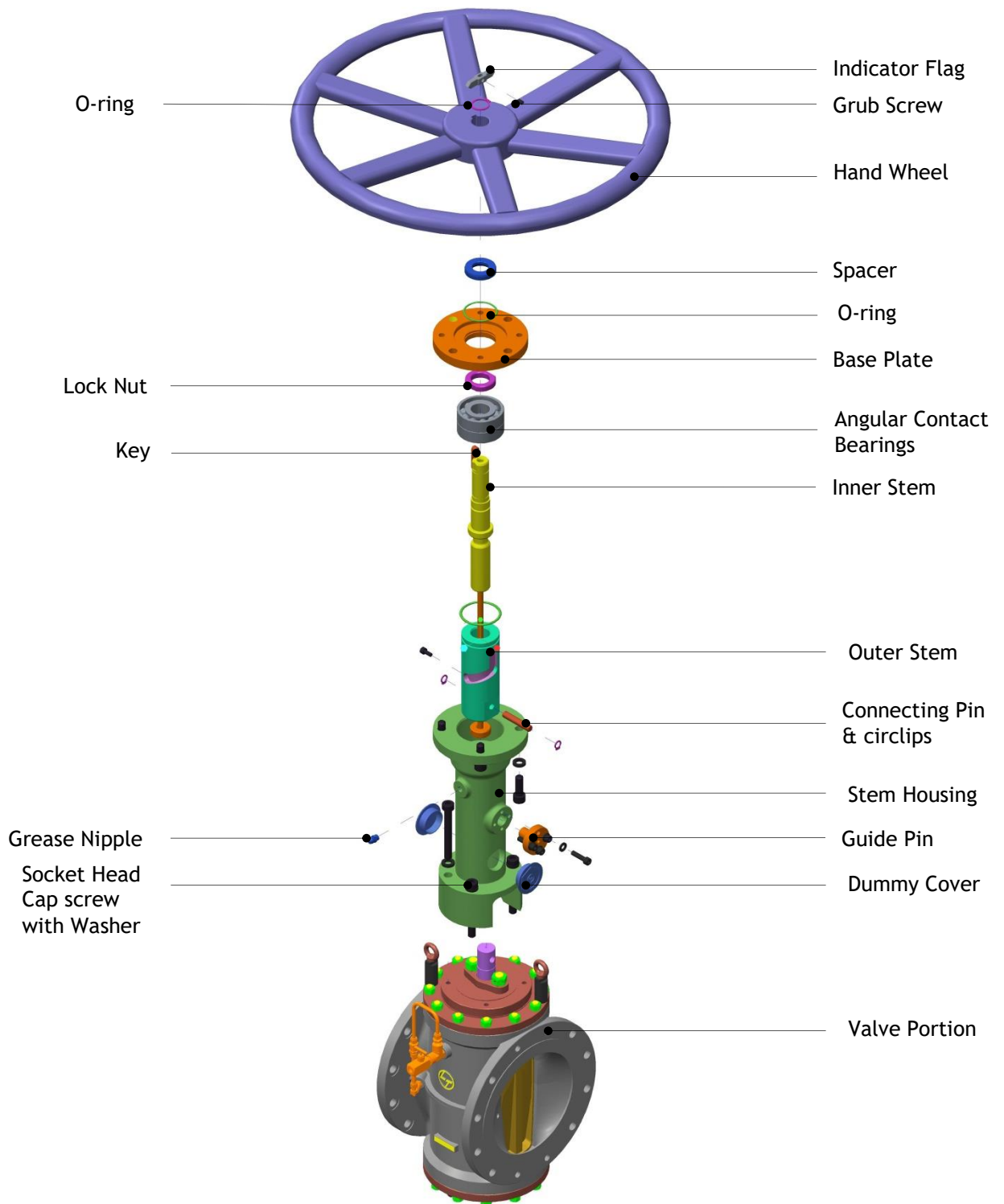
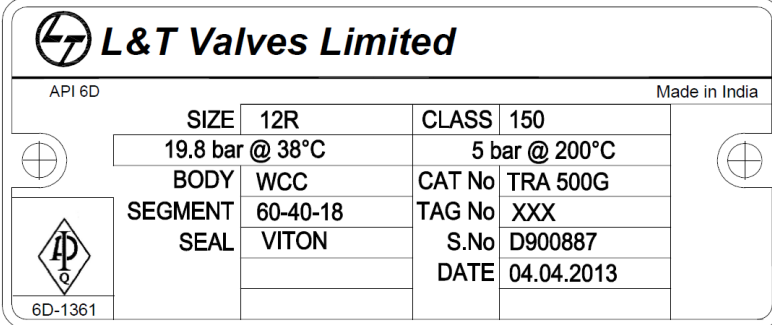


Fig. 1b Exploded view - Double Block and Bleed Valve (Hand wheel operated Portion)

Shipment

Valves are shipped with the valve in fully open position. Orientation of the valve shall be in stem vertical position. Please check the packing slip attached to the container before opening the same.

Valve identification details can be found on the ID plate and on the body of the valve (cast design). A typical identification plate is shown in Fig. 2.



