

Installation, Operation and Maintenance Manual

W-K-M[®] 370D5 BALL VALVES



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Initial Release 01
April 2012

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I. GENERAL INFORMATION

DESIGN

All WMK 370D5 Ball Valves are non-directional and can be installed with either end upstream. Flanged-end valves (sizes 24" and smaller, except 22") have flanges faced and drilled in accordance with ASME B16.5. 22" and sizes 26" and larger conform to MSS SP-44. Face-to-face and end-to-end dimensions conform to API Spec. 6D, Table 4.4, "Flanged-End and Welding-End Ball Valves Full Port and Reduced Port."

BLOCK-AND-BLEED

All current 370D5 valves have body drain ports per MSS-SP-45, i.e. 3/4" NPT for 6-8" valves and 1" NPT for 10" and up. A special vent valve is supplied as a standard feature for block-and-bleed service.

EMERGENCY SEAT SEALANT SYSTEM

1/2" NPT steel fittings with giant button heads are installed in the mid-section of both closures. On valves 22" and larger, dual fittings are provided on both the front and back side of the valve. Section III-C describes the function of the sealant system.

FIELD WELDABILITY - WELDING END VALVES

WKM ASME Ball Valves with welding end connection(s) utilize ASTM A36, A572 Gr. 50, A537, A216 Gr. WCB, A350 LF2, A105 and A106 Gr. B steel. All are readily field weldable. When welding 370D5 valves in the line, standard field welding techniques and procedures are satisfactory.

BODY RELIEF VALVE

To protect the body from thermal over-pressure in above ground liquid service when valve is in the closed position, a 1/2" NPT steel body relief valve, located in the upper body area, is furnished. It has been factory adjusted to a nominal relief setting of 1.6 x rated pressure. A small hole in the ball equalizes Line pressure and body pressure when the valve is in the open position.

II. VALVE INSTALLATION

A. EQUIPMENT

Handling equipment is required for the weight involved. The current 370D5 Ball Valve catalog furnishes the weight of the specific valve.

B. PROCEDURES

1. Remove end connection protectors.
2. Inspect valve port for foreign matter and clean, if necessary. Valves are shipped with ends sealed, but during transit foreign material may be introduced into the port.

3. Install in line; either end may be installed upstream.
4. Install vent valve, if not already factory-installed.
5. On valves having extensions, check all extension piping and fittings to ensure that all are tight prior to placing valve in service.
6. The seat sealant system is intended only for emergency shut-off. Do not lube. (See Section III-C).

III. ON STREAM MAINTENANCE

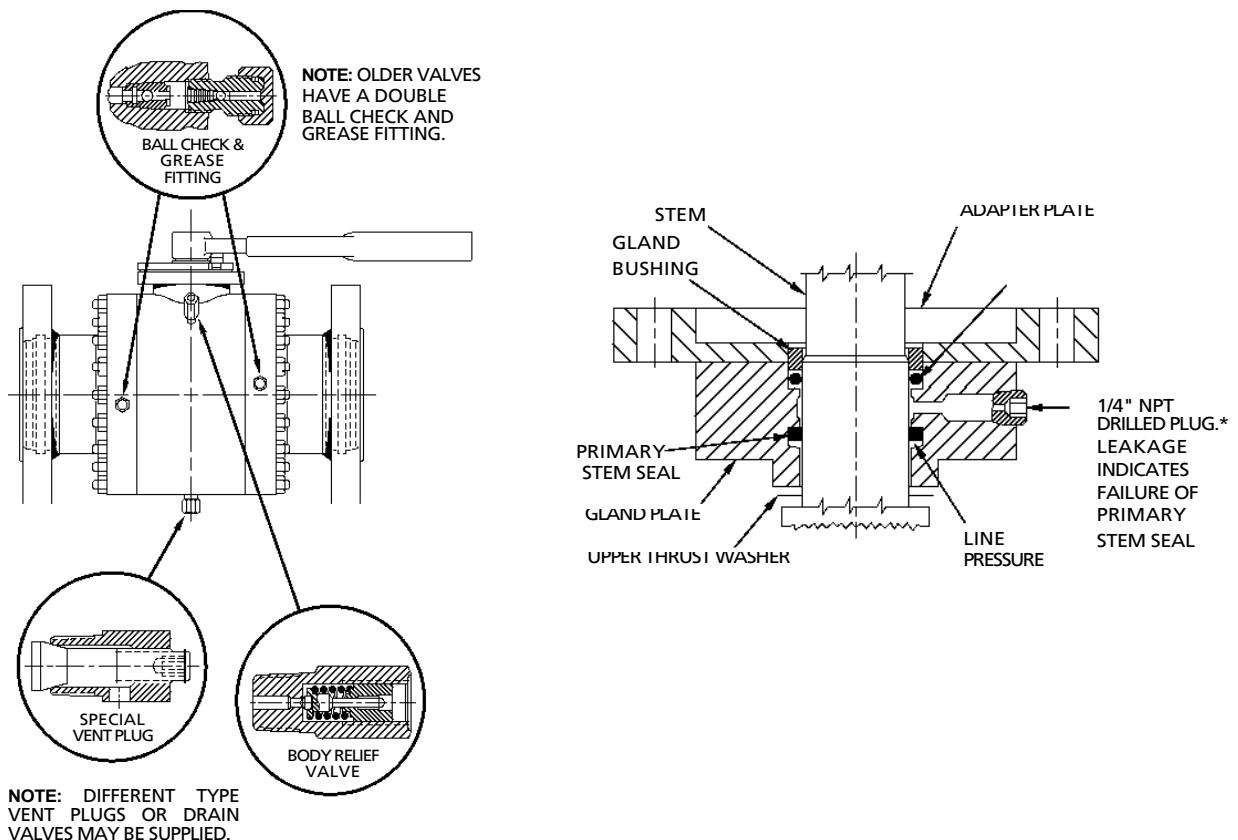
This part covers maintenance and repair which can be performed without removing the valve from the line.

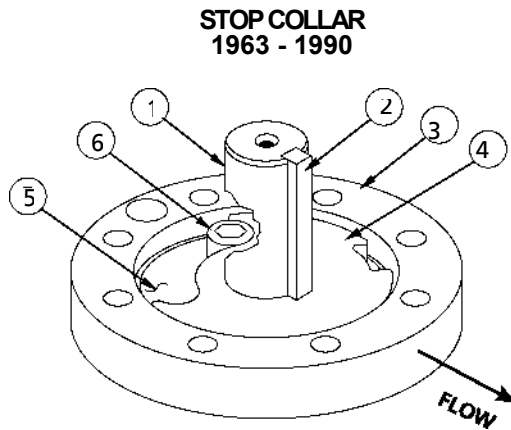
A. BLOCK-AND-BLEED

With the line under pressure the valve body cavity can be vented to atmosphere and completely drained down with the ball in the **CLOSED POSITION ONLY**.

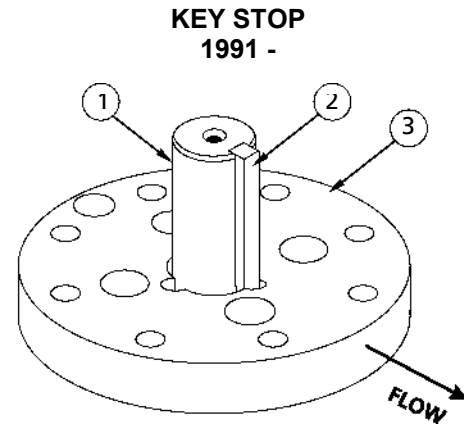
The valve body cavity may be drained and flushed by:

1. Removing the special vent valve after pressure has been vented.
2. Removing the 1/2" NPT relief valve from the upper body area.
3. Flushing through upper relief valve connection and allowing drainage through the lower vent plug connection.




