OM—01919—03
July 22, 2019

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WITH PARTS LIST

GORMAN-RUPP PUMPS

60 SERIES PUMP

MODEL

612L20B—B

GORMAN-RUPP PUMPS

www.grpumps.com

Printed in U.S.A.

Register your new
Gorman-Rupp pump online at
www.grpumps.com/register.

Valid serial number and e-mail address required.

RECORD YOUR PUMP MODEL AND SERIAL NUMBER

Please record your pump model and serial number in the spaces provided below. Your Gorman-Rupp distributor needs this information when you require parts or service.

Pump Model: _____

Serial Number: _____

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INTRODUCTION

Thank You for purchasing a Gorman-Rupp pump. **Read this manual** carefully to learn how to safely install and operate your pump. Failure to do so could result in personal injury or damage to the pump.

This pump is a 60 Series, enclosed impeller, centrifugal model with straight-in suction, without a suction check valve. The pump is designed for handling wastewater, mud or slurries containing specified entrained solids. The basic material of construction for wetted parts is gray iron, with ductile impeller, brass wear rings and a stainless steel impeller shaft.

This manual will alert personnel to known procedures which require special attention, to those which could damage equipment, and to those which could be dangerous to personnel. However, this manual cannot possibly anticipate and provide detailed precautions for every situation that might occur during maintenance of the unit. Therefore, it is the responsibility of the owner/maintenance personnel to ensure that **only** safe, established maintenance procedures are used, and that any procedures not addressed in this manual are performed **only** after establishing that neither personal safety nor pump integrity are compromised by such practices.

For information or technical assistance on the power source, contact the power source manufacturer's local dealer or representative.

If there are any questions regarding the pump or its application which are not covered in this manual or in other literature accompanying this unit, please contact your Gorman-Rupp distributor, or The Gorman-Rupp Company:

The Gorman-Rupp Company
P.O. Box 1217
Mansfield, Ohio 44901—1217
Phone: (419) 755—1011
or:
Gorman-Rupp of Canada Limited
70 Burwell Road
St. Thomas, Ontario N5P 3R7
Phone: (519) 631—2870

The following are used to alert maintenance personnel to procedures which require special attention, to those which could damage equipment, and to those which could be dangerous to personnel:

DANGER!

Immediate hazards which WILL result in severe personal injury or death. These instructions describe the procedure required and the injury which will result from failure to follow the procedure.

WARNING!

Hazards or unsafe practices which COULD result in severe personal injury or death. These instructions describe the procedure required and the injury which could result from failure to follow the procedure.

CAUTION

Hazards or unsafe practices which COULD result in minor personal injury or product or property damage. These instructions describe the requirements and the possible damage which could result from failure to follow the procedure.

NOTE

Instructions to aid in installation, operation, and maintenance or which clarify a procedure.

SAFETY - SECTION A

This information applies to 60 Series basic pumps. Gorman-Rupp has no control over or particular knowledge of the power source which will be used. Refer to the manual accompanying the power source before attempting to begin operation.

Because pump installations are seldom identical, this manual cannot possibly provide detailed instructions and precautions for each specific application. Therefore, it is the owner/installer's responsibility to ensure that applications not addressed in this manual are performed only after establishing that neither operator safety nor pump integrity are compromised by the installation.

WARNING!

Before attempting to open or service the pump:

1. **Familiarize yourself with this manual.**
2. **Disconnect or lock out the power source to ensure that the pump will remain inoperative.**
3. **Allow the pump to completely cool if overheated.**
4. **Check the temperature before opening any covers, plates, or plugs.**
5. **Close the suction and discharge valves.**
6. **Vent the pump slowly and cautiously.**
7. **Drain the pump.**

WARNING!

This pump is designed to handle wastewater, mud or slurries containing specified entrained solids. Do not attempt to pump volatile, corrosive or flammable liquids which may damage the pump or endanger personnel as a result of pump failure.

WARNING!

Death or serious personal injury and damage to the pump or components can occur if proper lifting procedures are not observed. Make certain that hoists, chains, slings or cables are in good working condition and of sufficient capacity and that they are positioned so that loads will be balanced and the pump or components will not be damaged when lifting. Suction and discharge hoses and piping must be removed from the pump before lifting. Lift the pump or component only as high as necessary and keep personnel away from suspended objects.

WARNING!

After the pump has been positioned, make certain that the pump and all piping or hose connections are tight, properly supported and secure before operation.

WARNING!

Do not operate the pump against a closed discharge valve for long periods of time. If operated against a closed discharge valve, pump components will deteriorate, and the liquid could come to a boil, build pressure, and cause the pump casing to rupture or explode.

WARNING!

Do not remove plates, covers, gauges, pipe plugs, or fittings from an over-

heated pump. Vapor pressure within the pump can cause parts being disengaged to be ejected with great force. Allow the pump to cool before servicing.

Do not operate the pump without shields and/or guards in place over the drive shafts, belts, and/or couplings, or other rotating parts. Exposed rotating parts can catch clothing, fingers, or tools, causing severe injury to personnel.

Pumps and related equipment must be installed and operated according to all national, local and industry standards.

INSTALLATION – SECTION B

Review all SAFETY information in Section A.

Since pump installations are seldom identical, this section offers only general recommendations and practices required to inspect, position, and arrange the pump and piping.

Most of the information pertains to a standard **static lift** application where the pump is positioned above the free level of liquid to be pumped.

If installed in a **flooded suction application** where the liquid is supplied to the pump under pressure, some of the information such as mounting, line configuration, and priming must be tailored to the specific application. Since the pressure supplied to the pump is critical to performance and safety, **be sure** to limit the incoming pressure to 50% of the maximum permissible operating pressure as shown on the pump performance curve (see Section E, Page 1).

For further assistance, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

Pump Dimensions

See Figure B–1 for the approximate physical dimensions of this pump.

OUTLINE DRAWING

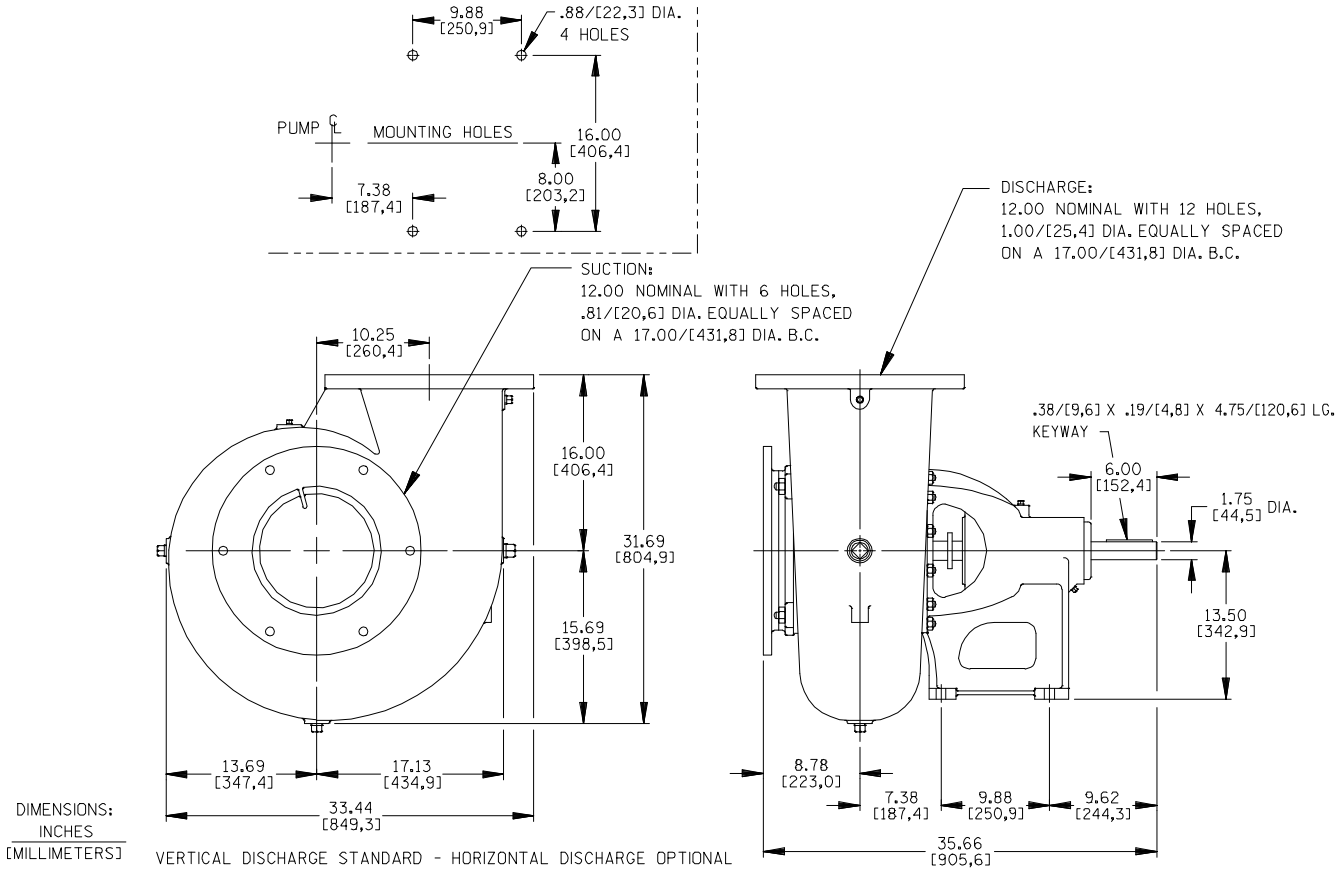


Figure B–1. Pump Model 612L20B–B

PREINSTALLATION INSPECTION

The pump assembly was inspected and tested before shipment from the factory. Before installation, inspect the pump for damage which may have occurred during shipment. Check as follows:

a. Inspect the pump for cracks, dents, damaged threads, and other obvious damage.

b. Check for and tighten loose attaching hardware. Since gaskets tend to shrink after dry-

ing, check for loose hardware at mating surfaces.

c. Carefully read all tags, decals, and markings on the pump assembly, and perform all duties indicated. Note that the pump shaft rotates in the required direction.