The identification plate is a rectangular label with rounded corners. At the top left is the L&T Valves logo. To its right, the text 'L&T Valves Limited' is written in a bold, sans-serif font. Below the logo, 'API 6D' is printed on the left and 'Made in India' on the right. The main body of the plate is a table with technical specifications. On the left side of the table, there are two circular symbols: a top one with a crosshair and a bottom one with a diamond shape containing the letters 'IP' and 'Q'. At the bottom left of the plate, the number '6D-1361' is printed.

API 6D		Made in India	
SIZE	12R	CLASS	150
	19.8 bar @ 38°C		5 bar @ 200°C
BODY	WCC	CAT No	TRA 500G
SEGMENT	60-40-18	TAG No	XXX
SEAL	VITON	S.No	D900887
		DATE	04.04.2013

Fig. 2 Identification Plate Details

Valves are supplied with end protectors for avoiding damage to internals. Hand wheels for gear operated valves are usually dismantled and packed separately.

Note:

Refer Appendix B for valves with CE certification requirements.

Handling and Storage

Handling

Valve shall be properly supported and secured before moving, to prevent possible damage to valve, property or harm to personnel.

Do not drag the valve on the ground while transporting. A minimum of one foot height from the ground is to be maintained while moving the valve.

Valve shall not be slung around the valve port for transportation. Lifting lugs are provided for this purpose on the valves.

The crane wire should not be slung around the actuator/gear unit to avoid any load acting on it. Also, ensure that while handling the valve, no external load acts on the actuator/gear unit.

Valves shall not be handled with the hand wheel keyed/ fixed to the gear unit. The hand wheel shall be dismantled before handling and transporting the valve.

Storage

Valves shall be stored in covered area which is dust free, least humid and well ventilated. Ensure that the end protectors are in place before the valve is stored, as dry contaminants like dust, sand, grit etc. can scratch metal seating surfaces and the soft parts, leading to leakage during operation.

If the valve end protectors are opened for any check or testing, the same preservation and protection shall be done after the check or testing.

Valves shall be stored in covered area which is dust free, least humid and well ventilated.

The valve shall always be maintained in an ambience with temperature higher than the dew point temperature at the storage location, so as to avoid collection of water droplets on the valve surface.

Do not keep the valve directly on the floor. Valve shall be placed on wooden pallet such that it is at least at a height of 6 inches from the floor.

Care should be exercised not to damage the operator portion, gear unit/ actuator while storage.

Do not apply tar, grease or any other material inside the valve, as it could impair the performance of the valve.

Improper storage and /or handling may cause damage on the segment seal, body bore and Cavity Pressure Relief Arrangement which will affect sealing and operational performance of the valve.

Planning & Responsibilities

When installing or maintaining valves

- Conduct a risk assessment and eliminate or reduce hazards to an acceptable level.
- Work in accordance with safe systems of work site.
- Observe all site health and safety rules.
- Wear all necessary personal protective equipment during installation and operation.
- Never use a valve on a duty which exceeds its prescribed operating parameters. Refer to L&T Valves for further information
- The valve shall not be subjected to frequently occurring disturbances
- End user to ensure there are no external disturbances (e.g. Shocks, vibrations, electromagnetic fields etc.)
- Misuse of valves / valve components are strictly prohibited.
- Maximum surface temperature of the equipment will be same as the line media temperature. The end user must take account of the line media temperature.
- If the processes or environments that the valves are used in are likely to cause temperatures (high or low) that may cause injury to personnel if touched, then adequate insulation / protection must be fitted.
- Adequate safety measures shall be made for valves similar to pipe lines.
- Due to variety of duties in which these valves can be employed, it is the end user's responsibility to ensure the compatibility of media with the material of construction of the product for each specific application (i.e. corrosion and erosion which may affect integrity of the pressure containing envelope).
- Before valves are installed in areas which may be subject to seismic activity or extreme climatic conditions, consult L&T Valves with data.
- All exposed parts shall be cleaned to prevent dust deposit or insulation is needed similar to pipe line.

Valve Installation

General

Carefully unpack the valve and check for tags or identification plates, etc.

- If the identification plate / tag is lost or destroyed during the shipment or while in storage or if it is not legible, contact your distributor or L&T Valves
- Look for any special warning tags or plate attached to or accompanying the valve and if any, take appropriate action.
- It is recommended to remove all foreign particles from the pipe line by flushing it with a suitable fluid. Corrosion inhibitors shall be added to the flushing medium to prevent any corrosion due to trapped fluids.
- Remove the end protectors and protective sheath within the flow bore valve, wherever provided.
- Gasket contact faces of the valve and pipe flanges shall be inspected thoroughly for scratches / defects. Scratches, if any, shall be corrected by grinding the surfaces or by rubbing with emery sheet.
- After cleaning, operate the valve for at least two complete cycles before installing.
- The pipes must be properly aligned and provisions made to minimize stresses from external load/thermal expansion. Always review pipe manufacturer's recommendation.
- In case of pipes with long overhangs, adequate support/jacks shall be provided at the flange ends of the pipe so as to avoid bending of pipes due to weight of the valve.
- Double block and bleed valves are recommended to install in stem vertical position.