FIG. A

1. STEM
2. KEY
3. ADAPTER PLATE
4. STOP COLLAR
5. NYLON WASHER
6. STOP CAPSCREW


FIG. B

1. STEM
2. KEY
3. ADAPTER PLATE

B. Stem Seal O-Ring Replacement

Note: On newer versions of the 370D5 ball valve, the adapter plate and stop collar are one-piece. (See Fig. A and B)

* On newer valves a needle valve is supplied in lieu of a vent plug. The 370D5 has two stem seals, one primary seal, backed up by a second independent seal. If the primary O-ring seal becomes faulty, a leak will occur through the gland plate vent plug.* In this case remove 1/4" vent plug* and replace with 1/4" solid plug to energize the secondary O-ring seal.

1. To verify the integrity of the primary stem seal, open the needle on the vent assembly plug.* If the primary seal is faulty, close the needle valve to energize the secondary seal.

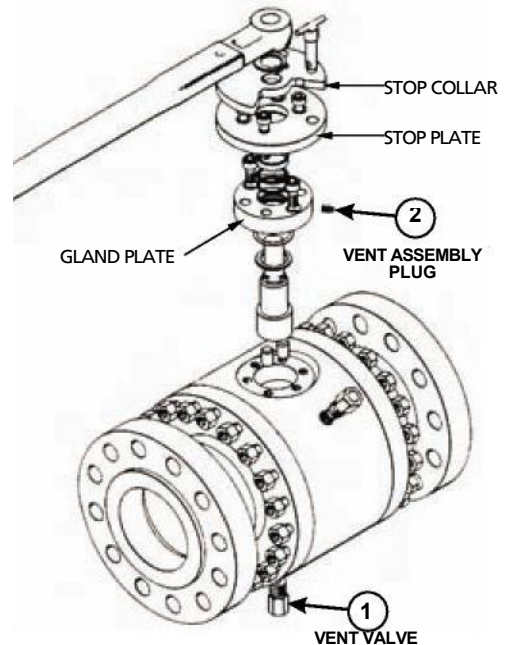
Should seals leak, they may be replaced by the following procedure:

WRENCH OPERATED VALVE

1. Turn valve to fully closed position.
2. Bleed off body pressure, leaving vent valve 1 open.
3. Open 1/4" NPT vent assembly plug 2 on the gland plate.

Caution: Exercise extreme care when removing this plug as it is possible, even with body pressure relieved, to have trapped line pressure behind this valve.

4. Lift wrench off stem. Do not lose key.
5. Remove lock pin and capscrews and lift collar from the stem.
6. Remove capscrews and lift stop plate and key stop off stem.
7. Remove gland plate capscrews.
8. Lift stem unit with gland plate out of body. Do not remove the drive pins.
9. Slip gland plate off the stem. Remove gland bushing, o-rings and upper thrust washer(s).
10. Coat new o-rings with a thin film of non-fibrous grease and install in gland plate.
11. Reassemble gland plate, thrust washer(s) and stem assembly and insert into the body. (See torque table, Section VI).
12. Close vent valve 1 .
13. Replace 1/4" NPT vent assembly plug 2 .
14. Crack valve to allow body to re-pressure to check integrity of the new seal.



GEAR OR MOTOR OPERATED VALVE

1. Follow steps 1 and 2 as outlined for wrench operated valve.
2. With valve in fully closed position mark vertical line on operator, adapter flange and body, to ensure correct alignment of these parts at reassembly.
3. Remove mounting nuts from adapter plate and lift operator off plate.

Note: Exercise caution when removing operator. It is keyed to stem and must be lifted straight up until stem is clear. Be careful not to damage or lose key.

Remove adapter plate (remove stop collar if required).

4. Follow steps 7 through 13 as outlined for wrench operated valve.
5. Replace adapter plate making certain vertical mark line on body and adapter, are in alignment.

6. Replace nylon washer and stop collar if required.
7. Replace gear operator making certain vertical mark line on body, adapter plate and operator, are in alignment.
8. Replace key in stem.
9. Replace mounting nuts and tighten evenly all around.
10. Crack valve to allow body to re-pressure to check Integrity of the new seal.

C. Emergency Shut-Off

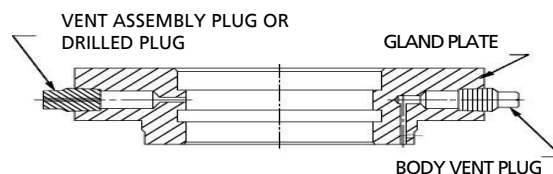
The seat seals of all 370D5 valves are designed not to require sealants; however, in the presence of excessive line contaminants, the possibility of leakage, due to erosion, is greater than when a valve is used for normal on-off service. If the metal-to-metal primary seal and the secondary O-ring seal are damaged, an emergency shut-off may be obtained with a sealant injected into a specially designed groove in the seat ring assembly. This feature is especially important in critical under-water applications where it may be impractical to remove a valve from the line. WKM 370D5 valves are equipped with fittings for emergency sealant injection. We ship without sealant fittings and drain valves for subsea service.

SEALANT INJECTION INSTRUCTIONS

First purge the sealant passages by injecting "SEALWELD" VALVE CLEANER (or equivalent). This operation purges old greases and residual build-up which contribute to seal leakage and excessive operating torque. With valve in the fully closed position, slowly inject "SEALWELD 911" sealant (or equivalent) through the large buttonhead fitting provided on the upstream closure. If possible, move ball slightly during injection to ensure that sealant is evenly distributed over the sealing surfaces of the seat ring and the ball (for ball valves with damaged balls or seats use "SEALWELD" BALL VALVE SEALANT NO. 5050, or equivalent). For low temperature services down to -75 to +400 degrees Fahrenheit, use "SEALWELD" VALVE SEALANT D-1014 (or equivalent). A damaged sealant fitting may be removed and replaced while the valve is under pressure, by first injecting a small amount of sealant to ensure the tightness of the single or double ball check valve installed in the sealant passage under the grease fitting.

D. In-Line Hydrostatic Testing

1. With zero pressure in the line and in the valve, remove the relief valve and replace with a pipe plug.
2. Make sure that vent plug valve at bottom of valve is closed.
3. On valves 14" and larger, remove the body vent plug from the gland plate to permit evacuating all air from body cavity.



4. Open ball valve about 1/3 to permit pressurizing valve body.
5. Fill line and valve body until liquid flows from gland plate body vent port and pressures the relief port.
6. Raise pressure to desired hydrostatic test pressure. This pressure must not exceed 1-1/2 times the maximum operating pressure of the valve — unless prior approval to test at higher levels is obtained from engineering.
7. After test is completed:
 - a. Close ball valve.
 - b. Vent any remaining body pressure through bottom vent plug valve and close tightly.
 - c. REINSTALL THE RELIEF VALVE.
This is very important for protection of the body against over-pressure when the valve is in the closed position.

Caution: Do not alter the relief valve setting.

8. When valve is in the closed position, test pressures must NOT exceed the maximum rated operating pressure on the valve.

