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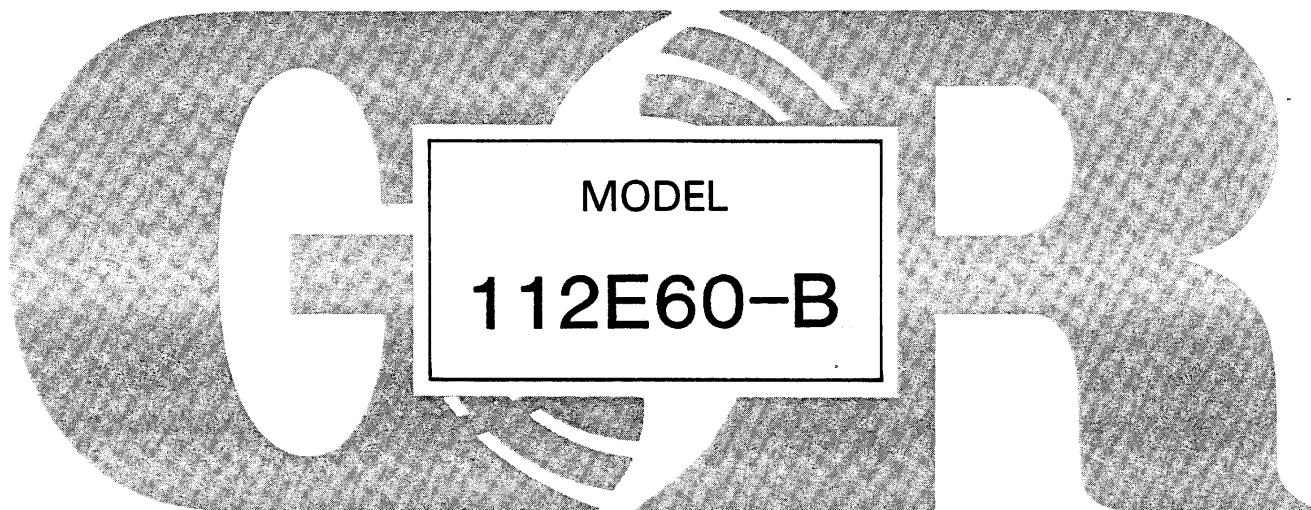
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March 22, 1983

Rev. B

10 SERIES™

**INSTALLATION, OPERATION, PARTS LIST,
AND MAINTENANCE MANUAL**



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

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INTRODUCTION

This Installation, Operation, and Maintenance Manual is designed to help you achieve the best performance and longest life from your Gorman-Rupp pump.

This pump is a 10 Series, semi-open impeller, self-priming centrifugal model with a suction check valve. The pump is designed for pumping liquids with specified entrained solids.

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 write:

The Gorman-Rupp Company	or	Gorman-Rupp of Canada Limited
P.O. Box 1217		70 Burwell Road
Mansfield, Ohio 44901		St. Thomas, Ontario N5P 3R7

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

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:

NOTE

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

CAUTION

Instructions which must be followed to avoid causing damage to the product or other equipment incidental to the installation. These instructions describe the requirements and the possible damage which could result from failure to follow the procedures.

WARNING

```

////////////////////////////////////
//                               //
// These instructions must be followed to avoid causing in- //
// jury or death to personnel, and describe the procedure //
// required and the injury which could result from failure //
// to follow the procedure. //
//                               //
////////////////////////////////////

```


WARNINGS

WARNINGS - SECTION A

THESE WARNINGS APPLY TO 10 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.

WARNING

```

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

```

WARNING

```

////////////////////////////////////
//
// This pump is designed to pump most liquids with en-
// trained solids. Do not attempt to pump volatile, corro-
// sive, or flammable liquids which may damage the pump or
// endanger personnel as a result of pump failure.
//
////////////////////////////////////

```

WARNING

```

////////////////////////////////////
//
// After the pump has been installed, make certain that the
// pump and all piping connections are secure before at-
// tempting to operate the pump.
//
////////////////////////////////////

```

WARNING

```

////////////////////////////////////
//
// 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.
//
////////////////////////////////////

```

WARNINGS

WARNING

```
////////////////////////////////////  
//  
// Do not operate the pump against a closed discharge valve //  
// for long periods of time. This could bring the liquid //  
// to a boil, build pressure, and cause the pump to rupture //  
// or explode. //  
// //  
////////////////////////////////////
```

WARNING

```
////////////////////////////////////  
//  
// Overheated pumps can cause severe burns and injury. If //  
// overheating of the pump occurs: //  
// //  
// 1. Stop the pump immediately. //  
// 2. Allow the pump to cool. //  
// 3. Refer to instructions in this manual before re- //  
// starting the pump. //  
// //  
////////////////////////////////////
```

WARNING

```
////////////////////////////////////  
//  
// Do not remove plates, covers, gauges, pipe plugs, or //  
// fittings from an overheated pump. Vapor pressure within //  
// the pump can cause parts being disengaged to be ejected //  
// with great force. Allow the pump to cool before servic- //  
// ing. //  
// //  
////////////////////////////////////
```

INSTALLATION - SECTION B

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 pressure developed by the pump. (See Section E, Page 1.) If the pump is fitted with a Gorman-Rupp double grease lubricated seal, the maximum incoming pressure must be reduced to 10 p.s.i..