The improper alignment of the pipe and the valve during installation can lead to unbalanced tightening of the flanges which may cause excessive stress on the flange bolts and lead to leakage

Flanged Ends

- Refer [Appendix A1](#) for applicable standards
- For handling refer relevant section on [Handling and Storage](#)
- Ensure that the valve is in closed position during installation
- Clean valve flanges and companion flanges and remove protective grease from the valve flanges. Clean the valve interiors adjacent piping prior to mounting of the valve pipe joint.
- Align the bolt holes of the valve end flange and pipe flange.
- Insert the gasket (not supplied with valve) and tighten the bolts. Flange bolts shall be tightened evenly. Using suitable device, in cross rotation to prevent damage to the flange.
- Bolts should be lubricated for ease of installation
- For sequence of tightening bolts, refer [Appendix A2](#)
- For larger flanged valves, which are provided with bottom base support / pedestal shall be placed beneath the valve after the alignment and bolting of the pipe.

If valve is not cleaned or if cleaning is done after valve installation cavities may form a natural trap in the piping system. Any impurity not dissolved or washed out by the flushing fluid/line fluid may settle in such cavities and adversely affect valve performance.

Valve Operation

General

- Operational life of the valve can be maximized if the valve is used within the rated range, pressure and temperature.
- For understanding the internal construction refer to the general assembly drawing of the valve.

Operation Mechanism

Quarter turn motion of the valve is achieved using Gear unit/ Electric Actuator. DBB valve has two types of motion like lifting and rotating for quarter turn, which is achieved with the help of operator assembly, gear unit and actuator.

Operator Assembly

Provides lifting and rotation movement on the obturator with the rotation in the gear unit hand wheel.

Valve position indicator is available on the operator assembly to know about the actual position of the valve.

Gear Unit

Gear units are provided on valves for easier operation. Usually clockwise operation is for closing and anti-clockwise for opening of the valve. The number of turns will depend on the gear unit used. The gear units are self-locking type, i.e., the line fluid will not make the spreader to rotate.

Electric Actuator

It gives multi-turn output and is fitted on the gear unit. The actuator drives the gear unit which in turn rotates the shaft. Electrically actuated valves are provided with declutching mechanism for manual operation of the valve. For electric actuators, L&T Valves recommends to strictly adhere to the instructions as per actuator's manual.

For DBBV, the actuator setting is done as limit for opening and torque for closing. This actuator setting should not be disturbed.

Caution

Valve operating time: shall be limited from 30 to 60 sec

Actuator RPM: shall be limited from 48 to 72 (With L&T gear unit combination)

Actuator setting: Open limit & close limit based on valve travel

In case of customer selected actuators: selection parameters shall be verified by L&T valves

Do's and Don'ts

Do's

Before taking valve for erection, make sure that is cleaned properly from inside and outside and there are no foreign particles or metallic chips sticking on to sealing element

While installing the operating mechanism make sure that the valve in fully closed position

Make sure to remove the entire rust preventive on the machined surface in the flow area before a valve is put in the pipe line.

Carefully read the identification plate details and install the valve in the right place and for the correct duty conditions for which it is designed and manufactured.

Refer the general assembly drawing for recommended valve installation. Valves should be installed in the line after visually checking the condition of segment seal, In case there is any damage to the segment seal, the valve will not be leak tight, in such a case, replace the segment, before installing the valve in the line.

DBBV needs care and maintenance in its use. Always make routine checks once in three months for the working condition of operating mechanism

Check valve travel and torque setting as per Appendix C

Don'ts

DO NOT install a valve in the pipe line without the operating mechanism

DO NOT attempt forcible assembly of actuator on to the valve shaft, In case of any difficulty in proper matching of the key-ways, refer to the detailed instructional manual

DO NOT hammer actuator surface to drive it in

DO NOT use Stem housing, actuator, Cavity Pressure Relief System (CPRS) and gear box casting as lifting points

DO NOT use force multiplying devices like levers or pulleys. In case a valve demands excessive operating torque, make sure there is no artificial obstruction in the pipe line or in the operating mechanism

DO NOT remove operating mechanism from the valve when the valve is full closed.

DO NOT change the actuator setting and actuator RPM

DO NOT apply any impact on the CPRS.

Maintenance

Introduction

For enhanced life of the valve and better operability, it is recommended to do a periodic inspection and maintenance of the valves as per the procedure explained below:

The frequency of observation depends on its application. L&T Valves recommends that valve shall be inspected every 1000 cycles or six months (whichever earlier) for smooth operation and leak free performance. This is recommended even for stored valves also.

It is advisable to maintain a record of the performance of the valve.

Safety Procedure

Always depressurize the pipeline when taking up any maintenance activity on the valve/Operator portion.

Always disconnect the electrical supply to the electrical actuator before carrying out any maintenance activity on the valve/actuator.

Study carefully and understand the instructions outlined in the installation, operation & maintenance manual of the valve & actuator before taking up any maintenance.

Routine Maintenance

The following activities can be carried out during the routine maintenance of the valves.

- Check the Gland Packing leakage
- Sediment flushing at bottom plate
- Lubrication of operator portion
- Lubrication of Gear units & Actuators
- Seat Leakage
- Leak in Cavity Pressure Relief System

1. Gland Packing leakage

When the valve is in service and has been brought to the operating temperature the packing shall be checked for leakage by keeping the valve partially open. If leakage occurs tighten the gland flange nuts uniformly.