IV. OFF STREAM MAINTENANCE

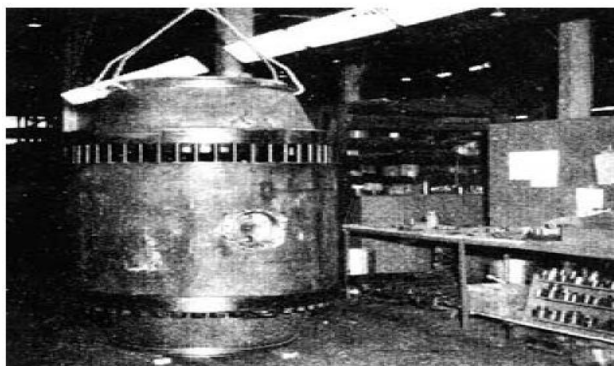
Major repairs which necessitate removing the valve from the line.

EQUIPMENT

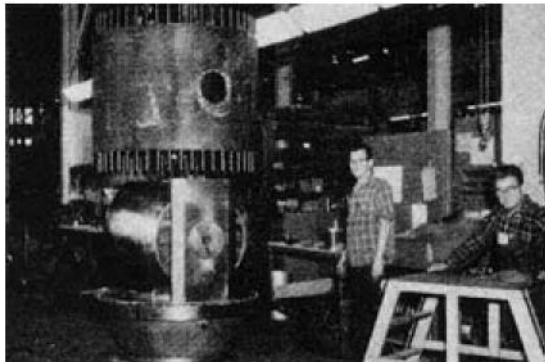
Handling equipment as required for weight involved, see current 370D5 Ball Valve catalog for weight of specific valve. Also required is a plywood sheet to press in large seat rings.

A. Disassembly Procedure

1. Turn the valve to open position and open vent to relieve line pressure before removing the valve from the line.
2. Remove the wrench or gear per instructions in Section III.
3. Remove stem assembly per instructions Section III.
4. Remove body nuts except four (4) on each flange



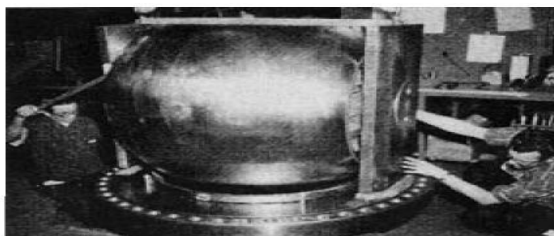
5. Turn the valve on end with the weight spread evenly on one port face of the body, exercising care not to damage the sealing surfaces if the valve is flanged. Loosen body nuts on upper closure one full turn and lift on closure to loosen closure, O-rings, and body.
6. Remove remaining body nuts from upper closure and lift closure off body studs. Be careful not to damage body O-ring or bearing unit dowel pins. Loosen body nuts on lower closure one full turn and lift on body to loosen body, O-ring and closure.
7. Remove remaining body nuts from lower closure and remove body. On large valves, body studs may be replaced by eyebolts for this operation.



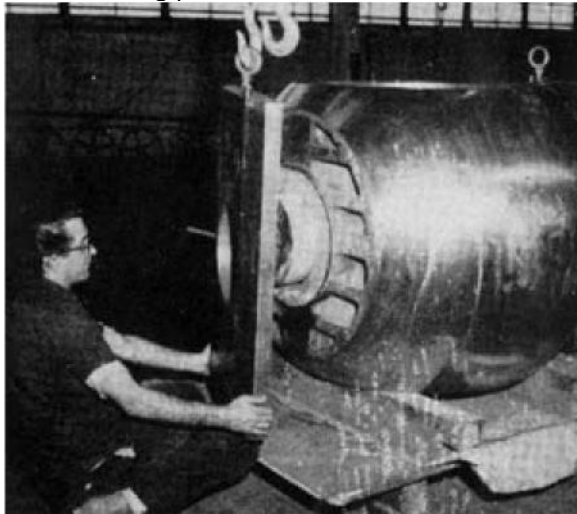
8. Remove vent valve and relief valve from body for cleaning.
9. Insert lifting eyebolts in threaded holes provided in bearing plates.
10. Using eyebolts and a spreader bar cut to length, lift the ball up and out of the seat ring.

Caution: Ball can slide out of the bearing blocks.

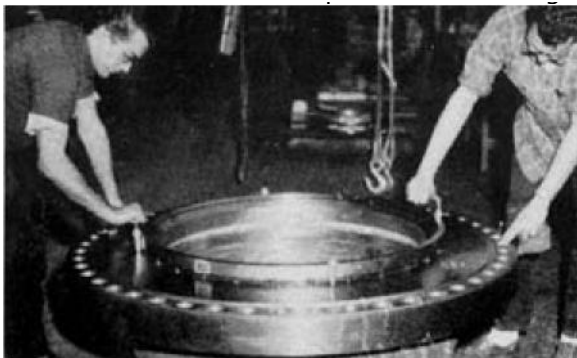
11. For reassembly note position of the three or more reassembled drilled holes on O.D. of outer seat ring. Seat ring must be with these holes at 90° to the vertical centerline of the stem and ball.



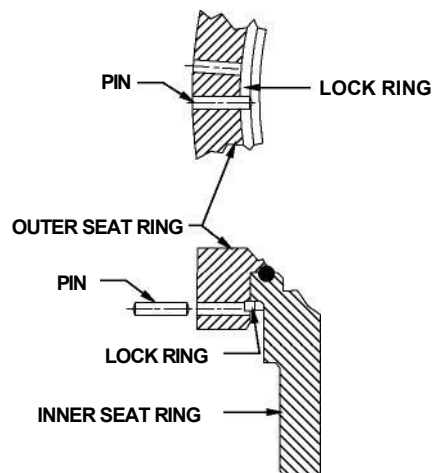
12. Lower ball onto wood blocks with the plates clear and remove the plates from the ball. Spacer and lower thrust washer are now free. Retainer pins are a press fit in bearing plates and should NOT be removed.



13. Remove from closures, four (4) seat retainer capscrews and bushings (if valve is so equipped). Carefully pry out the seat ring assembly from both closures and remove seat ring springs from the closures. Remove buttonhead grease fittings and ball check valves from closures for inspection and cleaning.



14. Disassemble seat ring as follows: a. Remove seat gasket O-ring and U-cup (not shown).



- a. On small valves, the U-cup remains in the closure when the seat assembly is removed.
- b. Remove lock pin by introducing screw driver between inner and outer seat rings and pry pin outward. Compress lockring inward by introducing a punch-through hole adjacent to pin and progressively pry out lockring from its groove.
- c. Separate inner ring from outer ring and remove seal O-ring.

B. Inspection and Cleaning

1. Wipe off metal parts with soft cloth, using a petroleum solvent, detergent, or cleaner. Replace O-rings and gasket.
2. Inspect metal parts for damage or burrs on all moving surfaces.
3. Replace defective parts with only genuine 370D5 manufactured and supplied parts.

Note: *O-rings are made to stretch with a certain tension around a metal shoulder. Any stretching or swelling of O-rings may cause cutting on reassembly. Do not reuse O-rings unless their dimensions are carefully checked against new parts.*

C. Lubrication

1. DO NOT lubricate the dry bearing plates or the contact surfaces.
2. For temperatures from -50°F to +225°F, lubricate all moving contact metal surfaces with a low temperature, high quality grease. Lubricate O-rings with heavy grease (Marfak #3 or equal). INTERTHERM 751 CSA-100 MICRONS DFT.
3. For temperatures +10°F to +350°F, lubricate all moving contact metal surfaces and O-rings with Bracote 622 wide temperature grease or equivalent.

