2022

# LaBour Taber Vertical Centrifugal Pumps 1000/8000 Series

INSTALLATION, OPERATION, AND MAINTANENCE

2005 Dr Martin Luther King Jr Street
Indianapolis, IN 46202

# Taber 1000/8000 IOM

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## 1.0 Preface

Thank you for purchasing a Peerless Pump Company manufacture of LaBour/Taber Chemical Process Pump. These pumps are an ideal choice for applications involving the transfer of chemicals where long service life or special construction is required. Please READ THIS ENTIRE IOM before attempting to install, operate, or repair this pump. Failure to read and comply with installation and operating instructions will void the responsibility of the manufacturer, and may also result in bodily injury as well as property damage. Properly installed, your pump will give you satisfactory, dependable service.

The instructions and recommendations contained in this manual are intended for personnel trained in installation, operation, and maintenance of centrifugal pumps. It should be understood that the information enclosed will not relieve the operator from the responsibility of exercising normal good judgment in the care and operation of this equipment.

Peerless Pump Company assumes no responsibility for the design of foundations, piping systems, or other manufacturers' equipment. We recommend that a specialist in the design and installation of pumping systems be consulted.

Peerless Pump Company pumps are identified by serial number, model number, type, style, and size. This information can be found stamped onto nameplates located on the pump and/or base/support plate. Leave the name plate securely attached to the pump for future references. Please reference pump serial number on all correspondence that you make with the factory, sales representative, or our sales department.

This book is intended to be a permanent part of your pump installation and should be preserved in a convenient location for ready reference. If these instructions should become soiled, obtain a new copy form Peerless Pump Company.

## 2.0 Safety and Storage

The design, material, and workmanship incorporated in the construction of Taber pumps makes them capable of giving long, trouble free service. The life and satisfactory service of any mechanical unit, however, is enhanced and extended by periodic inspection and careful maintenance. This instruction manual was prepared to assist operators in understanding the construction and correct methods of installing, operating, and maintaining these pumps. Further information can be obtained by contacting the local sales representative or Peerless Pump Company.

**!~ SPECIAL WARNING ~!**

Peerless Pump Company will not be liable for any damages or delay caused by failure to comply with the provisions of this instruction manual. This pump is not to be operated at speeds, working pressures, discharge pressures, or temperatures higher than, nor used with liquids other than, stated in the original order acknowledgment without written permission of Peerless Pump Company.

### 2.1 Check Points on Arrival

Care should be taken when unloading pumps. If shipment is not delivered in good order and in accordance with the Bill-of-Lading, note the damage or shortage on both receipt and freight bill.

Below is a minimum recommendation of items to check:

- Does the nameplate correspond to what you ordered?
- Are all the accessories supplied?
- Have any components been damaged in transit?
- Can the shaft be turned easily by hand? If heavy resistance is felt, or the pump does not turn at all, this means that the equipment has been damaged in shipping.

MAKE ANY CLAIMS TO THE TRANSPORTATION COMPANY PROMPTLY. This will reduce potential controversies when claims are filed with the carrier. No claims will be considered later than thirty (30) days after receipt of shipment.

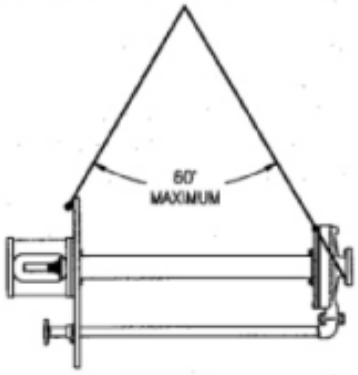
Instruction sheets on various components as well as the IOM for the pump are included in the shipment. DO NOT DISCARD!

### 2.2 Safety

A centrifugal pump, like most other high speed or pressure retaining devices, can be dangerous if misused. This danger is greatly increased when the pump is handling corrosive, toxic, or other hazardous liquids. Every caution must be taken against accidents that may endanger life or property.

#### 2.2.1 Handling

The pump should be lifted horizontally by the use of customer supplied eye bolts and shackles attached to the support plate and a sling around the casing. For long pumps, two cranes and/or a spreader beam may be required to prevent the total included hitch angle from exceeding 60° (see below).




**!~ DANGER ~!**

**Never lift by slinging to the motor or motor tripods. Do not use motor eyebolts for lifting pump unit.**

To lift the pump to the vertical position, soft wood blocking should be placed under the casing to prevent damage to the casing, column(s), motor tripod, piping, and suction flange.

For long pumps or pumps with suction nipples or strainer, use two cranes to lift the pump at the casing and the support plate. When the pump is well clear of the ground, slowly transfer all of the weight to the hitch at the support plate while allowing the pump to gently swing to the vertical position without tipping on the casing, suction nipple, or strainer.

All covers and shipping treatments should be removed from the pump suction and column piping before the pump is set in place.

#### 2.2.2 Electrical Dangers

Proper consideration must be given to the dangers associated with the presence of electric currents. It is essential that safety devices, such as removable fuses and safety lockouts, be used to guard against electrical shock or accidental pump starting.

#### 2.2.3 Pump Application

This pump has been engineered for a particular application and operating point. Before using this pump in another service, LaBour/Taber must be consulted to make sure that the pump will safely handle the application.

### 2.3 Storage

**2.3.1 Short Term (less than 4 months)**

LaBour/Taber's normal domestic shipping and storage preparation is suitable for protecting the pump during shipment in covered trucks. It also provides protection during covered storage at the job site, and for a short period between installation and start-up. It is recommended that the unit be stored in a environment that is relatively free of dirt and has controlled temperature and humidity.

Vertical storage in a DRY sump is the preferred method for vertical pumps to prevent sagging of the shaft. Alternatively, the unit can be stored vertically along a wall if properly supported. When a dry sump is not available for vertical storage, store the pump in the horizontal position without the motor. Sturdy wooden cradles must be used to evenly support the unit.

The pump must be drained of any liquids that might have entered or condensed during shipment. This is required to prevent damage due to freezing. Repair any damage to the covers on the flanges and coat machined surfaces and all cast iron or ductile iron components with a corrosion preventive coating; Tectyl 506, Mobilarma 355, or equal.

It is recommended that a weekly inspection of the pump be made. Manually rotate the shaft several times at least once every month. Note the position of the shaft keyway to make sure that the shaft is stopped 180º from the last storage position.

**2.3.2 Long Term (greater than 4 months)**

**2.3.2.1 Storage Area:** Sheltered storage is required to protect the pumps from the effects of the elements. Pumps must be properly protected from moisture, dirt, and physical damage during storage. The unit should be stored in a dry, level, covered area. A concrete floor is desirable. The storage area must be well ventilated.

**2.3.2.2 Pumps:** Remove packing from stuffing box (if equipped). Seal packing in a plastic bag and attach to the pump for future reinstallation. For mechanical seals see below ("Mechanical Seal").

The pump must be drained of any liquids that might have entered during shipment. This is required to prevent damage due to freezing.

Exterior surfaces of iron and steel components should be given a heavy coat of rust preventative such as Tectyl 506, Mobilarma 355, or equal.

For pumps with an iron casing, a powdered form of "Volatile Corrosion Inhibitor" such as Shell VPI 260, or Cortec VCI-309, should be placed into the pump through the suction flange. The suction and discharge flanges must be covered with a sturdy plastic flange cover and taped with waterproof duct tape to seal from the atmosphere.

Pumps with steel column piping require the addition of Volatile Corrosion Inhibitor though the vent/drain holes in column. The holes are then plugged with plastic caps or taped with water proof duct tape to seal from the atmosphere. Jacketed column piping is prepared in the same manner. However, the interior of the jacket is left untreated, and is sealed from the atmosphere with plugs or caps. Jackets must be cleared of liquid by draining or blowing out with compressed air.

Pumps of alloy construction should be stored with plastic screens taped over the suction and discharge flanges to allow the pump to "breathe". Column drain and vent holes should be protected in a similar manner to allow passage of air while preventing the entry of debris. The pump must be protected from liquids entering through the screens.

Manually rotate the shaft several times at least once every month. Note the position of the shaft keyway to make sure that the shaft is stopped 180º from the last storage position.

After six months in storage additional grease must be added to the bearings, purging some of the old grease from the cavity. If the pump has been stored more than twelve months, all old grease must be purged form the bearing and replaced by new grease.

**2.3.2.3 Motors:** Refer to the motor manufacturer for their recommendations and instructions.

LaBour/Taber recommends motors be stored in a clean, dry area protected from extremes of temperature, moisture, shock, and vibration. Storage temperatures of 50º - 120º F with a maximum relative humidity of 60% must be observed.

Motor windings must be protected from excessive moisture absorption. Do not wrap or cover the pump or motor in plastic as this will trap moisture and form condensation, causing damage to the insulation of the windings. All motors equipped with heaters are to have the heaters connected and operating.

Machined surfaces should be given a heavy coating of rust preventative (such as Tectyl 506).

Manually rotate the shaft several times at least once every month. Note the position of the shaft keyway to make sure that the shaft is stopped 180° from the last storage position.

All condensate drains must be open and the drain must be at the lowest point of the motor.

After six months in storage additional grease must be added to the bearings, purging some of the old grease from the cavity. If the motor has been stored more than twelve months, all old grease must be purged from the bearing and replaced by new grease.

Motor windings are to be "MEGGED" after the motor is removed from long term storage. The resistance of the stator windings must be at least 1.5 Megohms. If this resistance is not achieved, the motor manufacturer must be consulted before proceeding.

**2.3.2.4 Mechanical Seal:** Refer to the factory and seal manufacturer for their recommendations and instructions.

## 3.0 Installation and Operation

### 3.1 Installation and Piping

Installation: Provide sufficient accessibility for inspection and maintenance of the pump. Allow clear space and ample head room for use of an overhead crane, hoist or "A" frame with sufficient capacity to lift the entire unit, consistent with safe lifting practices.

For proper operation, a minimum submergence of the impeller is required. The pump must be located so that the minimum liquid level recommended is maintained at all times (see Certified Dimension Drawing).

Foundation: The pump should be installed on a tank flange, rigid sump cover, or concrete foundation properly fitted with a grouted curb ring. The pump foundation must be designed to absorb all loads, forces and vibration and to form a permanent, substantial support for the pump support plate. This is important in maintaining the alignment of the unit with respect to pump shaft position, piping and the driver shaft.

The support nozzle or flange must be located at the proper elevation and must be leveled to within 0.004 inch per foot in all directions. This is necessary so that the pump shaft centerline will be perpendicular to the horizontal plane of the pump at the support plate. This setting allows for vertical alignment of the pump shaft in its bearings.

While placing the pump in the sump or vessel, care should be taken to prevent the pump form bumping into the sides of the structure. Once the pump is set on its foundation, torque the hold down bolts or the studs to the fastener manufacturer's recommended value.

Check the level of the pump using a precision level placed on the machined surface of the motor tripod. Readings are to be taken at 0°, 90°, 180°, 270° and must be within 0.004 inches per foot in all directions. IF THE PUMP IS NOT LEVEL WITHIN THESE TOLERANCES, DO NOT PROCEED UNTIL THIS CONDITION IS RESOLVED. Grouting of the pump is not recommended unless a curb-ring is used.

#### 3.1.1 Impeller Clearance

Although the position of the impeller was set during shop assembly, shipment and/or differences in process temperature may cause differential expansion and require that the clearance be reset by the user. The numbers ( ) referred to in the text are item numbers of each component shown on the pump dimension print or sectional drawing included in this manual.

Before setting impeller clearances the pump should be mounted at its permanent location and secured properly in the upright position. Lockout motor controls to prevent starting of the equipment while maintenance personnel are performing the setting procedure.

**!~ DANGER ~!**
**Lockout motor controls and breakers to prevent injury to personnel!**

### 3.1.1.1 Standard Thrust Bearings (RFC Piloted Thrust Bearings)

1. Remove coupling guards. Remove the four threaded fasteners securing the motor tripod to the thrust tripod (models -30 & -40), or those securing same to adapter plate (models -10 & -20). Disconnect the motor wiring as needed and lift the motor and motor tripod as an assembly off of the thrust tripod/adapter and set aside.
2. With a spanner wrench or drift pin, loosen shaft locknut (72) and shaft adjusting nut (72A) (Note: rotation CCW to loosen R.H. threads; some models may have L.H. threads. Refer to bill of material to determine thread rotation). Loosen setscrew which is located in the concentric collar of the top side of the flanged thrust bearing.
3. The shaft assembly will drop a very small distance until the impeller bottoms in the casing and the shaft rotation is no longer possible. Slowly raise the shaft assembly by screwing the shaft locknut CW until shaft rotation by had barely becomes possible. Mount and zero a dial indicator in order to measure the upward movement of the shaft.
4. Continue to slowly rotate the shaft adjustment nut to move shaft upward until the top of the impeller (31) barely contacts the head (23). This condition is evident when there is a slight rub with increased drag when the shaft is turned by hand. Note and record the dial indicator reading. This value is the total impeller clearance and should be between 0.050" and 0.080". Pumps in high temperature service (above 300°F) will have additional clearance totaling 0.110" to 0.130". Values in excess of this indicate excessive clearance and require replacement of the impeller in most cases. Where corrosion or wear is excessive the casing and head should also be replaced.
5. Rotate adjusting nut CCW until dial indicator reads half of total clearance, positioning impeller in the middle of the available space. An alternate setting one third the distance as measured from the head but no less than 0.020" may be used when shaft expansion from differential heating is expected or pumped fluid temperature exceeds 150°F.
6. Tighten the setscrew on collar of the thrust bearing.
7. Tighten adjusting nut (72A) against collar. Tighten locknut (72) against adjusting nut. Using a spanner wrench, after initial contact between the locknut and adjusting nut, to tighten locknut per below chart (it maybe helpful to mark the starting point on each nut to ensure proper tightening). Proper engagement of the locknut in opposition to the adjusting nut is the key to adequately lock the shaft elevation in position. The shaft should rotate freely by hand without rubbing or binding.

| Shaft Diameter | Additional Turn |
|---|---|
| 1.25" | 0.38" |
| 1.63" | 0.50" |
| 2.00" | 0.63" |
| 2.50" | 0.63" |

8. Reinstall the motor and motor tripod assembly onto the pump and secure with four threaded fasteners. Prior to reinstalling the coupling and energizing the motor, refer to Section 3.2.1 for guidelines on checking motor rotation.