CAUTION

Only operate this pump in the direction indicated by the arrow on the pump body and on the accompanying decal. Otherwise, the impeller could become loosened from the shaft and seriously damage the pump.

d. Check levels and lubricate as necessary. Refer to **LUBRICATION** in the **MAINTENANCE AND REPAIR** section of this manual and perform duties as instructed.

e. If the pump has been stored for more than 12 months, some of the components or lubricants may have exceeded their maximum shelf life. These **must be inspected or replaced** to ensure maximum pump service.

If the maximum shelf life has been exceeded, or if anything appears to be abnormal, contact your Gorman-Rupp distributor or the factory to determine the repair or updating policy. **Do not** put the pump into service until appropriate action has been taken.

POSITIONING PUMP

Lifting

WARNING!

Death or serious personal injury and damage to the pump or components can occur if proper lifting procedures are not observed. Make certain that hoists, chains, slings or cables are in good working condition and of sufficient capacity and that they are positioned so that loads will be balanced and the pump or components will not be damaged when lifting. Suction and discharge hoses and piping must be removed from the pump before lifting. Lift the pump or component only as high as necessary and keep personnel away from suspended objects.

Pump unit weights will vary depending on the mounting and drive provided. Check the shipping tag on the unit packaging for the actual weight, and use lifting equipment with appropriate capacity. Drain the pump and remove all customer-installed equipment such as suction and discharge hoses or piping before attempting to lift existing, installed units.

Mounting

Locate the pump in an accessible place as close as practical to the liquid being pumped. Level mounting is essential for proper operation.

The pump may have to be supported or shimmed to provide for level operation or to eliminate vibration.

SUCTION AND DISCHARGE PIPING

Pump performance is adversely effected by increased suction lift, discharge elevation, and friction losses. See the performance curve on Page E-1 to be sure your overall application allows pump to operate within the safe operation range.

Materials

Either pipe or hose maybe used for suction and discharge lines; however, the materials must be compatible with the liquid being pumped. If hose is used in suction lines, it must be the rigid-wall, reinforced type to prevent collapse under suction. Using piping couplings in suction lines is not recommended.

Line Configuration

Keep suction and discharge lines as straight as possible to minimize friction losses. Make minimum use of elbows and fittings, which substantially increase friction loss. If elbows are necessary, use the long-radius type to minimize friction loss.

Connections to Pump

Before tightening a connecting flange, align it exactly with the pump port. Never pull a pipe line into place by tightening the flange bolts and/or couplings.

Lines near the pump must be independently supported to avoid strain on the pump which could cause excessive vibration, decreased bearing life, and increased shaft and seal wear. If hose-type lines are used, they should have adequate support to secure them when filled with liquid and under pressure.

Gauges

Most pumps are drilled and tapped for installing discharge pressure and vacuum suction gauges. If these gauges are desired for pumps that are not tapped, drill and tap the suction and discharge lines not less than 18 inches (457,2 mm) from the suction and discharge ports and install the lines. Installation closer to the pump may result in erratic readings.

SUCTION LINES

To avoid air pockets which could affect pump priming, the suction line must be as short and direct as possible. When operation involves a suction lift, the line must always slope upward to the pump from the source of the liquid being pumped; if the line slopes down to the pump at any point along the suction run, air pockets will be created.

The **maximum** vertical suction lift for this pump is 15 feet. It is not designed to be operated at a higher lift.

Fittings

Suction lines should be the same size as the pump inlet. If reducers are used in suction lines, they should be the eccentric type, and should be installed with the flat part of the reducers uppermost to avoid creating air pockets. Valves are not normally used in suction lines, but if a valve is used, install it with the stem horizontal to avoid air pockets.

Strainers

If a strainer is furnished with the pump, be certain to use it; any spherical solids which pass through a strainer furnished with the pump will also pass through the pump itself.

If a strainer is not furnished with the pump, but is installed by the pump user, make certain that the total area of the openings in the strainer is at least three or four times the cross section of the suction line, and that the openings will not permit passage of solids larger than the solids handling capability of the pump.

This pump is designed to handle up to 1—7/8 inch (47,6 mm) diameter spherical solids.

Sealing

Since even a slight leak will affect priming, head, and capacity, especially when operating with a high suction lift, all connections in the suction line should be sealed with pipe dope to ensure an air-tight seal. Follow the sealant manufacturer's recommendations when selecting and applying the pipe dope. The pipe dope should be compatible with the liquid being pumped.

Suction Lines In Sumps

If a single suction line is installed in a sump, it should be positioned away from the wall of the sump at a distance equal to 1—1/2 times the diameter of the suction line.

If there is a liquid flow from an open pipe into the sump, the flow should be kept away from the suction inlet because the inflow will carry air down into the sump, and air entering the suction line will reduce pump efficiency.

If it is necessary to position inflow close to the suction inlet, install a baffle between the inflow and the suction inlet at a distance 1—1/2 times the diameter of the suction pipe. The baffle will allow entrained air to escape from the liquid before it is drawn into the suction inlet.

If two suction lines are installed in a single sump, the flow paths may interact, reducing the efficiency of one or both pumps. To avoid this, position the suction inlets so that they are separated by a dis-

tance equal to at least 3 times the diameter of the suction pipe.

Suction Line Positioning

The depth of submergence of the suction line is critical to efficient pump operation. Figure B—2 shows recommended minimum submergence vs. velocity.

NOTE

The pipe submergence required may be reduced by installing a standard pipe increaser fitting at the end of the suction line. The larger opening size will reduce the inlet velocity. Calculate the required submergence using the following formula based on the increased opening size (area or diameter).

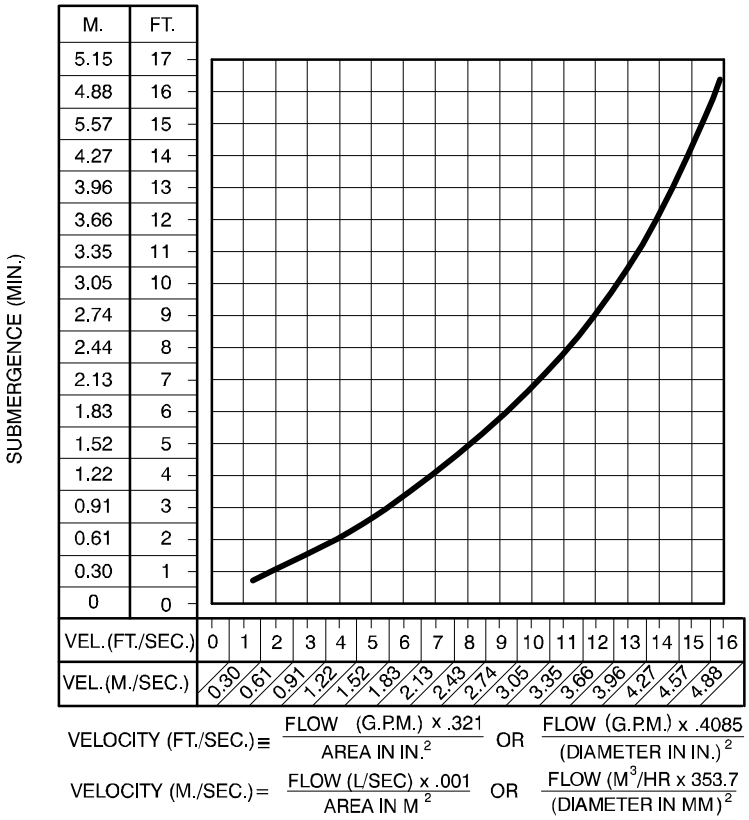


Figure B—2. Recommended Minimum Suction Line Submergence vs. Velocity

DISCHARGE LINES

Siphoning

Do not terminate the discharge line at a level lower than that of the liquid being pumped unless a siphon breaker is used in the line. Otherwise, a siphoning action causing damage to the pump could result.

Valves

If a throttling valve is desired in the discharge line, use a valve as large as the largest pipe to minimize friction losses. Never install a throttling valve in a suction line.

A check valve in the discharge line is normally recommended, but it is not necessary in low discharge head applications.

With high discharge heads, it is recommended that a throttling valve and a system check valve be installed in the discharge line to protect the pump from excessive shock pressure and reverse rotation when it is stopped.

CAUTION

If the application involves a high discharge head, gradually close the discharge throttling valve before stopping the pump.