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

Pump Dimensions

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

OUTLINE DRAWING

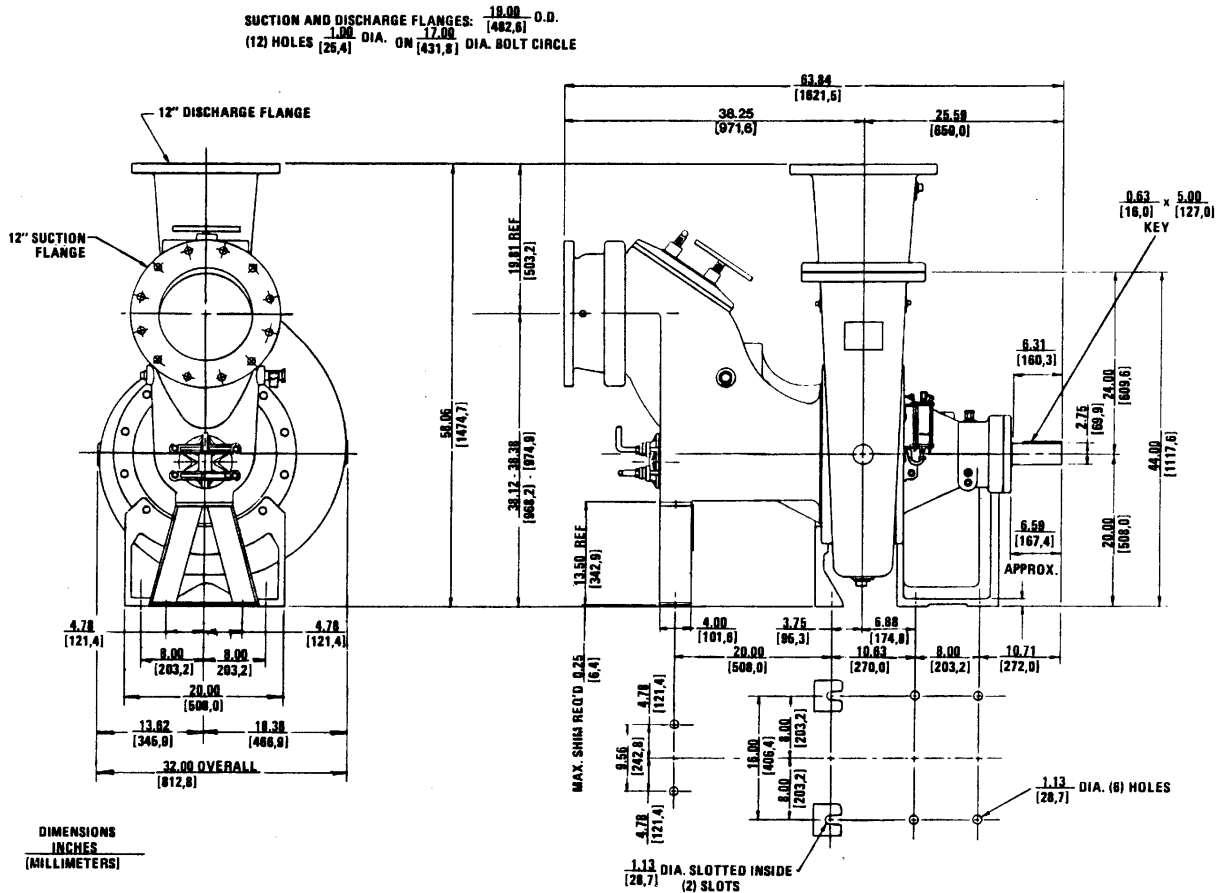


Figure 1. Pump Model 112E60-B

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 assembly for cracks, dents, damaged threads, and other obvious damage.
- b. Check for and tighten loose bolts, nuts, capscrews, and other attaching hardware. Since gaskets tend to shrink after drying, check for and tighten loose nuts and capscrews securing mating surfaces.
- c. Carefully read all tags, decals, and markings on the pump assembly, and perform all duties indicated. Note the direction of rotation indicated

on the pump. Check 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 all lubricant 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 and power source have 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

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.

Lifting

Use lifting equipment with a capacity of at least 11,000 pounds. This pump weighs approximately 2,200 pounds, not including the weight of accessories and base.

CAUTION

The pump assembly can be seriously damaged if the cables or chains used to lift and move the unit are improperly wrapped around the pump.

SUCTION AND DISCHARGE PIPING

Materials

Either pipe or hose may be used for suction and discharge lines. Piping 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 close to the pump before installing the lines.

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.

Never use a suction line smaller than the pump inlet connection. This pump is designed to accept a standard 12 inch pipe flange.

If a horizontal suction line must be used, the maximum acceptable length is 6 feet. The preferred installation would angle the suction line down to the source of the liquid at a 45° angle.

CAUTION

Use of long horizontal suction lines increase partial prime operation time which results in erratic performance and reduced pump life.

The maximum vertical suction lift for this pump is 15 feet. The pump is not designed to prime or operate 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 2.75 inch 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 airtight seal. 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 one and one-half 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 one and one-half 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 distance equal to at least three 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 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).

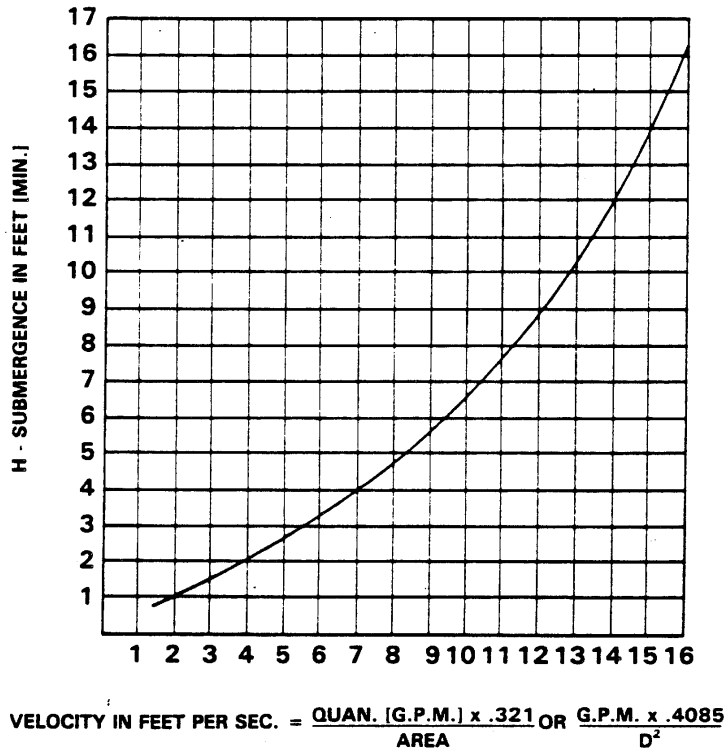


Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

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 in the line to minimize friction losses. Never install a throttling valve in a suction line.