### 3.1.1.2 Duplex (Heavy Duty) Thrust Bearings:

**Shaft Diameters 1.25" & 1.63"**

Designed with two heavy duty angular contact ball bearings mounted back to back for thrust control. The assembly allows for direct replacement of the RFC Piloted Thrust Bearings with the 1000 Series eight hole square tripod and shaft with no modifications required.

1. Remove coupling guards. Remove the four (4) bolts securing the motor tripod to the thrust tripod (models -30 & -40), or adapter plate (models -10 & -20). Disconnect motor wiring as needed and lift motor and motor tripod as an assembly off of the thrust tripod and set aside.
2. Loosen the set screws between the locknut and shaft sleeve. Loosen the locknut with a spanner wrench with a counter clock-wise motion holding the sleeve stationary. It may be necessary to remove the V- Seal to locate the holes for the spanner wrench on the sleeve.
3. Slowly lower the shaft assembly by rotating the shaft sleeve until the impeller (31) just contacts the pump casing (22). This condition is evident when there is a slight rub with increased drag when the shaft is rotated by hand. Mount and zero a dial indicator to measure the upward movement of the shaft.
4. Slowly rotate the shaft sleeve counter clockwise to raise the shaft assembly until the impeller just contacts the head (23). This condition is evident when there is a slight rub with increased drag when the shaft is rotated by hand. Record the dial indicator reading below. This value is the total impeller clearance and should be between 0.050" and 0.080". Pumps in high temperature service (above 300□F) will have additional clearances totaling 0.110" to 0.130". Values in excess of this indicate excessive clearance and require replacement of the impeller in most cases. Where corrosion or wear is excessive the casing and head should also be replaced.
5. Rotate the shaft sleeve to locate the impeller midway between the casing and head. For service above 150□F set 0.020" off bottom of head to allow of shaft thermal growth.
6. Use a spanner wrench after initial contact between the locknut and shaft sleeve to tighten locknut per below chart (it maybe helpful to mark the starting point on each nut to ensure proper tightening). Proper engagement of the locknut in opposition to the adjusting nut is the key to adequately lock the shaft elevation in position. The shaft should rotate freely by hand without rubbing or binding.

| Shaft Diameter | Additional Turn |
|---|---|
| 1.25" | 0.38" |
| 1.63" | 0.50" |

7. Tighten the set screws in the locknut against shaft sleeve. Reinstall V Seal, if removed.
8. Reinstall the motor and motor tripod assembly onto the pump and secure with four threaded fasteners. Prior to reinstalling the coupling and energizing the motor, refer to Section 3.2.1 for guidelines on checking motor rotation.

### 3.1.1.3 Duplex (Heavy Duty) Thrust Bearings: Shaft Diameters 2.00" & 2.50"

1. Remove coupling guards. Remove the four threaded fasteners securing the motor tripod to the thrust tripod (models -30 & -40), or those securing same to adapter plate (models -10 & -20). Disconnect motor wiring as needed and lift motor and motor tripod as an assembly off of the thrust tripod/adapter and set aside.
2. Loosen the four bolts which secure the bearing cartridge (71) to the thrust tripod (94) or adapter plate (46A). Tighten the jack bolts until the shaft assembly is raised an amount sufficient for the removal of the shims located beneath the cartridge flange. Remove the shims.
3. Slowly lower the shaft assembly by unscrewing the jacking bolts until the impeller (31) just contacts the pump casing (22). The condition is evident when there is a slight rub with increased drag when the shaft is turned by hand. Mount and zero a dial indicator to measure the upward movement of the bearing cartridge.

4. Slowly tighten the jacking bolts to raise the shaft assembly until the impeller just contacts the head (23). This condition is evident when there is a slight rub with increased drag when the shaft is turned by hand. Record dial indicator reading below. This value is the total impeller clearance and should be between 0.050" and 0.080". Pumps in high temperature (above 300ºF) will have additional clearance totaling 0.110" to 0.130". Values in excess of this indicate excessive clearance and require replacement of the impeller in most cases. Where corrosion or wear is excessive the casing and head should also be replaced.
5. Insert four identical shim packs of sufficient thickness in order to locate the impeller midway between the casing and head. For services above 150ºF, set 0.020" off bottom of head. Loosen jack screws to allow bearing cartridge to seat.
6. Reinstall the four bolts that secure the bearing cartridge in place and tighten in accordance with the torque table contained in the appendix. Before final tightening, check if shaft rotates freely by hand without rubbing or binding. Check final position of the impeller by reading the dial indicator. Add or subtract shims uniformly from each shim set to get impeller centered properly. Record final shim thickness.
7. Reinstall the motor and motor tripod assembly onto the pump and secure with four threaded fasteners. Prior to reinstalling the coupling and energizing the motor, refer to Section 3.2.1 for guidelines on checking motor rotation.

### 3.1.2 Shaft Alignment

This procedure covers the centering of the Taber pump shaft after assembly, whether the pump is new or rebuilt. If the pump is new this procedure has been performed at the factory prior to shipment, but should be checked after installation to check for changes that may have occurred as a result of handling.

The coupling halves should be disconnected and not reconnected until installation of the pumping unit is complete and the motor rotation has been checked and found to be correct.

RFC Pilot Fit Thrust Bearing (bearing cartridge is round casting with register machined on bottom). Thrust bearing has a register fit to the thrust tripod along with motor tripod and motor, requiring the user to simply mount the motor, electrically connect and verify proper rotation, and connect the coupling.

RCJ Non-Piloted Thrust Bearing (bearing cartridge is a square casting machined flat on the bottom must be aligned at the shaft location in reference to the motor fit at installation after initial assembly. Pump shaft was aligned at the factory, but shifting of the equipment during shipping and handling, and flexing of the manufactured components makes field alignment mandatory.

Using the procedure below check the shaft location in reference to the motor register prior to initial pump operation (only required after pump rebuild or installation of new pump following transport to the job site).

1. The pump must be assembled and in the vertical position with the impeller clearances properly set. Isolate the pump from the system pressure with a locked closed discharge valve or a blind flange. Remove the motor, coupling guards and coupling. Take all pertinent safety precautions consistent with the hazards present and existing procedures of the governing authority for the site.
2. Rotate the pump shaft (33) by hand several revolutions to align the inner ring of the flanged cartridge bearing.
3. Fasten an accurate dial indicator securely to the top of the shaft as shown in the illustration. The extension setup must be rigid with no loose joints.

4. Check the concentricity of the shaft in relation to the motor tripod (94) by rotating the shaft by hand and observing the dial indicator needle movement as the pointer tip sweeps the tripod register. The total indicator run-out (TIR) should be 0.004" or less. If the TIR is within this limit go to step 8.
5. Loosen the capscrews which secure the bearing cartridge (71) enough to allow restricted movement of the bearing cartridge.
6. Gently relocate the shaft in the direction indicated by the readings taken in Step 4 above by moving the bearing cartridge. Check the new location by sweeping the register again. This may take several attempts to get results that are within the stated range. Items to check if alignment is unobtainable are:
    - Registered fits must be clean and free of rust and scale for proper alignment.
    - Dial Indicator calibration.
    - Verify the dial indicator tip rides on the vertical surface only of the register. If the tip rides on the register radius or chamfer, erroneous readings will result.
    - Match marks not aligned - Rotation of the tripod(s) in 90° increments may be necessary to align the shaft without placing it in a bind.

TIR should be limited to half of the coupling manufacture's maximum allowable parallel misalignment. The pump should not be operated with TIR > 0.010".

7. With the shaft properly located, tighten the thrust bearing cap screws to the proper torque (see appendix). Verify the shaft position by sweeping the register as before.
8. Remove the dial indicator setup and install coupling and motor. Assembled unit should turn freely by hand with no rubbing or "hard spots." Pumps with packed stuffing boxes will have more resistant to turning by hand.

### 3.1.3 Piping Nozzle Loads

In accordance with Hydraulic Institute standards, "It is desirable to support and restrain both the suction and discharge pipe near the pump casing. In installations involving large temperature variations, expansion of the connected piping may subject the pump nozzles to significant forces and moments. If this condition is unavoidable, each such application should be referred to the pump manufacturer for approval." Typically there is no suction piping connected to a wet pit vertical sump pump, but in the case of externally mounted units the suction must be connected to the suction source via a long radius elbow and properly secured piping.

Maximum allowable nozzle loads are given in the appendix for discharge pipe loads. Loads exceeding those listed in the appendix must be approved by LaBour/Taber.

### 3.1.4 Discharge Piping

The discharge piping must be supported independently near the pump to avoid placing pipe strains on the pump. Where fabricated piping is used in making up the discharge line it is recommended that the system flange be aligned to the pump before the final weld is made to the system pipe. This will help to bring the piping into the proper alignment without putting a strain on the pump flange. Standard construction provides discharge flanges with bolt holes straddling plate centerlines.

**!~ CAUTION ~!**

**Do not use pump discharge flange bolts for pulling piping into alignment!**

When the temperature of the liquid being pumped varies from the ambient temperature, expansion joints must be used to prevent excessive thermal stresses from being transmitted to the pump.

Do not undersize the diameter of the discharge piping. Provide air vents where necessary since accumulation of air has an

adverse effect on pump operation even when it occurs on the discharge side. The pump is self venting on startup.

When the discharge piping has a vertical leg, it is best to install check valves to prevent reverse rotation during pump shutdown and also to avoid water hammer. Avoid piping arrangements that could form a siphon which could lead to inadvertent transfer of liquid after the pump has been turned off.

If the discharge piping has an upward vertical leg followed by a downturn of the pipe to form a siphon, the highest part of the discharge pipe must be well below the shutoff head capabilities of the pump.

### 3.1.5 Auxiliary Piping

Connect piping for auxiliary systems, such as external bearing flush (intermediate & head bearings), mechanical seal flush (always required when mechanical seals are installed), or oil mist lube system piping. Refer to the certified dimension drawing (if supplied) or Taber for the location and connection sizes of the auxiliary piping.

## 3.2 Precautions for Operation

### 3.2.1 Start-up

With the power disconnected, rotate the motor shaft manually and confirm it turns without resistance. Clean the inside of the tank/sump and piping system as dirt and scale may have entered the piping during installation which could cause pump damage.

On new constructions sites sumps which have been idle become a collection place for trash. Cleaning of sumps prior to initial startup is recommended to prevent damage to pump from items which may become entrained in the suction flow during pump operation.

Confirm proper rotation direction of the motor (correct direction shown by arrow on the pump support plate or motor/thrust tripod).

**!~ CAUTION ~!**

**Rotation must be check with the coupling halves disengaged. This must be done to prevent pump damage due to being driven in the reverse direction.**

Verify sump liquid level is within the limits stated on the certified dimension drawing or product documentation. Verify installation of, and start any auxiliary systems for bearings or seals. Typically the pump is lubricated by the pumped product. Some pumps require external lubrication which will be indicated on the certified dimension drawing.

Reconnect coupling and reinstall coupling and shaft guards prior to pump operation.

**!~ DANGER ~!**

**Operate pump only when coupling and shaft guards are installed to prevent injury to personnel.**

Start the pump with the discharge valve closed. The discharge pressure will rise sharply if the pump has been properly primed. Adjust the discharge valve until the specified pressure and/or flow has been reached.

**!~ CAUTION ~!**

**Never operate pump without liquid! Sever damage to pump will quickly result.**

**!~ CAUTION ~!**

**If the discharge pressure fails to rise after 10 seconds the pump must be shutdown & the cause of the problem corrected.**

### 3.2.2 Checks During Operation

During initial operation, pump and motor should be monitored closely until satisfactory operation is achieved at equilibrium temperatures (when process temperature is normal, and pump thrust bearing and stuffing box temperature have stabilized). When the pump operation is stable, routine monitoring of operation is recommended to identify trends which can aid in predictive maintenance. Repair costs and lost production costs can be minimized by

repairing aging equipment before it fails in operation.

### 3.2.3 Noise Check

Entrainment of air or solids from the suction source often gives rise to abnormal noise and vibrations. Normal operation produces noise which is usually below 85 dBA. However higher speed and higher HP ratings produce levels which can be greater than 85 dBA. Loud shrillness usually indicates component failure requiring the pump to be shutdown immediately. Unusual noises should be investigated immediately for cause and corrective action.

### 3.2.4 Vibration Check

Precautions are required in the case of vibration caused by cavitation, or poor installation. Adjust the flow rate as needed with the discharge valve only. The discharge valve must remain open during normal operation.

Verify proper sump level to prevent operation with insufficient liquid for impeller submergence at startup or for prevention of vortexing in the sump.

Typical and normal level vibration for a new installation should be below 0.10 in/sec with an upper limit of 0.15 in/sec. In no case should operational levels be in excess of 0.20 in/sec, unless emergency conditions exist requiring operation. Operation with vibration at excessive levels severely reduces pump service life and damages a greater number of pump components.

### 3.2.5 Performance Check

Discharge pressure and flow should be monitored at regular intervals and recorded. Over time performance will decrease with respect to pump wear. Pumping of abrasive solids will degrade performance at a much higher rate. Bearing and process temperatures can also add valuable input to a predictive maintenance program.

### 3.2.6 Stopping Operation

Under normal conditions, the discharge valve must be closed before stopping operation of the pump. Pump operation with the discharge valve closed, must be limited to no more than one minute.

When operating under pressurized suction conditions, close the discharge valve first and stop operation of the pump. This is an unusual situation and care must be exercised as the pump cannot be isolated from the pressure and can pose a personnel hazard if maintenance is performed with the tank pressurized.

