

INSTRUCTION AND REPAIR MANUAL

Model
661A

HORIZONTAL ONE STAGE SOLIDS HANDLING VORTEX PUMP

ENGLISH: PAGES 2-12

INSTRUCTION AND REPAIR MANUAL

NOTE! To the installer: Please make sure you provide this manual to the owner of the equipment or to the responsible party who maintains the system.



CALIFORNIA PROPOSITION 65 WARNING:

▲ WARNING This product and related accessories contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

SERVICE

Your Aurora pump requires no maintenance other than periodic inspection, occasional cleaning and lubrication of bearings. The intent of inspection is to prevent breakdown, thus obtaining optimum service life. The liquid end of the pump is lubricated by the fluid being pumped and therefore does not require periodic lubrication. The motor, however, may require lubrication, in which case, the motor manufacturer's recommendations should be followed.

LUBRICATION OF BEARINGS

Regreasable bearings will require periodic lubrication and this can be accomplished by using the zerk or lubrication fitting at each bearing. Lubricate the bearings at regular intervals using high quality grease. The initial bearing lubrication at Aurora is Chevron SRI Grease NLGI 2 (polyurea thickener) (Pentair Part Number 384-0002-639). Before lubricating the bearings, thoroughly flushing the old grease with the new grease is required. We recommend Chevron SRI Grease NLGI 2 (polyurea thickener) for follow-up relubrication after the flushing. Most major brands of Grade No. 2 ball bearing grease are satisfactory for pump operation in both wet and dry applications.

CAUTION

Be aware that mixing of different brands or blends of grease should be avoided due to possible incompatibilities that could damage the bearings. A thorough flushing of the old grease with the new grease is required to minimize this potential incompatibility. Avoid using the following: (1) grease of vegetable or animal base that can develop acids or (2) grease containing rosin, graphite, talc or other impurities. Under no circumstances should grease be reused.

CAUTION

Over lubrication should be avoided as it may result in overheating and possible bearing failure. Under normal application, adequate lubrication is assured if the amount of grease is maintained at 1/3 to 1/2 the capacity of the bearing and adjacent space surrounding the bearing.

In dry locations, each bearing will need lubrication at least every 4,000 hours of running time or every 6 to 12 months, whichever is more frequent. In wet locations the bearings will need lubrication at least after every 2,000 hours of running time or every 4 to 6 months, whichever is more frequent. A unit is considered to be installed in a wet location if the pump and motor are exposed to dripping water, to the weather, or to heavy condensation such as found in unheated and poorly ventilated underground locations.

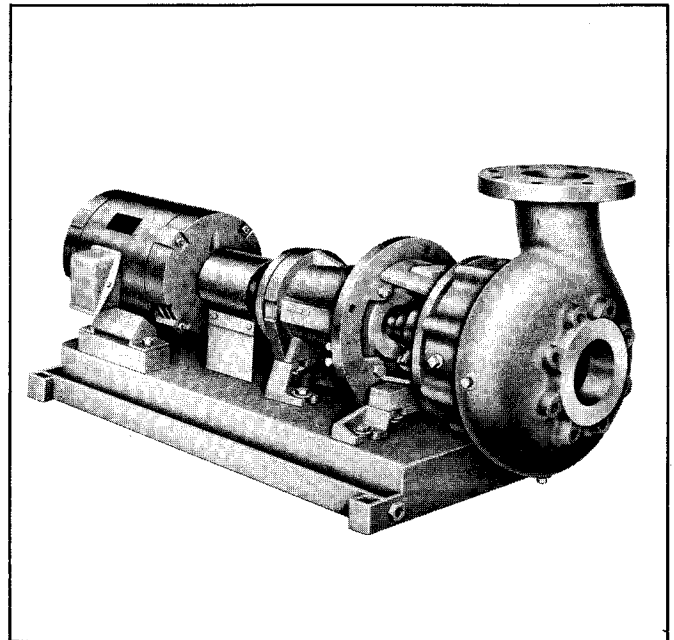
At times it may be necessary to clean the bearings due to accumulated dirt or deteriorated lubricants. This can be accomplished by flushing the bearing with a light oil heated to 180 to 200°F. While rotating it on a spindle, wipe the bearing housing with a clean rag soaked in a cleaning solvent and flush all surfaces.

Dry bearing thoroughly before relubricating. Compressed air can be used for speed drying, but care should be taken not to let bearings rotate while being dried.

CAUTION

Use normal fire caution procedures when using any petroleum cleaner.

The motor that drives your Aurora pump may or may not require lubrication. Consult the manufacturer's recommendations for proper maintenance instructions.



REPAIRS

The pump may be disassembled using the illustrations and text provided. Although complete disassembly is covered, it will seldom be necessary to completely disassemble your Aurora pump.

The illustration accompanying the disassembly instructions show an exploded view of the pump. The illustration is intended to aid in the correct identification of the parts mentioned in the text.

Inspect removed parts at disassembly to determine their reusability. Cracked castings should never be reused. Gaskets should be replaced at reassembly simply as a matter of economy; they are much less expensive to replace routinely than to replace as the need occurs. In general it is economical to return the motor and motor controller to the manufacturer for repair.

VORTEX PUMP 661A ON A 3C POWER FRAME DISASSEMBLY

This pump has been designed with back pull-out features which allow the power frame and rotating element to be removed without disturbing the suction and discharge piping.

Disassemble only that which is needed to make repairs or accomplish inspection..

1. Disconnect electrical connections to prevent drive unit from being energized during disassembly.
2. Close all valves or flow devices that control movement of liquids to or from pump. Remove drain plugs (25) from casing (1).
3. Remove all relief, cooling, flushing or drain lines from pump. Break suction and discharge connections unless it is intended to remove the power frame assembly and leave the casing (1) in the line.
4. Loosen capscrews which secure motor to base and slide motor out to obtain access to pump. Unscrew the capscrews that hold supports (21 and 22) to the base and slide the pump out to be worked on.

