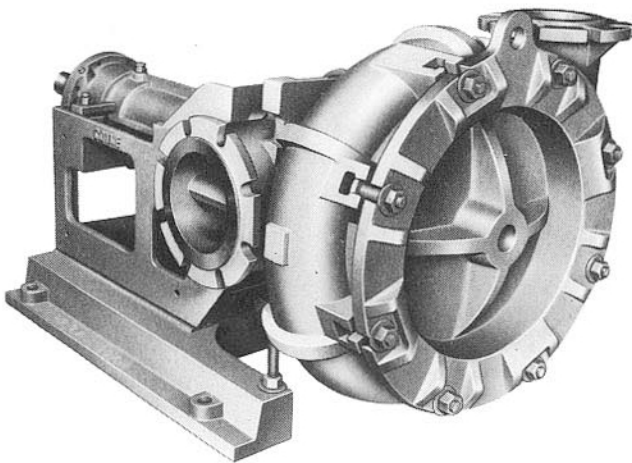
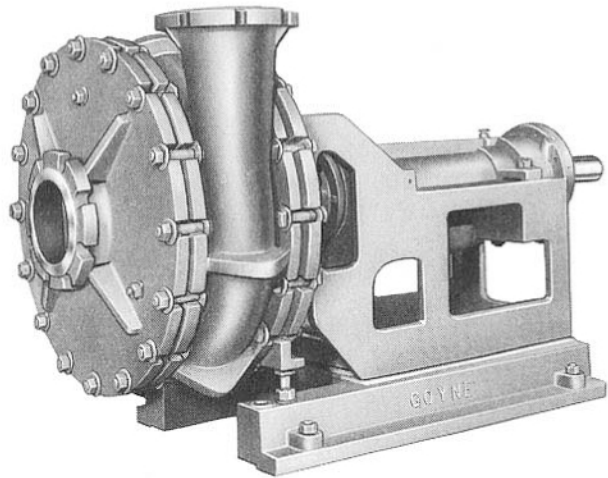




GOULDS PUMPS

Installation, Operation and Maintenance Instructions

**MODEL 5050
End Suction Pump**



**MODEL 5000
Side Suction Pump**



ITT

IMPORTANT SAFETY NOTICE

To: Our Valued Customers

User safety is a major focus in the design of our products. Following the precautions outlined in this manual will minimize your risk of injury.

ITT Goulds pumps will provide safe, trouble-free service when properly installed, maintained, and operated.

Safe installation, operation, and maintenance of ITT Goulds Pumps equipment are an essential end user responsibility. This *Pump Safety Manual* identifies specific safety risks that must be considered at all times during product life. Understanding and adhering to these safety warnings is mandatory to ensure personnel, property, and/or the environment will not be harmed. Adherence to these warnings alone, however, is not sufficient — it is anticipated that the end user will also comply with industry and corporate safety standards. Identifying and eliminating unsafe installation, operating and maintenance practices is the responsibility of all individuals involved in the installation, operation, and maintenance of industrial equipment.

Please take the time to review and understand the safe installation, operation, and maintenance guidelines outlined in this Pump Safety Manual and the Instruction, Operation, and Maintenance (IOM) manual. Current manuals are available at www.gouldspumps.com/literature_ioms.html or by contacting your nearest Goulds Pumps sales representative.

These manuals must be read and understood before installation and start-up.

For additional information, contact your nearest Goulds Pumps sales representative or visit our Web site at www.gouldspumps.com.

SAFETY WARNINGS

Specific to pumping equipment, significant risks bear reinforcement above and beyond normal safety precautions.

 **WARNING**

A pump is a pressure vessel with rotating parts that can be hazardous. Any pressure vessel can explode, rupture, or discharge its contents if sufficiently over pressurized causing death, personal injury, property damage, and/or damage to the environment. All necessary measures must be taken to ensure over pressurization does not occur.

 **WARNING**

Operation of any pumping system with a blocked suction and discharge must be avoided in all cases. Operation, even for a brief period under these conditions, can cause superheating of enclosed pumpage and result in a violent explosion. All necessary measures must be taken by the end user to ensure this condition is avoided.

 **WARNING**

The pump may handle hazardous and/or toxic fluids. Care must be taken to identify the contents of the pump and eliminate the possibility of exposure, particularly if hazardous and/or toxic. Potential hazards include, but are not limited to, high temperature, flammable, acidic, caustic, explosive, and other risks.

 **WARNING**

Pumping equipment Instruction, Operation, and Maintenance manuals clearly identify accepted methods for disassembling pumping units. These methods must be adhered to. Specifically, applying heat to impellers and/or impeller retaining devices to aid in their removal is strictly forbidden. Trapped liquid can rapidly expand and result in a violent explosion and injury.

ITT Goulds Pumps will not accept responsibility for physical injury, damage, or delays caused by a failure to observe the instructions for installation, operation, and maintenance contained in this Pump Safety Manual or the current IOM available at www.gouldspumps.com/literature.

SAFETY

DEFINITIONS

Throughout this manual the words **WARNING**, **CAUTION**, **ELECTRICAL**, and **ATEX** are used to indicate where special operator attention is required.

Observe all Cautions and Warnings highlighted in this Pump Safety Manual and the IOM provided with your equipment.



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Example: Pump shall never be operated without coupling guard installed correctly.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Example: Throttling flow from the suction side may cause cavitation and pump damage.




ELECTRICAL HAZARD

Indicates the possibility of electrical risks if directions are not followed.

Example: Lock out driver power to prevent electric shock, accidental start-up, and physical injury.









When installed in potentially explosive atmospheres, the instructions that follow the Ex symbol must be followed. Personal injury and/or equipment damage may occur if these instructions are not followed. If there is any question regarding these requirements or if the equipment is to be modified, please contact an ITT Goulds Pumps representative before proceeding.














Example:  Improper impeller adjustment could cause contact between the rotating and stationary parts, resulting in a spark and heat generation.