When the pump stops due to a power failure, first turn off the power switch and close the discharge valve manually. When power is restored refer to “Start-up” above to return to operation.

### 3.2.7 Freeze Damage

Special care is required during the cold season since retained liquid will freeze, upon which it will expand, causing cracks and other serious damage to pumps and piping systems.

### 3.2.8 Other Precautions

Installed spare pumps should not be left unused for long periods of time, but utilized periodically to confirm that they are ready for use when needed.

Do not allow dry operation of the pump. Dry running will cause sleeve bearing damage.

Operation must be restricted within the limits shown on the performance curve or as specified by Taber. Do not use with an insufficient or excessive flow rate.

Lubrication to oil and grease lubricated bearings should be verified prior to startup. See appendix for detailed instructions (Section 8.6).

## 4.0 Preventive and Corrective Maintenance

### 4.1 Maintenance Check Points

Varying operating conditions make it difficult to recommend a single maintenance Schedule. Good operating records are required to determine the particular maintenance schedule best suited for an individual pump application. Records of pump vibration spectrum, hours of operation, flow rates, suction and discharge pressures, motor amperage, etc., is the best way to predict when maintenance will be required. An individual log of pump operation and maintenance is the best means of record keeping.

For a non-critical, non-severe service, the following maintenance schedule is recommended. Lube pump in accordance with appendix, "Lubrication Requirements".

### 4.1.1 Weekly Checks:

- Level of sump should be in operating range.
- Strainer and sump should be clear of debris.
- Discharge pressure, note and record.
- Record motor amperage.
- Record pump and motor vibration.
- Note any unusual noise.
- Record bearing temperature (Lube per schedule).
- Check for leakage from the flanges, shaft, packing, or mechanical seal.

| Semi-Annual Maintenance Check Up | | |
|---|---|---|
| **Parts** | **Check Points** | **Countermeasures / Replacement** |
| Casing | • Erosion damage<br>• Impeller rubbing damage<br>• Surface deposits | • Replace if depth exceeds 0.06 inch<br>• Replace casing if depth exceeds 0.06 inch. Replace worn bearings and reset impeller clearance.<br>• Clean |
| Stuffing Box | • Monitor for adequate seal of vapors | • Adjust or replace shaft packing, or replace mechanical seal |
| Impeller | • Erosion or wear<br>• Surface deposits<br>• Cracks | • Replace if depth exceed 0.050 inch<br>• Clean<br>• Replace |
| Shaft | • Wear due to rubbing of packing<br>• Surface deposits<br>• Runout | • Replace if grooves are deeper than 0.010 inch<br>• Clean<br>• Use if less than 0.004 radial or 0.002 axial at impeller mount surface |
| Sleeve Bearings (Interm, Head & Stuffing Box) | • Erosion or wear<br>• Swelling or cracking | • Replace if clearance between shaft and bearing is more than 0.020 inch, diametrically.<br>• Replace and review material selection, check for overheated bearing (no lube, operation w/o liquid) |
| Discharge Pipe & Elbow | • Corrosion / erosion damage | • Replace if more than 0.130 inch combined (internal & external) wall thickness material loss |

### 4.1.2 Packed Stuffing Box

*Dry Lubricated Stuffing Box Pumps* equipped with die formed Grafoil type packing require no additional lubrication. The stuffing box space provides for 7 rings of packing above the stuffing box bushing end of the box with no lantern ring, followed by the gland. This stuffing box is packed solid and the stuffing box bushing requires no further lubrication.

The gland must be adjusted such that a seal is maintained without overheating the packing and shaft. Do not over tighten packing!

Packing wear will eventually result in the gland bottoming out against the box. When this happens it is acceptable to add one additional ring of packing. An additional ring of packing may be added as needed up to (3)

times. The next time a ring is needed the stuffing box should be repacked, inspecting the shaft for signs of wear.

A break-in period of about twenty (20) hours of operation is required before new packing can be adjusted down to the lowest leakage rates. Temporary cooling of the stuffing box may be necessary.

*Grease Lubricated Stuffing Box Pumps* equipped with compression type packing require particular attention. The stuffing box space provides for 2 rings of packing above the stuffing box bushing end of the box, followed by a lantern ring which must communicate with the lubrication tap, followed by three rings of packing, followed by the gland.

The gland must be adjusted such that a seal is maintained without overheating the packing and shaft. Grease lubricates and forms the seal between the shaft and packing. In this arrangement it is of particular importance the grease used in the stuffing box be chemically compatible with the pumped liquid (Dow Chemical, Krytox GPL is inert and non-flammable). If the gland has been over tightened, the box will have to be repacked.

Packing wear will eventually result in the gland bottoming out against the box. When this happens it is acceptable to add one additional ring of packing. The next time this happens, the stuffing box must be repacked.

A break-in period of about twenty (20) hours of operation is required before new packing can be adjusted down to the lowest leakage rates.

### 4.1.3 Thrust Bearing Lubrication

Every Taber pump is equipped with a thrust bearing that requires lubrication on a periodic basis. Refer to the Appendix for amount, frequency, and type of lubricant required.

## 5.0 Disassembly and Inspection

The following is the recommended step-by-step procedure for dismantling of the pump for inspection, repair and replacement of various component parts.

The numbers ( ) referred to in the text are the item numbers for each component shown on the Pump Dimension Print or sectional drawings. For references purposes the top of the pump is the motor end of the unit and the bottom is considered the suction or pump end.

**!~ DANGER ~!**

**Customer supplied eye bolts and rigging must be of sufficient strength to safely lift and handle the entire pump weight.**

Prior to attempting any repair, all onsite safety precautions must be met, discontinuing use of the system in which the pump is a component. Liquids must be removed from the system or placed in a safe location to prevent undue hazards to personnel and the environment. Physically disconnect power to the equipment designated for repair/removal. Again, onsite corporate maintenance and safety guidelines must be met before proceeding with the maintenance activity.

Before unbolting any flanges make certain that they have been properly match-marked in order to ease re-assembly and insure realignment.

Before proceeding with the dismantling of the pump become familiar with this procedure and the contents of this manual.

### 5.1 Disassembly of Standard Models

1. Remove all piping and electrical connections which would interfere with the removal of the pump and motor, observing standard industry and your particular company's safety practices to prevent personnel injury and/or equipment damage.
2. Remove the tripod guards. Loosen the set screws on the pump-half coupling flange and slide it down on the pump shaft to disengage the flexible member of the coupling.

**!~ WARNING ~!**

**Motor must be removed to prevent damage during handling the pump unit.**

3. Remove the motor hold-down bolts and lift the motor clear of the tripod, setting it down on blocking in the vertical position to prevent damage to the shaft, coupling or machined surfaces.
4. Remove the fasteners securing the support plate to the sump/tank opening. Attach the eye bolts to the pump support plate using the holes provided (tap size is shown on certified dimension drawing).
5. Lift the pump from the pit, allowing the sump liquid to drain from the pump. Decontaminate the pump as required.

**!~ DANGER ~!**

**Observe all pertinent safety precautions for handling equipment contaminated with the sump liquid. Since small pockets of liquid will always be retained in various pump cavities, care must be taken to protect personnel working on the pump.**

6. Carefully transfer the pump to the horizontal position and rest on blocking.
7. Match-mark the column piping flanges to speed re-assembly. Remove the discharge pipe (93) and elbow (112) as an assembly.

**!~ CAUTION ~!**

**Block under the tripod to prevent tipping when the pump casing is removed in the next step.**

8. Remove the pump casing (22) and strainer (29) as an assembly, exposing the impeller (31).
9. Remove cotter pin (CP) and impeller nut (69), and pull the impeller from the keyed shaft (33). Remove the impeller key (62). Pump models with "LF" in the model number designation have a right hand threaded impeller stub which threads into the shaft end. There are no locking nuts or keys. Unscrew impeller in the CCW direction to remove.
10. Loosen and remove shaft locknut (72) and adjusting nut (72A). Then loosen the locking collar on the bearing. Remove the shaft, being careful to support the shaft along its entire length.
11. Remove the pump head (23), containing the head bearing (17).
12. Relocate the blocking that is under the lower column pipe to the middle section of column pipe to allow removal of the lower section.
13. Remove all intermediate column pipe(s) and intermediate bearing housing(s). The remaining parts; tripod, stuffing box, and upper section of column pipe, may remain assembled. Remove the old shaft packing and sleeve bearing from the stuffing box and discard.

### 5.1.1 Disassembly Procedure for Heavy Duty Thrust Bearing (1.25 and 1.63 Shafts)

1. Refer to Section 5.1 Disassembly of Standard Models steps 1 thru 9.
2. Loosen four capscrews between motor tripod (94A) and thrust tripod (94). Remove motor tripod (94A)
3. Loosen the three set screws in the shaft locking nut (72).
4. Rotate Shaft Sleeve CCW until it is disengaged from shaft.
5. Loosen four capscrews holding bearing cartridge to thrust tripod and remove cartridge assembly.
6. Loosen socket head capscrews between cartridge cover (13) and cartridge (71). Remove cartridge cover.
7. Remove shaft sleeve assembly from bearing cartridge.
8. Remove grease seal from bearing cartridge.
9. Disengage the lock washer tab and remove bearing locknut from shaft sleeve.

10. Using a bearing puller, remove thrust bearings and discard. Never reuse bearings.
11. Refer to Section 5.1 Disassembly of Standard Models steps 11 thru 13.

### 5.1.2 Disassembly Procedure for Heavy Duty Thrust Bearing (2.00 and 2.50 Shafts)

1. Refer to Section 5.1 Disassembly of Standard Models steps 1 thru 9.
2. Relocate the blocking under the lower column pipe to the middle section of column pipe to allow removal of the lower column section.
3. Remove the four capscrews holding the bearing cartridge (71) to the thrust bearing tripod. Any spacers that were between the bearing cartridge and the thrust tripod should be stored for safekeeping and reuse upon re-assembly.
4. Removal of paint from the lower exterior portion of the bearing cartridge may be required to facilitate removal of the cartridge. Using the jacking bolts evenly, remove the bearing cartridge and shaft. The complete thrust bearing cartridge and shaft assembly may be pulled from the pump and disassembled at a workbench.
5. Place the pump shaft (with the thrust bearing cartridge assembly attached on a flat surface, supporting the shaft ever three feet with "V Blocks" or similar support to prevent bowing and movement of the shaft.
6. Remove the cartridge cover (13) to expose the thrust bearings. Disengage the lock washer (LW) tab and remove the bearing locknut (LN).
7. With the bearing cartridge still installed, use a bearing or gear puller to remove the bearings and cartridge form the shaft. Discard the old bearings. Never reuse bearings.
8. Refer to Section 5.1 Disassembly of Standard Models steps 11 thru 13.

### 5.2 Inspection of Parts

Inspect all parts, giving particular attention to below listed components. For quick reference see the chart, "Semi-Annual Maintenance Check-Up" (Section 4.0).

1. Sleeve bearings are required to stabilize the shaft and provide for smooth operation. Because the bearing/shaft clearance is critical to pump operation, it is recommended that all bearings be replaced whenever the pump is dismantled. Sleeve bearings are located in the stuffing box, intermediate bearing housings, and head.

   To remove the sleeve bearings from the bearing housing or head first remove setscrew(s) or pin which locks the bearing in place (stuffing box bearings are not pinned). Press/remove the worn bearing from the housing. Inspect housing bore and smooth any scratches with a fine abrasive paper/cloth.

   To remove the sleeve bearing from the stuffing box (if supplied) simply press/remove the worn bearing. Inspect stuffing box bore and smooth any scratches with a fine abrasive paper/cloth.

   Replace sleeve bearings if clearance between shaft and bearing is more than 0.020 inch diametrically.
2. Check bearing wetting lines to make sure they are functional. Replace any plugged lines or fittings.
3. Shafts are subject to wear at the sleeve bearing and stuffing box locations. If the shaft is badly scored (more than 0.010" deep), worn more than 0.008" over 20% of the bearing area, or bent it should be replaced. Minor scoring may be removed by polishing with fine emery or crocus cloth.
4. Carefully inspect the impeller for any signs of rubbing, mechanical damage, or

material loss due to corrosion, erosion, or cavitation (replace if grooves are greater 0.050"). Remove any foreign material that would restrict the flow passages through the impeller. Check the clearance between the impeller and casing for uniformity. Pump performance is dependent on a good impeller. A worn or damaged impeller must be replaced.

5. Carefully inspect the casing and head for any signs of rubbing, mechanical damage, or material loss due to corrosion, erosion or cavitation (replace if grooves are greater 0.060"). Remove any surface deposits.
6. DO NOT REINSTALL WORN BEARINGS. If the unit has been in service for a long period of time, it is good practice to replace the thrust bearing while the pump is disassembled for maintenance or repairs.
7. Clean and inspect all fasteners. Replace fasteners with damaged threads or tool gripping areas. Badly rusted and pitted steel, or dull matte finish and pitted stainless steels indicate the fastener has been subjected to chemical attack and should be replaced. Fasteners of materials such as stainless steels, nickel, and titanium will require replacement when only minor thread damage is evident due to the potential for galling.

## 6.0 Ordering Spare/Replacement Parts

When ordering spare or replacement parts please include the following information on your order:

- Pump model, size of pump and serial number. (These can be obtained from the nameplate on the pump).
- Write plainly the name, part number (from Bill of Material), item number (from sectional drawings in appendix) and material of each part required.
- Give quantity of parts required.
- Give complete shipping instructions.

Repair orders will be handled with a minimum of delay. To ensure against possible long and costly downtime periods, especially on critical services, it is advisable to have spare parts on hand. Refer to the appendix chart "Standard Materials of Construction" for a list of recommend spare parts.

## 7.0 Assembly Instructions

The numbers ( ) referred to in the text are the item numbers of each component shown on the Pump Dimension Print or Bill of Material. For references purposes the top of the pump is the motor end of the unit and the bottom is considered the suction or pump end. Typically Taber Pumps are assembled in a horizontal position due to limited space for assembly, and this procedure is based on that consideration.