During the tightening process give half a turn to every nut. Turn the valve hand wheel back and forth for half a turn after every pass and check for leakage. Refer Table 2 for tightening torque details.

Note:

The objective is to provide the minimum required torque to the gland nuts for sealing and also avoid stem binding. The packing glands shall be adjusted as soon as leakage is detected.

If the gland is still leaking even after adequate tightening the valve shall be scheduled for packing replacement.

Do not replace the packing with pressure in the pipe line.

2. Sediment flushing at bottom plate

Once in six months, sediment collected at the bottom plate shall be drained and flush the sediments by removing the drain plug. Before proceeding the activity valve shall be depressurize.

3. Lubrication of operator mechanism

Ensure that valve operator housing is always full of lubricant. This will prevent moisture from accumulating and freezing. Use grease nipple provided on both base plate and guide pin for above process. It is recommended to use LGHB 2 grease for lubrication.

4. Gear Unit & Actuators

Generally the gear units are filled with grease (Shell Alvania EP2/equivalent 3). They do not require any additional maintenance. If operation found to be difficult, apply the grease through the grease nipple and operate one or two times and observe. If it still operation found to be difficult then remove the top cover and refill the grease.

Actuators

For maintenance of electrical actuator refer the instruction manual of the electric actuator

Note:

After Maintenance of the DBBV, and before commissioning the same, please observe all the installation guidelines as mentioned in Valve Installation section.

5. Segment Replacement

- Ensure disassembly space clearance of segment in valve assembly as per catalog GAD.
- Operate the valve to closed condition.
- Depressurize the pipeline.
- Open the vent valve in CPRS to ensure that there is no pressure in the cavity.
- Loosen nuts in bottom plate and remove the bottom plate from valve assembly as shown in Fig. 3.
- Place the bottom plate along with bearing bush in a secured place.
- Remove the gasket from valve body.
- Operate the valve to open condition gently until segment started to slide down.
- Remove the segments from spreader with care to avoid damage in dovetail engagement as shown in Fig. 3.
- Place the segment in secured place to avoid damages on segment seal profile.
- If the segments found defective, Insert new segments such that it engages with the dovetail of the spreader.
- Replace with the new gasket and O-ring in valve body.
- Then place the bottom plate to the valve body and tighten the nuts.
- If there is any disassembly space restriction in removing the segments from the bottom, then the same shall be removed from the top bonnet.

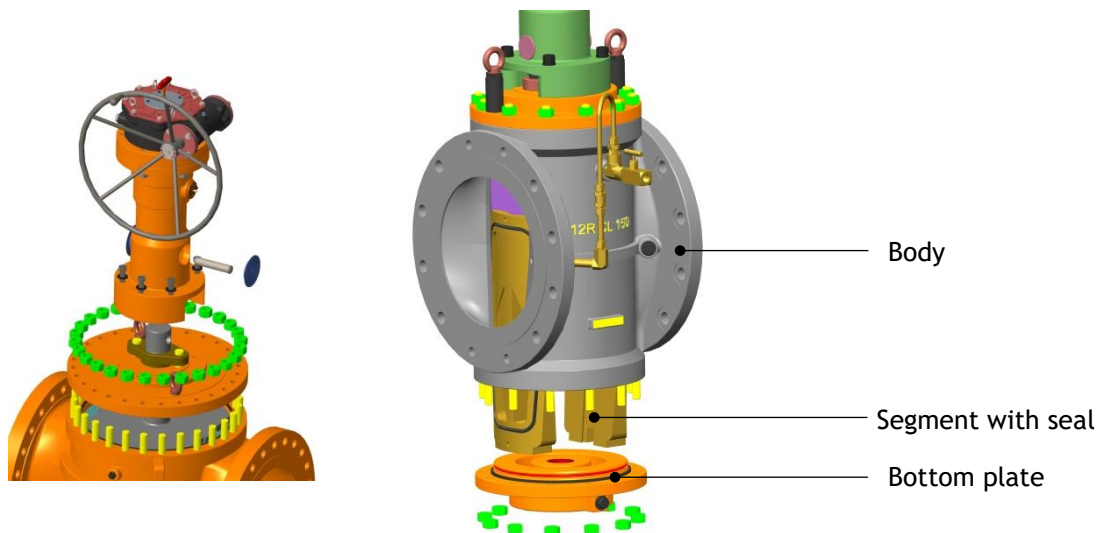


Fig. 3 Segment Replacement

6. Leak in Cavity Pressure Relief System:

- Cavity pressure relief arrangement is available in all DBBVs, prevents the significant increase of pressure in the body cavity which may leads to thermal expansion.
- CPRS arrangement set to open at 25 psi differential pressure between the body cavity and upstream, i.e., the relief valve in the system will open at 25 psi above the upstream pressure. This system works only when the valve is closed.
- CPRS arrangement has a Bleed valve (Needle valve) as shown in Fig. 4. and the same shall be opened when the valve is fully closed to ensure the seal effectiveness. Ensure that this valve is kept closed always.
- It is possible that the Needle valve may be leaking and subject to replace the same with depressurized line condition. This shall be confirmed after segments are found satisfactory on pressure testing.