GENERAL PRECAUTIONS

WARNING

A pump is a pressure vessel with rotating parts that can be hazardous. Hazardous fluids may be contained by the pump including high temperature, flammable, acidic, caustic, explosive, and other risks. Operators and maintenance personnel must realize this and follow safety measures. Personal injuries will result if procedures outlined in this manual are not followed. ITT Goulds Pumps will not accept responsibility for physical injury, damage or delays caused by a failure to observe the instructions in this manual and the IOM provided with your equipment.

General Precautions		
WARNING		NEVER APPLY HEAT TO REMOVE IMPELLER. It may explode due to trapped liquid.
WARNING		NEVER use heat to disassemble pump due to risk of explosion from tapped liquid.
WARNING		NEVER operate pump without coupling guard correctly installed.
WARNING		NEVER run pump below recommended minimum flow when dry, or without prime.
WARNING		ALWAYS lock out power to the driver before performing pump maintenance.
WARNING		NEVER operate pump without safety devices installed.
WARNING		NEVER operate pump with discharge valve closed.
WARNING		NEVER operate pump with suction valve closed.
WARNING		DO NOT change service application without approval of an authorized ITT Goulds Pumps representative.
WARNING		<p>Safety Apparel:</p> <ul style="list-style-type: none"> ♦ Insulated work gloves when handling hot bearings or using bearing heater ♦ Heavy work gloves when handling parts with sharp edges, especially impellers ♦ Safety glasses (with side shields) for eye protection ♦ Steel-toed shoes for foot protection when handling parts, heavy tools, etc. ♦ Other personal protective equipment to protect against hazardous/toxic fluids
WARNING		<p>Receiving:</p> <p>Assembled pumping units and their components are heavy. Failure to properly lift and support equipment can result in serious physical injury and/or equipment damage. Lift equipment only at specifically identified lifting points or as instructed in the current IOM. Current manuals are available at www.gouldspumps.com/literature_ioms.html or from your local ITT Goulds Pumps sales representative. Note: Lifting devices (eyebolts, slings, spreaders, etc.) must be rated, selected, and used for the entire load being lifted.</p>
WARNING		<p>Alignment:</p> <p>Shaft alignment procedures must be followed to prevent catastrophic failure of drive components or unintended contact of rotating parts. Follow coupling manufacturer's coupling installation and operation procedures.</p>

General Precautions		
WARNING		Before beginning any alignment procedure, make sure driver power is locked out. Failure to lock out driver power will result in serious physical injury.
CAUTION		Piping: Never draw piping into place by forcing at the flanged connections of the pump. This may impose dangerous strains on the unit and cause misalignment between pump and driver. Pipe strain will adversely effect the operation of the pump resulting in physical injury and damage to the equipment.
WARNING		Flanged Connections: Use only fasteners of the proper size and material.
WARNING		Replace all corroded fasteners.
WARNING		Ensure all fasteners are properly tightened and there are no missing fasteners.
WARNING		Startup and Operation: When installing in a potentially explosive environment, please ensure that the motor is properly certified.
WARNING		Operating pump in reverse rotation may result in contact of metal parts, heat generation, and breach of containment.
WARNING		Lock out driver power to prevent accidental start-up and physical injury.
WARNING		The impeller clearance setting procedure must be followed. Improperly setting the clearance or not following any of the proper procedures can result in sparks, unexpected heat generation and equipment damage.
WARNING		If using a cartridge mechanical seal, the centering clips must be installed and set screws loosened prior to setting impeller clearance. Failure to do so could result in sparks, heat generation, and mechanical seal damage.
WARNING		The coupling used in an ATEX classified environment must be properly certified and must be constructed from a non-sparking material.
WARNING		Never operate a pump without coupling guard properly installed. Personal injury will occur if pump is run without coupling guard.
WARNING		Make sure to properly lubricate the bearings. Failure to do so may result in excess heat generation, sparks, and / or premature failure.
CAUTION		The mechanical seal used in an ATEX classified environment must be properly certified. Prior to start up, ensure all points of potential leakage of process fluid to the work environment are closed.
CAUTION		Never operate the pump without liquid supplied to mechanical seal. Running a mechanical seal dry, even for a few seconds, can cause seal damage and must be avoided. Physical injury can occur if mechanical seal fails.
WARNING		Never attempt to replace packing until the driver is properly locked out and the coupling spacer is removed.
WARNING		Dynamic seals are not allowed in an ATEX classified environment.
WARNING		DO NOT operate pump below minimum rated flows or with suction and/or discharge valve closed. These conditions may create an explosive hazard due to vaporization of pumpage and can quickly lead to pump failure and physical injury.

General Precautions		
WARNING		Ensure pump is isolated from system and pressure is relieved before disassembling pump, removing plugs, opening vent or drain valves, or disconnecting piping.
WARNING		Shutdown, Disassembly, and Reassembly: Pump components can be heavy. Proper methods of lifting must be employed to avoid physical injury and/or equipment damage. Steel toed shoes must be worn at all times.
WARNING		The pump may handle hazardous and/or toxic fluids. Observe proper decontamination procedures. Proper personal protective equipment should be worn. Precautions must be taken to prevent physical injury. Pumpage must be handled and disposed of in conformance with applicable environmental regulations.
WARNING		Operator must be aware of pumpage and safety precautions to prevent physical injury.
WARNING		Lock out driver power to prevent accidental startup and physical injury.
CAUTION		Allow all system and pump components to cool before handling them to prevent physical injury.
CAUTION		If pump is a Model NM3171, NM3196, 3198, 3298, V3298, SP3298, 4150, 4550, or 3107, there may be a risk of static electric discharge from plastic parts that are not properly grounded. If pumped fluid is non-conductive, pump should be drained and flushed with a conductive fluid under conditions that will not allow for a spark to be released to the atmosphere.
WARNING		Never apply heat to remove an impeller. The use of heat may cause an explosion due to trapped fluid, resulting in severe physical injury and property damage.
CAUTION		Wear heavy work gloves when handling impellers as sharp edges may cause physical injury.
CAUTION		Wear insulated gloves when using a bearing heater. Bearings will get hot and can cause physical injury.

ATEX CONSIDERATIONS and INTENDED USE

Special care must be taken in potentially explosive environments to ensure that the equipment is properly maintained. This includes but is not limited to:

1. Monitoring the pump frame and liquid end temperature.
2. Maintaining proper bearing lubrication.
3. Ensuring that the pump is operated in the intended hydraulic range.