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

With high discharge heads, it is recommended that a throttling valve and a 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 application involves a high discharge head, gradually close the discharge throttling valve before stopping the pump.

Bypass Lines

If it is necessary to permit the escape of air to atmosphere during initial priming or in the repriming cycle, install a bypass line between the pump and the discharge check valve. The bypass line should be sized so that it does not affect pump discharge capacity.

Either a Gorman-Rupp automatic air release valve - which will automatically open to allow the pump to prime, and automatically close when priming is accomplished - or a hand-operated shutoff valve should be installed in the bypass line.

NOTE

The bypass line may clog frequently, particularly if the valve remains closed. If this condition occurs, either use a larger bypass line or leave the shutoff valve open during the pumping operation.

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 could result, causing damage to 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 is 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 can occur in transit and handling. Pumps should be checked, and realigned if necessary, before being put into 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 degrees. The coupling is in alignment when the hub ends are the same distance apart at all points (see Figure 3A).

Align non-spider type couplings by using a feeler gauge or taper gauge between the coupling halves every 90 degrees. The coupling is in alignment when the hubs are the same distance apart at all points (see Figure 3B).

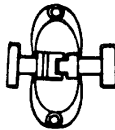


Figure 3A. Aligning Spider-Type Couplings

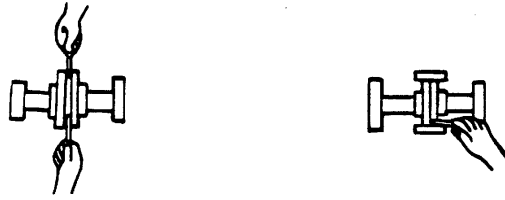


Figure 3B. Aligning Non-Spider Type Couplings

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.

V-Belt Drives

When using V-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 3C). In drive systems using two or more belts, make certain that the belts are a matched set; unmatched sets will cause accelerated belt wear.

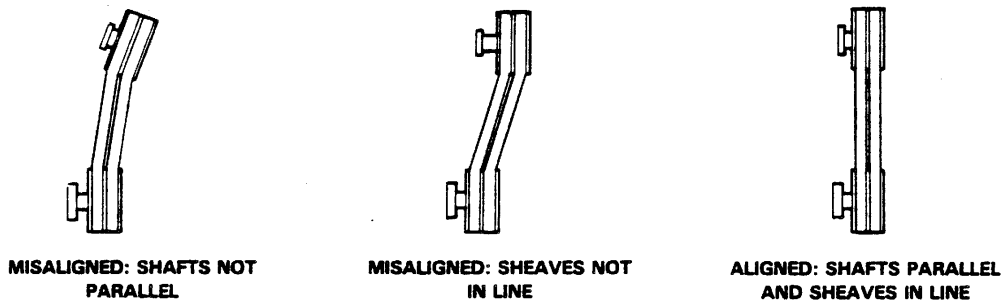


Figure 3C. Alignment of V-Belt Driven Pumps

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 a guard over the rotat- //
// ing parts. Exposed rotating parts can catch clothing, //
// fingers, or tools, causing severe injury to personnel. //
//
////////////////////////////////////

OPERATION

OPERATION - SECTION C

WARNING

```

////////////////////////////////////
//
// This pump is designed to pump most liquids with en- //
// trained solids. Do not attempt to pump volatile, corro- //
// sive, or flammable liquids which may damage the pump or //
// endanger personnel as a result of pump failure. //
//
////////////////////////////////////

```

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 is self-priming, but the pump should never be operated unless there is liquid in the volute.

CAUTION

Never operate a self-priming pump unless there is liquid in the volute. The pump will not prime when dry. Extended operation of a dry pump will destroy the seal assembly.

Add liquid to the volute housing 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 volute housing has evaporated.

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

WARNING

```

////////////////////////////////////
//
// After filling the volute housing, do not attempt to op- //
// erate the pump unless all connecting piping is securely //
// installed. Otherwise, liquid in the pump forced out un- //
// der pressure could cause injury to personnel. //
//
////////////////////////////////////

```

To fill the pump, remove the volute fill cover or fill plug at the top of the casing and add clean liquid until the pump is filled. Replace the fill cover or fill plug before operating the pump.

STARTING

Consult the operations manual furnished with the power source.

Rotation

The correct direction of pump rotation is indicated by an arrow on the pump body and on the accompanying decal. If the pump is operated in the wrong direction, the impeller could become loosened from the shaft and seriously damage the pump.

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.

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

If the rotation of a three-phase electric motor is incorrect, have qualified personnel interchange any two of the three-phase wires to change direction.

OPERATION

Lines With a Bypass

Either a Gorman-Rupp automatic air release valve or a hand operated shutoff valve may be installed in a bypass line.

If a Gorman-Rupp automatic air release valve has been installed, close the throttling valve in the discharge line. The Gorman-Rupp valve will automatically open to allow the pump to prime, and automatically close when priming has been accomplished. After the pump has been primed, and liquid is flowing steadily from the bypass line, open the discharge throttling valve.

If a hand operated shutoff valve has been installed, close the throttling valve in the discharge line, and open the bypass shutoff valve so that the pump will not have to prime against the weight of the liquid in the discharge line. When the pump has been primed, and liquid is flowing steadily from the bypass line, close the bypass shutoff valve and open the discharge throttling valve.

OPERATION

Lines Without a Bypass

Open all valves in the discharge line and start the power source. Priming is indicated by a positive reading on the discharge pressure gauge or by a quieter operation. The pump may not prime immediately because the suction line must first fill with liquid. If the pump fails to prime within five minutes, stop it and check the suction line for leaks.

After the pump has been primed, partially close the discharge line throttling valve in order to fill the line slowly and guard against excessive shock pressure which could damage pipe ends, gaskets, sprinkler heads, and any other fixtures connected to the line. When the discharge line is completely filled, adjust the throttling valve to the required flow rate.