ALIGNMENT

The alignment of the pump and its power source is critical for trouble-free mechanical operation. In either a flexible coupling or V-belt driven system, the driver and pump must be mounted so that their shafts are aligned with and parallel to each other. It is imperative that alignment be checked after the pump and piping are installed, and before operation.

NOTE

*Check **Rotation**, Section C, before final alignment of the pump.*

When mounted at the Gorman-Rupp factory, driver and pump are aligned before shipment. Misalignment will occur in transit and handling. Pumps **must** be checked and realigned before operation. Before checking alignment, tighten the foundation bolts. The pump casing feet and/or pedestal feet, and the driver mounting bolts should also be tightly secured.

WARNING!

When checking alignment, disconnect the power source to ensure that the pump will remain inoperative.

CAUTION

Adjusting the alignment in one direction may alter the alignment in another direction. Check each procedure after altering alignment.

Coupled Drives

When using couplings, the axis of the power source must be aligned to the axis of the pump shaft in both the horizontal and vertical planes. Most couplings require a specific gap or clearance between the driving and the driven shafts. Refer to the coupling manufacturer's service literature.

Align spider insert type couplings by using calipers to measure the dimensions on the circumference of the outer ends of the coupling hub every 90°. The coupling is in alignment when the hub ends are the same distance apart at all points (see Figure B—3).

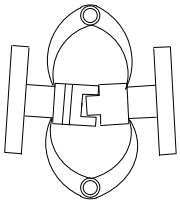


Figure B—3. Aligning Spider-Type Couplings

Align non-spider type couplings by using a feeler gauge or taper gauge between the coupling halves every 90°. The coupling is in alignment when the hubs are the same distance apart at all points (see Figure B—4).

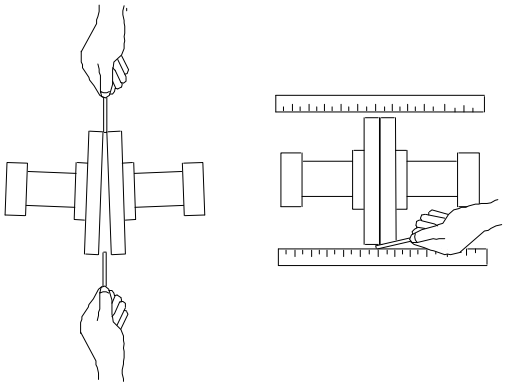


Figure B—4. Aligning Non-Spider-Type Couplings

Check parallel adjustment by laying a straightedge across both coupling rims at the top, bottom, and side. When the straightedge rests evenly on both halves of the coupling, the coupling is in horizontal parallel alignment. If the coupling is misaligned, use a feeler gauge between the coupling and the straightedge to measure the amount of misalignment.

Belt Drives

When using belt drives, the power source and the pump must be parallel. Use a straightedge along the sides of the pulleys to ensure that the pulleys

are properly aligned (see Figure B—5). In drive systems using two or more belts, make certain that the belts are a matched set; unmatched sets will cause accelerated belt wear.

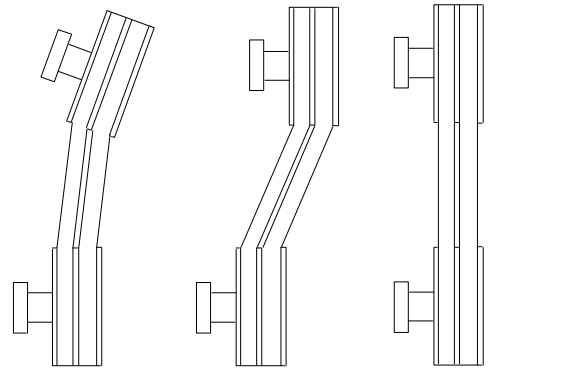


Figure B—5. Alignment of V-Belt Driven Pumps

Tighten the belts in accordance with the belt manufacturer's instructions. If the belts are too loose, they will slip; if the belts are too tight, there will be excessive power loss and possible bearing failure. Select pulleys that will match the proper speed ratio; overspeeding the pump may damage both pump and power source.

WARNING!

Do not operate the pump without the guard in place over the rotating parts. Exposed rotating parts can catch clothing, fingers, or tools, causing severe injury to personnel.

V-Belt Jack Shaft Drives

If the pump is to be driven at speeds exceeding 1050 rpm, the V-belts must operate through a jack shaft arrangement to protect the shaft bearings from excessive stress. Failure to use a jack shaft on high speed applications will result in premature shaft bearing failure.

OPERATION — SECTION C

Review all SAFETY information in Section A.

Follow the instructions on all tags, labels and decals attached to the pump.

WARNING!

This pump is designed to handle wastewater, mud or slurries containing specified entrained solids. Do not attempt to pump volatile, corrosive or flammable liquids which may damage the pump or endanger personnel as a result of pump failure.

CAUTION

Pump speed and operating condition points must be within the continuous performance range shown on the curve (see Section E, Page 1).

PRIMING

Install the pump and piping as described in **INSTALLATION**. Make sure that the piping connections are tight, and that the pump is securely mounted. Check that the pump is properly lubricated (see **LUBRICATION** in **MAINTENANCE AND REPAIR**).

This pump should never be operated unless there is liquid in the pump casing.

CAUTION

Never operate this pump unless there is liquid in the pump casing. The pump will not prime when dry. extended operation of a dry pump will destroy the seal assembly.

Add liquid to the pump casing when:

1. The pump is being put into service for the first time.
2. The pump has not been used for a considerable length of time.
3. The liquid in the pump casing has evaporated.

Once the pump casing has been filled, the pump will prime and reprime as necessary.

WARNING!

After filling the pump casing, reinstall and tighten the fill plug. Do not attempt to operate the pump unless all connecting piping is securely installed. Otherwise, liquid in the pump forced out under pressure could cause injury to personnel.

Hand-Operated Priming Pump

The hand-operated priming pump (see Figure 1) is designed to draw air out of the suction line and the pump casing.

The hand-operated priming pump can be used while the pump is either stopped or operating.

Close the discharge line check valve (if so equipped) before engaging the priming device.

To prime the pump, open the cock in the bottom of the priming pump. Operate the handle of the pump until all of the air is expelled from the line and a small amount of liquid flows from the drain cock.

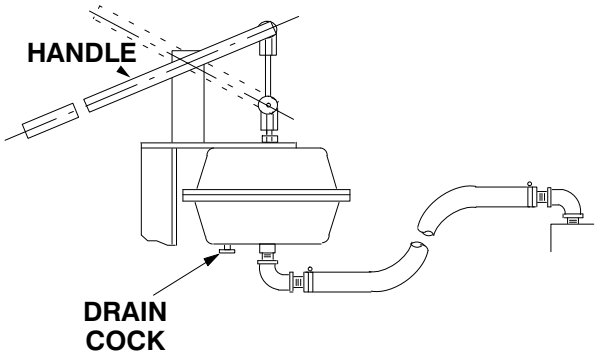


Figure C—1. Hand Primer Assembly

Once the pump is fully primed, close the cock, open the discharge line throttling valve and start the pump.

STARTING

Consult the operations manual furnished with the power source.

Starting procedures will vary slightly depending on the pump application, type of priming device, and type of drive.

Rotation

The correct direction of pump rotation is counterclockwise when facing the impeller. If the pump is operated in the wrong direction, the impeller could become loosened from the shaft and seriously damage the pump.

CAUTION

The pump must operate in the direction indicated by the arrow on the pump, or accompanying decals.

Consult the operating manual furnished with the pump power source before attempting to start the power source.

If an electric motor is used to drive the pump, remove V-belts, couplings, or otherwise disconnect the pump from the motor before checking motor rotation. Operate the motor independently while observing the direction of the motor shaft, or cooling fan.

If rotation is incorrect on a three-phase motor, have a qualified electrician interchange any two of the three phase wires to change direction. If rotation is incorrect on a single-phase motor, consult the literature supplied with the motor for specific instructions.

OPERATION

Leakage

No leakage should be visible at pump mating surfaces, or at pump connections or fittings. Keep all line connections and fittings tight to maintain maximum pump efficiency.

Liquid Temperature And Overheating

The **maximum** liquid temperature for this pump is 160° F (71°C). Do not apply it at a higher operating temperature.

Overheating can occur if operated with the valves in the suction or discharge lines closed. Operating against closed valves could bring the liquid to a boil, build pressure, and cause the pump to rupture or explode. If overheating occurs, stop the pump and allow it to cool before servicing it. Refill the pump casing with cool liquid.

DANGER!

Allow an over-heated pump to cool before servicing. Do not remove plates, covers, gauges, or fittings from an overheated pump. Liquid within the pump can reach boiling temperatures, and vapor pressure within the pump can cause parts being disengaged to be ejected with great force. After the pump cools, drain the liquid from the pump by removing the casing drain plug. Use caution when removing the plug to prevent injury to personnel from hot liquid.

Strainer Check

If a suction strainer has been shipped with the pump or installed by the user, check the strainer regularly, and clean it as necessary. The strainer should also be checked if pump flow rate begins to drop. If a vacuum suction gauge has been installed, monitor and record the readings regularly to detect strainer blockage.