The ATEX conformance is only applicable when the pump unit is operated within its intended use. Operating, installing or maintaining the pump unit in any way that is not covered in the Instruction, Operation, and Maintenance manual (IOM) can cause serious personal injury or damage to the equipment. This includes any modification to the equipment or use of parts not provided by ITT Goulds Pumps. If there is any question regarding the intended use of the equipment, please contact an ITT Goulds representative before proceeding. Current IOMs are available at www.gouldspumps.com/literature_ioms.html or from your local ITT Goulds Pumps Sales representative.

All pumping unit (pump, seal, coupling, motor and pump accessories) certified for use in an ATEX classified environment, are identified by an ATEX tag secured to the pump or the baseplate on which it is mounted. A typical tag would look like this:



The CE and the Ex designate the ATEX compliance. The code directly below these symbols reads as follows:

- II = Group 2
- 2 = Category 2
- G/D = Gas and Dust present
- T4 = Temperature class, can be T1 to T6 (see Table 1)

Code	Max permissible surface temperature °F (°C)	Max permissible liquid temperature °F (°C)
T1	842 (450)	700 (372)
T2	572 (300)	530 (277)
T3	392 (200)	350 (177)
T4	275 (135)	235 (113)
T5	212 (100)	Option not available
T6	185 (85)	Option not available

The code classification marked on the equipment must be in accordance with the specified area where the equipment will be installed. If it is not, do not operate the equipment and contact your ITT Goulds Pumps sales representative before proceeding.

PARTS



The use of genuine Goulds parts will provide the safest and most reliable operation of your pump. ITT Goulds Pumps ISO certification and quality control procedures ensure the parts are manufactured to the highest quality and safety levels.

Please contact your local Goulds representative for details on genuine Goulds parts.

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SECTION I — GENERAL

INTRODUCTION

This instruction manual is intended to assist those involved with the installation, operation and maintenance of Goyne Model 5000 Side Suction and Model 5050 End Suction pumps. It is recommended that this manual be thoroughly reviewed prior to installing or performing any work on the pump or motor.

I-A. IMPORTANCE OF INSTRUCTIONS

The design, material and workmanship incorporated in the construction of Goyne pumps make them capable of giving long, trouble-free service. The life and satisfactory service of any mechanical unit, however, is enhanced and extended by periodic inspection and careful maintenance. This instruction manual was prepared to assist operators in understanding the construction and correct methods of installing, operating, and maintaining these pumps.

Study thoroughly Sections I, II, III, IV, and carefully follow the instructions for installation and operation. Sections V, VI, VII, and VIII are answers to trouble and maintenance questions. Keep this instruction manual handy for reference. Further information can be obtained by contacting Goyne Pump Div., Ashland, Pennsylvania, 17921, or your local Representative.

I-B. SPECIAL WARNINGS

Goyne Pump Div. will not be liable for any damages or delay caused by failure to comply with the pro-

visions of this instruction manual. This pump is not to be operated at speeds, working pressures, discharge pressures, or temperatures higher than, nor used with liquids other than, stated in the original order acknowledgment without written permission of Goyne Pump Division.

I-C. RECEIVING INSPECTION — SHORTAGES

Care should be taken when unloading pumps. If shipment is not delivered in good order and in accordance with the bill of lading, note the damage or shortage on both receipt and freight bill. **MAKE ANY CLAIMS TO THE TRANSPORTATION COMPANY PROMPTLY.**

I-D. PRESERVATION AND STORAGE

Goyne's normal domestic shipping and storage preparation is suitable for protecting the pump during shipment in covered trucks. It also provides protection during covered storage at the jobsite and for a short period between installation and start-up. If the pump is to be idle and exposed to the elements for an extended period, either before or after installation, special precautions are required. One approach is to provide special preservatives and wrapping before shipment. However, after installation the protective wrappings will have been removed. Therefore, application of preservatives after installation is considered a good practice.

SECTION II — INSTALLATION INSTRUCTIONS

Horizontal Pumps

II-A. FOUNDATION

The foundation must be sufficiently substantial and level to give rigid support to the pump and to absorb any vibration. When necessary to support the pump on a steel structure, the unit must be placed as close as possible to main supports.

Foundation bolts which are $\frac{1}{8}$ " less in diameter than the pump base holes (size is shown on the certified dimension drawing) should be used.

II-B. SUCTION PIPE

CAUTION:
Provision must be made to support suction and discharge piping independently from the pump to prevent excessive nozzle loads and maintain pump-driver alignment.

Locate the pump as close to the sump as practical so that a short suction line, with the least number of elbows and fittings, may be used. When elbows are required, they must be the long radius type and located as far as possible from the pump.

Suction piping should never be smaller than the pump suction. If the velocity of the water at the suction pipe inlet is too high, a vortex (whirlpool) is created which pulls air into the suction pipe and on into the pump. Sometimes a rib at the suction pipe entrance will control this situation.

The pipe must be supported independently near the pump to prevent any strain being transmitted to the pump.

The suction line must be air-tight to prevent air leaks which can prevent proper operation of the pump.

If the suction line is horizontal, it must have a gradual rise to the pump. If a reducer is used, it must be an eccentric reducer with the straight side on the top. If a gate valve is used, it must be installed so that the stem is horizontal. The above precautions must be followed in order to eliminate any high points in the line which will fill with air. An air pocket in the line can cause loss of prime at start-up, it can restrict the flow and cause a loss of capacity, and it may become serious enough to cause cavitation in the pump.

Slurry entering the sump may carry air with it to the suction inlet and on into the pump. The slurry entrance point at the sump should be as far as possible from the pump suction and a baffle should be installed to help alleviate the air.

Either the suction pipe intake should be equipped with a strainer or the sump should be screened in order to prevent oversize particles from entering and blocking the pump.

II-C. DISCHARGE PIPE

The pipe must be supported independently near the pump to prevent any strain being transmitted to the pump.

Arrangements should be made to keep the pump from back-spinning severely during shutdown. On a long discharge line a non-slam check valve should be installed. At no point should the pump be started while the impeller is in reverse rotation.