All components must be thoroughly cleaned and inspected in accordance with Section 5.2 before assembling the pump. Give particular attention to the cleaning of close and register fits.

Carefully inspect all gasket surfaces to make sure that they are free of any nicks or scratches that might impair their sealing. Replace all gaskets, lip seals, o-rings, etc.

Align all flanged component match marks when reassembling the pump.

### 7.1 Standard Thrust Bearing Pump

1. Use one of the following procedures to install the sleeve bearing into the housing or stuffing box depending on the material of the bearing.

   **Carbon Graphite and Metallized Graphite Bearings/Bushings** - Chill the new bearing in a slurry of ice and water. Lightly lubricate the bearing housing bore with water. Align pin hole of sleeve with pin hole in housing. Press the new bearing in place. Install new retaining pin or new locking setscrews as applicable. Stake setscrews to lock in place. Retaining pins are to be a tight fit into the

bearing housing. Worn retaining pin hole may be peened to distort the hole enough to provide a tight fit for the new retaining pin.

The stuffing box bushing is a press-fit carbon graphite bushing and is located at the bottom of the stuffing box. Press the new bushing into place using water as a lubricant.

A continuous, straight-in motion must be used when pressing carbon graphite bearings into place. Stopping before the bearing is bottomed, or use of excessive force will result in breaking of the bearing/bushing.

**Metal and Non-Metallic Bearings/Bushings** - Bearings should have a light slide fit into a clean housing. Install new retaining pin or new locking setscrews as applicable. Stake setscrews to lock in place. Retaining pins are to be a tight fit into the bearing housing. Worn retaining pin holes may be peened to distort the hole enough to provide a tight fit for the new retaining pin.

2. If the pump was completely disassembled, suspend the support plate in a vertical fashion and install the stuffing box or adapter plate. Consider proper column stud orientation for later alignment of casing discharge location.

**!~ CAUTION ~!**

**Use properly rated lifting equipment consistent with the load to be handled. Failure of the lifting equipment could result in injury to personnel and/or damage to pump components.**

3. Assemble longest column piece as upper column to the stuffing box or adapter plate register. Evenly tighten the fasteners to assure solid seating of the column pipe at the stuffing box resister.

| Stub Size | Drill Size |
|---|---|
| 0.50" threaded stub | 0.141 |
| 0.75" threaded stub | 0.203" |
| 1.00" threaded stub | 0.203" |

4. Assemble intermediate bearing housings (with new sleeve bearings installed) in the register fits of the column flanges. Housings equipped with a lubrication tap must be assembled with the tap facing the discharge pipe, and aligned with the grooves in the column flange.
5. All column flange-to-flange fasteners must be tightened evenly to ensure solid seating of the intermediate bearing housing in the registered fit of the column flange. Uneven tightening will lead to cocking of the column flange joint, resulting in misalignment of the column and "hard" turning of the shaft.
6. Repeat step 4 & 5 for all remaining column and intermediate bearing housings.
7. Wrap the threaded impeller stub end of the shaft with heavy tape to prevent damage to the thread or pump sleeve bearings when the shaft is installed. (A bullet shaped protector can be made to thread onto the shaft at the impeller end to prevent damage to bearings or shaft). Carefully slide the shaft into the pump, slowly turning the shaft as each sleeve bearing is encountered, approximately positioning the shaft as it will be when assembly is complete.
8. Slide head (with new bearing installed) over shaft and align the head and column register fits. Evenly tighten the fasteners for solid seating of the column to head register fit.
9. Remove tape and any tape residue from the shaft end and install impeller key, impeller, impeller washer and impeller nut. Torque the impeller nut in accordance with the torque table located in the Appendix. Drill through the impeller nut and threaded stub with the size drill indicated below. If you are reusing the old shaft, make sure that a new hole is drilled rather than using existing holes, to ensure that the impeller nut is properly tightened.

On units with "LF" designation, the impeller threads onto the shaft and does not require and drilling for a cotter pin.

10. Install new cotter pin through the nut and shaft stub, trimming excess to ¼" and bending ends around impeller nut.
11. Place casing gasket into casing, and install casing onto head. Align the pump discharge with the discharge pipe and elbow. Evenly tighten fasteners.
12. Install discharge elbow gasket(s) and spacer (only if specified on bill of materials) and tighten fasteners evenly. If discharge pipe is to be replaced, contact factory for additional information to assure proper intermediate bearing lubrication is maintained.
13. Install thrust tripod to stuffing box (if supplied).
14. Install the thrust bearing onto the shaft and locate with the register on the thrust tripod or adapter. (Some thrust bearings will not have a register fit. Install shaft adjusting nut and locknut. Refer to Section 3.1 for impeller adjustment and shaft alignment procedures before tightening adjusting nut and locknut.
15. *For units with a stuffing box*, the box must be thoroughly cleaned before packing is placed in. Packing must be cut so that the ends just meet when wrapped around the shaft. The joints should be staggered by minimum of 120º as each successive ring of packing is added.

    Press each ring of packing into the box, bottoming each ring firmly (do not compress the rings) before the next ring is installed. Refer to the appendix "Stuffing Box Configuration" for proper placement of packing within the stuffing box and location of seal ring (if applicable).

    Install the gland and finger tighten the gland bolt nuts. The gland is designed to (and must) engage the bore of the box. If this is not possible when all rings are in the stuffing box, one ring of packing should be left out during the break-in period of the new packing. Refer to the "Packed Stuffing Box" section under Section 4.1.2 for information on packing adjustment.

    Pumps equipped with double stuffing boxes are assembled in the same manner. Setting of the spring loaded packing for double stuffing boxes requires approximately 1/8" compression of the spring after initial packing. Do not over compress the packing. The shaft will require alignment as indicated above.
16. Assembly by installing motor tripod onto stuffing box or adapter plate.
17. Torque all fasteners in accordance with the torque table contained in the appendix (Section 8.5).
18. Install coupling halves and install motor. Prior to start-up ensure that the shaft rotates freely. Refer to section 3.0 for start-up recommendations.

**7.2 Duplex Thrust Bearings (1.25" & 1.63")**

1. Refer to section 7.1, steps 1 thru 13.
2. Ensure that all parts, the work bench area, and all required tools are free of grit, rust, dirt and any other debris.
3. Blow air through any grease or oil passage in cartridge to assure that they are free from debris. For grease lubricated bearing install grease fittings where required and pump with grease until all passages are filled with clean grease. Install new grease seal into bearing cartridge (71).
4. Heat two new angular contact bearings to 180ºF and install on shaft sleeve in a "Back to Back" configuration. These bearings should have no seals on them and should be open to allow the entry of grease after installation.

5. Install new lock washer and hand tighten a new locknut. When the bearings and sleeve have cooled, use a spanner wrench to tighten until lower bearing race is solid against the sleeve shoulder. Bend one tab form the lock washer into one slot on the locknut.
6. *Grease lubricated bearings* are to be hand packed with MangaLube (Carleton-Stuart Corporation, Long Island City, NY) grease or equal. Accrolube is an equivalent grease. Enough grease must be worked past the balls and the cage such that at least 90% of all air space within the bearing has been filled with clean grease.
7. *Oil Mist Lubricated bearings* require pre-lubrication with the same oil used in the mist generating system. Prior to start-up, the oil mist systems must be in operation on the entire assembled cartridge for a minimum of 12 hours before the pump can be started.
8. Install sleeve assembly into bearing cartridge. Install bearing cartridge cover (13) and tighten cap screws.
9. Slowly lower cartridge assembly onto shaft and rotate shaft sleeve over the shaft threads. Continue to rotate sleeve until the approximate amount of thread exposed are enough for the locknut (72).
10. Install bearing locknut (72) onto shaft but do not tighten against shaft sleeve.
11. Refer to Section 3.1.1.2 for impeller adjustment and shaft alignment procedures before tightening locknut.
12. Tighten the three set screws in locknut against shaft sleeve.
13. Install "V-Seal" between shaft sleeve and bearing cartridge cap.
14. Refer to section 7.1, step 15 thru 18.

**7.3 Duplex Thrust Bearings (2.00" & 2.50")**

1. Do not remove the bearings from bearing manufacture's packing until the shaft and lock washer into one slot on the locknut. all other required components are ready for assembly. It is not necessary to remove the light coating of preservative which is on the bearing to prevent corrosion in storage.
2. Refer to section 7.1, steps 1 thru 6.
3. Ensure that all parts, the work bench area, and all required tools are free of grit, rust, dirt and any other debris.
4. Install new labyrinth or oil seals, gaskets or o-rings in bearing cover and bearing cartridge. The lip of any oil seal must be installed pointing to the bearing (any garter springs must face towards the bearings). Lubricate the lip seal and o-rings with grease or a light oil. Blow air through any grease or oil passage to assure that they are free of debris. For grease lubricated bearings install grease fittings where required and pump until all passages are filled with clean grease. Cover components to keep clean.
5. Angular Contact Bearings - Only specially matched ground bearings are suitable for mounting in pairs. The bearing markings must match the bill of materials. The bearings must be installed as a pair in a "Back to Back" configuration (as a set of two bearings with the large portion of the outer race on one bearing facing the large portion of the outer race on the other bearing).
6. Heat two new angular contact bearings to 180ºF. These bearings should have no seals on them and should be open to allow the entry of grease after installation. While the bearings are hot install on shaft.
7. Install new lock washer and hand tighten a new locknut. When the bearings and sleeve have cooled, use a spanner wrench to tighten until lower bearing race is solid against the sleeve shoulder. Over tightening can damage the bearing or shaft shoulder. Bend one tab from the

8. Where bearings are to be mounted on a shaft sleeve installed on the shaft, the sleeve should be placed on the shaft before the bearings are placed on the sleeve. Put the split thrust ring halves in the shaft groove and then slide the sleeve in place, covering the retaining the thrust ring.

   Install the bearings on the shaft sleeve as indicated above. The shaft locknuts are installed after the bearings are placed on the sleeve and the bearing lock washer and locknut have been threaded on to the sleeve hand tight. Tighten the shaft locknuts in place, securing the shaft sleeve. Hand tighten the bearing locknut with a spanner wrench and lock the nut by bending a tab on the lock washer into the slot on the locknut with which it aligns.

9. *PUMPAC Bearings* - Install on shaft/sleeve (in the same manner as angular contact bearings above) making sure that the "V" etched on the outer races of the set of bearings aligns and points toward the impeller end of the shaft. Wrap the bearings with oil paper to keep them clean.

10. *Grease lubricated bearings* are to be hand packed with MagnaLube (Carleton-Stuart Corporation, Long Island City, NY) grease, Accrolube or equivalent grease. Enough grease must be worked past the palls and the cage such that at least 90% of all air space within the bearing has been filled with clean grease.

11. *Oil Mist Lubricated bearings* require pre-lubrication with the same oil used in the mist generating system. Prior to start-up, the oil mist systems must be in operation on the entire assembled cartridge for a minimum of 12 hours before the pump can be started.

12. Lubricate the entire lower length of the shaft with a light oil, and install the bearing cartridge onto the lower portion of the shaft, carefully sliding it onto the thrust bearings. Make certain the lip seal does not roll under while sliding along the shaft. An alternate method is to install the cartridge without the lip seal in place, and then install the lip seal last.

13. Assembly of the covers, plugs, adapters and fittings must be completed quickly to prevent contamination of the bearings with dirt and debris.

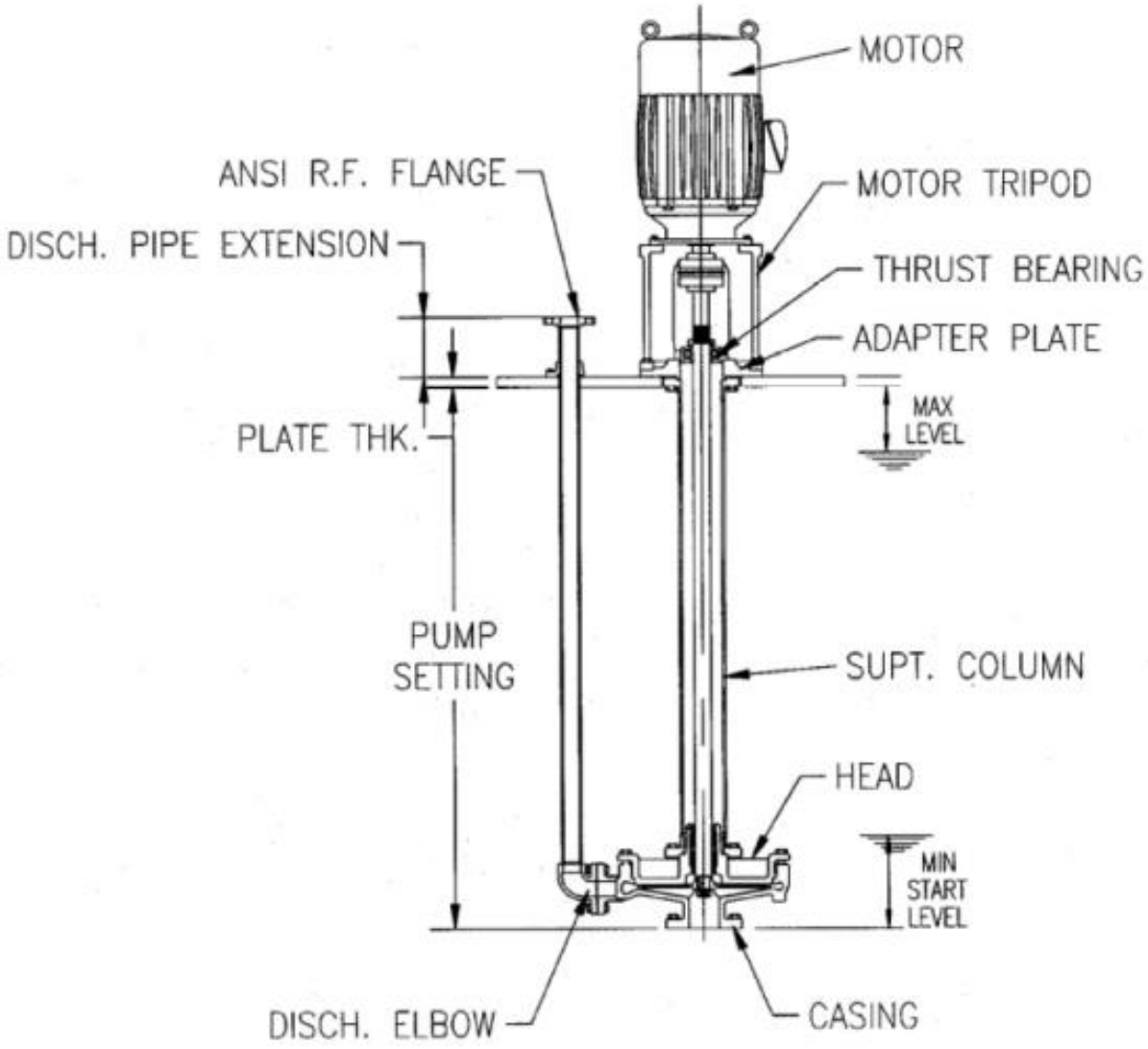
14. Install the cartridge cover with the lubrication port properly aligned. Later models have a locator pin to align the lubrication ports and an o-ring seals the gap between cover and cartridge. When properly installed the fasteners evenly tight, the cover will have a distinct gap between cover and cartridge surfaces. Before starting, several strokes of grease from a grease gun should be added through the grease fittings.