D. Reassembly

1. Place both closures on a clean, solid surface.
If flanged, be careful not to damage sealing surface.
 - a. Install check valve and buttonhead grease fittings into sealant passages of closures.
 - b. Lubricate threads with thread sealant.
 - c. Fill sealant cavities, through the grease fittings, with a low temperature, high quality, grease until lubricant just appears in the seat ring recess. This process serves to lubricate the check valves, assuring pressure tightness.
2. Reassemble seat rings:

Note: *A press will make the assembly of the inner and outer seat rings easier. Contact Cameron for more information.*

- a. Place Seal-O-Ring in inner seat ring and place outer seat ring over inner ring, set the loose seat rings in the press then press together.
- b. Secure with lock ring and pin as follows: Push lock pin inward through hole in outer set ring until it protrudes slightly into lock ring groove. Start lock ring into it's groove by abutting the pin and working it into its groove progressively

- around the seat circumference. Push lock pin fully through gap between ends of nested lock ring. Remove from press (refer to illustration, Section IV-A, Step 14).
- c. Grease seat gasket O-ring. Stretch seat gasket O-ring over shoulder of inner seat ring.
 - d. Replace U-cup. DO NOT stretch. U-cup is designed to fit with minimum contact. Stretching will make it too large.
3. Insert springs in closure and position seat ring in closure so that the three or more drilled holes on the O.D. of outer seat ring are at 90° to the vertical centerline of the stem and ball.



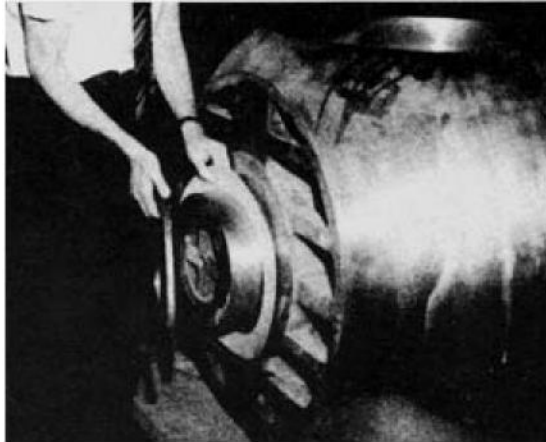
4. Seat ring assembly must be pressed into the closure recess. On larger valves, this may be done by using ball as a press, as follows:

Note: *If your valve has the four (4) seat retainers in each seat, these should be used to pull seat into closures which would eliminate steps a, b and c.*

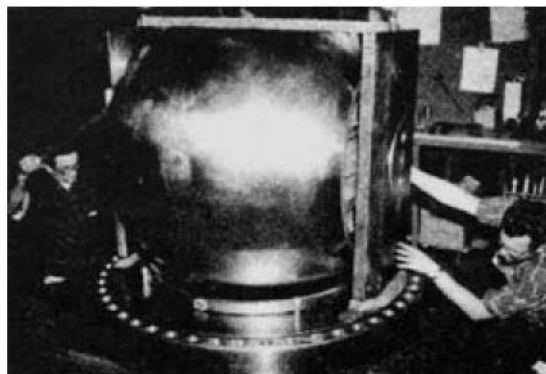
- a. Lay plywood sheet over the entire exposed surface of seat rings.
- b. Place slings around the ball and suspend the ball over seat rings.
- c. Lower ball onto wood and carefully press seat rings into closure.

Caution: *Be sure pressure is applied evenly. Seat rings must be properly aligned or ball will bind and valve will leak.*

5. Remove slings from ball and block up, so end trunnions are accessible with clearance for bearing plates.
- a. On lower trunnion place lower thrust washer and spacer, if used. The chamber on the inner diameter of the spacer must face the thrust washer.
 - b. Locate the bearing plates on the ball trunnions with lifting eyebolts installed.



6. Using eyebolts in bearing plates with a spreader bar lift ball into position over seat assembly in closure.
7. Lower ball into seat rings while rotating bearing plates so that pins fit into matching holes in closure. Remove lifting eyebolts.



8. Apply grease to the closure O-ring and body O-ring groove. Place body O-ring over shoulder on closure.
9. Lift body over ball and set into position with studs matching closure holes and ball.



10. Lower other closures over body studs with the bearing plate pins seating into the matching closure holes.

Caution: Be sure to lower closure evenly.



11. Replace four (4) evenly spaced body nuts on each closure. Tighten these nuts, replace all body nuts. Tighten all body nuts.
12. Turn valve assembly upright.



13. The stem and gland plate are installed in the valve as a unit.
 - a. Install the lower and upper stem O-rings with assembly grease.
 - b. Install the gland bushing.

Securely block the stem vertically. If available, set in a press.
Lubricate the stem O-ring area.



Set the thrust washer on the stem shoulder.

Set the gland plate on the stem.

Orient the gland plate to the key slot witness mark.

Set the adapter plate on the gland plate.

Firmly press the adaptor plate until the gland plate and thrust washer make contact with the stem shoulder.

Set the adapter plate off to one side.

14. Install the gland plate O-ring with grease. Inspect the gland plate O-ring groove in the body. Grease the O-ring groove.

15. Insert the stem/gland plate unit into the body. Align the stem pins and key. If the ball is closed, the keyway should be over the nameplate.

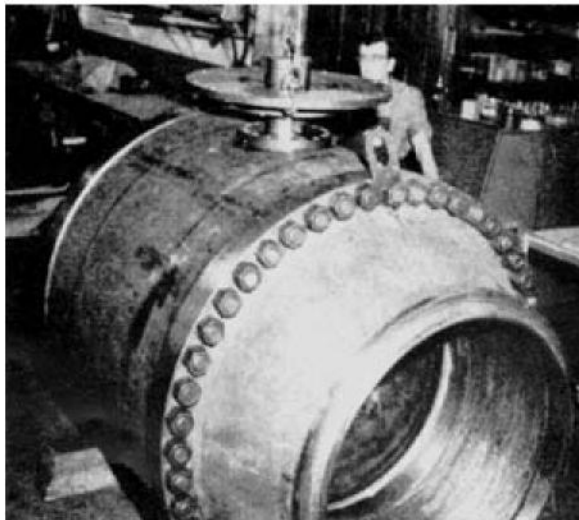
If the ball is open, the keyway should face the right side of the valve. Secure the gland plate capscrews (refer to torque table, Section VI).