II-D. V-BELT DRIVES

Well designed and properly installed V-belt drives are capable of running for years without maintenance. There are a few points that should be checked periodically.

1. Check Belt Fit

Regardless of the belt section used, the belt should never be allowed to bottom in the groove. This will cause the belts to lose their wedging action and slippage can occur. Sheaves or belts that permit such a condition to occur should be changed.

2. Keep Belts Clean

Dirt and grease reduce belt life. Belt dressing affects performance only temporarily and is never recommended. Maintaining a clean drive is a better idea.

3. Use Belt Guards

Belt guards protect personnel from danger and the

drive from contamination. Inspect periodically to assure that belts do not rub against guard.

4. Maintain Proper Belt Tension

Proper tension is the primary reason for long belt life. Improper tension could cause belt fatigue and/or hot bearings.

5. Sheave Alignment

Alignment must be maintained for full power transmission, minimum vibration, and long drive life.

If any questions arise pertaining to the drive limitations, consult the manufacturer.

II-E. DIRECT CONNECTION

WARNING:

The unit must not be operated unless coupling guard is in place. Failure to observe this warning could result in personal injury to operating personnel.

Check parallel alignment by placing a straight edge across the two coupling flanges. Check angular alignment with a micrometer or caliper. Measure from the outside of one flange to the outside of the other at intervals around the periphery of the coupling.

CAUTION:

The permissible amount of mis-alignment will vary with the coupling type. Follow the manufacturer's recommendations.

II-F. STUFFING BOX

Goyne horizontal pumps are properly packed at the factory. The packing gland is left finger-tight and may require adjustment during start-up. Refer to Section III for stuffing box adjustment.

SECTION III — STARTING A HORIZONTAL PUMP

Before starting a new pump, check the pump foundation and piping to be certain that they conform to the specifications in the "Installation Instructions" Section.

Remove the bearing housing oil drain plug and drain the oil which is used in assembly. Replace the oil drain plug and fill the bearing housing until the oil starts to come out of the oil level tap and then replace the plug. USE AN S.A.E. NO. 90 EXTREME PRESSURE WINTER OIL for year-round use in heated buildings. Use S.A.E. No. 30 motor oil in unheated buildings.

Turn the pump shaft by hand. If the pump does not turn freely, it should be checked to determine what is causing the binding.

The pump should be readjusted before start-up to assure proper positioning of the impeller and provide maximum efficiency. Refer to Section IV for impeller adjustment.

Check the motor rotation to be certain that it will drive the pump in the correct direction.

NOTE:

Packing glands must never be tightened to the point where leakage from the packing is stopped. A small amount of leakage is required for lubrication of the packing. Shutting off leakage flow from the packing will result in burned packing and scored shaft sleeves.

Be sure that the water line is connected to the packing box and the proper pressure and flow exist to lubricate the packing. See Figure 1 for the water requirements. The packing gland should be adjusted so that some fresh water is always dripping from the stuffing box. If the packing becomes hot, loosen the gland allowing more water to cool the box. After a few hours of running time, the gland may be brought up to a proper leakage rate.

The bearing housing seals may generate some heat until broken in. Oil may be applied to them if the heat becomes excessive at the time the pump is started.

If the pump is equipped with a heavy duty bearing housing with cooling jackets, be sure to have the cooling water line in operation. Figure 2 illustrates the method of piping to the cooling jackets. Cooling water capacities are also listed.

The pump must be primed. Be certain that all air is out of the pump before attempting to start. With a suction lift, it will be necessary to use an air ejector or vacuum pump to effect the prime.

Do not operate the pump with a closed discharge line. At the shut-off point, with no water flow, the horsepower delivered to the pump is rapidly converted into heat and presents a great danger.

WARNING:
Do not operate the pump without proper drive guard in place.

CAUTION:
When operating for some time at reduced capacity, much of the pump horsepower will go into the liquid in the form of heat. A bypass must be provided under these conditions to prevent the liquid in the pump from becoming hot enough to vaporize.

PRESSURE					
Side Suction Pump				$PSI = \frac{\text{Net static head} \times \text{slurry sp. gr.} \times 1.1 \text{ safety factor}}{2.31}$	
End Suction Pump				PSI = Pump Discharge Pressure	
CAPACITY					
Pump Size				Leakage to Pump Gallons/Hour	Total Water Consumption Gallons/Hour
3" x 3" x 12" 3" x 4" x 12" 3" x 3" x 14½" 3" x 4" x 14½" 4" x 4" x 12" 4" x 5" x 12" 4" x 4" x 14½" 4" x 5" x 14½"				9	18
4" x 4" x 18" 4" x 6" x 18" 5" x 6" x 15" 6" x 6" x 17½"				11	22
4" x 4" x 21½" 4" x 6" x 21½" 6" x 6" x 21½" 6" x 8" x 17½" 6" x 8" x 21" 8" x 8" x 17½" 8" x 10" x 17½"				17	34
10" x 12" x 15"				20	40
6" x 6" x 27¼" 6" x 8" x 27¼" 8" x 10" x 21" 10" x 10" x 26" 10" x 12" x 21"				26	52
10" x 12" x 27" 12" x 12" x 21¾" 14" x 16" x 25" 12" x 14" x 21¾" 10" x 12" x 34"				33	66