15. Refer to Section 7.1, step 7 thru 13.

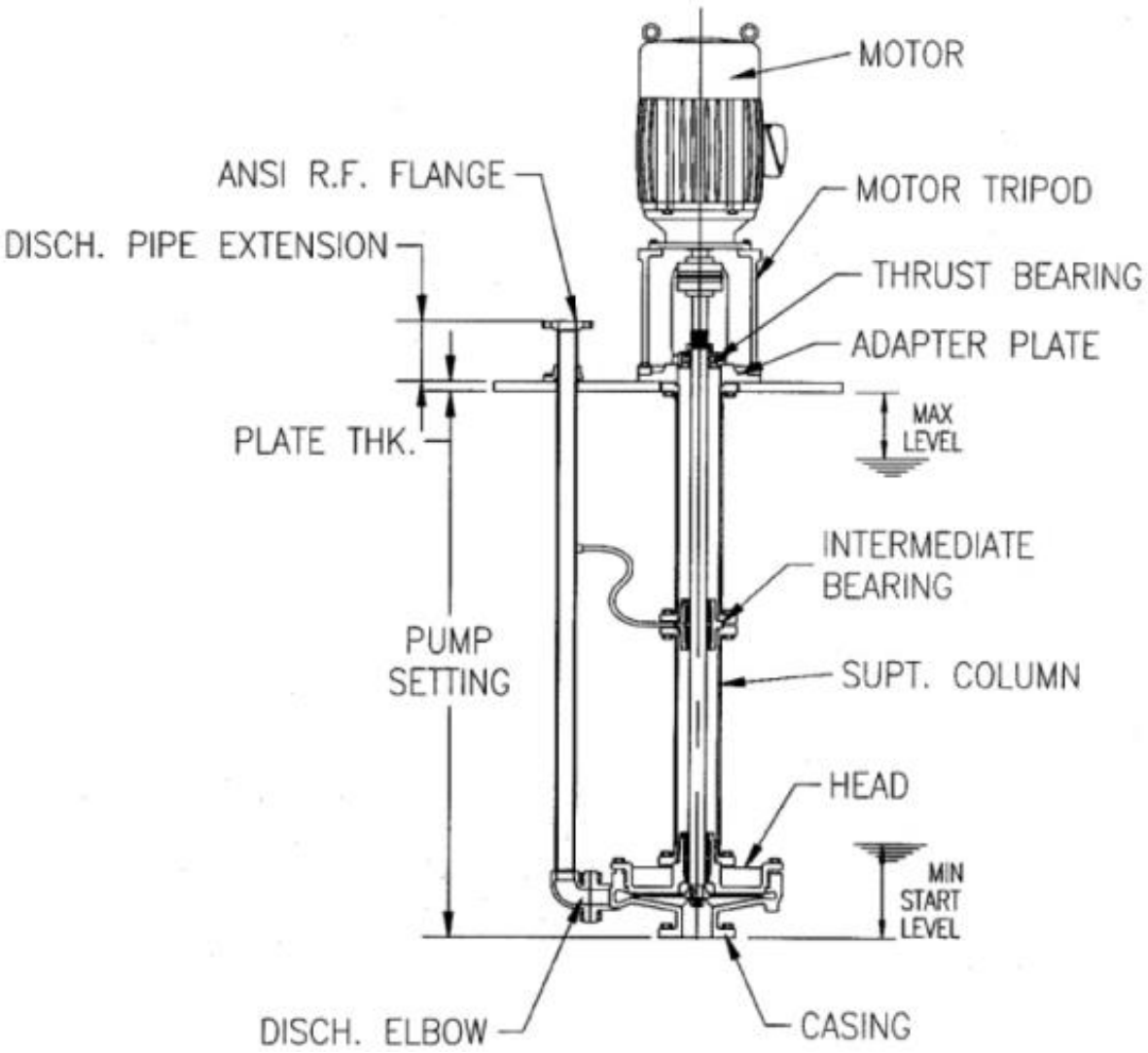
16. Refer to Section 3.1 for impeller adjustment and shaft alignment procedures before tightening locknut.

17. Refer to Section 7.1, step 15 thru 18.

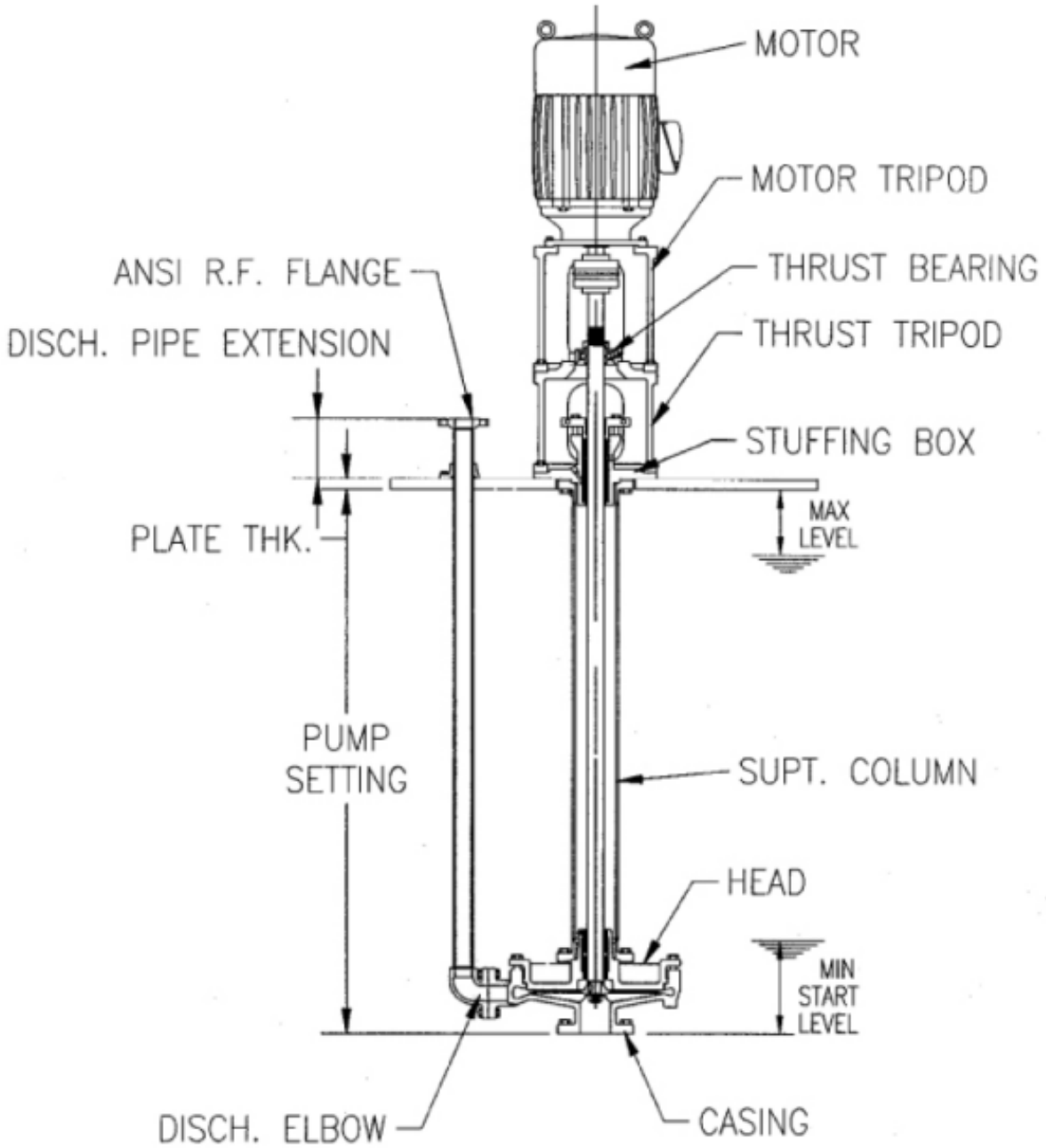
## TABER 1000/8000 SERIES STANDARD CONFIGURATION
## ALL -10 MODELS



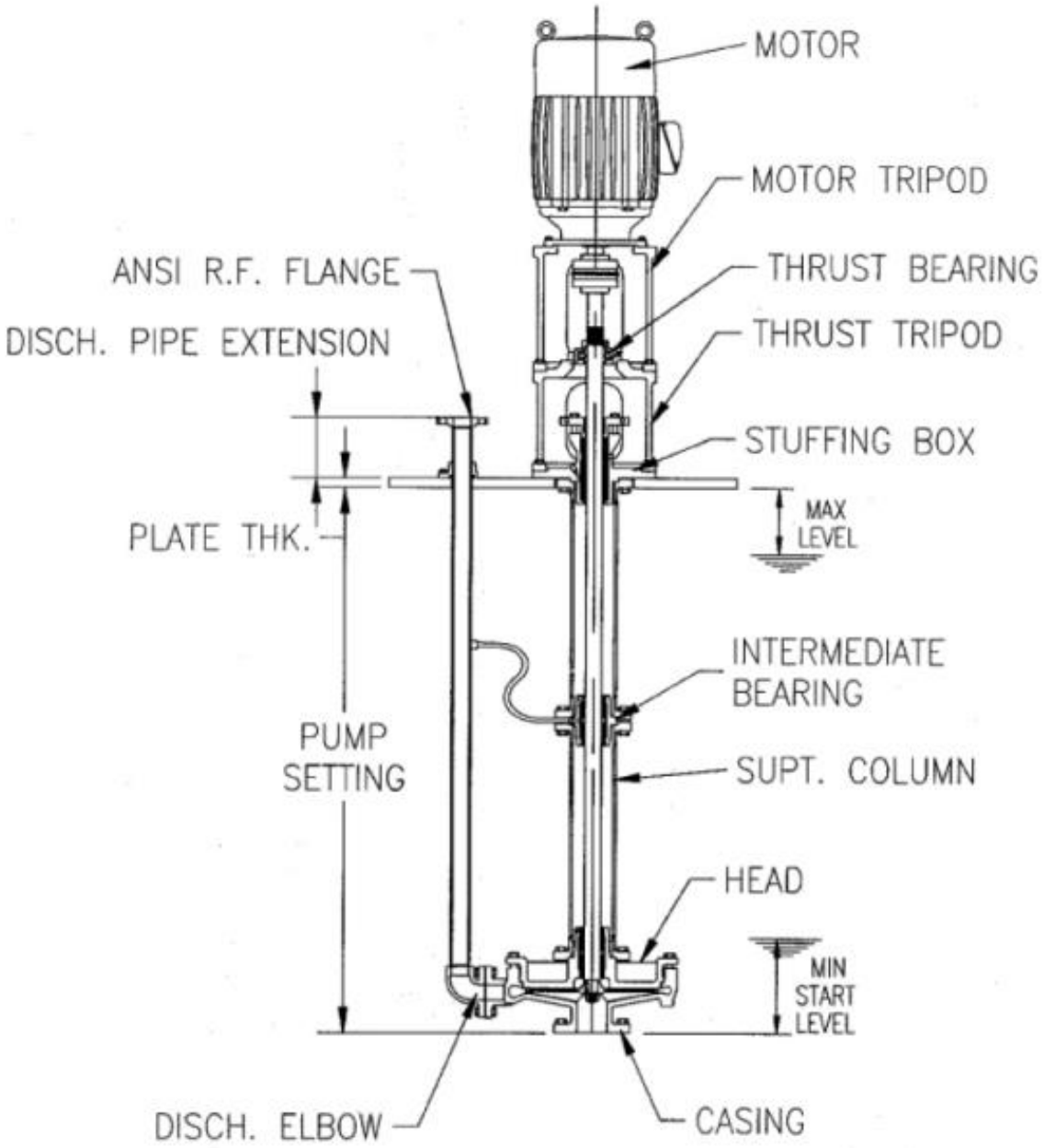
## TABER 1000/8000 SERIES STANDARD CONFIGURATION
## ALL -20 MODELS