Fig. 4 Cavity Pressure Relief System (Typical Arrangement)

Dismantling and Assembly Procedure

Disassembly Operator Assembly from valve

- Depressurize the valve and operate the hand wheel to closed condition.
- Keep the valve in close condition (not fully closed)
- Remove the circlips from the locating pin which connects outer stem and spreader of the valve as shown in Fig. 4.
- Remove the connecting pin from the hole and place in a secured place.
- Loosen and remove the socket head bolts and spring washers from the operator base.
- Place the entire operator assembly in a secured place as shown in Fig. 5.
- Use suitable tools to tighten the gland flange nuts.

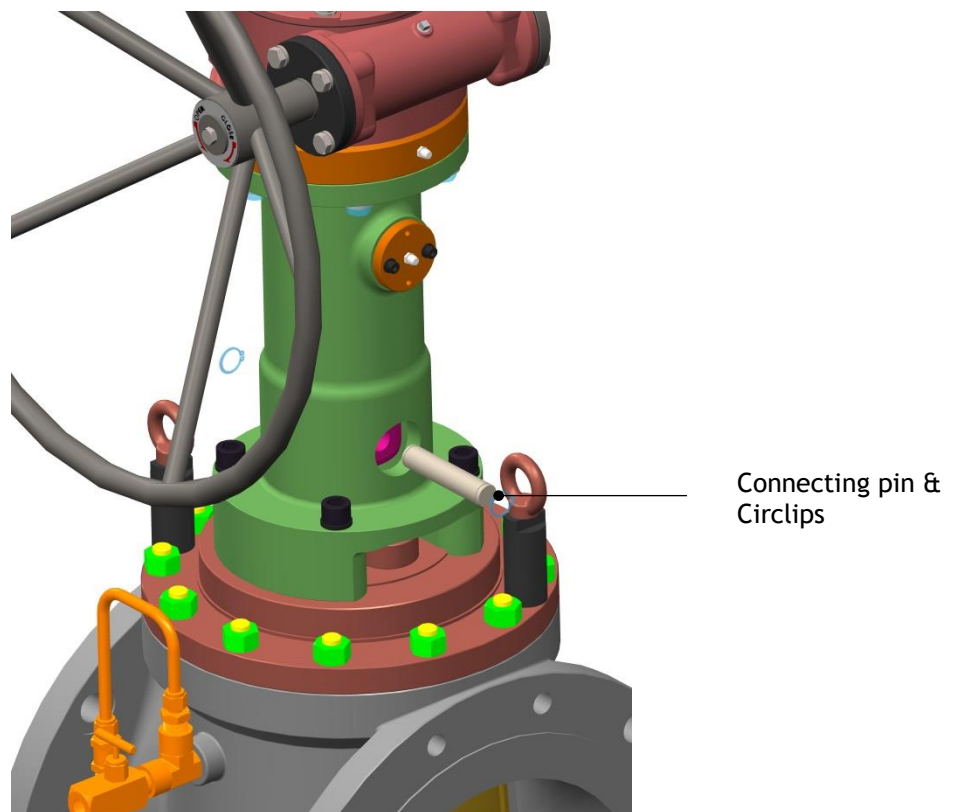


Fig. 5 Disassembly of Operator Assembly

Disassembly of Operator Assembly

Note: Operator disassembly shall be done with the valve in partial open condition.

- Unscrew the grub screw from the top & remove the indicator
- Unbolt the Hexagonal head screw, washer & remove the gear unit with the base plate.
- Remove the key.
- Loosen the screw & washer and remove the guide pin.
- Loosen the locknuts in the inner stem.

Note: Do not remove the locknut.

- Pull the inner stem along with the 2 nos. of bearing, outer stem & roller out through the top of the stem housing.

Note: Hold the outer stem to prevent unscrewing from inner stem and falling down.

- Unscrew the Hexagonal socket head cap screw from the outer stem & remove the indicator disc assembly through the bottom of the outer stem.
- Place the outer stem in a flat surface or hold the outer stem from falling and remove the roller from the outer stem.
- Unscrew & remove the inner stem from the outer stem
- Unscrew the locknut from the inner stem
- Remove 2 nos. of bearing from the inner stem

Note: Use proper tools to remove the bearing from the inner stem to avoid damage.

Assembly of Operator

- Place the first of the two bearings on the inner stem in such a way that the wider surface of the bearing butts against the shoulder of the inner stem.

Note: Ensure proper butting between first bearing & the inner stem shoulder. Fill adequate quantity of grease (LGHB 2) in the bearing.

- Now place the second bearing on the first bearing in such a way that the narrow surface of the second bearing butts against the narrow surface of the first bearing.

Note: Ensure proper butting between the two bearings. Fill adequate quantity of grease (LGHB 2) in the bearing.

- Screw the thick locknut to the inner stem & butt against the wider surface of the second bearing.

Note: Do not torque the locknut. Locknut should be torqued finally after putting the inner stem & outer stem assembly into the housing.