NOTE

If spacer coupling or V-belt drive is supplied, it is not necessary to move the motor. Loosen capscrews from each hub of spacer type coupling and remove coupling flanges and rubber insert. This leaves adequate space between end of drive shaft and pump shaft to facilitate back pull-out of pump. For V-belt drive units, remove sheave from pump shaft for back pull-out.

5. Remove capscrews (15A & 34) that hold casing (1) to bracket (8) with aid of a rope sling and a crane or hoist, carefully slide power frame and rotating element away from casing. Remove gasket (17) from its position between bracket (8) and casing (1). Inspect the sealing surface to insure that it is clean and free of any gasket material which has stuck to parting surfaces. Replace this gasket with a new one when pump is reassembled.
6. Unscrew impeller screw (10) and o-ring (11), remove washer (12) taking care not to damage gasket (13).

NOTE

The vortex pumps have a tapered end impeller fit-up to facilitate impeller removal. Use caution in the removal of impeller as it has to be moved only a few thousandths of an inch to become entirely free.

7. Slide impeller (2) and impeller key (14) from the shaft, again taking care not to damage gasket (38) located behind impeller. Remove gasket (38).
8. The various types of stuffing boxes may be disassembled as follows:

PACKING WITH LANTERN RING (STANDARD)

- A. Remove capscrews (45) and gland halves (44).

Remove and discard old packing (40). Clean all parts to remove any packing that may have adhered.

- C. Unscrew capscrews (33) and remove stuffing box (27) from bracket (8). The throat of adapter plate or stuffing box should be checked for excessive wear. Remove gasket (32).

- D. Shaft sleeve (36) is a slip fit on the shaft and should be easily removed unless the pump has been in service for a long time. In this case it may be necessary to use a puller. A snap ring may be installed in the sleeve groove to ease disassembly. Take care to prevent damaging the surface of the sleeve. Replace the sleeve if it is grooved from wear. Remove key (54) and retaining ring (37) from shaft.

DOUBLE MECHANICAL SEAL (OPTIONAL)



The mechanical seal is a precision product and must be treated as such. During removal great care must be taken to avoid dropping any part of the seal. Take particular care not to scratch the lapped faces on the washer or the sealing seat. Do not put a seal back into service until the sealing faces of the washer and seat have been lapped or replaced.

- A. Remove seal gland bolts (45) and remove gland (44) carefully exposing seal (47).
- B. Unscrew capscrews (33) and remove stuffing box assembly (27). Remove gasket (32).
- C. Slide sleeve (36) with rotating parts of mechanical seal (47) from the shaft. Remove ceramic seal rings and stainless steel parts from sleeve with great care as ceramic parts are easily damaged.

The sleeve should be carefully cleaned to remove any residue that may be remaining in the seal area. The rubber in the seal may have become partially adhered to the sleeve. The sleeve must also be checked for abrasion or corrosion that can occur when fluid residue penetrates between the seal (47) and sleeve (36). The sleeve under the seal may be polished lightly to a 32 RMS finish before reassembly. Do not reuse a pitted sleeve. Remove retaining ring (37) and key (54).

- D. Remove stationary seat and o-rings from gland (44) and stuff box (27), using care not to damage these parts.
9. Remove capscrews (23) and washers (24) to take off support foot (22).
10. Unscrew capscrews (35) to remove bracket (8) from power frame (56).
11. Remove key (55) from the shaft (48).
12. Unscrew capscrews (59) and remove bearing cap (51). Remove gasket (51A) and retaining ring (50C).

13. Slide out shaft (48) and bearings (50 and 49). Remove shim (60). (See Figure 4). Since bearings (50 and 49) are press fitted on the shaft, they will have to be pulled or pressed off the shaft.

Remove grease seals (52 and 53) from power frame (56) and bearing cap (51).

14. Remove screws (72) and nameplate (73) only if replacement is necessary.

VORTEX PUMPS 661A ON A 3C POWER FRAME REASSEMBLY

Reassembly will generally be in reverse order of disassembly. If disassembly was not complete, use only those steps related to your particular repair program.

1. Press grease seals (52 and 53) into power frame (56) and bearing cap (51).

2. Press bearings (50 and 49) onto shaft (48). Snap retaining ring (50C) into place.

3. Slide shaft (48) and bearings (50 and 49) into frame (56). Do not install gasket (51A), shim (60), or bearing cap (51) at this point.

4. Position key (54) in shaft (48).

5. Position bracket (8) on the frame (56) and secure with capscrews (35). Tighten capscrews evenly to assure proper alignment.

6. If nameplate (73) was removed, install and attach with screws (72).

7. Reassemble the various types of stuffing boxes as follows.

PACKING WITH LANTERN RING (STANDARD)

A. Place gasket (32) on stuffing box (27), slide over shaft and secure to bracket (8) with capscrews (33).

B. Install retaining ring (37), place key (54) in shaft and slide sleeve (36) over shaft. Packing (40) and lantern ring (41) may be replaced at this time. From impeller end of shaft place two new rings of packing (40) around shaft sleeve, slide lantern ring (41) back in position and place remaining three rings of packing on shaft sleeve. Be sure to stagger joints of packing rings to avoid excessive leakage through the packing.