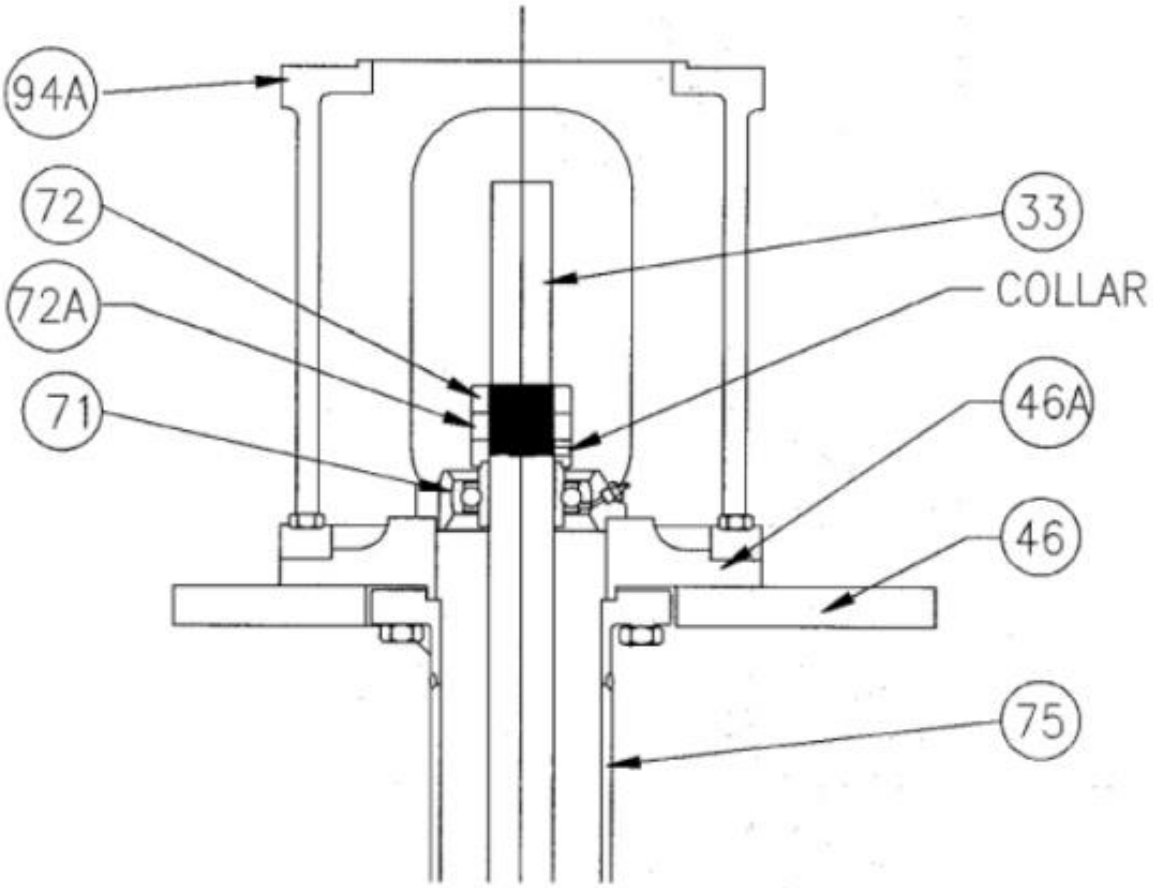
## TABER 1000/8000 SERIES STANDARD CONFIGURATION
## ALL -30 MODELS



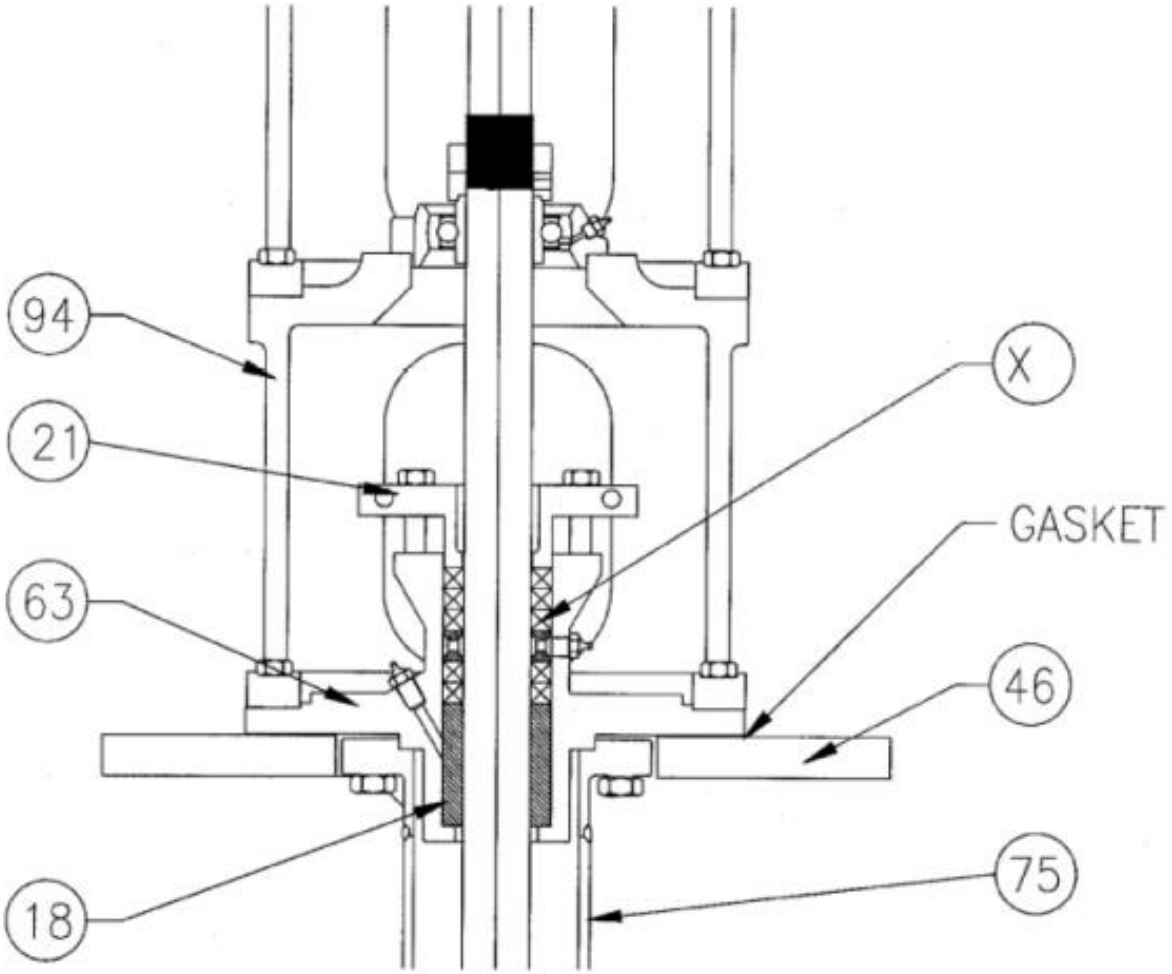
## TABER 1000/8000 SERIES STANDARD CONFIGURATION
## ALL -40 MODELS



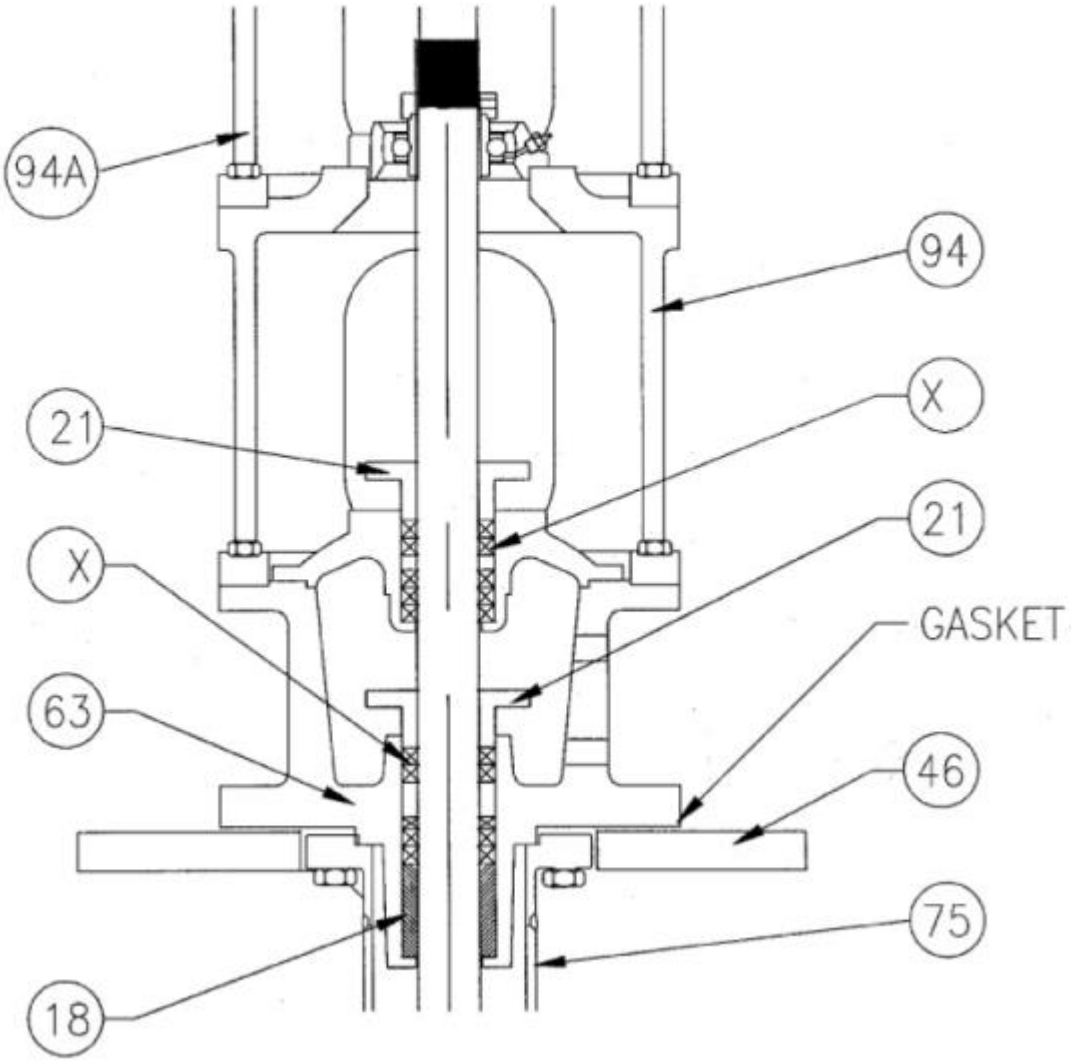
## TABER 1000/8000 SERIES STANDARD THRUST BEARING
## ALL -10 & -20 MODELS



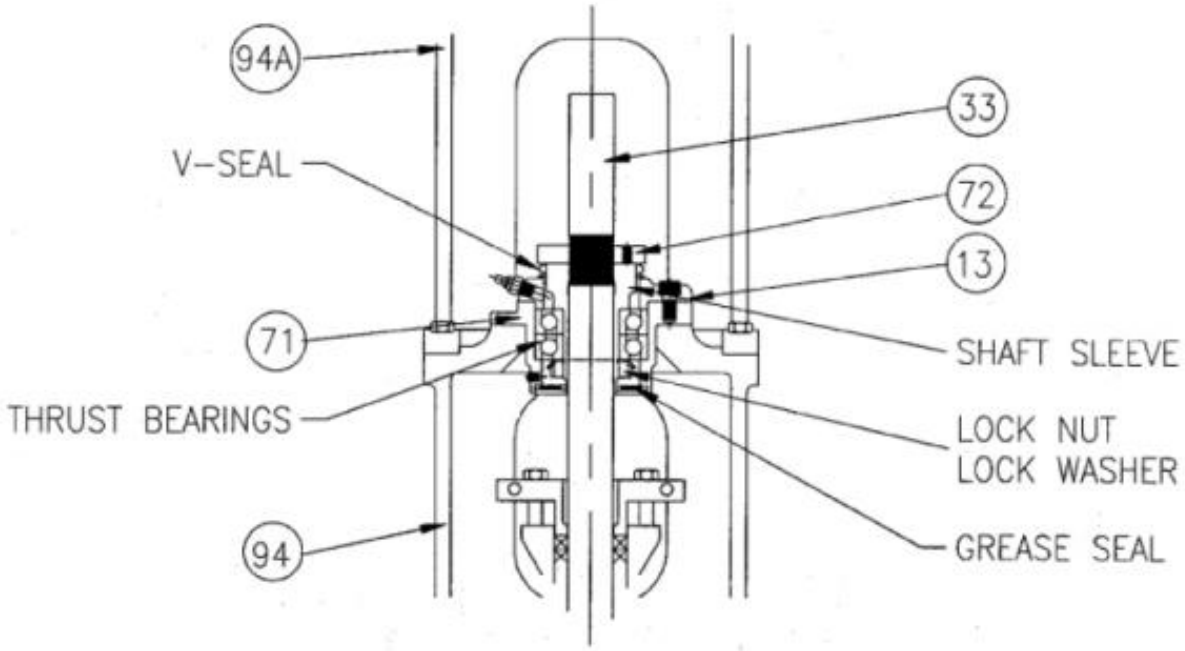
# TABER 1000/8000 SERIES STANDARD STUFFING BOX AND THRUST BEARING ALL -30 & -40 MODELS