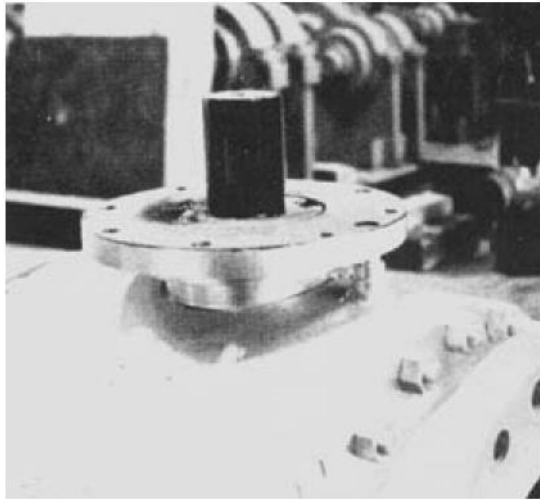


16. Install vent plug assembly.

17. Finish tightening body nuts with wrench evenly all around (refer to torque table, Section VI).

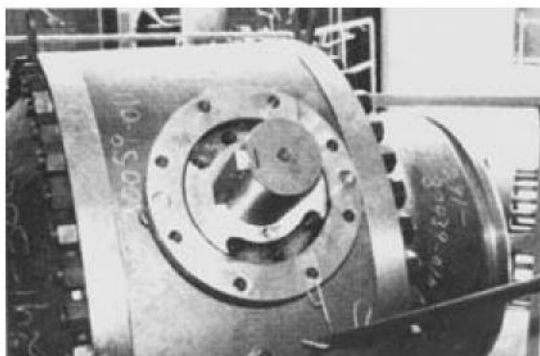
18. Replace gland plate gasket.





19. If valve has gear operator:

- a. Replace adapter plate with stop collar over gland plate with anchor pin engaged. Secure with capscrews (see torque table, Section VI). Replace stop collar capscrews.
- b. Replace adapter plate with keystone over gland plate with anchor pin engaged. Secure with capscrews (see torque table, Section VI).



- c. Replace washer and stop collar.
- d. Replace key in valve stem, engaging keyway in stop collar.

- e. Replace operator (observing the reference marks on operator, adapter flange and body) and secure to adapter plate with capscrews (see Section VI for torque).
 - f. Refer to operator mounting instructions for adjustment of stops (see Section V).
20. If valve is wrench operated:
- a. Replace stop plate and secure to gland plate with capscrews (see torque table, Section VI).
 - b. Replace washer and stop collar over stop plate. Rotate so the lock pin holes line up and replace lock pins and stop collar capscrews.
 - c. Replace wrench if stem has square end. Otherwise, replace key in stem, engaging keyway in stop collar. Replace wrench.

E. Testing for Leakage

1. Install pipe plug in drain valve port at bottom of valve.
2. Close valve fully. Install body vent plug (if required).
3. Admit 50 -100 psi air or nitrogen pressure into body cavity through relief valve port. Lock off body pressure.
4. If body pressure falls steadily, apply soap solution to ball/seat circumference closure, flange to body interface and to vented assembly plug in gland plate. Release pressure, disassembly and repair area of leakage.
5. Vent air pressure from body and install relief valve.
6. Remove pipe plug from drain port and install drain valve assembly, close drain valve.

V. ACCESSORY INSTALLATION

A. SY Scotch Yoke Operator Mounting and Setting Stops

1. Before mounting the operator on the valve, grease the valve stem. Check the key to see that it is the proper length and fits the key slot without excessive play. Lower the operator over the stem and bolt down to the valve adaptor plate. Tighten bolts securely.

Note: *If operator fits tight over the valve stem, do not force down by taking up on the bolts. This will lock up the ball and cause excessive torque. Check for scratches or burrs and polish to provide smooth sliding surfaces.*

2. The valve internal stop is designed to serve as an indicator of the ball open and closed positions. This stop permits slightly more than 90° travel in order that the stops in the operator can be set to serve as the ACTUAL stopping means. After the operator has been properly installed on the valve, the operator stops can be set as follows:

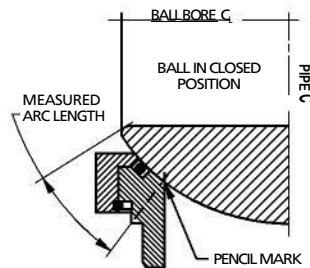
Note: *On newer versions of the 370D5 ball valve, the adapter plate and stop collar are one-piece. (see Fig. A & B, page 6.)*

Off-stream (Valve Remove from Line)

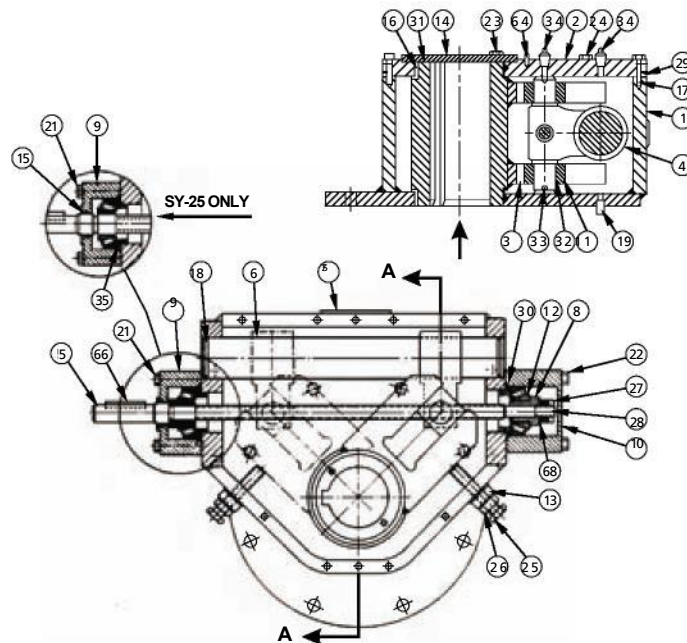
- a. Back-off locknuts and stop screws on both sides of the operator.
- b. Turn handwheel clockwise until ball is about 1/2 closed.
- c. From the table, find the arc length for the size and pressure class of the valve and measure off this distance from ball port lip along horizontal centerline.

Make a pencil mark on the ball at this point. Refer to sketch.

**Section on Horizontal Plane
Thru Valve Port Centerline**



- d. Continue to turn valve towards the closed position until the pencil mark is flush with the I.D. of the seat ring.
- e. Turn the operator "close" stop screw (farthest from the handwheel) until it can go no further. Tighten the locknut.
- f. Turn operator handwheel counter-clockwise until port of the ball lines up visually with port of seat ring.
- g. Advance "open" operator stop screw nearest the handwheel until it can go no further, and tighten.



SIZE (inches)	MEASURED ARC LENGTH (inches)				
	CLASS 150/600		CLASS 900		CLASS 1500
18	1 17/32	± 1/8	2 7/32	± 1/8	
20	1 11/16	± 1/8	2 17/32	± 1/8	
22	1 27/32	± 1/8	2 11/16	± 1/8	
24	2 1/32	± 1/4	3 1/16	± 1/4	
26	2 1/16	± 1/4	2 29/32	± 1/4	
28	2 7/32	± 1/4	3 1/4	± 1/4	
30	2 3/8	± 1/4	3 29/32	± 1/4	
34	2 17/32	± 1/4	3 25/32	± 1/4	
36	2 19/32	± 1/4	3 5/8	± 1/4	
40	2 15/16	± 1/4			
42	2 31/32	± 1/4			
48	4 9/16	± 5/16			