C. Thread capscrews (45) into stuffing box (27) approximately $\frac{1}{4}$ in. place each half of gland (44) in stuffing box. Insert gland clamps (44E) and tighten packing adjusting capscrews (45) to obtain proper sealing. Ensure capscrews (45) are tightened enough to hold parts in place. Final adjustment of packing box will have to be made after pump is returned to operation. When pump is running, gland capscrews (45) should be evenly turned down a flat at a time, allowing packing to work in until a leakage rate of approximately 60 to 120 drops per minute is obtained.

NOTE

Do not over tighten packing as this will cause packing box to over-heat and the shaft sleeve to receive excessive wear.

DOUBLE MECHANICAL SEAL (OPTIONAL)

NOTE

The mechanical seal (47) cannot be installed as an assembly. It is necessary to have the seal seats properly in place before the balance of parts can be added.

A. Install retaining ring and key (54) in shaft.

B. Wipe the sealing faces of the seat and seal washer clean. Lubricate the shaft sleeve (36) with a silicone-base lubricant. Slide the entire rotating assembly onto the sleeve.

C. Thoroughly inspect the seal box cavity checking for burrs or nicks which could damage the seat of the seal. Apply a film of liquid dishwashing detergent or rubber lubricant (do not use oil or grease) to the seal seats. Replace stationary seat and o-rings in gland (44) and stuffing box (27).

NOTE

If it is not possible to insert seat with fingers, place cardboard protecting ring furnished with seal over lapped face of seat and press into place with a piece of tubing having an end cut square. The tubing should be slightly larger than the diameter of the shaft. Remove cardboard after seat is firmly in place. Carefully slip the stuffing box assembly (27) over the shaft with the stationary seat facing away from the motor. Install gasket (46) into gland (44). Apply a film of liquid dishwashing detergent or rubber lubricant to the washer and bellows of the seal, and slide the remaining seal parts onto the sleeve, making sure the washer is seated against the seal seat.

D. The shaft sleeve (36) with the seal rotating assembly on it may now be replaced on the shaft. The shaft sleeve (36) should slide over shaft with keyway for key (54) toward power frame (56).

E. Replace gasket (32) on bracket (8) and carefully slip stuffing box (27), with stationary seal seat toward power frame (56), over the shaft, and secure with capscrews (33).

F. Position gland (44) onto stuffing box (27), taking care to seat it evenly and squarely. Secure by tightening capscrews (45) evenly, being careful not damage gasket (46) between them.

8. Carefully place o-ring gasket (38) on shaft sleeve (36). Assemble key (14) and impeller (2) to shaft. Secure impeller with gasket (13), washer (12), impeller screw o-ring (11) and impeller screw (10).

9. Fasten supports (21 and 22) to bracket (8) and frame (56) with washers (15B & 24) and capscrews (15A & 23).

LAMINATED SHIM IMPELLER ADJUSTMENT

10. Push the shaft and impeller assembly completely forward until the snap ring and outboard bearings contacts the power frame. With a feeler gauge measure the clearance between the impeller wiper vanes and the stuffing box. This measurement minus the recommended clearance of .020 in. will give the total required shim thickness. Example: With the shaft and impeller assembly completely forward there is .040 in. of clearance between wiper vanes and stuffing box. Subtract the recommended clearance of .020 in. and .020 in. remains. This is the required shim thickness needed. Remove snap ring on outer race of outboard bearing (50) and install proper shim (60). Replace snap ring (50C).

11. Install the pipe plugs (25) in the pump casing (1). Position gasket (17) and casing (1) against the bracket (8) and secure with capscrews (34). Position support foot (21) against bracket (8) and secure with capscrews (15A).

12. Install gasket (51A) and fasten bearing cap (51) in position with capscrews (59). Position key (55) on shaft.

13. Replace all relief, cooling, flushings or drain lines from the pump.

14. Secure suction and discharge piping to the pump. Make sure to install gaskets on flanged connections.

15. Connect electricity to the motor.

16. Open all valves or flow devices that control flow of liquids to and from pump.

STARTING PUMP AFTER REASSEMBLY

Do not start pump until all air and vapor has been bled making sure that there is liquid in the pump to provide the necessary lubrication. Without the fluid around it, a seal may be ruined in a few seconds of operation. It is possible that the mechanical seal may drip during the first few minutes to one hour of operation.

Packing should be adjusted as previously discussed in this manual.

VORTEX PUMPS 661A ON A 4C OR 5E POWER FRAME DISASSEMBLY

LUBRICATION OF BEARINGS

At the time of initial startup it is important to note that the pump bearings have been factory lubricated. Do not add additional lubrication until completion of initial break-in period, which is first 10 hours of continuous operation, or equivalent intermittent operation. After break-in period, while unit is operating, add fresh grease (American Oil Company's Rykon #2 or equivalent) through zerk fitting near bearings.

In dry locations, each bearing will need lubrication at least every 2,000 hours of running time or every 6 to 12 months, whichever is more frequent. In wet locations the bearings should be lubricated at least every 1,000 hours of running time

or every 4 to 6 months, whichever is more frequent. A unit is considered to be installed in a wet location if the pump and motor are exposed to dripping water, to the weather, or to heavy condensation such as is found in unheated and poorly ventilated underground locations.

The 5E bearing frame has back-to-back angular contact bearings as the outboard thrust bearing (50). This style bearing requires more frequent lubrication intervals. It is suggested that this bearing be lubricated every 1000 hours of running time in dry locations, and every 500 hours in wet locations.

At times it may be necessary to clean the bearings due to accumulated dirt or deteriorated lubricants. This can be accomplished by flushing the bearing with a light oil heated to 180 to 200°F. While rotating it on a spindle, wipe the bearing housing with a clean rag soaked in a cleaning solvent, and flush all surfaces.

Dry bearing thoroughly before relubricating. Compressed air can be used for speed drying, but care should be taken not to let bearings rotate while being dried.

Use normal fire caution procedures when using any petroleum cleaner.