Never introduce air or steam pressure into the pump casing or piping to remove a blockage. This could result in personal injury or damage to the equipment. If backflushing is absolutely necessary, **liquid pressure** must be limited to 50% of the maximum permissible operating pressure shown on the pump performance curve (see Section E, Page 1).

Pump Vacuum Check

Since this pump does not have a suction check valve, the discharge line must be fitted with a check valve if a pump vacuum reading is to be taken.

With the pump inoperative, install a vacuum gauge in the system, using pipe dope on the threads. Block the suction line and start the pump. At operating speed the pump should pull a vacuum of 20 inches (508 mm) or more of mercury. If it does not, check for air leaks in the seal, gasket, or discharge valve.

Open the suction line, and read the vacuum gauge with the pump primed and at operating speed. Shut off the pump. The vacuum gauge reading will immediately drop proportionate to static suction lift, and should then stabilize. If the vacuum reading falls off rapidly after stabilization, an air leak exists. Before checking for the source of the leak, check the point of installation of the vacuum gauge.

STOPPING

Never halt the flow of liquid suddenly. If the liquid being pumped is stopped abruptly, damaging shock waves can be transmitted to the pump and piping system. Close all connecting valves slowly.

CAUTION

If the application involves a high discharge head, gradually close the discharge throttling valve before stopping the pump.

After stopping the pump, disconnect the power source or lock it out to ensure that the pump will remain inoperative.

Cold Weather Preservation

In below freezing conditions, drain the pump to prevent damage from freezing. Also, clean out any solids by flushing with a hose. Operate the pump for approximately one minute; this will remove any remaining liquid that could freeze the pump rotating parts. If the pump will be idle for more than a few hours, or if it has been pumping liquids containing a large amount of solids, drain the pump, and flush it thoroughly with clean water. To prevent large solids from clogging the drain port and preventing the pump from completely draining, insert a rod or stiff wire in the drain port, and agitate the liquid during the draining process. Clean out any remaining solids by flushing with a hose.

BEARING TEMPERATURE CHECK

Bearings normally run at higher than ambient temperatures because of heat generated by friction. Temperatures up to 160°F (71°C) are considered normal for bearings, and they can operate safely to at least 180°F (82°C).

Checking bearing temperatures by hand is inaccurate. Bearing temperatures can be measured accurately by placing a contact-type thermometer against the housing. Record this temperature for future reference.

A sudden increase in bearing temperatures is a warning that the bearings are at the point of failing to operate properly. Make certain that the bearing lubricant is of the proper viscosity and at the correct level (see **LUBRICATION** in Section E). Bearing overheating can also be caused by shaft misalignment and/or excessive vibration.

When pumps are first started, the bearings may seem to run at temperatures above normal. Continued operation should bring the temperatures down to normal levels.

TROUBLESHOOTING — SECTION D

Review all SAFETY information in Section A.

WARNING!

Before attempting to open or service the pump:

1. **Familiarize yourself with this manual.**
2. **Lock out or disconnect the power source to ensure that the pump will remain inoperative.**
3. **Allow the pump to completely cool if overheated.**
4. **Check the temperature before opening any covers, plates, or plugs.**
5. **Close the suction and discharge valves.**
6. **Vent the pump slowly and cautiously.**
7. **Drain the pump.**

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Auxiliary priming device faulty or improperly installed.	Check for and replace defective unit.
	Suction lift or discharge head too high.	Check piping installation and install bypass line if needed. See **INSTALLATION**.
	Strainer clogged.	Check strainer and clean if necessary.
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Suction intake not submerged at proper level or sump too small.	Check installation and correct submergence as needed.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE (cont.)	Impeller or other wearing parts worn or damaged.	Replace worn or damaged parts. Check that impeller is properly centered and rotates freely.
	Strainer clogged.	Check strainer and clean if necessary.
	Impeller clogged.	Free impeller of debris.
	Discharge head too high.	Install bypass line.
	Suction lift too high.	Measure lift w/vacuum gauge. Reduce lift and/or friction losses in suction line.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Pump speed too slow.	Check driver output; check belts or couplings for slippage.
PUMP REQUIRES TOO MUCH POWER	Pump speed too high.	Check driver output; check that sheaves or couplings are correctly sized.
	Discharge head too low.	Adjust discharge valve.
	Liquid solution too thick.	Dilute if possible.
PUMP CLOGS FREQUENTLY	Discharge flow too slow.	Open discharge valve fully to increase flow rate, and run engine at maximum governed speed.
	Suction check valve or foot valve clogged or binding.	Clean valve.
EXCESSIVE NOISE	Cavitation in pump.	Reduce suction lift and/or friction losses in suction line. Record vacuum and pressure gauge readings and consult local representative or factory.
	Pumping entrained air.	Locate and eliminate source of air bubble.
	Pump or drive not securely mounted.	Secure mounting hardware.
	Impeller clogged or damaged.	Clean out debris; replace damaged parts.
BEARINGS RUN TOO HOT	Bearing temperature is high, but within limits.	Check bearing temperature regularly to monitor any increase.
	Low or incorrect lubricant.	Check for proper type and level of lubricant.
	Suction and discharge lines not properly supported.	Check piping installation for proper support.
	Drive misaligned.	Align drive properly.

PREVENTIVE MAINTENANCE

Since pump applications are seldom identical, and pump wear is directly affected by such things as the abrasive qualities, pressure and temperature of the liquid being pumped, this section is intended only to provide general recommendations and practices for preventive maintenance. Regardless of the application however, following a routine preventive maintenance schedule will help assure trouble-free performance and long life from your Gorman-Rupp pump. For specific questions concerning your application, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

Record keeping is an essential component of a good preventive maintenance program. Changes in suction and discharge gauge readings (if so equipped) between regularly scheduled inspections can indicate problems that can be corrected before system damage or catastrophic failure occurs. The appearance of wearing parts should also be documented at each inspection for comparison as well. Also, if records indicate that a certain part (such as the seal) fails at approximately the same duty cycle, the part can be checked and replaced before failure occurs, reducing unscheduled down time.

For new applications, a first inspection of wearing parts at 250 hours will give insight into the wear rate for your particular application. Subsequent inspections should be performed at the intervals shown on the chart below. Critical applications should be inspected more frequently.

Preventive Maintenance Schedule

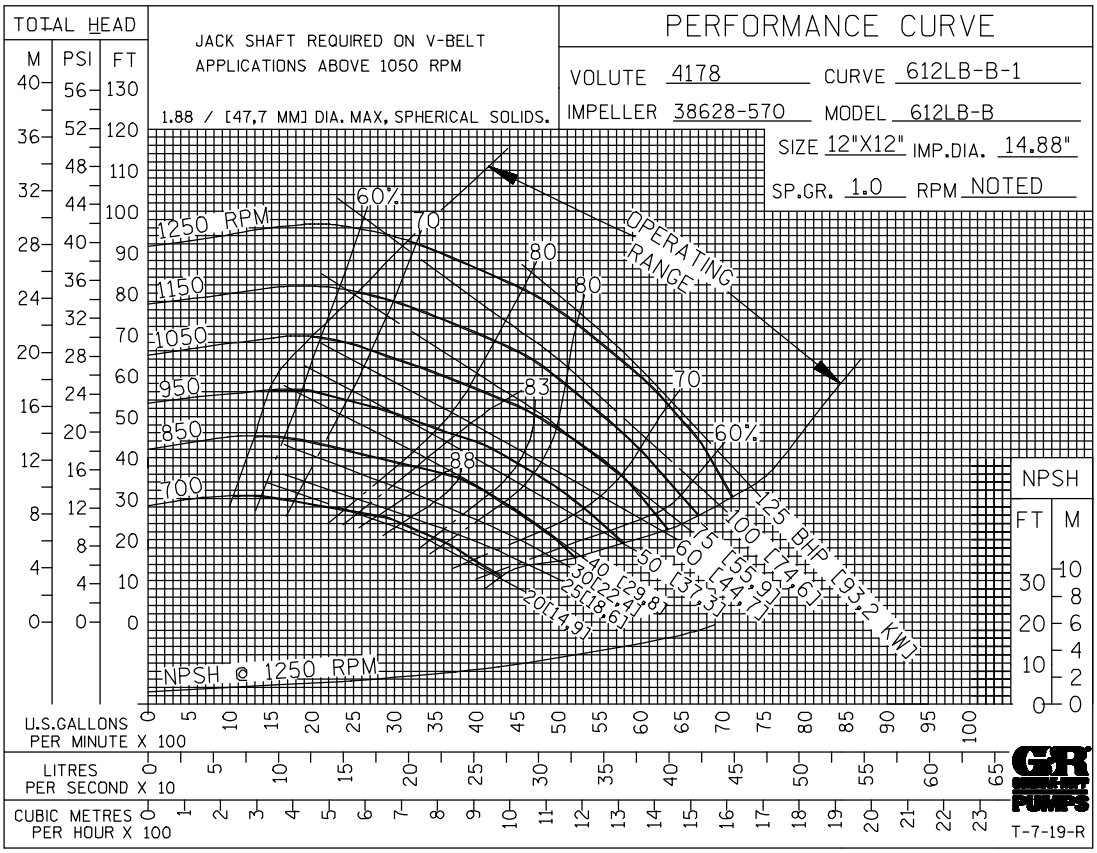
Item	Service Interval*				
	Daily	Weekly	Monthly	Semi-Annually	Annually
General Condition (Temperature, Unusual Noises or Vibrations, Cracks, Leaks, Loose Hardware, Etc.)	I				
Pump Performance (Gauges, Speed, Flow)	I				
Bearing Lubrication		I			R
Seal Lubrication (And Packing Adjustment, If So Equipped)		I			R
V-Belts (If So Equipped)			I		
Air Release Valve Plunger Rod (If So Equipped)			I	C	
Front Impeller Clearance (Wear Plate)				I	
Rear Impeller Clearance (Seal Plate)				I	
Check Valve					I
Pressure Relief Valve (If So Equipped)					C
Pump and Driver Alignment					I
Shaft Deflection					I
Bearings					I
Bearing Housing					I
Piping					I
Driver Lubrication — See Mfgr's Literature					

Legend:
I = Inspect, Clean, Adjust, Repair or Replace as Necessary
C = Clean
R = Replace

* Service interval based on an intermittent duty cycle equal to approximately 4000 hours annually. Adjust schedule as required for lower or higher duty cycles or extreme operating conditions.