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. Do not apply it at a higher operating temperature.

Overheating can occur if the valves in the suction or discharge lines are 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 volute housing with cool liquid.

WARNING

```

////////////////////////////////////
//                               //
// Do not remove plates, covers, gauges, pipe plugs, or //
// fittings from an overheated pump. Vapor pressure within //
// the pump can cause parts being disengaged to be ejected //
// with great force. Allow the pump to cool before servic- //
// ing. //
//                               //
////////////////////////////////////

```

As a safeguard against rupture or explosion due to heat, this pump is equipped with a pressure relief valve which will open if vapor pressure within the pump casing reaches a critical point. If overheating does occur, stop the pump immediately and allow it to cool before servicing it. Approach any overheated pump cautiously.

It is recommended that the pressure relief valve assembly be replaced at each overhaul, or any time the pump casing overheats and activates the valve. Never replace this valve with a substitute which has not been specified or provided by the Gorman-Rupp Company.

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.

Pump Vacuum Check

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 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 operation 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. If the pump is driven by an engine, reduce the throttle speed slowly and allow the engine to idle briefly before stopping.

CAUTION

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

After stopping the pump, disconnect the power source 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 are considered normal for pedestal bearings, and they can operate safely to at least 180°F.

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 MAINTENANCE AND REPAIR). 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