1. Break electrical connections to prevent drive unit from being energized during disassembly.

2. Close all valves or flow devices that control movement of liquids to or from pump. Remove drain plugs (25 & 26) from casing (1).

3. Remove all relief, cooling, flushings or drain lines from the pump.

4. Loosen capscrews from each hub of spacer type coupling and remove coupling flanges and rubber insert. This leaves adequate space between end of drive shaft and pump shaft to facilitate back pullout of pump. For V-belt drive units remove sheave from pump shaft or back pullout.

NOTE

If pump is not equipped with a spacer-type coupling or V-belt driven it will be necessary to break suction and discharge piping or move driver to remove the pump.

5. Unscrew the capscrews that hold support (22) to base. Remove capscrews (34), that hold casing (1) to bracket (8).

6. With the aid of a rope sling and crane or hoise, carefully slide power frame and rotating element or close coupled motor away from casing.

7. Unscrew capscrews (23) with washers (24) and remove support (22).

8. Remove gasket (17) from its position between bracket (8) and casing (1). Once power frame and rotating element has been withdrawn, inspect sealing surface to insure that they are clean and free of any gasket material which has struck to parting surfaces. Replace gasket with a new one when pump is reassembled.

9. Remove impeller capscrews (10), o-ring gasket (11), washer (12) and gasket (13) which allows impeller (2), key (14) and gasket (38) to be removed.

NOTE

The vortex pumps have a tapered hub impeller to facilitate impeller removal. Use caution in the removal of impeller as it has to be removed only a few thousandths of an inch to become entirely free.

The easiest method for removing the impeller is to suspend entire power frame and rotating element by an eyebolt about 1/32 of an inch above floor work area. Eyebolt size below. Apply pressure to the impeller by means of jackscrews (60 and 61) (located on the bearing cap (51)). When impeller is firmly against bracket (8) it should drop free after turning jackscrews evenly, a flat at a time, three or four flats.

- a. Power frame 4C requires a 5/8-11 NC eyebolt.
- b. Power frame 5E requires a 3/4-10 NC eyebolt.

10. When the power frame assembly is clear of impeller, place it on its side. At this point, either of the sealing box arrangements can be removed as a complete assembly by unscrewing capscrews (33). Slide complete assembly including shaft sleeve (36) off shaft (48) with the aid of a pinch bar or other lever. Remove gasket (32).

NOTE

The shaft sleeve incorporates a snap ring designed to interfere with the base of the seal box assembly. Therefore, when removing seal box the shaft sleeve is also removed.

For further disassembly of sealing box, proceed as follows:

A. Packing Box (Standard)

- I. Remove capscrews (45), gland clamps (44E) and split gland halves (44).
- II. Remove and discard old packing (40). Clean all parts to remove any packing that may have adhered during removal.

B. Double Mechanical Seal (Optional)

- I. Remove seal gland bolts (45) and remove gland (44), exposing mechanical seal (47).
- II. Use great care in removing ceramic seal rings and stainless steel metal parts from sealing box as ceramic parts are easily chipped or cracked.
- III. Remove the carbon stationary seats and o-rings only if necessary, using care not to damage these parts.

11. Now set power frame on two benches, so that its shaft rests between them or on a bench with a hole cut in it large enough for shaft.

Remove grease zerk (63) and pipe plug (62) from inboard end of power frame. Remove retainer ring (37) by twisting it in a spiral movement toward end of shaft. Remove grease seal (53).

12. Unscrew capscrews (35) to remove bracket (8) from power frame (56). Lift the stuffing box away from power frame and shaft.

13. Unscrew capscrews (59) and lift out shaft assembly with bearings from the power frame.

14. Remove coupling half and key (55) from the shaft. Remove plug (57) and zerk fitting (58).

15. Retainer ring (50B) is removed with a pair of truearc internal pliers so that grease retainer (50A) can be removed allowing bearing cap (51) to be removed from shaft assembly. Grease seal (52) may be removed if necessary.

16. With a pair of truearc external pliers, remove snap ring (50C) (PF#4 only), or remove locknut (50D) and lockwasher (50C) on power frame #5.

17. Both inboard bearing (49) and outboard bearing (50) are pressed onto shaft. To remove bearings, use a wheel puller or press them off the shaft.

NOTE

When removing the inboard bearing (49), avoid damaging the separate grease shield (49A). This shield can be removed when bearing is removed from shaft.

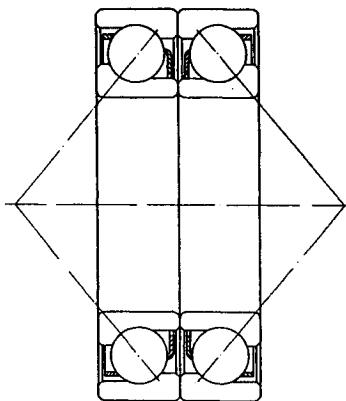
18. If total disassembly is required, break connections to suction and discharge pipe and remove capscrews that hold support (21) to the pump base.

19. Secure casing and support assembly in a sling and move it away from the piping. Invert this assembly and set casing (1) on wood blocks so as not to mar the surface that mates with bracket (8). Remove support (21) by removing capscrews (15A) to complete disassembly.