NO.	PART NAME	NO.	PART NAME
1.	Housing	21.	Capscrew (Bearing Cover)
2.	Cover	22.	Capscrew (Bearing Cover)
3.	Drive Sleeve & Yoke	23.	Capscrew (Indicator Cover)
4.	Trunnion	24.	Capscrew (Cover)
5.	Stem	25.	Stop Screw
6.	Guide Bar	26.	Lock Nut
7.	Bearing Bushing (Left)	27.	Slotted Nut (Stem)
8.	Bearing Bushing (Right)	28.	Cotter Pin
9.	Bearing Cover (left)	29.	Gasket (Cover)
10.	Bearing Cover (Right)	30.	O-Ring (Bearing Cover)
11.	Torque Arm Shoe	31.	Gasket (Indicator Cover)
12.	Bearing (Stem)	32.	Washer
13.	Seal Washer	33.	Cotter Pin
14.	Indicator Cover	34.	Grease Fitting
15.	O-Ring (Stem)	35.	Bearing Spacer
16.	O-Ring (Drive Sleeve)	64.	Groove Pin
17.	Roll Pin	66.	Key
18.	O-Ring (Guide Bar)	68.	Spacer (SY 25 Only)
19.	1/4" Pipe Plug	75.	Emblem

On-Stream (Valve in Pipeline and Under Pressure)

- a. Back-off lock nuts and screws on both sides of the operator.
- b. Turn handwheel in a clockwise direction as far as it will go. This places valve in maximum closed position as permitted by the stop collar of the valve.
- c. Vent body cavity pressure through special vent valve. If CONTINUOUS drainage occurs, slowly turn handwheel counter-clockwise until drainage just stops.
- d. From this handwheel position, count the number of handwheel turns in counter-clockwise direction required to initiate flow from vent port. DO NOT overshoot.
- e. Turn handwheel clockwise one half the counted number of turns determined in "d" above.
- f. Turn the operator stop screw (farthest from the handwheel) until it will go no further. Tighten lock nuts.
- g. Tighten the vent plug assembly. Close vent valve.
- h. From the handwheel position in step "f", turn the handwheel counter-clockwise the number of turns for 90° rotation indicated in the table for the operator involved.

OPERATOR	URNS FOR 90°
SY 25	40
SY 50	40
SY 150	56
SY 300	72
SY 500	60

- i. Advance the operator stop screw (nearest the handwheel) until it will go no further. Tighten the lock nuts.

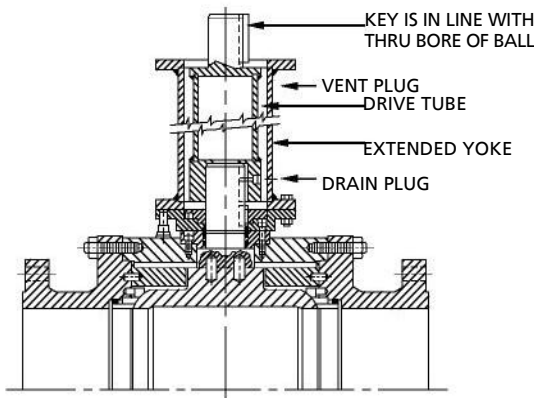
Note: For valves isolated from the line pressure, the above stop setting procedure may be accomplished by using 50-100 psi air or nitrogen pressure introduced into the body cavity of closed valve.

Note: For setting stops on other gear or power operators, refer to the manufacturer's instruction.

B. Operator Extension - Field Mounting

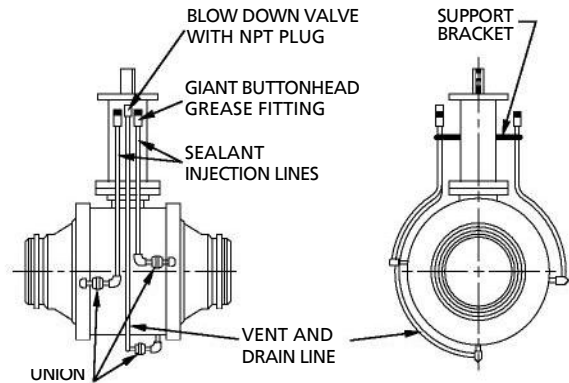
Move ball slightly off the open or closed position. Remove key from stem. Remove primary gear and clean adapter plate surfaces. Install gasket on adapter flange. Insert eyebolt in drive tube and install over stem, being careful not to damage key. Install extended yoke onto adapter flange, bolting up tight to torque specifications in Section VI. Install gasket on extended yoke mounting flange. Install "alignment lugs" on adapter plate and extended drive yoke. Mount primary gear on extended yoke. Refer to above section on mounting primary gear operator for instructions on setting stops.

Note: After field mounting extension on standard ball valve, primary gear operator stops will have to be reset.



Extended Blow-Down and Extended Sealant Injection Lines

Recommendation for extending vent and seat sealant, injection lines on valves having extended operators. 1/2" Sched. 80 piping is suggested for all lines.



VI. MISCELLANEOUS

A. Bolting Torques

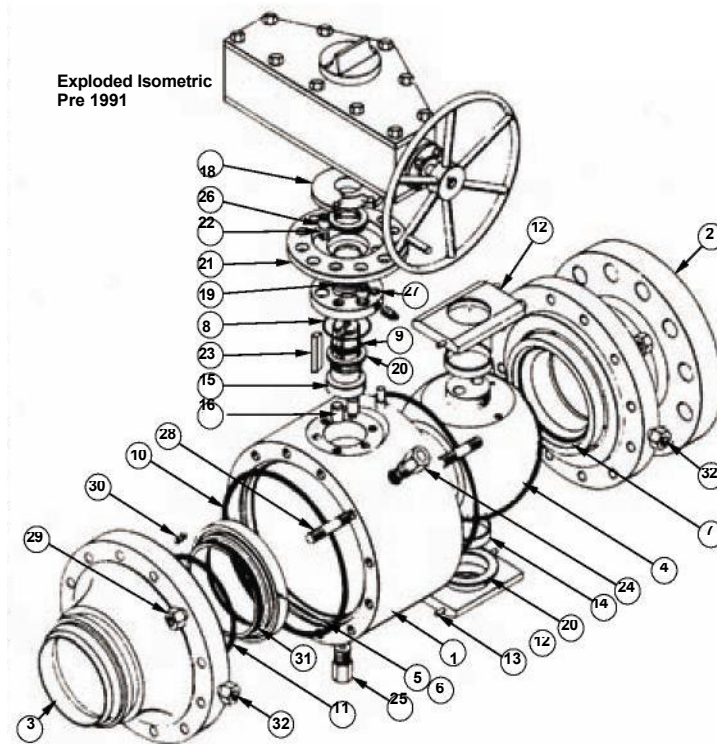
Body Stud Torque (370D5)

Stud Size		Torque* (ft.-lb.) Lube (Moly)
1/2	13 UNC	55
5/8	11 UNC	105
3/4	10 UNC	180
7/8	9 UNC	300
1	8 UNC	440
1 1/8	8 N	640
1 1/4	8 N	920
1 3/8	8 N	1240
1 1/2	8 N	1640
1 5/8	8 N	2120
1 3/4	8 N	2675
1 7/8	8 N	3325
2	8 N	4070
2 1/4	8 N	5815
2 1/2	8 N	8000

Capscrew Torque (370D5)

Capscrew Size		Minimum Torque
1/2	13	50 ft-lb
5/8	11	100 ft-lb
3/4	10	170 ft-lb
7/8	9	250 ft-lb
1	8	350 ft-lb

Note: On newer versions of the 370D5 ball valve, the adapter plate and stop collar are one-piece.