Figure 1 — PACKING BOX WATER REQUIREMENTS

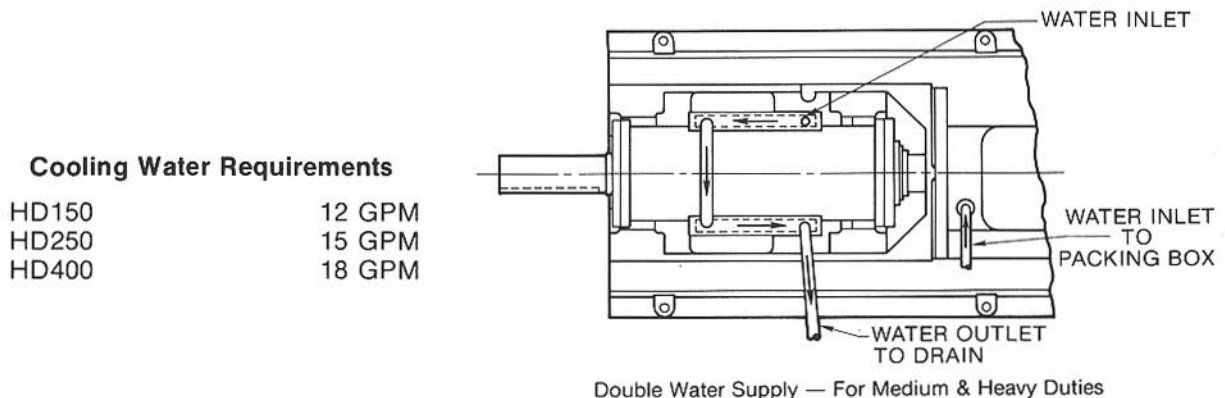


Figure 2 — HEAVY DUTY BEARINGS

SECTION IV — OPERATING AND MAINTENANCE INSTRUCTIONS

IV-A. LUBRICATION

Heavy duty roller bearings carry both radial and thrust loads. Check the oil level when the pump is stopped. Flush the bearings and the bearing housing occasionally with hot light oil, rotating shaft by hand and then drain thoroughly before adding new oil. For lubricating the bearings, ALWAYS USE AN S.A.E. NO. 90 EXTREME PRESSURE WINTER OIL, similar to that used for automotive transmission lubrication. Change oil every 1000 hrs. or sooner if conditions dictate.

WARNING:

Operation of the unit without proper lubrication can result in overheating of the bearings, bearing failures, pump seizures and actual breakup of the equipment exposing operating personnel to personal injury.

IV-B. SEALS

The bearing housing seals may generate some heat until broken in. Oil may be applied to them if the heat becomes excessive at the time the pump is started.

IV-C. PACKING BOX

Almost all Goyne pumps require $\frac{1}{2}$ " square graphite asbestos packing. The exceptions are: 3" x 3" x 12", 3" x 4" x 12", 3" x 3" x 14 $\frac{1}{2}$ ", 3" x 4" x 14 $\frac{1}{2}$ ", 4" x 4" x 12", 4" x 5" x 12", 4" x 4" x 14 $\frac{1}{2}$ ", 4" x 5" x 14 $\frac{1}{2}$ ", 3" x 4" x 13". They use $\frac{3}{8}$ " square graphite asbestos packing.

1. Side Suction (See Figure 3) 5000 Series

Sketch "C" shows a typical packing box assembly. Two rings of packing are inserted into the bottom of the packing box, followed by the lantern ring (105) and then additional rings of packing are inserted to fill the packing box. The gland (107) is then inserted to retain the packing. Periodic adjustment of the gland will prevent excessive leakage of water from the packing box.

Sketch "CV" is similar to "C" type but has a rotating excluder ring (125A) to protect the packing when the pump is not operating and gland water is shut off. The ring is self-adjusting.

Adjustment of the rotating assembly toward the rear head will move the excluder ring (125A), from the stuffing box bushing (125). After the worn impeller and casing ring are removed and after the rotating assembly has been adjusted toward the rear head preparatory to installing the new impeller and casing ring, the excluder ring (125A), should be inspected and if in satisfactory condition, pushed along the shaft sleeve until it contacts the stuffing box bushing.

Following the installation of the new impeller and casing ring, the excluder ring will maintain its correct position during subsequent adjustments for wear between impeller face and casing ring face.

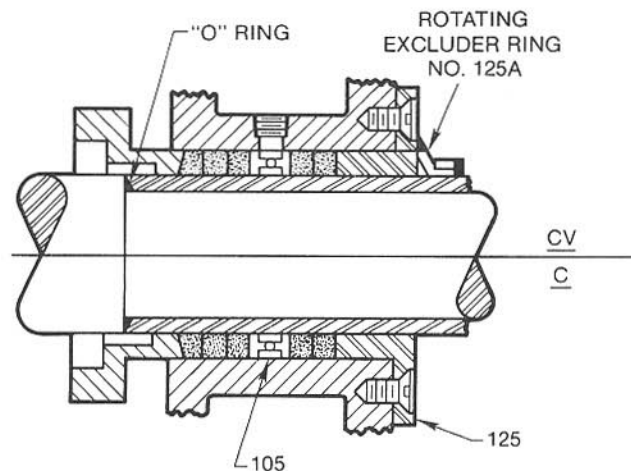


Figure 3 — SIDE SUCTION — 5000 SERIES

2. End Suction (See Figure 4) 5050 Series

The stuffing box bushing (125) is inserted in the bottom of the packing box cover (184), followed by four rows of packing (three rows for pumps using $\frac{3}{8}$ " packing, see above list), the lantern ring (105) and then additional rows of packing until the box is full. The gland (107) is then inserted to retain the packing. Periodic adjustment of the gland will prevent excessive leakage of water from the packing box.

To the tap which feeds into the lantern ring, supply clear water from an outside source at a pressure approximately the same as the pump discharge pressure. (Our tests indicate the pressure on the packing box to be approximately $\frac{2}{3}$ of the discharge pressure.)

Convey the clear water for sealing through a pipe of $\frac{1}{2}$ " inside diameter or larger. Insufficient water or pressure will permit grit to enter the packing box and cause added wear on the shaft sleeve.

There are four pipe taps on the packing box. Two are available for gland flushing and packing box lubrication. They are the ones closest to the shaft. Attach

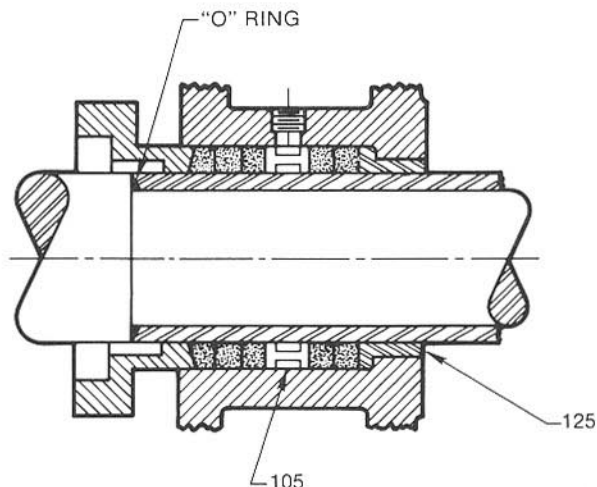


Figure 4 — END SUCTION — 5050 SERIES

the gland water line to the tap that is more readily available and leave the other plugged.