PUMP MAINTENANCE AND REPAIR - SECTION E

MAINTENANCE AND REPAIR OF THE WEARING PARTS OF THE PUMP WILL MAINTAIN PEAK OPERATING PERFORMANCE.



✳ STANDARD PERFORMANCE FOR PUMP MODEL 612L20B—B

✳ Based on 70˚F (21˚C) clear water at sea level with minimum suction lift. Since pump installations are seldom identical, your performance may be different due to such factors as viscosity, specific gravity, elevation, temperature, and impeller trim.

If your pump serial number is followed by an “N”, your pump is **NOT** a standard production model. Contact the Gorman-Rupp Company to verify performance or part numbers.

CAUTION

Pump speed and operating condition points must be within the continuous performance range shown on the curve.

ILLUSTRATION

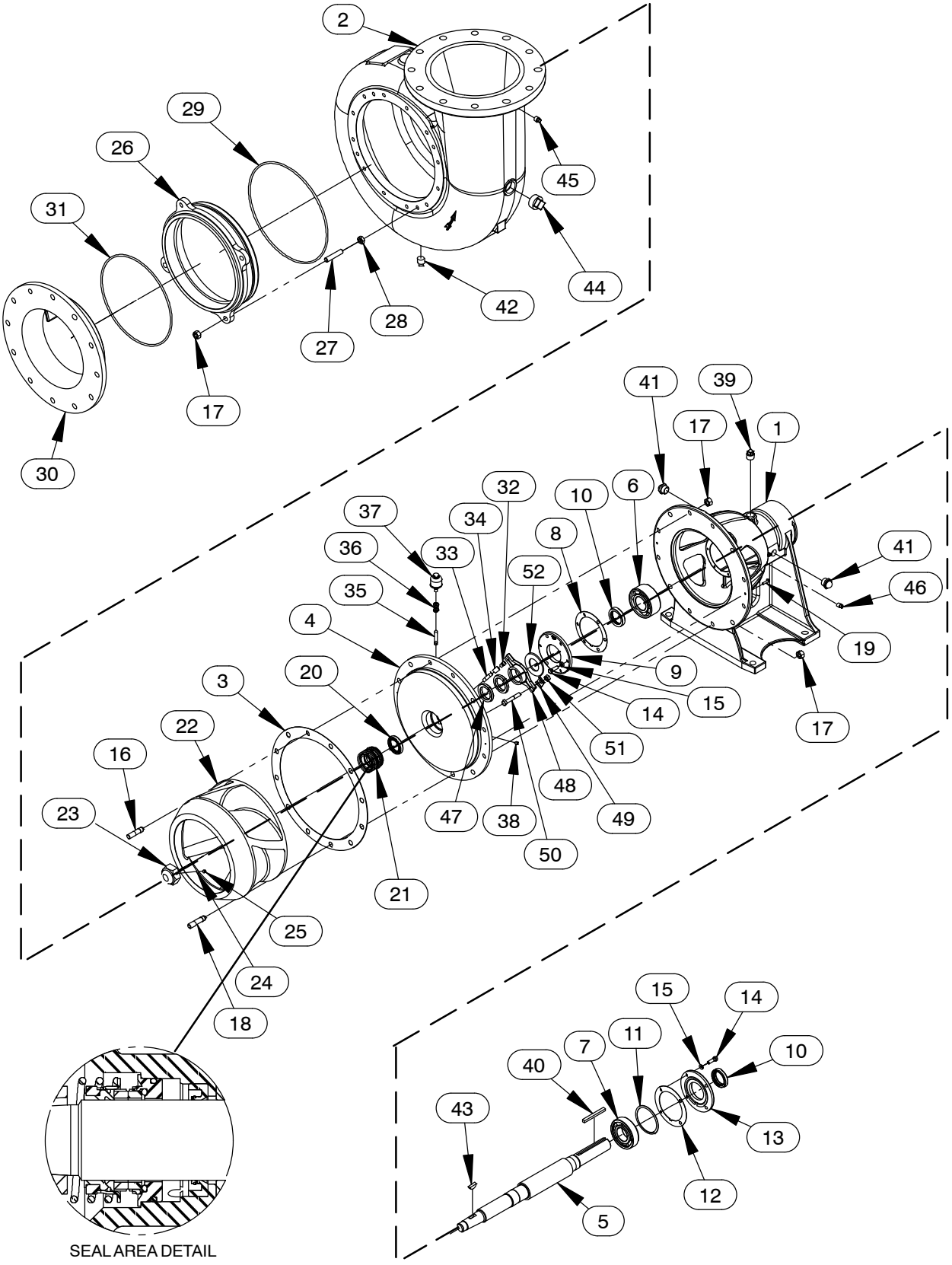


Figure 1. Pump Model 612L20B–B

PARTS LIST
Pump Model 612L20B–B
(From S/N 1707096 Up)

If your pump serial number is followed by an "N", your pump is **NOT** a standard production model. Contact the Gorman-Rupp Company to verify part numbers.

ITEM NO.		PART NAME	PART NUMBER	QTY
1		PEDESTAL	3233D 10010	1
☞2		PUMP CASING	SEE NOTE BELOW	1
3	✳	GASKET	4180G 18000	1
4		SEAL PLATE	4179F 10010	1
5		IMPELLER SHAFT	38516–202 1706H	1
6	✳	DBL ROW BALL BEARING	23421–461	1
7	✳	BALL BEARING	S1077	1
8	✳	BEARING CAP GASKET	4184G 18000	1
9		BEARING CAP	4184A 10010	1
10	✳	OIL SEAL	25227–629	2
11	✳	BEARING SHIM SET	8546 15990	3
12	✳	GASKET	5413G 18000	1
13		BEARING CAP	4185A 10010	1
14		HEX HEAD CAP SCREW	B0605 15991	10
15		LOCK WASHER	J06 15991	10
☞16		STUD	C1011 15991	10
17		HEX NUT	D10 15991	16
☞18		STUD	C1012 15991	2
19		MACHINE SCREW	X0404 15991	2
20	✳	OIL SEAL	25217–601	1
21	✳	SEAL ASSEMBLY	12590B	1
22	✳	IMPELLER	38628–570 11030	1
23	✳	SHAFT NUT	4190B 11010	1
24		INSERT	31111–003 23050	2
25		A HD SETSCREW	GA0601–1/2 17090	2
26	✳	ADJ WEAR RING	12736 11030	1
☞27		STUD	12739 15000	4
28		HEX JAM NUT	AT10 15991	4
29	✳	O-RING	S1914	1
30		SUCTION PLATE	12737 11030	1
31	✳	O-RING	S1991	1
32		AIR VENT	S2162	1
33		PIPE NIPPLE	T0206 15079	1
34		PIPE CPLG 1/8	AE02 15079	1
35		PIPE NIPPLE	T0212 15079	1
36		PIPE ELBOW	R02 11999	1
37		BOTTLE OILER	S1933	1
38		PIPE PLUG	P02 15079	1
39		VENTED PIPE PLUG	38649–009 15079	1
40	✳	KEY	N0616 15990	1
41		SIGHT GAUGE	S1471	2
☞42		PIPE PLUG	P12 15079	2
43		WOODRUFF KEY	AV1210 15990	1
☞44		PIPE PLUG	P24 10009	1
☞45		PIPE PLUG	P06 15079	1
46		PIPE PLUG	P04 15079	1
47		PACKING SET	PP0629 22110	1
48		SPLIT GLAND	5047C 10010	1
49		CLIP	4192 15991	2
50		SQUARE HEAD BOLT	A0711 15991	2
51		DEFORM LK NUT	DD07 15991	2
52	✳	SLINGER RING	5053 19120	1
NOT SHOWN:				
		NAME PLATE BLANK	38819–002 13000	1
		DRIVE SCREW	BM#04–03 17000	4
		ROTATION DECAL	2613M	1
		G–R DECAL, 6 IN	GR–06	1
		LUBE DECAL	38816–079	1
		INSTRUCTION TAG	38817–011	1
		INSTRUCTION TAG	38817–024	1
		SUCTION STICKER	6588AG	1
		DISCHARGE STICKER	6588BJ	1
		WARNING DECAL	2613FE	1

✳ INDICATES PARTS RECOMMENDED FOR STOCK

☞	INCLUDED WITH REPAIR PUMP CASING ASSY	46474–307	1

PUMP AND SEAL DISASSEMBLY AND REASSEMBLY

Review all SAFETY information in Section A.