Part No.	Name	Part No.	Name
1	Body	17	Gland Plate
2	Closure Flanged End	18	Stop Collar
3	Closure Weld End	19	Gland Bushing
4	Ball	20	Thrust Washers
5	Inner Seat Ring	21	Adapter Plate
6	Outer Seal Ring	22	Washer
7	O Ring (Seat Seal)	23	Key (Stem)
8	O Ring (Gland Plate)	24	Relief Valve Assembly
9	O Ring (Stem)	25	Vent Plug or Drain Valve
10	O Ring (Body)	26	Capscrew (Adapter Plate)
11	O Ring (Seat Gasket)	27	Capscrew (Gland Plate)
12	Bearing Retainers	28	Stud
13	Dowel Pins (Retainer)	29	Nut
14	Bearings	30	Seat Springs
15	Stem	31	U Cup Ring
16	Drive Pins	32	Check Valve & Grease Fitting

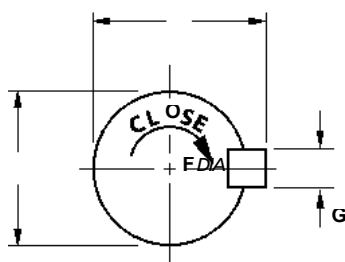
B. Top Mounting Dimensions for W-K-M 370D5 Ball Valves Less Gear Operators

Note: To Operator Manufacturers

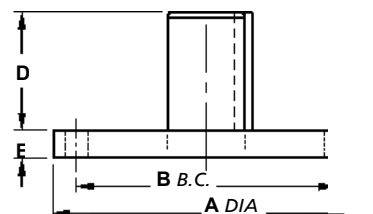
1. Key is in-line with port of ball.
2. Operator must be arranged for 91° rotation including adjustable 1/2° rotation at each end of travel. Adjustment to be external type.
3. All operators and mounting adaption to be fully enclosed and weather proof.

Caution: Minimum Operator Stem Engagement (E-1") Dim. must be fully engaged by operator drive sleeve.

VALVE SIZE (in.)	CLASS	A	B	C	D	E	+ .000 F - .004	+ .000 G - .010	+ .000 H .002
18	150/900	15 5/8	14	13/16	1 9/16	5 1/2	3.499	3.882	.875
20	150/600	15 5/8	14	13/16	1 9/16	5 1/2	3.499	3.882	.875
20	900	15 5/8	14	13/16	1 9/16	6	4.748	5.292	1.250
22	150	15 5/8	14	13/16	1 9/16	5 1/2	3.499	3.882	.875
22	300/600	15 5/8	14	13/16	1 9/16	6	4.748	5.292	1.250
22	900	18	16	1 1/16	1 9/16	6	4.748	5.292	1.250
24	150/600	15 5/8	14	13/16	1 9/16	6	4.748	5.292	1.250
24	900	18	16	1 1/16	1 3/16	6	4.748	5.292	1.250
26	150/400	15 5/8	14	13/16	1 7/8	6	4.748	5.292	1.250
26	600	18	16	1 1/16	1 9/16	6	4.748	5.292	1.250
26	900	18	16	1 1/16	1 3/4	6	4.748	5.292	1.250
28	150	15 5/8	14	13/16	2 1/16	6	4.748	5.292	1.250
28	300/600	18	16	1 1/16	1 13/16	7	5.998	6.655	1.500
28	900	18	16	1 1/16	1 13/16	7	5.998	6.655	1.500
30	150	15 5/8	14	13/16	2 1/16	6	7.748	5.292	1.250
30	300/600	18	16	1 1/16	1 13/16	7	5.998	6.655	1.500
30	900	22	20	1 1/16	2 1/16	7 1/2	6.498	7.162	1.500
32	150	15 5/8	14	13/16	2 1/16	6	4.748	5.292	1.250
32	300/600	18	16	1 1/16	1 13/16	7	5.998	6.655	1.500
32	900	22	20	1 1/16	2 1/16	7 1/2	6.498	7.162	1.500
34	150/600	18	16	1 1/16	2 3/16	7	5.998	6.655	1.500
36	150/600	18	16	1 1/16	2 3/16	7	5.998	6.655	1.500
36	900	22	20	1 1/16	2 3/16	7 1/2	6.498	7.162	1.500
40	150/400	18	16	1 1/16	2 3/16	7	5.998	6.655	1.500
40	600	22	20	1 1/16	2 1/16	7 1/2	6.498	7.162	1.500
42	150/300	18	16	1 1/16	2 3/16	7	5.998	6.655	1.500
42	400/600	22	20	1 1/16	2 1/16	7 1/2	6.498	7.162	1.500
42	900	25	22	1 1/16	3 1/4	8	7.496	8.364	2.000

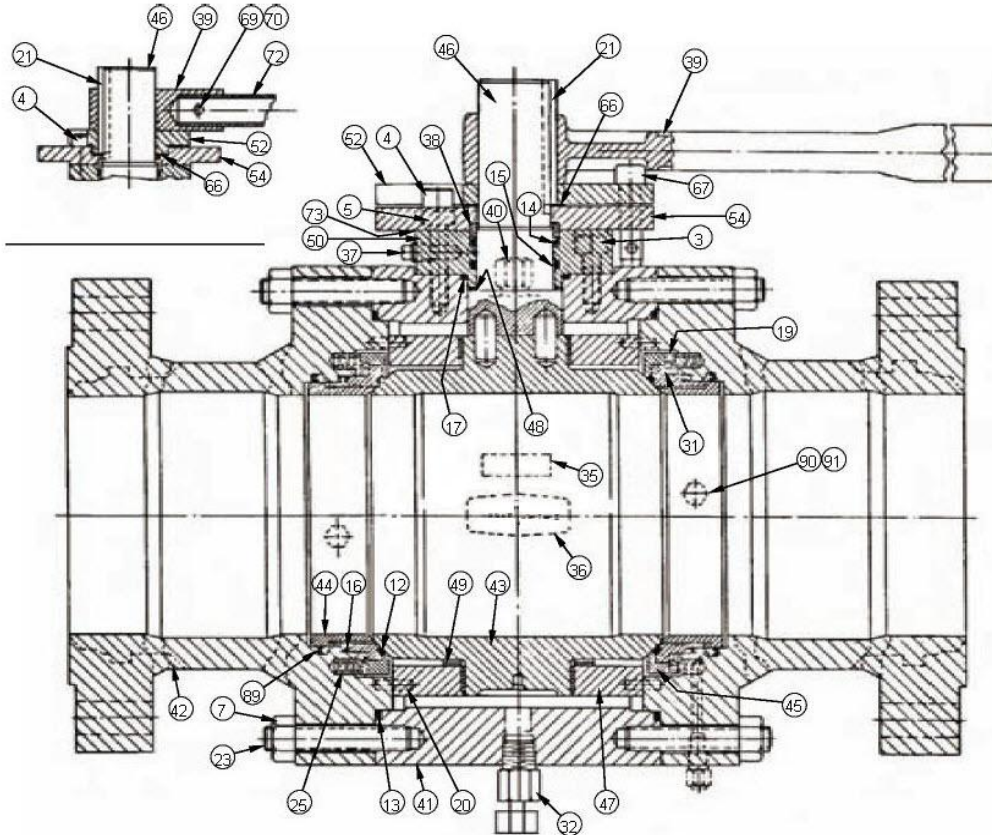


H SQ



C HOLE DIA B* HOLES EQUALLY SPACED STRADDLE C. L.