WARNING

```

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

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	<p>Air leak in suction line.</p> <p>Lining of suction hose collapsed.</p> <p>Suction check valve or foot valve clogged or binding.</p> <p>Leaking or worn seal or pump gasket.</p> <p>Suction lift or discharge head too high.</p> <p>Strainer clogged.</p>	<p>Correct leak.</p> <p>Replace suction hose.</p> <p>Clean valve.</p> <p>Check pump vacuum. Replace leaking or worn seal or gasket.</p> <p>Check piping installation and install bypass line if needed. See INSTALLATION.</p> <p>Check strainer and clean if necessary.</p>
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	<p>Air leak in suction line.</p> <p>Suction intake not submerged at proper level or sump too small.</p> <p>Lining of suction hose collapsed.</p> <p>Impeller or other wearing parts worn or damaged.</p>	<p>Correct leak.</p> <p>Check installation and correct as needed. Check submergence chart (Section B).</p> <p>Replace suction hose.</p> <p>Replace worn or damaged parts. Check that impeller is properly centered and rotates freely.</p>

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE(cont.)	<p>Impeller clogged.</p> <p>Pump speed too slow.</p> <p>Discharge head too high.</p> <p>Suction lift too high.</p> <p>Leaking or worn seal or pump gasket.</p> <p>Strainer clogged.</p>	<p>Free impeller of debris.</p> <p>Check driver output; check belts or couplings for slippage.</p> <p>Install bypass line.</p> <p>Reduce suction lift.</p> <p>Check pump vacuum. Replace leaking or worn seal or gasket.</p> <p>Check strainer and clean if necessary.</p>
PUMP REQUIRES TOO MUCH POWER	<p>Pump speed too high.</p> <p>Discharge head too low.</p> <p>Liquid solution too thick.</p>	<p>Check driver output; check that sheaves or couplings are correctly sized.</p> <p>Adjust discharge valve.</p> <p>Dilute if possible.</p>
PUMP CLOGS FREQUENTLY	<p>Discharge flow too slow.</p> <p>Suction check valve or foot valve clogged or binding.</p>	<p>Open discharge valve fully to increase flow rate, and run engine at maximum governed speed.</p> <p>Clean valve.</p>
EXCESSIVE NOISE	<p>Cavitation in pump.</p> <p>Pumping entrained air.</p> <p>Pump or drive not securely mounted.</p> <p>Impeller clogged or damaged.</p>	<p>Reduce suction lift and/or friction losses in suction line.</p> <p>Locate and eliminate source of air bubble.</p> <p>Secure mounting hardware.</p> <p>Clean out debris; replace damaged parts.</p>

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
BEARINGS RUN TOO HOT	Bearing temperature is high, but within limits. Low or incorrect lubricant. Suction and discharge lines not properly supported. Drive misaligned.	Check bearing temperature regularly to monitor any increase. Check for proper type and level of lubricant. Check piping installation for proper support. Align drive properly.

MAINTENANCE AND REPAIR - SECTION E

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

Performance curve not available at time of printing please consult factory for details

***STANDARD PERFORMANCE FOR PUMP MODEL 112E60-B**

*Based on 70°F 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 application must be within the operating range shown on curve.

SECTIONAL DRAWING

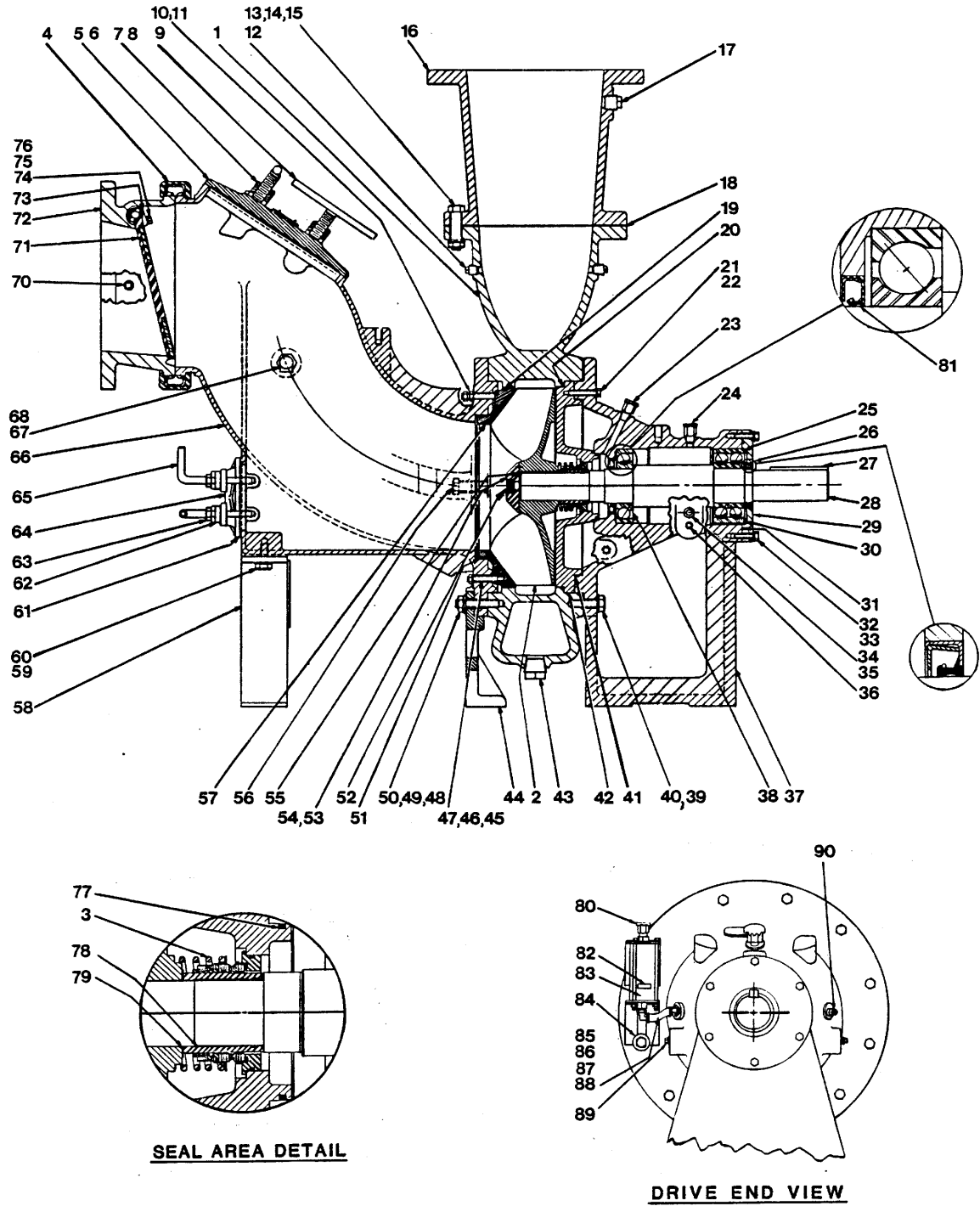


Figure 1. Pump Model 112E60-B

MAINTENANCE AND REPAIR

PARTS LIST
Pump Model 112E60-B
 (From S/N 782750 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	MATL CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	PUMP CASING	38222-702	10010	1	49	LOCKWASHER	J12	15991	4
2	*IMPELLER	38617-717	11030	1	50	HEX NUT	D12	15991	4
3	*SEAL ASSY	46512-061	-----	1	51	*WEAR PLT O-RING	25152-278	-----	1
4	*VICTAULIC COUPLING	25552-214	-----	1	52	*SOC HD CAPSCREW	BD1206	15990	1
5	ACCESS COVER ASSY	48271-026	-----	1	53	*IMP WASHER	31167-012	15030	1
	-WARNING PLATE	38816-097	13990	1	54	*ROLL PIN	S2197	-----	1
	-DRIVE SCREW	BM#04-03	15990	2	55	*IMPELLER KEY	N0812	15990	1
6	*COVER GSKT	38688-015	20000	1	56	HEX HD CAPSCREW	B1210	15990	2
7	COVER CLAMP	12872	11000	2	57	*WEAR PLATE	38691-851	11030	1
8	MACHINE BOLT	A1011	15991	4	58	SUCTION ELBOW	41881-258	24150	1
9	SCREW	2536	24000	2		SUPPORT			
10	WEAR PLT ADJ SCREW	21612-199	-----	4	59	HEX HD CAPSCREW	B1206	15991	2
11	WEAR PLT JAM NUT	AT08	15991	4	60	LOCKWASHER	J12	15991	2
12	PIPE PLUG	P08	11990	2	61	*COVER GSKT	38682-016	20000	1
13	HEX HD CAPSCREW	B1414	15991	12	62	CLAMP BAR	38111-310	11000	2
14	LOCKWASHER	J14	15991	12	63	MACHINE BOLT	A1011	15991	4
15	HEX NUT	D14	15991	12	64	CLEANOUT CVR ASSY	48271-025	-----	1
16	REDUCER	25512-035	-----	1		-WARNING PLATE	38816-097	13990	1
17	PIPE PLUG	P16	11990	1		-DRIVE SCREW	BM#04-03	15990	2
18	FLANGE GSKT	2751-G	18000	1	65	SCREW CLAMP BAR	31912-009	15000	2
19	*CASING O-RING	25152-283	-----	1	66	SUCTION ELBOW	38647-910	10010	1
20	*SEAL PLATE O-RING	25152-283	-----	1	67	PIPE PLUG	P08	11990	1
21	HEX HD CAPSCREW	B0610	15991	2	68	*PRES RELIEF VALVE	26662-005	-----	1
22	LOCKWASHER	J06	15991	2	69	*CHECK VALVE ASSY	46421-035	-----	1
23	*SEAL CVTY AIR VENT	S1703	-----	1	70	-PIPE PLUG	P08	11990	2
24	*PEDESTAL AIR VENT	S1703	-----	1	71	-FLAP VALVE ASSY	46411-068	24010	1
25	*WAVE WASHER	23963-333	-----	2	72	-CHK VALVE ASSY	38341-806	10010	1
26	*BRG CAP OIL SEAL	25258-850	-----	1	73	-PIVOT CAP	38141-003	11060	2
27	*SHAFT KEY	N1020	15990	1	74	-HEX HD CAPSCREW	B0606	15991	2
28	*IMPELLER SHAFT	38512-519	16040	1	75	-LOCKWASHER	AK06	15991	2
29	BEARING COVER	38322-419	10010	1	76	-FLAT WASHER	KB08	17000	4
30	*BALL BEARING	23421-417	-----	1	77	*SEAL PLATE O-RING	25152-256	-----	1
31	*BRG CAP O-RING	S1874	-----	1	78	*SHAFT SLEEVE	31513-015	17200	1
32	HEX HD CAPSCREW	B0808	15991	6	79	*IMPELLER SHIM SET	48261-033	-----	REF
33	LOCKWASHER	J08	15991	6	80	AIR VENT	S1703	-----	1
34	*OIL SIGHT GAUGE	26714-011	-----	1	81	*PED OIL SEAL	25258-851	-----	1
35	PIPE PLUG	P06	11990	1	82	OIL LEVEL DECAL	38816-123	-----	1
36	PED DRAIN PLUG	P06	11990	2	83	SIGHT GAUGE ASSY	46353-020	-----	1
37	PEDESTAL BODY	38257-511	10010	1	84	FLAT WASHER	K12	15991	2
38	*BALL BEARING	23413-216	-----	1	85	BARB ELBOW	26523-506	-----	1
39	HEX HD CAPSCREW	B1210	15991	14	86	FEED TUBE	31411-197	19360	1
40	LOCKWASHER	J12	15991	14	87	HOSE CLAMP	26518-642	-----	2
41	*PEDESTAL O-RING	25152-282	-----	1	88	BARB FITTING	26523-409	-----	1
42	*SEAL PLATE	38272-706	10010	1	89	PIPE PLUG	P06	11990	2
43	PIPE PLUG	P24	11990	1	90	PIPE PLUG	P06	11990	1
44	PED FOOT	38151-002	10010	1		NOT SHOWN:			
45	STUD	C0814	15991	4		NAME PLATE	2613-D	13990	1
46	LOCKWASHER	J08	15991	4		DRIVE SCREW	BM#04-03	15990	4
47	HEX NUT	D08	15991	4		STRAINER	46641-012	24150	1
48	STUD	C1216	15991	4		LUB DECAL	38816-079	-----	1

*INDICATES PARTS RECOMMENDED FOR STOCK

Above Serial Numbers Do Not Apply To Pumps Made In Canada.

CANADIAN SERIAL NO AND UP

PUMP AND SEAL DISASSEMBLY AND REASSEMBLY

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 sectional view (see figure 1) and the accompanying parts list.

Basic service functions may be performed by draining the pump and removing the access covers provided. If major repair is required, the piping and/or power source must be disconnected.

Before attempting to service the pump, take precautions to insure the power source will remain inoperative and close all connecting valves.

WARNING