The other two pipe taps lead to the area between the stuffing box bushing (125) and the impeller (101). Depending on the material being pumped, it may be necessary to supply clear water to this area periodically, in order to flush away the solids. Otherwise, leave them plugged.

IV-D. MAINTAINED CAPACITY

The amount of liquid being pumped will lessen as wear occurs between the faces of the impeller and wear ring. To maintain full pump capacity, the impeller clearance must be adjusted periodically. Each application is different and it is necessary to determine the amount of wear for a certain time limit before setting up a schedule for adjustment.

1. Impeller Clearance Adjustment — Side Suction 5000 Series

(a) Loosen the two nuts on the housing locking studs (370C) in the bottom of the bearing housing (134A).

(b) Back off the lock nut on the adjusting bolt (370D).

(c) Turn the adjusting bolt to move the bearing housing and shaft assembly toward the drive end of the pump until the face of the impeller (101) gently touches the face of the casing ring (103).

(d) Turn the adjusting bolt in the opposite direction, approximately one-fourth turn, to provide the correct operating clearance between the faces of the impeller and casing ring. Make sure the impeller turns freely through the entire rotation.

(e) Lock the adjusting bolt and bearing housing locking nuts in this position. For proper adjustment, this should be done when the pump is not running.

2. Impeller Clearance Adjustment — End Suction 5050 Series

(a) Loosen the two (2) nuts on the housing locking studs (370C) in the bottom of the bearing housing (134A).

(b) Back off the lock nut on the adjusting bolt (370D).

(c) Turn the adjusting bolt to move the bearing housing and shaft assembly toward the suction end of the pump until the face of the impeller (101) gently touches the face of the suction liner (100B).

(d) Turn the adjusting bolt in the opposite direction approximately one-fourth turn to provide the correct operating clearance. Make sure the impeller runs free of the suction liner by rotating one (1) full turn by hand.

(e) Lock the adjusting bolt and bearing housing locking nuts in this position.

For proper adjustment, this should be done when the pump is not running.

IV-E. GASKETS

When making inspections or repairs, be sure to replace all gaskets. Pumps will frequently operate at reduced capacities if the casing ring gasket (or suction liner gasket in 5050 series), or the shaft gaskets on both sides of the impeller are not installed.

SECTION V — DISASSEMBLY AND REASSEMBLY

V-A. DISASSEMBLY OF HORIZONTAL SIDE SUCTION PUMP

1. Lock out power supply to motor.

2. Shut off valves controlling flow to and from pump. Remove all auxiliary piping and tubing.

3. Loosen V-belts or disconnect coupling. Remove either from shaft.

4. Drain oil.

5. Unbolt split packing gland (107) to loosen packing.

6. Loosen rear head (100A) and drain pump.

7. Remove rear head (100A) and rear head gasket (351).

8. Remove impeller locking capscrew (198) and impeller nut (304). The impeller nut has right-hand threads and the locking capscrew has left-hand threads.

9. Thread impeller puller onto shaft and insert pulling rods into the two corresponding slots on the impeller hub. Rotate the puller slightly to engage the tips of the rods and pull the impeller from the shaft.

10. Remove fiber gaskets (211, 360R) from between impeller nut, impeller, and sleeve.

11. Unbolt casing ring studs and nuts (370H) and remove casing ring (103) with rubber gasket (360D).

12. If included, remove excluder ring (125A) from shaft sleeve (126).

13. Slide shaft sleeve (126) from shaft (122).

14. Unbolt and remove volute casing (100) with rubber gasket (360).

15. Unbolt and remove suction head (182) from frame (228A).

16. From the suction head, remove stuffing box bushing, packing, lantern ring (105) and packing gland (107).

17. Unlock adjusting bolt (370D), loosen bearing housing clips on each side of the frame, and remove housing locking studs (370C).

18. Lift bearing housing and shaft assembly as a unit from the frame (228A).

19. Unbolt the frame (228A) from the sub-base (307) when used.

V-B. DISASSEMBLY OF HORIZONTAL END SUCTION PUMP

1. Lock out power supply to motor.
2. Shut off valves controlling flow to and from pump. Remove all auxiliary piping and tubing.
3. Loosen V-belts or disconnect coupling. Remove either from shaft.
4. Drain oil.
5. Unbolt split packing gland (107) to loosen packing.
6. By means of a dresser coupling, unbolt and remove a section of the suction pipe. Drain pump.
7. Unbolt and remove suction head (182) with suction liner (100B) attached.
8. Suction liner may be removed from suction head by removing liner studs and nuts (370J).
9. Remove impeller locking capscrew (198) and impeller nut (304). The impeller nut has right-hand threads and the locking capscrew has left-hand threads.
10. Thread shaft extension onto shaft (122). Pull impeller from the shaft.
11. Remove fiber gaskets (211, 360R) from between impeller nut, impeller, and sleeve.
12. Unbolt casing ring studs and nuts (370H) and remove casing ring (103) with rubber gasket (360D).
13. Slide shaft sleeve (126) from shaft (122).
14. Unbolt and remove volute casing (100) with rubber gasket (360).
15. Unbolt and remove packing box cover (184) from frame (228A).
16. From packing box, remove stuffing box bushing (125), packing, lantern ring (105), and split packing gland (107).
17. Unlock adjusting bolt (370D), loosen bearing housing clips on each side of the frame, and remove housing locking studs (370C).
18. Lift bearing housing and shaft assembly as a unit from the frame (228A).
19. Unbolt the frame (228A) from the sub-base (307) when used.