- Apply adequate amount of grease in the threaded portion & the dimple surface of the outer stem & inner stem and screw the inner stem into the outer stem such that drive block in the inner stem butts against the shoulder at the top of the outer stem and the dimple in inner stem is exactly in line with the roller opening in outer stem.

Note: Match the markings in the inner and outer stem to assemble in the correct start.

- Insert the indicator disc assembly from the bottom of the outer stem through the hole in the inner stem.
- Align the tapped hole in the indicator disc assembly inline to the through hole with a counter bore in the outer stem and fasten the Indicator disc assembly to the outer stem with the hexagonal socket head screw.

Note: Ensure that the screw head is not projecting outside the counter bore in the outer stem.

- Apply adequate quantity of grease to the O-Ring & the groove in the stem housing to assist O-Ring to be held in position & place the O-Ring in the O-Ring groove.
- Place the roller in the opening of outer stem. Apply adequate amount of grease to hold it in position.
- Place the Stem & Indicator assembly into the stem housing such that roller is aligned with vertical groove in stem housing. Push entire assembly down until the bearing rests on shoulder in housing.
- Insert the guide pin to the stem housing & ensure the butting of the guide pin surface & housing surface and fasten with washer & cap screws.

- Tighten the thick locknut to the recommended torque. Now insert the thin locknut & tighten it to the recommended torque against the thick locknut.
- Place the gear unit on the base plate and fasten the base plate to the gear unit with hexagonal socket head screws to the recommended torque values.

Note: Align the front face of the gearbox to the groove in the base plate.

- Place the gear key in the inner stem.
- Locate the Gear unit & the base plate assembly on the Housing such the groove in the housing and the groove in the base plate are in line & ensure that the hand wheel comes in front of the valve. Assemble the Gear box sub assembly to the stem housing with spring washers & Hexagonal bolt & tighten the bolt to the recommended torque.
- Install the 2 nos. of grease nipples one in the boss provided in the stem housing & other in the threaded hole in the base plate.
- Place the indicator flag in the indicator disc assembly and fasten with a grub screw

Assembly of Valve Portion

Assembly of operator in the valve

- Locate the stem housing in the bonnet in such a way that the pin hole in housing is in line with the hole in the valve spreader & fasten the housing to the bonnet using washer & screw
- Align the holes in housing, Outer Stem & the valve. Lock the outer stem & valve using the pin & insert Circlips on both the sides of the pin.
- Close the pin hole on either side of the Stem Housing using plastic dummy

Disassembly of Hand wheel operated

Note: Operator disassembly to be done with the valve in the closed condition and the spreader should be in its lowest position

- Remove the plastic dummy from the stem housing
- Remove the Circlips from both the ends of the pin connecting the outer stem & valve.
- Remove the pin.
- Unscrew the hexagonal socket head screw connecting the operator and valve and remove the screw & washer.
- Lift the Operator assembly from the Valve body.
- Unscrew the grub screw from the top & remove the indicator flag
- Remove the circlip present above the hand wheel
- Remove the hand wheel from the inner stem
- Remove the key
- Remove the spacer
- Unscrew the hexagonal socket head screw connecting the base plate & operator housing and remove the screw & washer.
- Remove the base plate
- Loosen the set screw available in the periphery of the locknut.
- Loosen the locknut in the inner stem

Note: Do not remove the locknut.

- Unscrew the hexagonal socket head screw & remove the screws & washer
- Remove the guide pin
- Pull the inner stem along with the 2 nos. of bearing & outer stem out through the top of the stem housing.

Note: Hold the outer stem to avoid falling down.

- Unscrew the Hexagonal socket head cap screw from the outer stem & remove the indicator disc & rod assembly through the bottom of the outer stem.
- Unscrew & remove the inner stem from the outer stem

- Unscrew & remove the locknut from the inner stem
- Remove 2 nos. of bearing from the inner stem

Note: Use proper tools to remove the bearing from the inner stem to avoid damage.

Assembly of Hand wheel operator

Note: Assembly of operator mechanism to be done with the valve in the closed condition and the spreader should be in its lowest position.

- Place the first of the two bearings on the inner stem in such a way that the wider surface of the bearing butts against the shoulder of the inner stem.

Note: Ensure proper butting between first bearing & the inner stem shoulder. Fill adequate quantity of grease in the bearing.

- Now place the second bearing on the first bearing in such a way that the narrow surface of the second bearing butts against the narrow surface of the first bearing.

Note: Ensure proper butting between the two bearings. Fill adequate quantity of grease in the bearing.

- Screw the locknut to the inner stem & butt against the wider surface of the second bearing.

Note: Do not torque the locknut. Locknut should be torqued finally after placing the inner stem & outer stem assembly into the housing.

- Apply adequate amount of grease in the threaded of the outer stem & inner stem and screw the inner stem into the outer stem.

Note: Match the markings in the inner and outer stem to assemble in the correct start.

- Insert the indicator disc assembly from the bottom of the outer stem through the hole in the inner stem.
- Align the tapped hole in the indicator disc assembly inline to the through hole with a counter bore in the outer stem and fasten the Indicator disc & rod assembly to the outer stem with the hexagonal socket head screw.

Note: Ensure that the screw head is not projecting outside the counter bore in the outer stem.