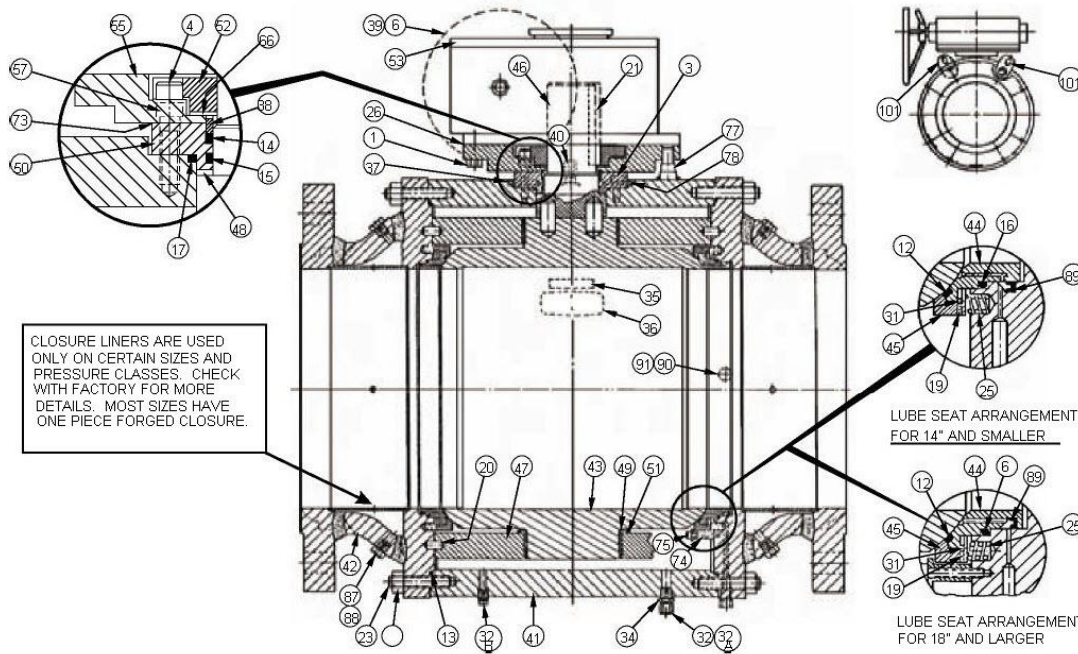
* 4 HOLES FOR 6" CL 150/600



ITEM	PART NAME	MATERIAL	ITEM	PART NAME	MATERIAL
3	Capscrew (Gland Plate)	Steel	40	Relief Valve	Steel
4	Capscrew (Stop Collar)	Steel	41	Body	Steel
5	Capscrew (Stop Plate)	Steel	42	Closure	Steel
7	Nut (Body)	Steel	43	Ball	Ductile Iron Electroless Nickel Coated
At 12	Seal O Ring	GROVEX	Bt 44	Inner Seat Ring	Steel Electroless Nickel Coated
At 13	O Ring (Body)	GROVEX	Bt 45	Outer Seat Ring	Steel Electroless Nickel Coated
At 14	O Ring (Upper Stem Seal)	GROVEX	46	Stem Unit	Steel Electroless Nickel Coated
At 15	O Ring (Lower Stem Seal)	GROVEX	C/Bt 47	Bearing Unit	Steel & Teflon **
At 16	O Ring (Seat Gasket)	GROVEX	Bt 48	Upper Thrust Washer	Steel & Rython #
At 17	O Ring (Gland Plate)	GROVEX	Bt 49	Lower Thrust Washer	Steel & Rython #
Bt 19	Pin (Seat Ring)	18/8 C.RE.S	50	Gland Plate	Steel
20	Pin (Bearing Retainer)	Steel	52	Stop Collar	Steel
21	Key (Stem)	Steel	54	Stop Plate	Steel
23	Stud (Body)	Steel	66	Washer	Nylon
At 25	Spring (Seat)	18/8 C.RE.S or INCO-NEL	67	Lock Pin	Steel
Bt 31	Seat Lock Ring	18/8 C.RE.S	69	Capscrew (Wrench)	Steel
32	Drain Valve	Steel	70	Nut (Wrench)	Steel
35	Name Plate	18/8 C.RE.S	72	Wrench Handle	Steel
36	Emblem	A.B.S. Plastic	At 73	Gasket (Gland Plate)	Fiber
37	Vented Assy. Plug	Steel	At 89	U Cup (Packing)	GROVEX
38	Gland Bushing	Steel	90	Check Valve	Steel
39	Wrench	Ductile Iron & Steel	91	Grease Fitting	Steel

* Used on 6" Class 150 through 600 Only.
 for Spare Parts (Spare Parts, Kits, A, B & C).
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Trademark of Phillips 66 Co t Recommended for Spare t t Recommended



ITEM	PART NAME	MATERIAL	ITEM	PART NAME	MATERIAL
1	Capscrew (Operator Mount)	Steel	41	Body	Steel
3	Capscrew (Gland Plate)	Alloy Steel	42	Closure	Steel
4	Capscrew (Stop)	Alloy Steel	Ct 43	Ball	Ductile Iron or Steel*
6	Set Screw (Handwheel)	Steel	Bt 44	Inner Seat Ring	Steel*
7	Nut (Body)	Steel	Bt 45	Outer Seat Ring	Steel*
At 12	Seal O Ring	GROVEX	46	Stem Unit	Steel*
At 13	O Ring (Body)	GROVEX	Ct 47	Bearing Unit/Bearing	Steel & Teflon **
At 14	O Ring (Upper Stem Seal)	GROVEX	At 48	Upper Thrust Washer	Steel & Rython #
At 15	O Ring (Lower Stem Seal)	GROVEX	At 49	Lower Thrust Washer	Steel & Rython #
At 16	O Ring (Seat Gasket)	GROVEX	50	Gland Plate	Steel
	O Ring (Gland Plate)	GROVEX	51	Spacer (Lower Thrust Washer)	Steel
Bt 19	Pin (Seat Ring)	C.RE.S	52	Stop Collar	Steel
20	Pin (Bearing Retainer)	Steel	53	Operator	Steel & Iron
21	Key (Stem)	Steel	55	Adapter Plate	Steel
23	Stud (Body)	Steel	57	Capscrew	Alloy Steel
At 25	Spring	18/8 C.RE.S	66	Washer	Nylon
At 26	Gasket (Operator Mount)	Fiber	At 73	Gasket (Gland Plate)	Fiber
Bt 31	Seat Lock Ring	18/8 C.RE.S	74	Puller Bushing (Seat Ring)	Steel
32	Drain Valve	Steel	75	Capscrew (Puller Bushing)	Alloy Steel
32A	Pipe Plug	Steel	77	Anchor Pin	Steel
32B	Pipe Plug (Body)	Steel	78	Vent Plug (Gland Plate)	Steel
35	Name Plate	18/8 C.RE.S	87	O Ring (Seal Plug)	GROVEX
36	Emblem	A.B.S. Plastic	88	Seal Plug	Steel
37	Vented Assy. Plug	Steel	At 89	U Cup (Packing)	GROVEX
38	Gland Bushing	Steel	90	Check Valve	Steel
39	Handwheel	Steel	91	Grease Fitting	Steel
40	Relief Valve	Steel	101	Lifting Lug	Steel

* Electroless Nickel Coated. ** Trademark of E.I. DuPont Co. © A Cameron Trade Name Covering a Variety of Elastomeric Materials.

t Recommended for Spare Parts (Spare Parts, Kits, A, B & C).

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