```

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

```

WARNING

```

////////////////////////////////////
//
// Use lifting and moving equipment in good repair and with
// adequate capacity to prevent injuries to personnel or
// damage to equipment.
//
////////////////////////////////////

```

Suction Check Valve Disassembly

Remove the volute drain plug (43) and drain the pump. Clean and reinstall the drain plug.

For access to the flap valve, loosen the cover clamp screws (9) and remove the cover clamps (7). Remove the clean out cover (5) and gasket (6).

Reach through the access opening and remove the capscrews (74), flat washers (75) and pivot caps (73) which secure the flap valve assembly (71). Remove the flap valve through the access opening.

Inspect the flap valve for wear or damage. Remove the four stainless steel flat washers (76) from the pivot arm. Tie and tag the washers for future reference.

If the check valve body (72) must be removed, disconnect the suction flange hardware and loosen the "victaulic" coupling clamp (4). Separate the valve body from the suction elbow. Inspect the rubber "victaulic" gasket for damage.

Pump Disassembly

Service to the wear plate (57), impeller (2), or seal assembly (3) may be accomplished from either side of the volute casing (1). The following instructions are based on service from the suction side.

Install a lifting eye bolt in the 5/8-11 UNC tapped hole located in the suction elbow. Tighten the eye bolt completely until the threads bottom out.

Remove the suction piping. Remove the suction check valve assembly (69) if additional clearance is required.

Remove the foundation mounting hardware from the elbow support (58) and pedestal foot (44). Tie and tag any shims used under the supports.

Support the suction elbow using a suitable hoist. Separate the elbow from the volute casing (1) by removing the capscrews (56), hex nuts (50), and lockwashers (49).

WARNING

```

//////////////////////////////////////
//                               //
// Do not attempt to lift the complete pump unit using the //
// lifting eye. It is designed to facilitate removal or //
// installation of individual components only. Additional //
// weight may result in damage to the pump or failure of //
// the eye bolt. //
//                               //
//////////////////////////////////////

```

NOTE

To ease removal of the suction elbow from the volute casing, it may be necessary to loosen the wear plate retaining hardware (10, 11, 46, and 47). If the wear plate is loosened, the impeller face clearance will require adjustment. See Pump Reassembly.

Inspect the wear plate (57) and O-ring (19) for damage or wear. If the wear plate must be replaced, remove the hex nuts (46) and lockwashers (47) from the wear plate studs (45). Loosen the jam nuts (11) and back the adjusting screws (10) out until the wear plate is free. Inspect the O-ring (51) for damage.

To loosen the impeller (2), remove the socket head capscrew (52), the impeller washer (53), and roll pin (54).

Install two capscrews in the 3/8-16 UNC tapped holes located in the impeller hub, and use a gear puller to slide the impeller from the shaft (28). Retain the shaft key (55). Replace the impeller if cracked or badly worn.

Remove the impeller adjusting shims (79). For ease of reassembly tie and tag the shims, or measure and record their thickness.

Seal Disassembly

NOTE

There is an air filled cavity with an open drain hole located directly behind the seal plate (42). If oil escapes from the drain hole, the seal plate O-ring (77) is leaking and disassembly of the seal plate would be required. The drain hole is tapped, but installation of a pipe plug is not recommended.

Before removing the seal, disconnect the feed tube (86) from the barbed fitting (88) and plug the tube to stop the flow of oil. Remove the seal cavity drain plug (90) and drain the cavity. Clean and reinstall the drain plug.

Carefully remove the spring, retainer, rotating and stationary seal elements, and the shaft sleeve (78), using a stiff wire with a hooked end if necessary. Be sure to remove the two O-rings located under the shaft sleeve.

Clean the seal cavity and shaft with a soft cloth soaked in 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 prec- //
// autions printed on solvent containers. //
//
////////////////////////////////////

If no further disassembly is required, refer to Seal Reassembly

Impeller Shaft And Bearing Disassembly

Disconnect the discharge adaptor (16) from the piping system by removing the attaching hardware. If additional clearance is required, remove the discharge adaptor from the volute casing (1).

Remove the capscrews (39), lockwashers (40), and flat washers (84) securing the sight gauge brackets to the pedestal. Inspect the sight gauge assembly (83) for leaks or cracks.

Support the volute casing using a suitable hoist and remove the remaining capscrews (39) and lockwashers (40). Separate the volute from the pedestal assembly (37).

Remove the seal plate O-ring (20) and inspect for damage.

Install a lifting eye bolt in the 5/8-11 UNC tapped hole located on top of the pedestal. Tighten the eye bolt completely until the threads bottom out.

Remove the foundation mounting hardware from the pedestal feet. Tie and tag any shims used under the pedestal.

Separate the pedestal assembly from the power source. Retain the shaft key (27).

WARNING