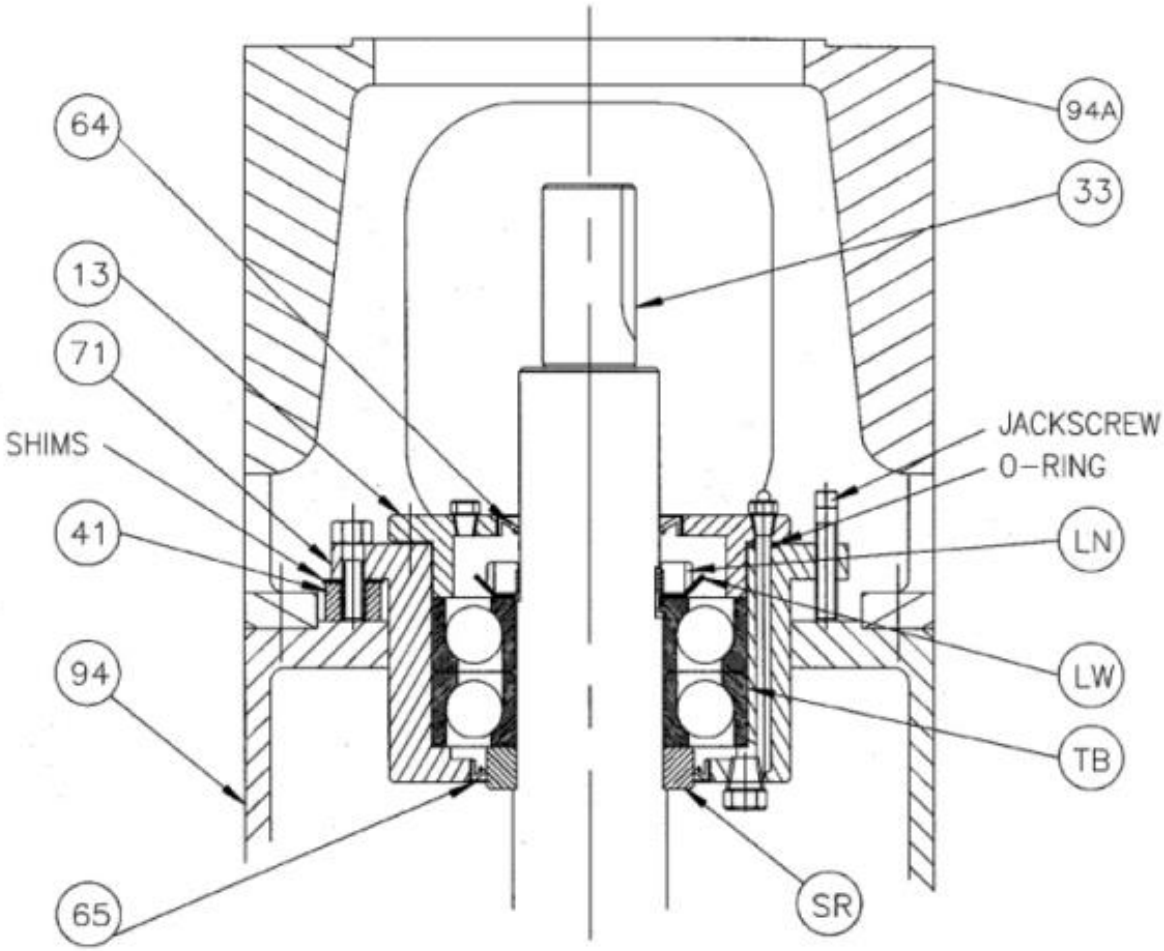
## TABER 1000/8000 SERIES DOUBLE STUFFING BOX (OPTIONAL)
## ALL -30 & -40 MODELS (1.25" & 1.63" SHAFTS)



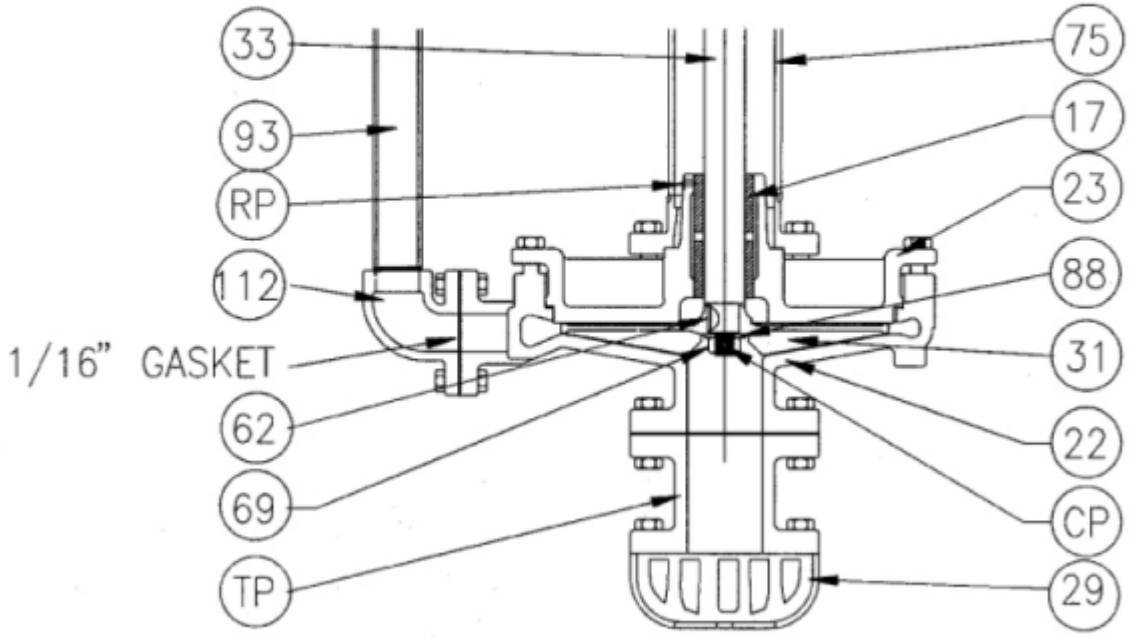
## TABER 1000/8000 SERIES DUPLEX THRUST BEARING OPTIONAL 1.25" & 1.63" SHAFTS



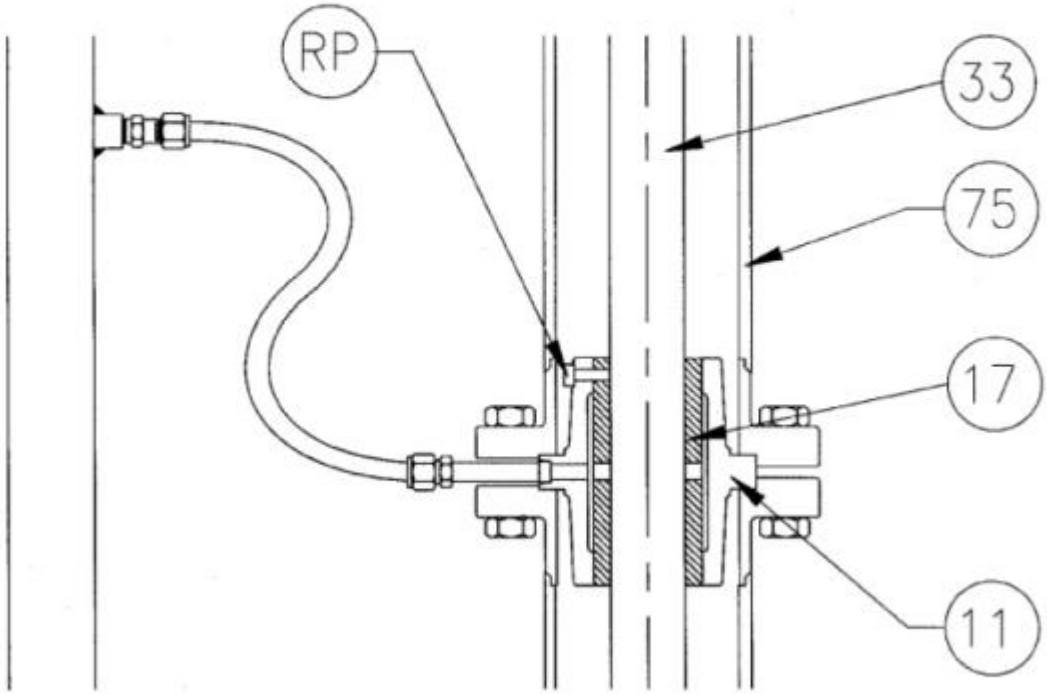
## TABER 1000/8000 SERIES DUPLEX THRUST BEARING OPTIONAL 2.00" & 2.50" SHAFTS



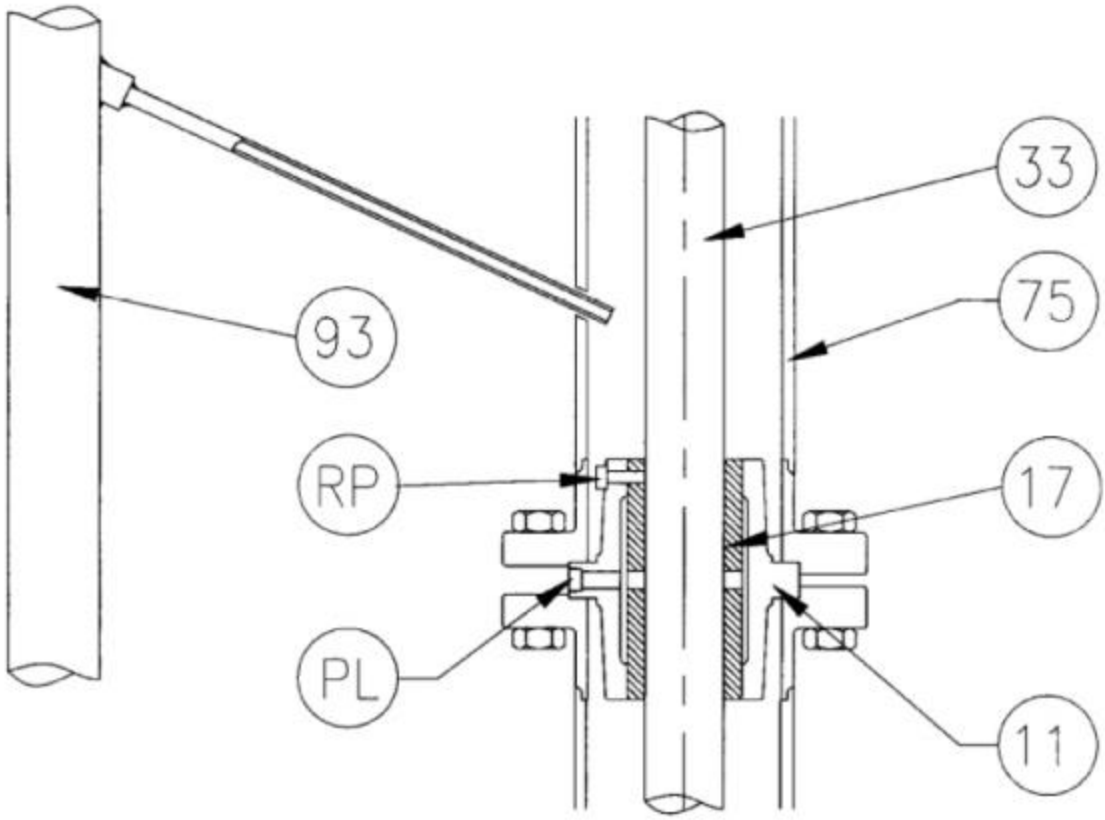
## TABER 1000/8000 SERIES CASING, HEAD & IMPELLER ASSEMBLY



# TABER 1000/8000 SERIES INTERMEDIATE BEARING ASSEMBLY -20 & -40 MODELS



## TABER 1000/8000 SERIES INTERMEDIATE BEARING ASSEMBLY FLOODED LUBE -20 & -40 MODELS ALL MODELS



## STUFFING BOX CONFIGURATION -30 & -40 MODELS

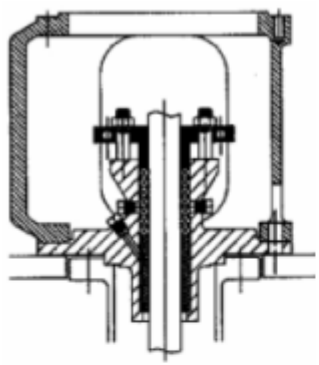


FIGURE 1

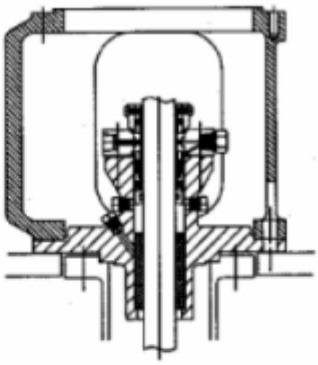


FIGURE 3

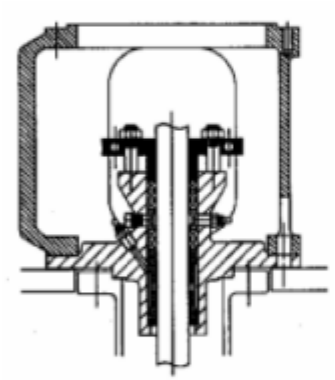


FIGURE 2

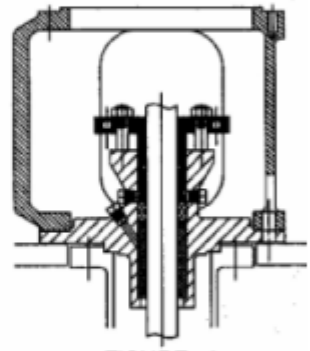


FIGURE 4

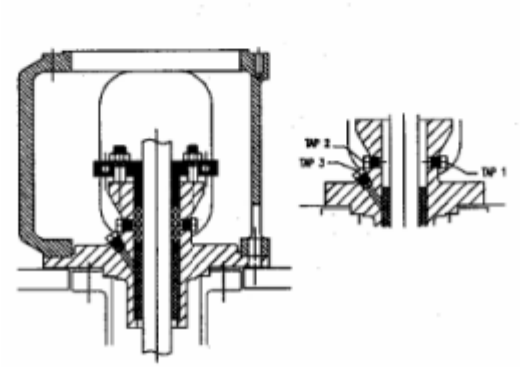



FIGURE 6

| FIG. | SHAFT SEAL TYPE | | | PACKING LUBE | S.B. BEARING | | NOTES |
|---|---|---|---|---|---|---|---|
| 1 | | 7 OR AS | NO | SELF LUBRICATING PLUG TAPS 1 & 2 | | SELF LUBRICATING PLUG TAP 3 | |
| 2 | | 5 | YES | GREASE | | | |
| 3 | | N/A | N/A | N/A PLUG TAPS 1 & 2 | | SELF LUBRICATING PLUG TAP 3 | |
| 4 | | 7 | NO | SELF LUBRICATING PLUG TAPS 1 & 2 | | SELF LUBRICATING PLUG TAP 3 | |
| 5 | (NOT SHOWN) SUPPLIED BY OTHERS | N/A | N/A | PLUG TAPS 1 & 2 | | SELF LUBRICATING PLUG TAP 3 | |
| 6 | | 4 + 2 OR AS | NO | SELF LUBRICATING PLUG TAPS 1 & 2 | | SELF LUBRICATING PLUG TAP 3 | |