VORTEX PUMP 661A ON A 4C OR 5E POWER FRAME REASSEMBLY

1. Place support (21) in place and fasten to casing (1) with capscrews (15A).
2. Turn above sub-assembly over so it lies with suction facing down. Replace drain plugs (25) and rodding hole plug (26) in casing (1).
3. Hand pack the outboard bearing (50) with grease and pack the grease retainer (50A) cavity one half full. Slide the grease retainer onto the shaft. Press the outboard bearing onto the shaft until it hits the shoulder of the shaft. Make sure the outboard bearing set is properly matched back to back.

configuration before pressing on shaft. Assemble snap ring (50C) onto the shaft with the beveled side outward to match the bevel in the shaft groove (power frame 4C only). For power frame 5E, assemble lockwasher (50C) and locknut (50D) onto the shaft threads and torque to 100 ft-lbs. Slide the bearing cap (51) over the bearing. Lock in the assembly with snap ring (50B) matching the snap ring bevel to the groove bevel.



Back-to-Back
Bearing Configuration

4. Hand pack the inboard bearing (49) and the recessed area of its grease shield (49A). Slide the grease shield onto the shaft with the raised lip toward the bearing. Press on the bearing.

5. Press or gently tap grease seal (52) into bearing cap (51). Place grease seal (53) into place on inboard end of power frame (56).

6. Lower sub-assembly from steps 3 through 5 into outboard end of power frame (56) which has been set on a bench with a hole in it to accommodate the shaft.

7. Position the jacking screws so that they extend past bearing cap as given below. This will position impeller hub end of the shaft in an axial position which will allow mounting impeller and closing down liquid end without any adjustment during intermediate assembly step. Final adjustment will have to be made by evenly tightening capscrews (60) (page 7, step 21).

	Gap Clearance	Bolt Extension
Power Frame #4C	1/8 in.	1/4 in.
Power Frame #5E	1/4 in.	9/16 in.

10. Place plug (57) and zerk (58) back in the bearing cap.

11. Place plug (62) and zerk (63) back on inboard end of power frame (56).

12. Retainer ring (37) can be set in its groove by turning it in a spiral motion up the shaft. When in position, outside diameter of ring should slope toward impeller end of shaft.

13. Position bracket (8) to power frame (56) and secure in place by evenly tightening capscrews (35).

14. The following procedure is used in assembling the sealing box:

A. Packing Box

I. Place two pieces of packing (40) into stuffing box cavity (27) being careful to get each piece firmly in place. Install lantern ring (41), then add remaining three pieces of packing. When packing is tightened, lantern ring should align with holes for plugs (29), flushing lines, or cooling lines.

NOTE

Be sure to stagger joints of packing rings to avoid excessive leakage.

II. Snap retainer ring (39) onto shaft sleeve (36) with a pair of truarc external snap ring pliers. Slide shaft sleeve carefully into inboard end of packing box.

III. Thread capscrews (45) into stuffing box (27) approximately 1/4 in. Insert both halves of gland (44) into stuffing box (27). Insert gland clamps (44E) and tighten capscrews (45) to obtain proper sealing.

IV. Ensure capscrews (45) are tightened enough to hold assembled gland in place. Final adjustment of packing box will have to be made after pump is returned to operation.

When pump is running, gland capscrews (45) should be evenly turned down a flat at a time, allowing packing to work in until a leakage rate of approximately 60 to 120 drops per minute is obtained.

NOTE

Do not over tighten packing as this will cause packing box to over-heat and the shaft sleeve (36) to receive excessive wear.

V. Place gasket (38) in radial corner groove that is machined around inboard end of shaft sleeve to complete assembly.

B. Double Mechanical Seal

I. Press one stationary seat with o-ring gently into stuffing box body (27) and the other into gland plate (44).

II. Place gasket (46) in position in the gland register.

III. Snap retainer ring (39) onto sleeve (36) with a pair of truarc external pliers.

IV. Slide sleeve through the bottom of stuffing box and place one seal (47) over sleeve and slide it down to stationary seat. Place metal parts over the shaft sleeve and then second seal ring.

V. Position gland (44) over shaft sleeve and fasten to seal box with capscrews (45).

NOTE

Do not put mechanical seal back into service until seal ring and stationary seat faces have been relapped or replaced.

- 15. Place gasket (32) in groove of bracket (8).
- 16. Place key (54) in its keyway on shaft. Slide stuffing box assembly onto shaft, so that, key and keyway in shaft sleeve mate. Continue to slide assembly forward until shaft sleeve is contact with retainer ring (37).
- 17. Align stuffing box (27) with gasket (32) and bracket (8). Fasten with capscrews (33).
- 18. Place impeller key (14) in keyway on tapered shank portion of shaft (48) and set impeller (2) in position. Put gasket (13) inside impeller suction eye with washer (12) next and o-ring gasket (11) last. Secure impeller in place with capscrew (10) according to chart below.

IMPELLER BOLT TORQUE

Power Frame	Impeller Bolt Size	Torque Value
4C	½ in.	75 FT-LBS.
5E	¾ in.	100 FT-LBS.

- 19. Attach support (22) to power frame (56) with capscrews (23) and washers (24). Remove eyebolt that has been used to handle power frame and rotating assembly and place a rope sling on assembly. Carefully lower assembly to a horizontal position.
- 20. Place a gasket (17) on bracket (8). Slide power frame and element into casing (1) and join them with capscrews (34).
- 21. Using jackscrews (60) and (61) located on bearing cap (51), adjust impeller axially up or down to gain proper impeller clearance. Turning hexagon head jackscrews one flat will axially move impeller approximately 0.008 inch. When this adjustment is completed, secure shaft in position by evenly tightening capscrews (59).
- 22. Make one last check to see that all parts of the rotating element turn freely.
- 23. Connect any flushing lines or cooling lines that were removed. Install spacer coupling in place between pump and motor.
- 24. Open all valves or flow devices that control flow of liquids to and from the pump.
- 25. Read carefully the section of this manual titled, Installation, especially those paragraphs referring to pump and coupling alignment.
- 26. Connect power.