V-C. DISASSEMBLY OF BEARING HOUSING AND SHAFT ASSEMBLY STANDARD BEARINGS

1. Remove deflector (123).
2. Remove end cover (109A).
3. Remove pipe plugs and loosen set screws, retaining bearing adjusting ring (518).
4. Unscrew bearing adjusting ring (518).

5. Using an acceptable bearing puller or press, remove the outboard bearing (112A) from the bearing housing (134A).
6. Remove end cover (119A).
7. Pull shaft with inboard bearing (168A) from the bearing housing (134A).
8. Using an acceptable bearing puller, remove the inboard bearing (168A) from the shaft (122).
9. Remove oil seals (332A, 333A) from the bearing housing caps.

NOTE:

Whenever bearings are to be removed from the shaft, always have spare bearings on hand.

V-D. DISASSEMBLY OF BEARING HOUSING AND SHAFT ASSEMBLY HEAVY DUTY BEARINGS

1. Remove deflector (123).
2. Remove end covers (119A, 109A) from bearing housing (134A).
3. Remove pipe plugs and loosen set screws, retaining bearing adjusting ring (518).
4. At the drive end of the bearing housing (134A), remove the outboard bearing positioning bolt.
5. Unscrew bearing adjusting ring (518).
6. Carefully remove shaft (122) with both bearings from the bearing housing (134A).
7. Inspect bearings completely. If bearings and shaft are in good condition, do not disassemble.
8. To remove bearings, straighten tang in lock washers and remove bearing lock nuts (140) & (136). Remove bearings (168A, 112A) with an acceptable bearing puller. (Note: On HD400 bearings remove oil slinger if necessary.)
9. Remove oil seals (332A, 333A) from the bearing housing caps.

NOTE:

Whenever bearings are to be removed from the shaft, always have spare bearings on hand.

V-E. INSPECTION AND PARTS REPLACEMENT GUIDELINES

1. Impeller — Replace if impeller shows excessive erosion, corrosion, extreme wear, or vane breakage. Keyway and impeller hub must be in good condition. Reduction in hydraulic performance may be caused by excessive impeller wear, especially along the wear ring mating surface. Replace if impeller adjustment is gone.
2. Suction Liner/5050 — Casing Ring/5000 — Replace if impeller mating surface is worn flush.

3. Shaft Sleeve — Sleeve surface in stuffing box must be smooth. If badly grooved or cut, replace.
4. Volute Casing — Suction Head — Replace if worn.
5. Shaft — Check for runout (.006" max.) to see that shaft has not been bent. Bearing seats and oil seal area must be smooth and free of scratches or grooves. Shaft threads must be in good condition. Impeller to shaft fit should not exceed .006". Replace if necessary.

CAUTION:

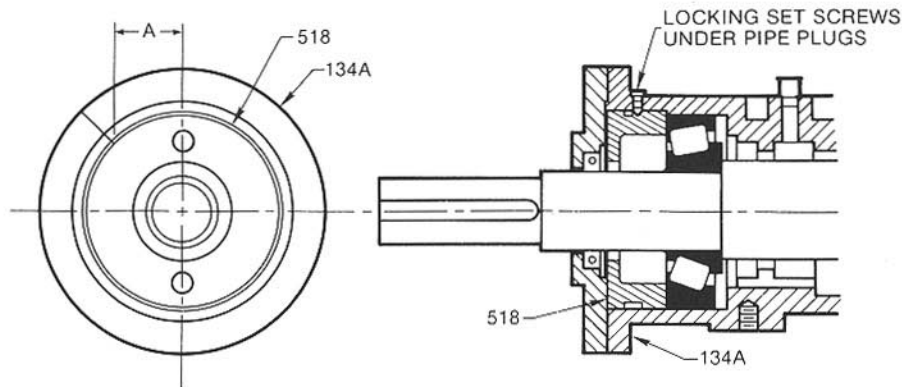
It is important that, if bearing replacement is required, the new bearings installed be of the same brand and construction as the bearings that were installed at the factory.

Despite manufacturers' claims, there is a difference in load-carrying capacity and life characteristics between different brands of manufacturers.

6. Bearings — Replace if worn, loose or rough and noisy when rotated.
7. Oil Seals — Replace if worn or otherwise damaged.
8. General — All parts should be clean before assembly. All burrs should be removed.

V-F. REASSEMBLY OF BEARING HOUSING AND SHAFT ASSEMBLY STANDARD BEARINGS

1. Clean shaft (122) thoroughly, checking for nicks or worn areas.
2. Press oil seals (332A, 333A) into both bearing caps (119A, 109A).
3. Press inboard bearing (168A) onto impeller end of shaft.
4. Insert shaft (122) with inboard bearing (168A) into the bearing housing (134A) and attach end cover (119A). Use a suitable shim stock to avoid damaging oil seal.
5. Press outboard bearing (112A) onto drive end of shaft.
6. Screw bearing adjusting ring (518) into bearing housing (134A) by hand, until snug.
7. Mark position on face of ring and housing.
8. Back off bearing adjusting ring according to tabulated Dimension A. (Figure 5)
9. Tighten locking set screws to hold ring in position and replace pipe plugs.



Pump Size			"A" Dimension
3" x 3" x 12"	3" x 4" x 12"	3" x 3" x 14 1/2"	1"
3" x 4" x 14 1/2"	4" x 4" x 12"	4" x 5" x 12"	
4" x 4" x 14 1/2"	4" x 5" x 14 1/2"	3" x 4" x 13"	
6" x 6" x 27 1/4"	6" x 8" x 27 1/4"	8" x 10" x 21"	2 7/16"
10" x 10" x 26"	10" x 12" x 21"	10" x 12" x 27"	
12" x 12" x 21 3/4"	12" x 14" x 21 3/4"	10" x 12" x 34"	
4" x 4" x 18"	4" x 6" x 18"	4" x 4" x 21 1/2"	2"
4" x 6" x 21 1/2"	6" x 6" x 21 1/2"	5" x 6" x 15"	
6" x 6" x 17 1/2"	6" x 8" x 17 1/2"	6" x 8" x 21"	
8" x 10" x 17 1/2"	10" x 12" x 15"	8" x 8" x 17 1/2"	

Figure 5 — INSTRUCTIONS FOR BEARING ADJUSTMENT

10. Attach end cover (109A) to bearing housing, using suitable shim stock to avoid damaging the seal.

11. Place deflector (123) in front of end cover (119A) and lock in place, using set screws provided.

V-G. REASSEMBLY OF BEARING HOUSING AND SHAFT ASSEMBLY HEAVY DUTY BEARINGS

1. Clean shaft (122) thoroughly, checking for nicks or worn areas. (Note: On HD400 bearings position oil slinger between bearing fits.)