Follow the instructions on all tags, label and decals attached to the pump.

This pump requires little service due to its rugged, minimum-maintenance design. However, if it becomes necessary to inspect or replace the wearing parts, follow these instructions which are keyed to the illustration (see Figure E—1) and the accompanying parts list.

WARNING!

This manual will alert personnel to known procedures which require special attention, to those which could damage equipment, and to those which could be dangerous to personnel. However, this manual cannot possibly anticipate and provide detailed instructions and precautions for every situation that might occur during maintenance of the unit. Therefore, it is the responsibility of the owner/maintenance personnel to ensure that only safe, established maintenance procedures are used, and that any procedures not addressed in this manual are performed only after establishing that neither personal safety nor pump integrity are compromised by such practices.

Before attempting to service the pump, disconnect or lock out the power source to ensure that the pump will remain inoperative. Close all valves in the suction and discharge lines.

For power source disassembly and repair, consult the literature supplied with the power source, or contact your local power source representative.

WARNING!

Before attempting to open or service the pump:

1. **Familiarize yourself with this manual.**
2. **Disconnect or lock out the power source to ensure that the pump will remain inoperative.**
3. **Allow the pump to completely cool if overheated.**
4. **Check the temperature before opening any covers, plates, or plugs.**
5. **Close the suction and discharge valves.**
6. **Vent the pump slowly and cautiously.**
7. **Drain the pump.**

WARNING!

Death or serious personal injury and damage to the pump or components can occur if proper lifting procedures are not observed. Make certain that hoists, chains, slings or cables are in good working condition and of sufficient capacity and that they are positioned so that loads will be balanced and the pump or components will not be damaged when lifting. Suction and discharge hoses and piping must be removed from the pump before lifting. Lift the pump or component only as high as necessary and keep personnel away from suspended objects.

CAUTION

Use **Only Genuine Gorman—Rupp** replacement parts. Failure to do so may create a hazard and damage the pump or diminish optimal pump performance. Any such hazard, damage or diminished performance is not covered by the warranty.

NOTE

When appropriate recycling facilities are available, the user should recycle components and fluids when doing any routine maintenance / repairs and also at the end of the pump's useful life. All other components and fluids shall be disposed of according to all applicable codes and regulations.

Suction Plate and Wear Ring Removal

Before attempting to service the pump, remove the pump casing drain plug (42) and drain the pump. Clean and reinstall the drain plug.

Remove the suction piping. Use a suitable pry bar to pry the suction plate (30) out of the wear ring (26). Remove the suction plate O-Ring (31).

Disengage the nuts (17) and use the jam nuts (28) to "jack" the wear ring (26) out of the pump casing.

Inspect the wear ring and O-rings (29 and 31) for excessive wear or damage and replace as required.

Pump Casing Removal

The impeller assembly (22) and seal assembly (21) may be removed through the suction port without removing the discharge piping. However, due to the weight of the impeller and the tight fit through the suction port, it is recommended that the discharge piping be removed and the pump casing (2) be separated from the pedestal to provide better access.

Support the pump casing using a suitable hoist and sling.

Remove the hardware (17) securing the pump casing to the pedestal. Pull the casing straight away from the pedestal to prevent binding on the impeller. Remove the pump casing gasket (3) and clean the mating surfaces.

Impeller Removal

Before removing the impeller, remove the bottle oiler and piping (35, 36 and 37). Remove the pipe plug (38) and drain the seal cavity. This will prevent oil from escaping when the impeller is removed. Clean and reinstall the pipe plug.

To loosen the impeller nut, the impeller shaft must first be disconnected from the power source. With the power source disengaged, install the key (40) in shaft keyway. Install a lathe dog on the drive end of the shaft with the "V" notch positioned over the shaft key.

Use a long piece of heavy bar stock and the lathe dog as shown in Figure E—2 to block shaft rotation. **Use caution** not to damage the shaft or keyway.

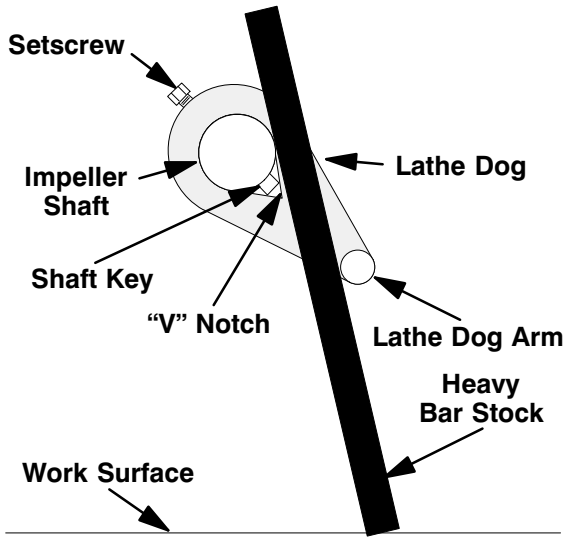


Figure E—2. Blocking Shaft Rotation

Loosen the two setscrews (25) and remove the impeller nut (23).

NOTE

If necessary, heat the impeller with a torch to aid removal.

CAUTION

The impeller is very heavy and could be damaged and/or could injure personnel if it is dropped. Use extreme caution when performing the following procedure to prevent dropping the impeller when it breaks loose from the shaft.

The impeller is secured to the shaft by the woodruff key (43) and a taper fit.To remove the impeller, install two 3/8-16 UNC capscrews (not supplied) in the tapped holes in the impeller. Use a gear puller to preload the impeller. Strike the gear puller shaft with a hammer to break the impeller loose. Remove the impeller and woodruff key.

NOTE

An alternate method of removing the impeller is to install two wedges 180 ° apart between the impeller and the seal plate. Tap the wedges alternately until the impeller breaks loose. If necessary, position a piece of round bar stock against the end of the impeller shaft and strike the bar stock with a hammer to loosen the taper fit between the impeller and the shaft.

Seal Removal and Disassembly

This pump is designed with three seals; a primary mechanical seal (21) located directly behind the impeller, a secondary oil seal (20) located in the seal oil cavity, and an emergency back-up packing seal (10) located at the back of the seal oil cavity. If the liquid being pumped begins to leak past the emergency packing seal, all three seals should be replaced as soon as possible.

To ease removal, the seal plate (4) and all three seals may be removed as a single unit.

Remove the air vent and piping (32, 33 and 34) from the seal plate. Loosen, but do not remove, the lock nuts (51) compressing the split packing gland (48).

Remove the seal spring. Apply oil to the shaft in the area of the mechanical seal bellows.

Remove the machine screws (19) and slide the seal plate, seals and split packing gland off the shaft as a unit. The rotating portion of the mechanical seal (21) will become a free part. **Be careful** not to drop or damage the seal components when removing the seal plate.

To remove the packing seal, remove the lock nuts (51), machine bolts (50), clips (49) and split packing gland (48) from the seal plate. Use a stiff wire with a hooked end to remove the packing from the seal plate.

Use a dowel or other suitable tool to press the stationary mechanical seal element, seat and O-rings out of the seal plate from the back side.

Use a screwdriver or other suitable tool to press or pry the oil seal (20) out of the seal plate. Be careful not to scratch or damage the seal plate bore.

If no further disassembly is required, see **Seal Reassembly and Installation**.

Shaft and Bearing Removal and Disassembly

When the pump is properly operated and maintained, the pedestal should not require disassembly. Disassemble the shaft and bearings **only** when there is evidence of wear or damage.

CAUTION

Shaft and bearing disassembly in the field is not recommended. These operations should be performed only in a properly-equipped shop by qualified personnel.

Remove the pedestal drain plug (46) and drain the pedestal. Clean and reinstall the plug.

Remove the hardware securing the pedestal (1) to the base. Remove the shaft key (40).

Remove the hardware (14 and 15) and slide the outboard bearing cap and oil seal (13 and 10) off the shaft as a unit. Remove the bearing cap gasket (12) and bearing adjusting shims (11). Tie and tag the shims or measure and record their thickness for ease of reassembly.

Press the oil seal out of the bearing cap.

Remove the hardware (14 and 15) and slide the inboard bearing cap and oil seal (9 and 10) off the shaft as a unit. Remove the bearing cap gasket (8).

Press the oil seal out of the bearing cap.

Place a block of wood against the impeller end of the shaft and tap the shaft and assembled bearings (6 and 7) from the pedestal bore. **Be careful** not to damage the shaft.

After removing the shaft and bearings, clean and inspect the bearings **in place** as follows.

CAUTION

To prevent damage during removal from the shaft, it is recommended that bearings be cleaned and inspected **in place**. It is **strongly** recommended that the bearings be replaced **any** time the shaft and bearings are removed.

Clean the pedestal, shaft and all component parts (except the bearings) with a soft cloth soaked in cleaning solvent. Inspect the parts for wear or damage and replace as necessary.

WARNING!

Most cleaning solvents are toxic and flammable. Use them only in a well ventilated area free from excessive heat, sparks, and flame. Read and follow all precautions printed on solvent containers.