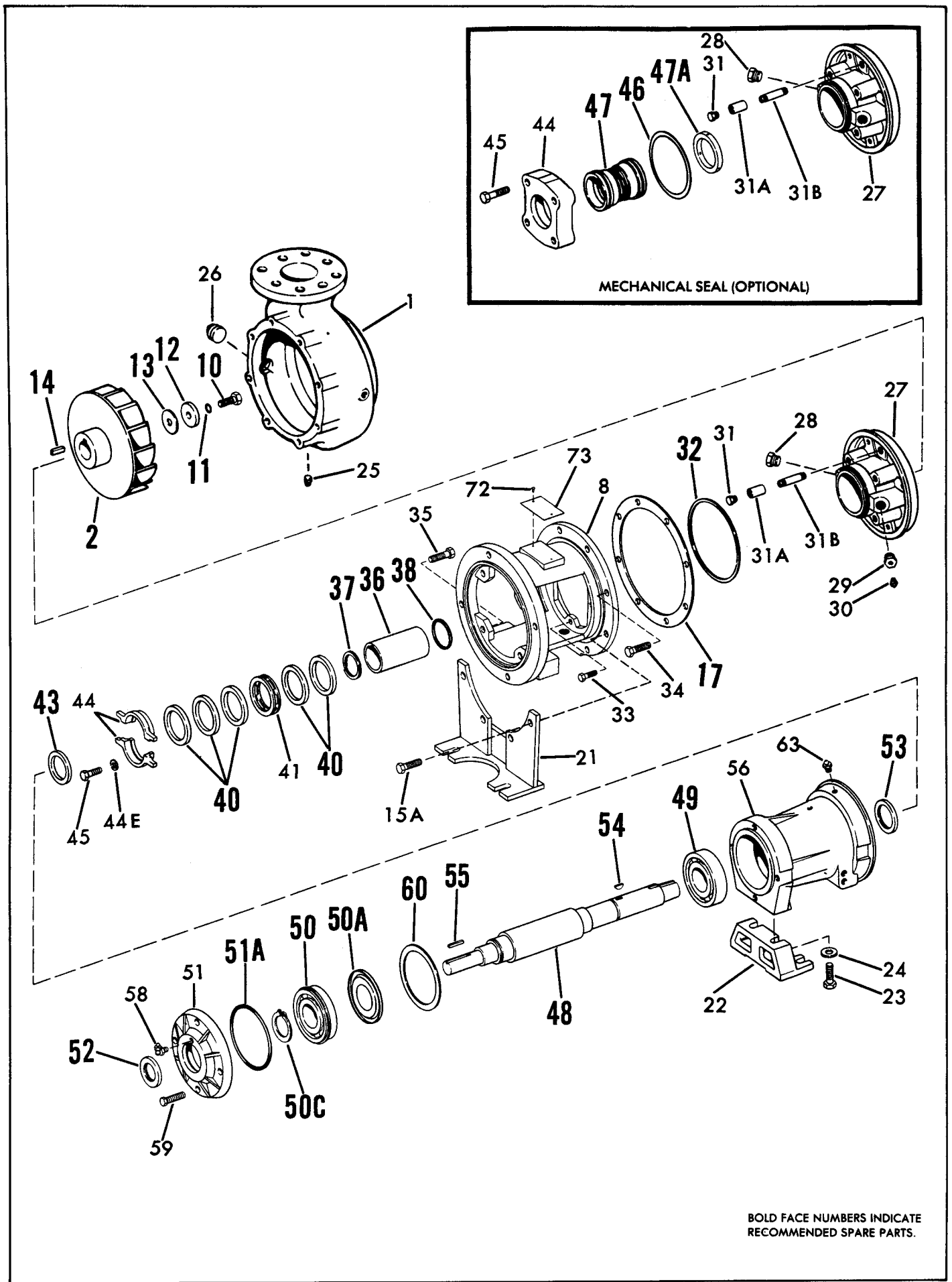
NOTE

Do not start up a pump until all air and vapor have been bled, making sure that there is liquid in the pump to provide necessary lubrication. It is possible that the mechanical seal may drip during first few minutes of operation.