## 1000/8000 SERIES STANDARD MATERIALS OF CONSTRUCTION

| Item No. | Part Name | Ductile Iron | 304SS | 316SS | Elc. K | R-55 | Nickel | Y-17 | Y-30 | Ti |
|---|---|---|---|---|---|---|---|---|---|---|
| 29 | Suction Strainer - Cast | C. Iron | 304SS | 316SS | Elc K | R-55 | Ni | Y-17 | Y-30 | Ti |
| 22 | Casing | D. Iron** | 304SS | 316SS | Elc K | R-55 | Ni | Y-17 | Y-30 | Ti |
| 23 | Head | D. Iron | 304SS | 316SS | Elc K | R-55 | Ni | Y-17 | Y-30 | Ti |
| *31 | Impeller | 316SS | 304SS | 316SS | Elc K | R-55 | Ni | Y-17 | Y-30 | Ti |
| *33 | Shaft | CRS | 304SS | 316SS | 20SS | Hast C22 | Hast C22 | Hast C22 | Hast B | Ti |
| *- | Impeller Hardware | 316SS | 304SS | 316SS | 20SS | Hast C | Hast C | Hast C | Hast B | Ti |
| *- | Gaskets - All | Sepco 6234 (Optional: Teflon, Gylon, Grafoil, and Flexitallic) | | | | | | | | |
| *17 | Bearings - Inter & Head | G.F. Teflon (Options: C.F. Teflon, Rulon, Metal & Carb Graph, C. Iron, & Nitronic) | | | | | | | | |
| *RP | Retaining Pin | 316SS | 304SS | 316SS | 20SS | Hast C | Ni | Hast C | Hast B | Ti |
| - | Fasteners - Wet | Steel | 304SS | 316SS | 20SS | Hast C | Ni | Hast C | Hast B | Ti |
| 112 | Discharge Elbow | D. Iron | 304SS | 316SS | Elc K | R-55 | Ni | Y-17 | Y-30 | Ti |
| 93 | Discharge Pipe | Steel | 304SS | 316SS | 20SS | Hast C | Ni | Hast C | Hast B | Ti |
| 75 | Support Column | Steel | 304SS | 316SS | 20SS | Hast C | Ni | Hast C | Hast B | Ti |
| 63 | Stuffing Box | D. Iron | 304SS | 316SS | Elc K | R-55 | Ni | Y-17 | Y-30 | Ti |
| - | Gland Hardware | Steel | 304SS | 316SS | 20SS | Hast C | Ni | Hast C | Hast B | Ti |
| 21 | Splite Gland | D. Iron | 304SS | 316SS | Elc K | R-55 | Ni | Y-17 | Y-30 | Ti |
| *XX | Packing - Stuffing Box | GFO Fiber (Optional: Die-Formed Grafoil Rings, Graphite, metallic Foil & Teflon) | | | | | | | | |
| *18 | Bushing - Stuffing Box | Carbon Graphite (Optional: G.F. & C.F. Teflon, Rulon, Metallized & Carbon Graphite) | | | | | | | | |
| 46A | Adapter Plate | CRS Plate (Optional Stainless Steel) | | | | | | | | |
| 46 | Support Plate | CRS Plate (Optional: Cladding and Solid Stainless Steel Alloys) | | | | | | | | |
| 47 | Discharge Pipe Clamp | Ductile Iron (Optional Stainless Steel) | | | | | | | | |
| *X | Packing - Disch Pipe Clp | GFO Fiber (Optional: Die-Formed Grafoil Rings, Graphite, metallic Foil & Teflon) | | | | | | | | |
| 94/94A | Tripod - Thrust & Motor | Cast Iron (Optional: Fabricated steel and Stainless Steel) | | | | | | | | |
| - | Guard - Tripod | Steel - 30 Gauge (Optional: Non-Sparking AL) | | | | | | | | |
| *71 | Bearing - Thrust, Single | Deep Groove Ball Bearing in Cast Iron Housing w/ Pilot Fit | | | | | | | | |
| *- | Bearing - Duplex | Angular Contact Ball Bearings Monted Back to Back (Optional: MRC PumPac) | | | | | | | | |
| 71 | Bearing Cartridge | Steel (Optional Stainless Steel) | | | | | | | | |
| *SS | Shim Set | 300 Stainless Steel | | | | | | | | |
| - | Fasteners - Above plate | Steel (Optional Stainless Steel) | | | | | | | | |
| - | Coupling w/ Steel Key | Woods Flexible Non-Spacer (Optional: Falk, Rexnord, Thomas, & Metastream) | | | | | | | | |

* - Indicates a Recommended Spare Part. See Bill of materials for applicable parts.
** - For 8000 Series pump, the casing is not available in ductile iron. The pump will be supplied with a 316SS casing.

Materials listed above reflect the standard for each item. Optional materials are available and commonly specified by our customers.

# FASTENER TIGHTENING TORQUE TABLE
# NON-LUBE VALUES

| Fastener Size | Torque (Lb-Ft) |
|---|---|
| 5/16-18 | 11 |
| 3/8-10 | 20 |
| 7/16-14 | 30 |
| 1/2-13 | 50 |
| 9/16-12 | 65 |
| 5/8-11 | 90 |
| 3/4-10 | 160 |
| 7/8-9 | 140 |
| 1-8 | 220 |
| 1 1/8-7 | 300 |
| 1 1/4-7 | 420 |
| 1 3/8-6 | 560 |
| 1 1/2-6 | 740 |

# LUBRICATION REQUIREMENTS

## 8.6 Lubrication Requirements

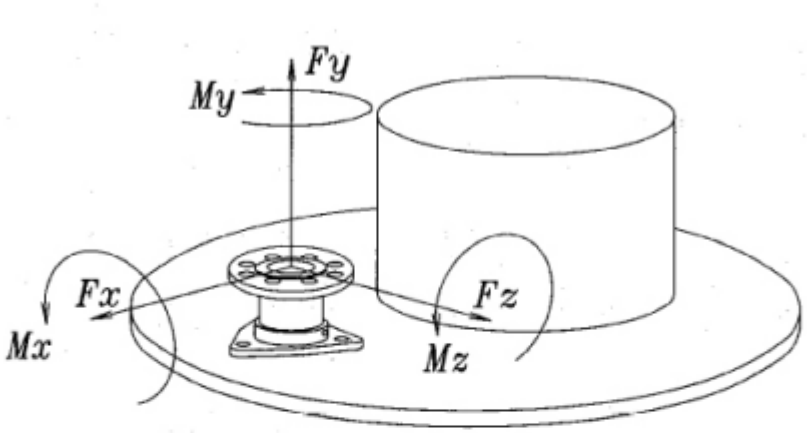
Rotating equipment requires proper and regular lubrication to attain expected service life and required levels of reliability. An understanding of all the points of lubrication will aid the operation and maintenance personnel in appropriate care of the equipment. Refer to the lubrication chart.

Mixing of lubricants of different types (bases) or from different manufacturer's is not recommended. The best practice is to select a grease and continue use as long as satisfactory service is obtained. If it is necessary to switch grease manufacturer or type of grease, purge all old grease form the bearing cavity until fresh grease is noted at the relief port. At the earliest available maintenance period the bearing and bearing cavity should be cleaned of residual greases and repacked with fresh grease. Refer to Section 5 "Inspection/Replacement of Worn Parts" for information regarding condition of used bearings.

Automatic lubricators from bearing supply distributors are labor saving and insure continuous lubrication at fixed rates. Battery operated gas-pressurized lubricators are intrinsically safe in an explosive atmosphere and allows various settings of different lubrication rates. These are available with any grease.

| Lube Point | Qty ($in^3$) | Recommended Lubricants |
|---|---|---|
| Standard Thrust Bearing<br>1.25" Shaft<br>1.63" Shaft<br>2.00" Shaft | Quarterly<br>1.0<br>1.5<br>2.0 | • Carleton Stuart-Magnalube G (TFE)<br>• Accro-Seal Accrolube (TFE)<br>• Dow Chemical - Krytox GPL (Inert)<br>• Mobil - Mobilith SCH 100 (#2)<br>• Shell - Alvania EP #2<br>• Amoco - Amolith #2 or Ricon #2 (Polyurea)<br>• Pennzoil - TTMEP Grease 302<br>Exxon - Polyrex (Polyurea) #1.5 Grease |
| Duplex Thrust Bearing<br>All shaft sizes | 5.5 Capty.<br>2.0<br>Quarterly. | |
| **Stuffing Box (Ref. Stuffing Box Configuration Drawing page 38)** | | |
| • Fig 1 - All taps plugged | N/A | • Dry lubricated by Grafoil packing. No additional required. |
| • Fig 2 - Taps #1 & #8 have grease fittings | 0.5-0.75 weekly | • Grease lubricated - use grease chemically compatible with pumped fluid. |
| • Fig 3 - Mechanical Seal | Seal Mft. Req'mt | • Lube seal with flush liquid that is compatible with pumped fluid. |
| • Fig 4 - All taps plugged | N/A | • Dry lubricated by Grafoil packing. |
| • Fig 6 - All taps plugged | N/A | • Dry lubricated by Grafoil & graphite packing. |
| **Intermediate & Head Bearing** | | |
| • Product Lube - Standard or Flooded | Cont. | • Lubricated by pumped fluid during operation |
| • External Lube | Cont. | • See Certified Dimensional Drawing |

## DISCHARGE PIPE LOADS CONSTRUCTION




| PUMP | $F_X$ lbs. | $F_Y$ lbs. | $F_Z$ lbs. | $M_X$ ft.-lbs. | $M_Y$ ft.-lbs. | $M_Z$ ft.-lbs. |
|---|---|---|---|---|---|---|
| 1001, 1005, 1008 | 50 | 80 | 65 | 130 | 170 | 85 |
| 1002, 1009, 1020, 1050, 8020, 8050 | 75 | 120 | 97 | 195 | 255 | 117 |
| 1010, 1030, 1060, 8010, 8030, 8060 | 100 | 160 | 130 | 260 | 340 | 170 |
| 1040, 1070, 8040, 8070 | 150 | 240 | 200 | 530 | 700 | 350 |
| 1080, 8080 | 200 | 320 | 260 | 740 | 980 | 500 |
| 1090, 8090 | 350 | 560 | 460 | 1300 | 1700 | 870 |
| 1120, 8120 | 530 | 850 | 700 | 1900 | 2600 | 1300 |

## 8.8 Vibration & Predictive Maintenance

Vibration monitoring should be part of a structured predictive failure analysis program. Early detection of pump problems is desirable, when damage is minor, so equipment is analyzed on line for diagnosis. Mechanical problems are determined before catastrophic failure; therefore, maintenance can be scheduled at a time that is convenient. The result of a good predictive maintenance program is reduced downtime, reduced maintenance cost, prevention of secondary damage and improved plant safety.

A predictive maintenance program is specifically tailored to the user's needs; as a result, programs and monitoring equipment vary from user to user. Therefore, we can only offer simple guidelines for vibration monitoring. Ultimately, the success of the program relies on the expertise of the user.

### 8.8.1 Monitoring Schedules

Pumps should be monitored in accordance with a prescribed schedule where vibration levels are recorded on an equipment data sheet to establish a history of the unit's condition. A trend of increasing vibration level is a sign of developing mechanical problems. These increases are compared to a baseline reading and maintenance is schedule at a predetermined vibration increase. A graph showing vibration trend vs monitoring date is a very useful analysis tool.

The baseline vibration level is the vibration of the unit while it is operating in good condition, without cavitation, with good coupling alignment, without undo pipe strains, and with straight suction piping to the casing for uniform flow. If previous vibration history is unavailable, a baseline reading can be determined from a similar unit in operation in good condition, or the factory can be consulted for a baseline value taken when the pump was tested before shipment.

Monitoring schedules are predetermined by the program administrator and will vary by application and useful failure detection period. This period is based on the time between confirmation of a machine problem and catastrophic failure.

Pumps that are in a very critical or hazardous service should be considered for a continuous monitoring system that will shut down or alarm at the predetermined vibration level increase.

### 8.8.2 Scheduled Maintenance

Maintenance should be scheduled at a predetermined vibration level increase above the baseline value. This level is determined by the user and will vary depending on the application.

As a general rule, maintenance should be scheduled when:

- Vibration exceed twice the baseline value.
- Vibration level exceeds 0.20 in/sec.

### 8.8.3 Measuring Procedure

1. Connect the pickup (accelerometer). The pickup should be placed on a rigid part of the pump where it can be securely held, typically in a horizontal/radial position on the bearing housing. The pickup must be connected at the same location each time the pump is monitored. This location should be illustrated on the data sheet an/or physically marked on the pump.
2. Check the operation conditions. The pump vibration will vary at different points along the pump performance curve, so the pump head and capacity should be at the design or baseline condition each time the unit is monitored.
3. Take a reading. Turn the vibration analyzer to the velocity (in/sec) setting and set to an appropriate scale (the lowest setting that will read full amplitude). Make a spectrum plot and mark the maximum velocity on the pump data sheet.
4. Check results. Compare vibration reading to the baseline reading and previous readings. It is useful to have a trend chart

that shows changes in vibration level with respect t monitoring dates.