- Apply adequate quantity of grease to the O-Ring & the groove in the outer stem to assist O-Ring to be held in position & place the O-Ring in the O-Ring groove.
- Place the Stem & Indicator assembly into the stem housing and push the entire assembly down until the bearing rests on shoulder in housing.

- Insert the guide pin to the stem housing in such a way that the guide pin gets located in the helical slot of the outer stem & ensure the butting of the guide pin surface & housing surface and fasten with washer & screws.
- Tighten the locknut to the recommended torque & tighten the grub screw in the locknut periphery after torquing.
- Apply adequate quantity of grease to the O-Ring & the groove present in the ID of the base plate & place the O-Ring in the groove.
- Mount the base plate to the housing with the hexagonal socket head screw & washer and torque the screws to the recommended torque value.
- Place the spacer above the lock nut
- Place the key in the inner stem.
- Locate the hand wheel in the inner stem & retain it in its position by inserting an external circlip in the circlip groove present in the inner stem
- Place the indicator flag in the indicator disc assembly and fasten with a grub screw
- Lift & locate the operator assembly in the bonnet in such a way that the pin hole in housing is in line with the hole in the valve spreader & fasten the housing to the bonnet using washer (19) & screw
- Align the holes in housing, Outer Stem & the valve. Lock the outer stem & valve using the pin & insert Circlips on both the sides of the pin.
- Close the pin hole on either side of the Stem Housing using plastic dummy.

Troubleshooting

Problem	Reason	Action
Leakage through the valve Fully Closed Condition	Segment Seal Damage	Replace the segment seals with new pair refer the section 5.
	Misalignment in the operator in closed condition	Check the operator mechanism for operation
Gland Packing leaking	Insufficient tightening	Tightening to be adjusted for packing leakage
	Packing damage	Replace the packing
Leakage through end flange facings	Inadequate tightening of flanged joint	Re tighten the Flanged joint
	Gasket damage	Replace the gasket
Noise /Vibrations while opening or closing of the valve	Inadequately supported / fixed valve and its assembly	Support / fix upstream / downstream piping and Valve foundation bolts (wherever applicable)

Appendix

A1 - References

Face to Face Dimensions

API 6D Specification for Pipeline Valves

Deviations (for sizes not covered, face to face dimensions as per Manufacturer's standard)

End Connections

ASME B16.5 Pipe Flanges and Flange Fittings (NPS ½ through NPS 24)

ASME B16.47 Large Diameter Steel Flanges (NPS 26 through NPS 60)

Testing Standard

API 6D Specification for Pipeline Valves

API 598 Valve Inspections and Testing

A2 - Tightening Sequence & Torque

The tightening sequence for all possible number of bolting is beyond the scope of this manual. However, the logic to be followed is explained below

- Tighten the first four nuts in the sequence shown Fig.4. This helps in correct location of the mating parts.
- Tighten the other bolts in the sequence shown Fig.5 the same way.
- The sequence goes clockwise around the bolt
- Ensure that the recommended torque (refer Table1&2) is maintained in all bolting.

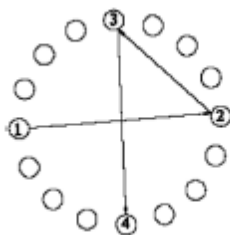


Fig. 4 Initial Tightening

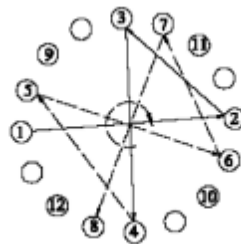


Fig. 5 Sequence of Tightening

Table 1 - Tightening Torque details for studs in body / bonnet & body / bottom plate

Stud Size (inch)	Thread Details	B7/ B16 / L7		B7M / L7M		B8 CL.2 / lbf.ft	B8M CL.2 Nm
		lbf.ft	Nm	lbf.ft	Nm		
3/8	16 UNC	20	27	16	20	20	27
7/16	14 UNC	30	40	25	35	25	35
1/2	13 UNC	55	75	45	60	45	60
9/16	12 UNC	65	90	55	75	65	90
5/8	11 UNC	100	135	80	110	85	115
3/4	10 UNC	190	260	145	200	150	200
7/8	9 UNC	290	390	210	285	200	270
1	8 UNC	390	530	350	475	350	475
1.1/8	8 UN	570	775	500	675	450	600
1.1/4	8 UN	800	1100	700	950	650	900
1.3/8	8 UN	1100	1500	950	1300	750	1020
1.1/2	8 UN	1400	1900	1250	1700	950	1290
1.5/8	8 UN	1800	2450	1590	2150	1200	1630
1.3/4	8 UN	2300	3120	2030	2750	1500	2040
1.7/8	8 UN	2800	3800	2440	3310	1850	2510
2	8 UN	3400	4610	3030	4110	2250	3060
2.1/4	8 UN	4900	6650	4320	5850	3250	4410
2.1/2	8 UN	6600	8950	5880	7970	4400	5970
2.3/4	8 UN	8800	11950	7840	10620	5800	7870
3	8 UN	11500	15600	10120	13730	7600	10310