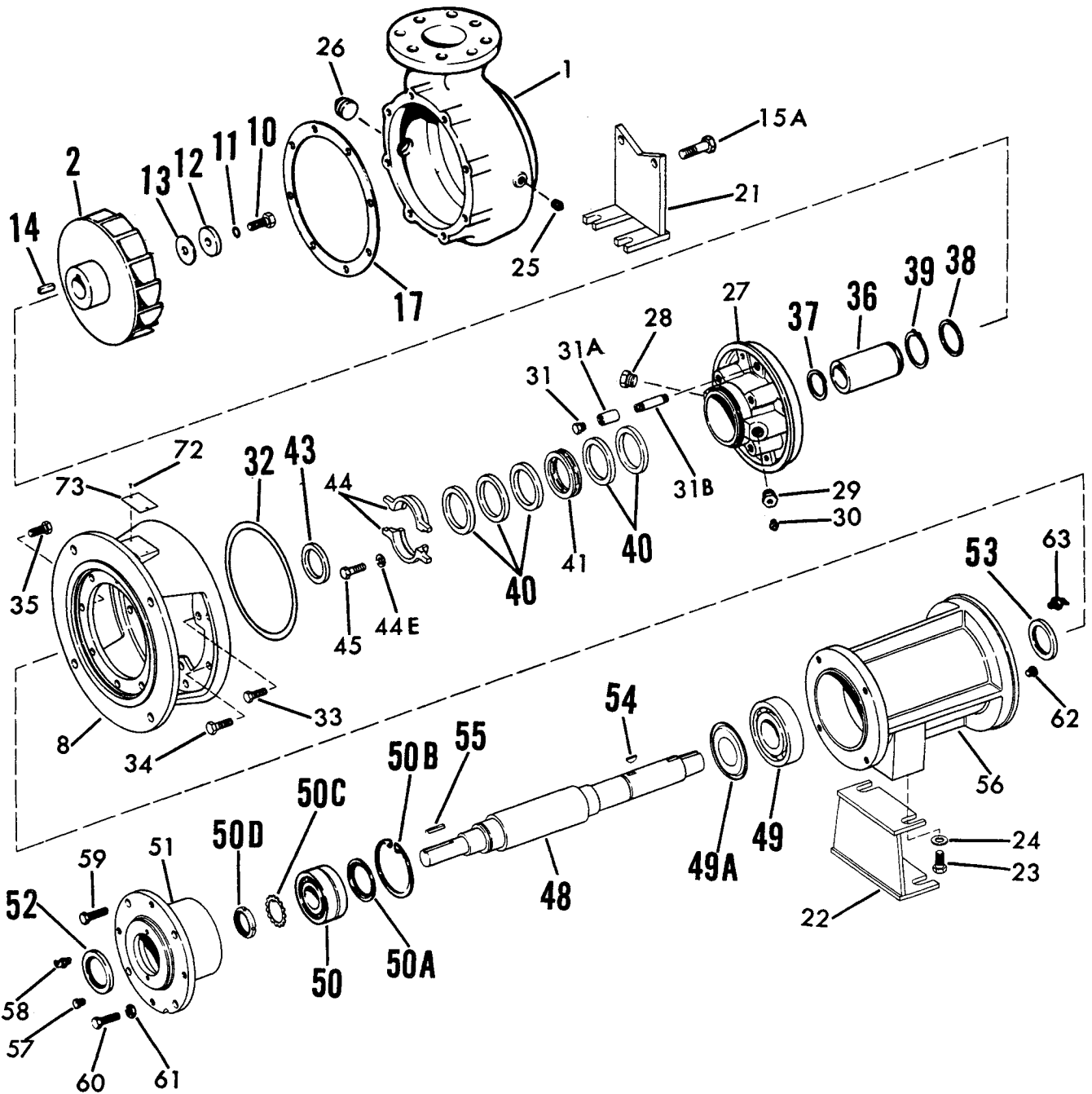
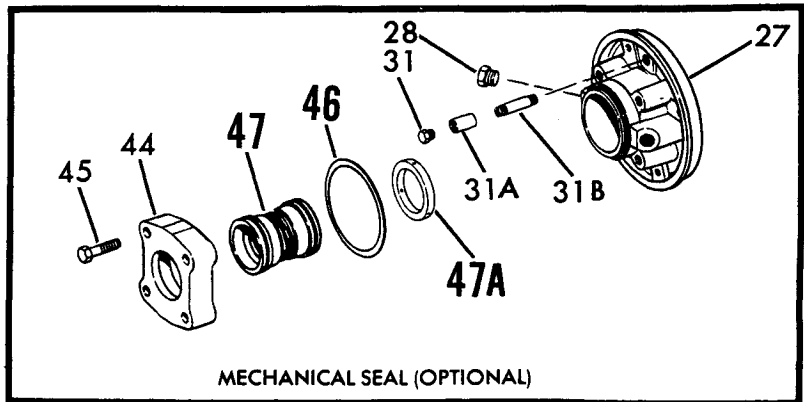
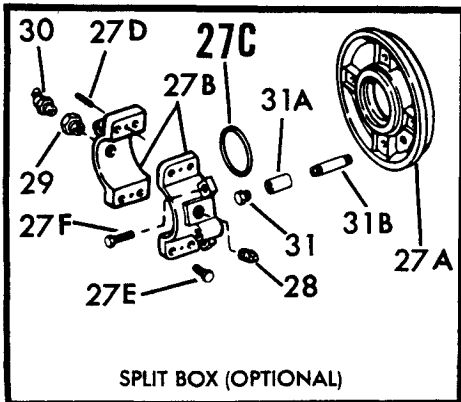
Turn on power momentarily to check for proper rotation. Rotation should be clockwise as viewed from driver (see arrow on casing).

MODEL 661A LIST OF PARTS

- | | | |
|------------------------|-----------------------------------|-------------------------------------|
| 1. Casing | 31A. Pipe Coupling | 51A. O-Ring |
| 2. Impeller | 31B. Nipple | 52. Grease Seal |
| 8. Bracket | 32. Gasket | 53. Grease Seal |
| 10. Imp. Bolt | 33. Capscrew | 54. Sleeve Key |
| 11. Imp. Bolt Seal | 34. Capscrew | 55. Shaft Key |
| 12. Imp. Washer | 35. Capscrew | 56. Power Frame |
| 13. Imp. Washer Gasket | 36. Sleeve | 57. Pipe Plug |
| 14. Impeller Key | 37. Retaining Ring | 58. Grease Fitting |
| 15A. Capscrew | 38. Gasket | 59. Capscrew |
| 17. Gasket | 39. Retaining Ring | 60. Capscrew or Shim Pack (P.F. 3C) |
| 21. Pump Support | 40. Packing | 61. Jam Nut |
| 22. Pump Support | 41. Lantern Ring | 62. Pipe Plug |
| 23. Capscrew | 43. Slinger | 63. Grease Fitting |
| 24. Washer | 44. Gland | 72. Drive Pins |
| 25. Pipe Plug | 44E. Gland Clamp | 73. Name Plate |
| 26. Pipe Plug | 45. Capscrew | |
| 27. Stuffing Box | 46. Gasket | |
| 27A. Adapter Plate | 47. Mechanical Seal | |
| 27B. Split Packing Box | 48. Shaft | |
| 27C. Gasket | 49. Inboard Bearing | |
| 27D. Pin | 49A. Grease Shield | |
| 27E. Capscrews | 50. Outboard Bearing | |
| 27F. Capscrews | 50A. Grease Shield | |
| 28. Pipe Plug | 50B Retaining Ring | |
| 29. Bushing | 50C. Lockwasher or Retaining Ring | |
| 30. Fitting | 50D. Locknut | |
| 31. Pipe Plug | 51. Bearing Cartridge | |



BOLD FACE NUMBERS INDICATE RECOMMENDED SPARE PARTS.