```

////////////////////////////////////
//                               //
// Do not attempt to lift the complete pump unit using the //
// lifting eye. It is designed to facilitate removal or //
// installation of individual components only. Additional //
// weight may result in damage to the pump or failure of //
// the eye bolt.                                           //
//                                                       //
////////////////////////////////////

```

Separate the seal plate from the pedestal by removing capscrews (21) and lockwashers (22). Remove the pedestal O-ring (41) and seal plate O-ring (77).

Before opening the pedestal cavity, drain the oil by removing the pedestal drain plug (36). Clean and reinstall the plug.

Remove the bearing cap (29) and wave washer (25) and inspect the bearing cap O-ring (31) for damage. Press the oil seal (26) out of the cap, if required.

Place a block of wood against the impeller end of the shaft and drive the shaft and bearings from the pedestal bore.

Use a bearing puller to remove the inboard bearing (38) and outboard bearing (25) from the impeller shaft.

Press the inboard oil seal (81) from the pedestal bore if badly worn.

Impeller Shaft And Bearing Reassembly

Clean the bore of the pedestal and seal plate, as well as the shaft and component parts with a cloth soaked in cleaning solvent. Inspect the parts for wear 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 prec- //
// autions printed on solvent containers.                 //
//                                                       //
////////////////////////////////////

```

NOTE

Be sure the oil return grooves provided under the bearings are clean and free of dirt.

Soak the bearings in cleaning solvent free of grit or metallic particles. Inspect the bearings and replace as necessary.

Position the inboard bearing (38) onto the shaft so that the largest shoulder of the outer race faces toward the impeller. Press the bearing on until it seats squarely against the shaft shoulder.

Press the outboard bearing (25) onto the shaft until it is fully seated.

Press the shaft and assembled bearings into pedestal bore until the inboard bearing seats squarely against the pedestal shoulder.

Replace the bearing cap O-ring (31) and oil seal (26). Position the lip of the oil seal away from the oil cavity, as shown in Figure 1. Position the wave washer (25) into the bearing cap undercut and secure the bearing cap to the pedestal.

NOTE

Before securing the bearing cap, make certain that the word "TOP" is properly positioned. The oil groove in the bearing cap must be aligned with the oil return groove under the bearing.

Press the front oil seal into the pedestal bore with the lip positioned toward the impeller end of the shaft, as shown in Figure 1.

Replace the O-rings (41 and 77) and secure the seal plate to the pedestal.

NOTE

Apply a light coating of petroleum jelly or oil to O-rings to ease reassembly.

Lubricate the bearing, pedestal as indicated in the LUBRICATION section.

NOTE

It is recommended that the seal assembly and impeller be reassembled at this point. Refer to the Seal Reassembly and Pump Reassembly sections.

Connect the pedestal assembly to the power source and secure it with the foundation mounting hardware. Be certain the pump and power source are properly aligned. See ALIGNMENT in INSTALLATION section.

Replace the seal plate O-ring (20) and secure the volute to the pedestal assembly.

Replace the discharge flange gasket (18) and reinstall the discharge adaptor.

Seal Reassembly

The seal is not normally reused because of the high polish on its lapped faces, but if it is necessary to reuse the old seal, wash all metallic parts in cleaning solvent and dry thoroughly.

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. Clean and polish the shaft sleeve, or replace it if there nicks or cuts on the end.