Clean the bearings thoroughly in **fresh** cleaning solvent. Dry the bearings with filtered compressed air and coat with light oil.

CAUTION

Bearings must be kept free of all dirt and foreign material. Failure to do so will greatly shorten bearing life. **Do not** spin dry bearings. This may scratch the balls or races and cause premature bearing failure.

Rotate the bearings by hand to check for roughness or binding and inspect the bearing balls. If rotation is rough or the bearing balls are discolored, replace the bearings.

The bearing tolerances provide a tight press fit onto the shaft and a snug slip fit into the pedestal. Replace the bearings, shaft, or pedestal if the proper bearing fit is not achieved.

If bearing replacement is required, use a bearing puller to remove the bearings from the shaft.

Shaft and Bearing Reassembly and Installation

Clean and inspect the bearings as indicated in **Shaft and Bearing Removal and Disassembly**.

CAUTION

To prevent damage during removal from the shaft, it is recommended that bearings be cleaned and inspected **in place**. It is **strongly** recommended that the bearings be replaced **any** time the shaft and bearings are removed.

Inspect the shaft for distortion, nicks or scratches, or for thread damage on the impeller end. Dress small nicks and burrs with a fine file or emery cloth. Replace the shaft if defective.

The bearings may be heated to ease installation. An induction heater, hot oil bath, electric oven, or hot plate may be used to heat the bearings. Bearings should **never** be heated with a direct flame or directly on a hot plate.

NOTE

If a hot oil bath is used to heat the bearings, both the oil and the container must be **absolutely** *clean. If the oil has been previously used, it must be* **thoroughly** *filtered.*

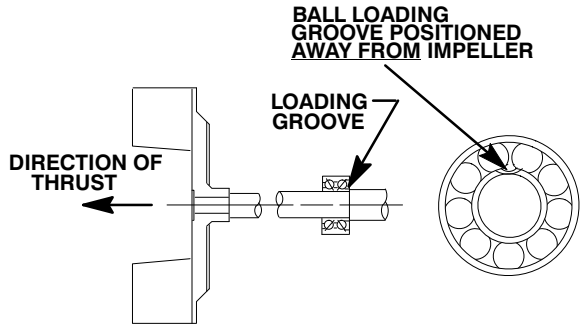
WARNING!

Use caution when handling hot bearings to prevent burns.

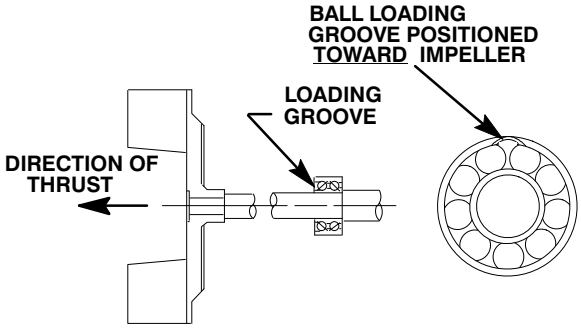
Heat the bearings to a uniform temperature **no higher than** 250°F (120°C), and slide the bearings onto the shaft, one at a time, until they are fully seated. This should be done quickly, in one continuous motion, to prevent the bearings from cooling and sticking on the shaft.

NOTE

Position the inboard bearing (16) on the shaft as indicated by the following illustrations.



INSTALLATION OF NEW DEPARTURE OR BCA/FEDERAL MOGAL 5300W SERIES BEARINGS (OPEN OR ENCLOSED IMPELLERS)



INSTALLATION OF MRC/SKF 5300M OR FAFNIR 5300W SERIES BEARINGS (OPEN OR ENCLOSED IMPELLERS)

Figure E—3. Bearing Installation

After the bearings have been installed and allowed to cool, check to ensure that they have not moved away from the shaft shoulders in shrinking. If movement has occurred, use a suitably sized sleeve and a press to reposition the bearings against the shaft shoulders.

If heating the bearings is not practical, use a suitably sized sleeve and an arbor (or hydraulic) press to install the bearings on the shaft.

CAUTION

When installing the bearings onto the shaft, **never** press or hit against the outer race, balls, or ball cage. Press **only** on the inner race.

Press the oil seal (10) into the inboard bearing cap (9) with the lip positioned as shown in Figure E—1. Center the seal in the bearing cap. Replace the bearing cap gasket (8) and secure the bearing cap to the pedestal with the hardware (14 and 15).

Slide the shaft and assembled bearings into the pedestal until the inboard bearing is fully seated against the bearing cap. **Be careful** not to roll or damage the oil seal lip.

CAUTION

When installing the shaft and bearings into the pedestal bore, push against the outer race. **Never** hit the balls or ball cage.

Press the oil seal (10) into the outboard bearing cap (13) with the lip positioned as shown in Figure E—1. Center the seal in the bearing cap. Replace the bearing cap gasket (12). Install the same thickness of bearing adjusting shims (11) as previously removed and secure the bearing cap to the pedestal with the hardware (14 and 15). **Be careful** not to roll or damage the oil seal lip on the shaft keyway.

NOTE

Shaft endplay should be between .002 and .010 inch (0,05 and 0,25 mm). Add or remove adjusting shims to establish the correct endplay.

Secure the pedestal to the base with the previously removed hardware. Install the shaft key (40). Be

sure to reinstall any leveling shims used under the pedestal mounting feet.

Lubricate the bearings and pedestal as indicated in **LUBRICATION** at the end of this section.

Seal Reassembly and Installation

Clean the bore of the seal plate, split packing gland and impeller shaft with a cloth soaked in fresh cleaning solvent.

WARNING!

Most cleaning solvents are toxic and flammable. Use them only in a well ventilated area free from excessive heat, sparks, and flame. Read and follow all precautions printed on solvent containers.

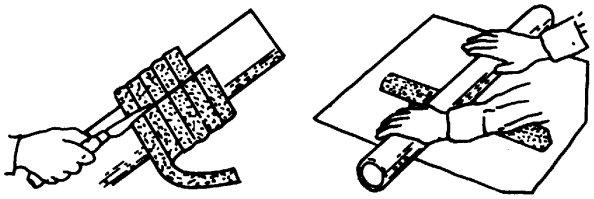
Inspect the impeller shaft for damage. Small scratches or nicks may be removed with a fine file or emery cloth. If excessive wear exists, the shaft will have to be replaced.

Install the slinger ring (52) on the shaft.

To install the packing seal, lay the seal plate (4) on a flat surface with the impeller side down. Position a dowel the same size as the impeller shaft in the center of the seal plate bore and install the new packing seal as follows.

NOTE

It is recommended that replacement rings pre-cut to the correct width and length, and packaged in a set be ordered from the Gorman-Rupp Company or your Gorman-Rupp distributor. However, if bulk commercial packing will be used in this unit, prepare and install it in accordance with the following steps in order to ensure that the packing will form a tight seal.



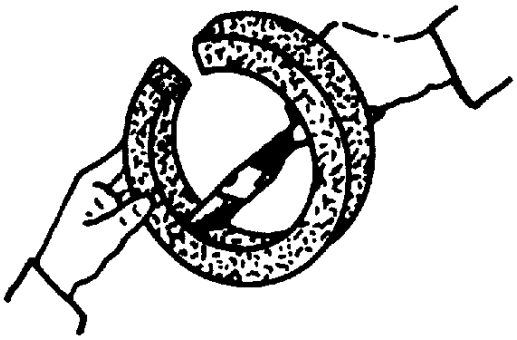
Step 1: Determine how much bulk packing will be required to fill the packing cavity, and wrap it around a rod of the same diameter as the shaft. With the packing wrapped around the rod, cut through each turn as shown.

If the cut rings are too thick and will not fit in the packing cavity, place each turn on a clean newspaper and use a length of pipe, as you would a rolling pin, to roll the ring until the thickness has been reduced. **Never** attempt to flatten a packing ring with a hammer.

Step 2: It is critical that the ends of the cut packing rings meet in a tight parallel fit to ensure proper sealing. Check this fit; it should be correct if the packing was cut while wrapped around a rod, but if the packing was cut while laid out straight, the ends will meet at an angle. **Never** install a packing ring with an angled gap; pressure on adjacent packing rings will cause them to work into the gap and prevent the angled ring from closing properly around the shaft.

Some channel-type packing with a lead core may require a slight gap between

packing ring ends to allow for expansion. Consult the packing manufacturer's installation instructions and follow his recommendations.



Step 3: Lubricate all metallic packings (foil type, lead core, etc.) with the lubricant recommended by the packing manufacturer. In general, swabbing the inside diameter of this type of packing with SAE No. 30 non-detergent oil provides sufficient lubrication.

Dip the new packing rings in SAE No. 30 non-detergent oil before installation. Push each packing ring into the seal plate and compress it using a mallet and blunt ended sleeve the same diameter as the split gland. Each successive layer must be compressed and rotated by 90° to prevent excessive leakage. Add enough packing to fill the seal plate to within 3/8 inch of the end.

Install the split packing gland (48) in the seal plate. Install the gland clips (49) and secure the packing gland to the seal plate with the hardware (50 and 51). Draw up the deform lock nuts evenly until snug, then back the nuts off until they just hold the packing glands in position.