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WARRANTY

Seller warrants equipment (and its component parts) of its own manufacture against defects in materials and workmanship under normal use and service for one (1) year from the date of installation or start-up, or for eighteen (18) months after the date of shipment, whichever occurs first. Seller does not warrant accessories or components that are not manufactured by Seller; however, to the extent possible, Seller agrees to assign to Buyer its rights under the original manufacturer's warranty, without recourse to Seller. Buyer must give Seller notice in writing of any alleged defect covered by this warranty (together with all identifying details, including the serial number, the type of equipment, and the date of purchase) within thirty (30) days of the discovery of such defect during the warranty period. No claim made more than 30 days after the expiration of the warranty period shall be valid. Guarantees of performance and warranties are based on the use of original equipment manufactured (OEM) replacement parts. Seller assumes no responsibility or liability if alterations, non-authorized design modifications and/or non-OEM replacement parts are incorporated. If requested by Seller, any equipment (or its component parts) must be promptly returned to Seller prior to any attempted repair, or sent to an authorized service station designated by Seller, and Buyer shall prepay all shipping expenses. Seller shall not be liable for any loss or damage to goods in transit, nor will any warranty claim be valid unless the returned goods are received intact and undamaged as a result of shipment. Repaired or replaced material returned to customer will be shipped F.O.B., Seller's factory. Seller will not give Buyer credit for parts or equipment returned to Seller, and will not accept delivery of any such parts or equipment, unless Buyer has obtained Seller's approval in writing. The warranty extends to repaired or replaced parts of Seller's manufacture for ninety (90) days or for the remainder of the original warranty period applicable to the equipment or parts being repaired or replaced, whichever is greater. This warranty applies to the repaired or replaced part and is not extended to the product or any other component of the product being repaired. Repair parts of its own manufacture sold after the original warranty period are warranted for a period of one (1) year from shipment against defects in materials and workmanship under normal use and service. This warranty applies to the replacement part only and is not extended to the product or any other component of the product being repaired. Seller may substitute new equipment or improve part(s) of any equipment judged defective without further liability. All repairs or services performed by Seller, which are not covered by this warranty, will be charged in accordance with Seller's standard prices then in effect.

THIS WARRANTY IS THE SOLE WARRANTY OF SELLER AND SELLER HEREBY EXPRESSLY DISCLAIMS AND BUYER WAIVES ALL OTHER WARRANTIES EXPRESSED, IMPLIED IN LAW OR IMPLIED IN FACT, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Seller's sole obligation under this warranty shall be, at its option, to repair or replace any equipment (or its component parts) which has a defect covered by this warranty, or to refund the purchase price of such equipment or part. Under the terms of this warranty, Seller shall not be liable for (a) consequential, collateral, special or liquidated losses or damages; (b) equipment conditions caused by normal wear and tear, abnormal conditions of use, accident, neglect, or misuse of said equipment; (c) the expense of, and loss or damage caused by, repairs or alterations made by anyone other than the Seller; (d) damage caused by abrasive materials, chemicals, scale deposits, corrosion, lightning, improper voltage, mishandling, or other similar conditions; (e) any loss, damage, or expense relating to or resulting from installation, removal or reinstallation of equipment; (f) any labor costs or charges incurred in repairing or replacing defective equipment or parts, including the cost of reinstalling parts that are repaired or replaced by Seller; (g) any expense of shipment of equipment or repaired or replacement parts; or (h) any other loss, damage or expense of any nature.

The above warranty shall not apply to any equipment which may be separately covered by any alternate or special warranties.

PERFORMANCE: In the absence of Certified Pump Performance Tests, equipment performance is not warranted or guaranteed. Performance curves and other information submitted to Buyer are approximate and no warranty or guarantee shall be deemed to arise as a result of such submittal. All testing shall be done in accordance with Seller's standard policy under Hydraulic Institute procedures.

LIABILITY LIMITATIONS: Under no circumstances shall the Seller have any liability under the Order or otherwise for liquidated damages or for collateral, consequential or special damages or for loss of profits, or for actual losses or for loss of production or progress of construction, regardless of the cause of such damages or losses. In any event, Seller's aggregate total liability under the Order or otherwise shall not exceed the contract price.

ACTS OF GOD: Seller shall in no event be liable for delays in delivery of the equipment or other failures to perform caused by fires, acts of God, strikes, labor difficulties, acts of governmental or military authorities, delays in transportation or procuring materials, or causes of any kind beyond Seller's control.

COMPLIANCE WITH LAW: Seller agrees to comply with all United States laws and regulations applicable to the manufacturing of the subject equipment. Such compliance shall include: The Fair Labor Standards Acts of 1938, as amended; Equal Employment Opportunity clauses of Executive Order 11246, as amended; Occupational Safety and Health Act of 1970 and the standards promulgated thereunder, if applicable. Since compliance with the various Federal, State, and Local laws and regulations concerning occupational health and safety, pollution or local codes are affected by the use, installation and operation of the equipment and other matters over which Seller has no control, Seller assumes no responsibility for compliance with those laws and regulations, whether by way of indemnity, warranty, or otherwise. It is incumbent upon the Buyer to specify equipment which complies with local codes and ordinances.



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