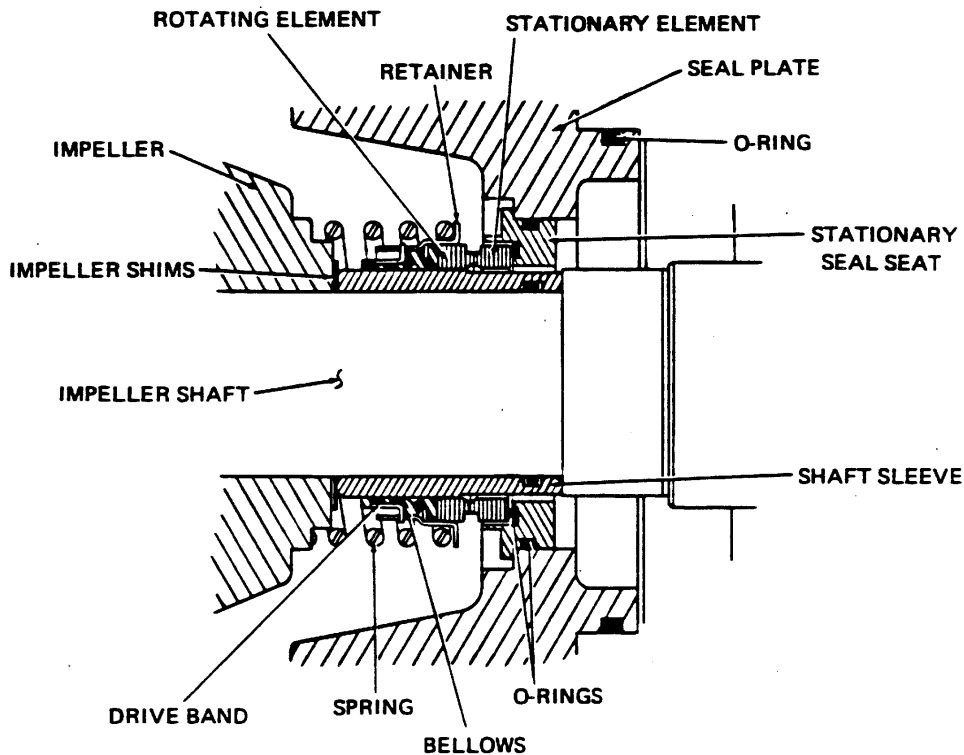


Figure 2. 46512-061 Seal Assembly

CAUTION

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

Lubricate the O-rings and reinstall the shaft sleeve. Be sure the O-rings are properly positioned and not damaged during installation.

Lubricate the O-rings and bellows with petroleum jelly or oil when installing the seal, and place a drop of light lubricating oil on the lapped faces. Assemble the seal as shown in figure 2.

Pump Reassembly

Reinstall the impeller adjusting shims.

Reinstall the impeller key, and press the impeller onto the shaft. A clearance of .010 to .020 inch between the impeller and the seal plate (44) is necessary for maximum pump efficiency. If the volute casing has already been installed, this clearance must be reached by removing impeller shims until the impeller binds against the seal plate when the shaft is turned. After the impeller binds, add .010 inch of shims.

NOTE

If the volute casing has not been secured to the pedestal assembly, this clearance may be measured with a feeler gauge and adjusted accordingly.

After the proper clearance has been attained, remove the impeller locking devices and clean the threads tapped in the impeller shaft with fresh cleaning solvent. Reinstall the impeller washer and roll pin. Prime the threads of the socket head capscrew with "Loctite Primer-T" (G-R P/N 18718-104) and apply four drops of "Loctite 242-31" adhesive sealant (G-R P/N 18771-040) around the circumference of the threads, one inch from the end. Reinstall the socket head capscrews and torque to 300 ft. lbs.. Recheck the impeller back clearance.

NOTE

Secure the volute casing and O-ring (20) to the seal plate and pedestal assembly if not already done.

Secure the seal oil sight gauge brackets and assembled sight gauge components. Reinstall the oil feed tube to the barbed fitting and tighten the tubing clamp.

If the wear plate was removed, lubricate the O-ring (51) with petroleum jelly and press the assembly into the suction elbow and secure.

Replace the wear plate O-ring (19), and lubricate it with petroleum jelly. Reinstall the suction elbow and pedestal support to the volute casing. Secure the elbow supports with the foundation mounting hardware.

A clearance of .010 to .020 inch between the impeller and the wear plate is necessary for maximum pump efficiency. This clearance can be reached by adjusting the wear plate. Back off the jam nuts (11) until they contact the heads of the wear plate adjusting screws (10). Tighten the adjusting screws evenly, no more than a half turn at a time, while rotating the impeller shaft until the wear plate makes contact with the impeller. Back off each of the adjusting screws a half turn, and tighten the jam nuts until they are snug against the suction head. The clearance should now be correct.

Lubricate the seal as indicated in the LUBRICATION section.

Suction Check Valve Reassembly

Install the stainless steel flat washers (76) onto the pivot arm; two on each side of the flap valve (71).

Secure the flap valve and pivot caps (73) to the check valve body using the attaching hardware.

NOTE

The flap valve must be positioned so that 1/2" diameter core holes face toward the interior of the pump.

Secure the check valve assembly to the suction elbow with the "victaulic" coupling. Be sure the rubber gasket is properly seated and not damaged.

Reach through the access opening and check the operation of the check valve to insure proper seating and free movement.

Replace the access cover gasket and secure the cover using the clamps and cover screws.

Reinstall the suction and discharge piping.

Before starting the pump, make certain the pump and power source are properly aligned, the piping is secure, the volute filled with liquid, and all connecting valves are open.

PRESSURE RELIEF VALVE MAINTENANCE

The suction elbow is equipped with a pressure relief valve (68) to provide additional safety for the pump and operator. (Refer to Liquid Temperature And Overheating in OPERATION.)

It is recommended that the pressure relief valve assembly be replaced at each overhaul, or any time the pump overheats and activates the valve. Never replace this valve with a substitute which has not been specified or provided by the Gorman-Rupp Company.

Periodically, the valve should be removed for inspection and cleaning. When reinstalling the relief valve, apply 'Loctite Pipe Sealant with Teflon #92', or equivalent compound, on the relief valve threads. Position the valve as shown in Figure 1 with the discharge port directed down.

LUBRICATION

Seal Assembly

Before starting the pump, remove the air vent fitting from the top of the sight gauge assembly (83) and fill the reservoir with S.A.E. #30 non-detergent oil. The oil level must be maintained above the oil level indicated, or at least 2 inches of oil from the bottom of the glass. Clean and reinstall the air vent fitting.

Periodically, clean and reinstall the seal cavity air vent (23).

Bearings

The bearing housing oil level must be maintained at the midpoint of the oil level sight gauge (34).

When oil is required, remove the pedestal air vent (24), and fill the bearing housing with a good grade of non-detergent SAE No. 30 motor oil to the midpoint of the oil level sight gauge. Clean and reinstall the pedestal air vent. Do not overfill. Overfilling will cause excessive heat resulting in shortened bearing life.

Under normal conditions, change the oil each 5000 hours of operation, or at 12 month intervals, whichever occurs first. In dirty or humid conditions change more frequently.

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

**For U.S. and International Warranty Information,
Please Visit www.grpumps.com/warranty**

or call:

U.S.: 419-755-1280

International: +1-419-755-1352

**For Canadian Warranty Information,
Please Visit www.grcanada.com/warranty**

or call:

519-631-2870