Remove the dowel from the seal plate bore.

Position the assembled seal plate, packing and split packing gland on the impeller shaft and push it on until the seal plate seats against the pedestal. Align the holes in the seal plate and pedestal, and secure the seal plate to the pedestal with the machine screws (19).

Tighten the deform lock nuts evenly and check shaft rotation. The shaft should rotate easily by hand. **Do not** over-tighten the lock nuts.

Press the oil seal (20) into the seal plate until fully seated with the lip positioned as shown in Figure E—1.

The mechanical seal (21) is not normally reused because wear patterns on the finished faces cannot be realigned during reassembly. This could result in premature failure. If necessary to reuse an old seal in an emergency, **carefully** wash all metallic parts in **fresh** cleaning solvent and allow to dry thoroughly.

Handle the seal parts with extreme care to prevent damage. Be careful not to contaminate precision finished faces; even fingerprints on the faces can shorten seal life. If necessary, clean the faces with a non-oil based solvent and a clean, lint-free tissue. Wipe **lightly** in a concentric pattern to avoid scratching the faces.

Inspect the seal components for wear, scoring, grooves, and other damage that might cause leakage. If any components are worn, replace the complete seal; **never mix old and new seal parts**.

If a replacement seal is being used, remove it from the container and inspect the precision finished faces to ensure that they are free of any foreign matter.

To ease installation of the seal, lubricate the O-rings and bellows with water or a very **small** amount of oil, and apply a drop of light lubricating oil on the finished faces. Assemble the seal as follows (see Figure E—4).

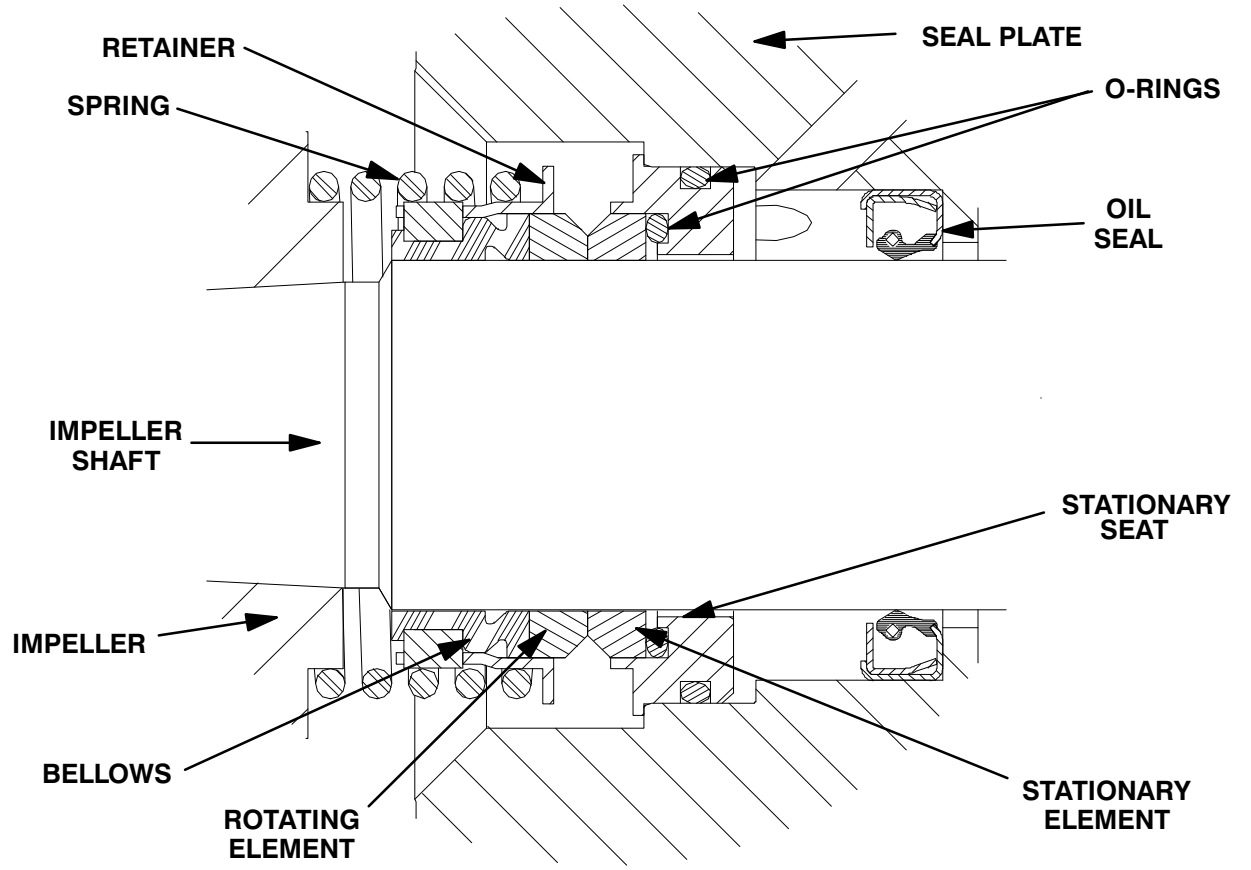


Figure E—4. 12590B Seal Assembly

CAUTION

This seal is not designed for operation at temperatures above 160°F (71°C). Do not use at higher operating temperatures.

Press the stationary subassembly (consisting of the stationary seat, O-rings and stationary element) into the seal plate until fully seated. A push tube cut from a length of plastic pipe would aid this installation. The I.D. of the pipe should be approximately the same diameter as the I.D. of the seal spring.

Slide the rotating subassembly (consisting of the rotating element, retainer and bellows) onto the lubricated shaft until the seal elements contact. Install the seal spring.

Reinstall the air vent and piping (32, 33 and 34) and bottle oiler and piping (35, 36 and 37). Lubricate the seal assembly as indicated in **LUBRICATION**, after the impeller is installed.

Impeller Installation

Inspect the impeller for excessive wear, damage or cracks and replace as required.

Install the woodruff key (43) and press the impeller onto the shaft until fully seated.

Remove the setscrews (25) from the impeller nut (23). Apply “Never-Seez” or equivalent compound to the shaft threads and screw the impeller nut onto the shaft. Immobilize the impeller as shown in Figure E—2, and torque the impeller nut to 300 ft. Lbs. (42 m. kg.).

Apply “Loctite No. 242” or equivalent compound to the setscrews (23). Install new inserts (24), and torque the setscrews to 18 ft. lbs. (216 in. lbs. or 2,5 m. kg.).

Pump Casing Installation

Replace the pump casing gasket (3). Slide the pump casing over the impeller and secure it to the seal plate and pedestal with the hardware (17).

Suction Plate and Wear Ring Installation and Adjustment

Replace the wear ring O-ring (29) and lubricate it with light oil or grease. Slide the wear ring (26) into the pump casing and secure it with the hardware (17).

Replace the suction plate O-ring (31) and lubricate it with light oil or grease. Slide the suction plate (30) into the wear ring. Use a soft-faced mallet to tap the suction plate into the wear ring until fully seated.

A clearance approximately .015 inch (35 mm) between the impeller and the wear ring (26) is recommended for maximum pump efficiency. This clearance may be measured through the suction port with feeler gauges and can be adjusted using the jam nuts (28) and hex nuts (17).

Loosen the hex nuts (17) and tighten the jam nuts (28) until the war ring touches evenly around the suction plate. Loosen the jam nuts until they contact the volute. Tighten the hex nuts evenly, not more than 1/2 turn at a time, until the wear ring touches the impeller when the shaft is turned by hand. Loosen the hex nuts 1/2 turn, then tighten the jam nuts until the wear ring is pushed back against the hex nuts. This will provide the recommended .015 inch (35 mm) clearance.

Final Pump Assembly

Be sure the pump and power source are securely mounted to the base and that they are properly aligned. If used, remove the eye bolt used to lift component parts.

Fill the pump casing with clean liquid.

Install the suction and discharge lines and open all valves. Make certain that all piping connections are tight, properly supported and secure. Open all the valves in the suction and discharge lines.

Be sure the pump and power source have been properly lubricated, see **LUBRICATION**.

Refer to **OPERATION**, Section C, before putting the pump back into service.

LUBRICATION

Seal Assembly

Fill the seal bottle oiler (37) with SAE No. 30 non-detergent oil. Check the oil level regularly and refill as required.

Periodically clean and reinstall the seal cavity air vent (32).

Bearings

The pedestal was fully lubricated when shipped from the factory. Check the oil level regularly and maintain it at the midpoint of the sight gauge (41). When lubrication is required, unscrew the vented plug (39) and fill the pedestal with SAE No. 30 non-detergent oil to the middle of the sight gauge (41). **Do not** overfill. Over-lubrication can cause the bearings to over-heat, resulting in premature bearing failure. Clean and reinstall the vented plug.

Under normal conditions, change the oil each 5000 hours of operation, or at twelve month intervals, which ever occurs first. Change the oil more frequently if the pump is operated continuously or installed in an environment with rapid temperature change.

Monitor the condition of the bearing lubricant regularly for evidence of rust or moisture condensation. This is especially important in areas where variable hot and cold temperatures are common.

For cold weather operation, consult the factory or a lubricant supplier for the recommended grade of oil.

For Warranty Information, Please Visit
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