Table 2 Tightening Torque values for Gland flange boltings

Description	Size (NPS)													
	2	3	4	6	8	10	12	14	16	18	20	24	26	30
Class150	15	15	15	40	40	40	50	50	80	80	80	80	80	100
Class 300	20	20	20	50	50	50	70	70	100	100	100	150	150	170

Table 3 Minimum clearance values for segment removal & No of Tap holes per flange details

Size		Class	Minimum clearance for segment removal (mm)	Number of Tapped Holes per Flange
NPS	DN			
2	50	150	85	--
3	80		100	--
4	100		140	4
6	150		200	4
8	200		255	4
10	250		340	4
12	300		425	4
14	350		470	4
16	400		535	8
18	450		590	8
20	500		670	8
24	600		820	8
30	750	1035	8	
<hr/>				
2	50	300	85	--
3	80		100	--
4	100		140	--
6	150		200	--
8	200		255	--
10	250		330	4
12	300		415	4
14	350		465	4
16	400		515	4
18	450		565	4
20	500		615	4
24	600		665	4

APPENDIX B

For valves with CE & ATEX certification requirements

- Each valve has a stainless steel name plate fixed to the body. The nameplate is marked with details of “figure number”, along with various other details such as the materials of construction, pressure-temperature rating as shown below

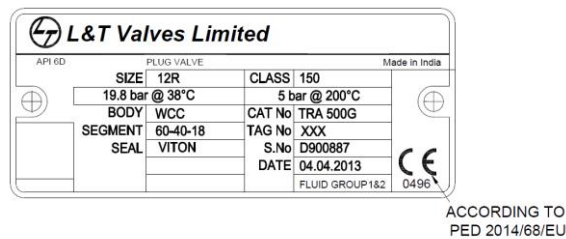


Fig.B.1 'CE' Marking Name Plate

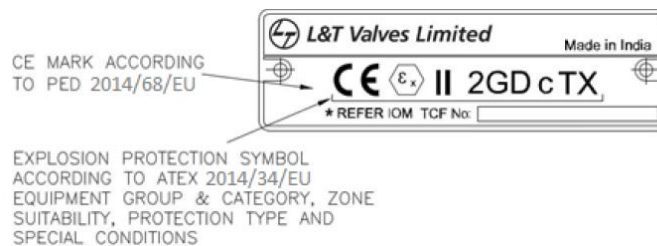


Fig.B.2 'ATEX' Marking Name Plate

When installing or maintaining valves

- Observation shall be made for safety codes and working practices relevant to gas zones 1 & 2 and dust zones 21 & 22 (as defined in EN 1127-1:1998).
- The equipment shall not be subjected to frequently occurring disturbances.
- End user to ensure there is no external disturbances (e.g. Shocks, vibrations, electromagnetic fields etc.)
- Misuse of valves / valve components are strictly prohibited.
- If the processes or environments that the products are used in are likely to cause temperatures (high or low) that may cause injury to personnel if touched, then adequate insulation / protection must be fitted.
- Adequate safety measures shall be made for valves similar to pipe lines.
- Before equipment is installed in areas which may be subject to seismic activity or extreme climatic conditions consult L&T Valves with data.

- Maximum surface temperature of the equipment will be same as the line media temperature. The end user must take account of the line media temperature.
- All exposed parts shall be cleaned to prevent dust deposit or insulation is needed similar to pipe line.
- This equipment should be protected by other devices to prevent over-pressurization. (i.e. caused by external fire etc.).
- Valves are not suitable for terminal connections. In such cases, valves shall be fitted with blind flanges.

APPENDIX C

Valve torque details

Valve size	Class Rating	End to close torque @ stem with FOS 1.5 (Nm)	Valve travel (mm)	Gear unit selection									
				Model	Gear ratio	Mech. Advt.	Max Input torque (Nm)	No. of rotations required	Torque available at GU (Nm) with FOS 1.5				
2R	150	45	30	(Direct mounting HW or Actuator)				3	45				
3R		45						3	45				
4R		45						3	45				
6R		477	25	SBWG 01MT	44	15.1	132.2	40	32				
8R		495						40	33				
10R		495						40	33				
12R		1172		SBWG 02MT	48	15.9	176.1	43	74				
14R		2024						43	127				
16R		2826						39	167				
18R		3443	30	SBWG 03MT	52	16.9	253.7	39	204				
20R		3630						47	198				
24R		5850		SBWG 04MT	56	18.3	569.8	47	320				
26R		5850						47	320				
30R		10650	SBWG 05MT	60	19.6	813.1	70	543					
2R	300	75	30	(Direct mounting HW or Actuator)				3	75				
3R		75						3	75				
4R		75						3	75				
6R		945	25	SBWG 01MT	44	15.1	132.2	40	63				
8R		1125						40	75				
10R		2230						SBWG 02MT	48	15.9	176.1	43	140
12R		4030		SBWG 03MT	52	16.9	253.7					39	238
14R		4500										39	259
16R		4800		SBWG 35MT	52	17.4	350.5	39	276				
18R		6600	42					361					
20R		9095	30	SBWG 04MT	56	18.3	569.8	58	497				
24R		12900	35	SBWG 05MT	60	19.6	813.1	70	658				



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As we continuously endeavour to improve our products, the data given herein is subject to change. Please refer www.lntvalves.com for the latest catalogue.