2. Press oil seals (332A, 333A) into both end covers (119A, 109A).

3. Press bearings (168A, 112A) onto shaft (122).

4. Position bearing lock nuts and lock washers (140) against the bearing shoulders. Bend tang of lock washers to engage slot in lock nuts.

5. Place shaft (122) with both bearings into the bearing housing (134A). Position hole in radial bearing race so that the radial bearing positioning bolt will engage properly.

6. Screw bearing adjusting ring (518) into bearing housing (134A) by hand, until snug.

7. Tighten locking set screws to hold ring in position and replace pipe plugs. Insert radial bearing positioning bolt.

8. Attach both end covers (119A, 109A) to bearing housing (134A). Use suitable shim stock to avoid damaging the seals.

9. Place deflector (123) in front of end cover (119A) and lock in place, using set screws provided.

V-H. HORIZONTAL SIDE SUCTION REASSEMBLY INSTRUCTIONS

1. Clean sub-base (307) when used. Place frame (228A) over bolt holes.

2. Tighten bolts firmly. Shim frame (228A) so that no stresses are transmitted to the machined surfaces.

3. Inspect frame saddles for burrs and/or dirt. Clean thoroughly. Place preassembled bearing housing and shaft assembly in saddles of frame (228A).

4. Tape the threaded portion of the shaft (122) to protect from damage.

5. Place lantern ring (105) along the shaft back toward the end cover (119A).

6. Insert suction head (182) into frame (228A) fit. Rotate suction to position desired.

7. Slide shaft sleeve (126) with "O" Ring on shaft after coating shaft with an anti-seizing compound such as "Never Seez" or equal. Make sure the "O" Ring and sleeve butt against the lip of the shaft.

8. Position stuffing box bushing (125) into suction head (182) and attach, using the capscrews provided. Check to see if the shaft sleeve (126) remains free of the stuffing box bushing (125).

9. If "CV" packing is used, press rubber saucer valve (125A) on to shaft sleeve (126), placing it up against the stuffing box bushing (125).

10. Place rubber gasket (360) on suction head, using a slight amount of grease to hold gasket into position. Bolt volute casing (100A) to suction head (182).

11. Screw casing ring studs (370H) into casing ring (103) and place rubber gasket (360D) into position. Use a slight amount of grease to hold gasket into position.

12. Insert casing ring (103) through volute casing (100) and bolt onto suction head (182). Tighten casing ring studs evenly, making sure the gasket (360D) remains in place.

13. Remove protective tape from shaft threads. Place fiber gasket (211) against end of shaft sleeve (126). Position impeller key (178) so that it engages both the gasket and the sleeve.

14. Thread impeller puller onto shaft. Dress shaft and impeller bore fit.

15. Adjust bearing housing and shaft assembly with the adjusting bolt (370D) so that the shaft extends completely into the volute casing (100) area. This will assure proper placement of the impeller (101) on the shaft during the following operations.

16. Slide impeller (101) onto shaft (122), engaging impeller key. Make sure impeller (101) contacts sleeve (126).

17. Place fiber gasket (360R) on impeller nut (304). Apply a light coating of grease on the gasket to eliminate tearing during tightening.

18. Screw impeller nut on threaded portion of shaft. The threads are right-hand. Tighten impeller nut (304), using impeller nut wrench supplied with pump.

19. Insert impeller locking capscrew (198) into end of shaft and tighten. The threads are left-hand.

20. Rotate shaft to assure that all parts are free.

21. Adjust impeller (101), using the adjusting bolt (370D) so that it slightly rubs the casing ring (103). Back off impeller approximately $\frac{1}{32}$ " (or until it turns freely) and lock adjusting bolt (370D) in place.

22. Tighten both housing locking studs (370C) and the bearing housing clamps located on each side of the frame.

23. Place rear head gasket (351) on rear head (100A), using a slight amount of grease to hold in place. Position rear head into the volute casing (100) and bolt it in place. Tighten all bolts evenly so that rear head will not become mis-aligned.

24. Pack pump with standard graphite/asbestos packing. Use $\frac{3}{8}$ " packing on small 3" or 4" pumps and $\frac{1}{2}$ " packing on larger sizes. See section on operating and maintenance instructions for information regarding packing box requirements.

25. Follow procedures listed under, "Starting a Horizontal Pump" for proper lubrication requirements.

Alternate Packing Method

If it becomes necessary to remove the suction head (182), an alternate method of packing the pump may be used.

1. Place suction head on floor with stuffing box bushing (125) attached.
2. Insert shaft sleeve (126) through packing box.
3. Insert packing and lantern ring (105) into suction head, using preassembled gland (107) as a press.
4. Attach gland (107) to suction head (182) with sleeve in place.
5. Slide entire suction head assembly into place.

V-I. HORIZONTAL END SUCTION REASSEMBLY

1. Clean sub-base (307) when used. Place frame (228A) over bolt holes.
2. Tighten bolts firmly, shim frame (228A) so that no stresses are transmitted to the machined surfaces.
3. Inspect frame saddles for burrs and/or dirt. Clean thoroughly. Place reassembled bearing housing and shaft assembly in saddles of frame (228A).
4. Tape the threaded portion of the shaft (122) to protect from damage.
5. Place lantern ring (105) along the shaft back towards the end cover (119A).
6. Press stuffing box bushing (125) into packing box cover (184).
7. Insert packing box cover (184) into frame (228A) fit.
8. Slide shaft sleeve (126) with "O" Ring on shaft (122) after coating shaft with an anti-seizing compound such as "Never Seez" or equal. Make sure the "O" Ring and sleeve butt against the lip on the shaft.
9. Pack pump with standard graphite/asbestos packing. Use $\frac{3}{8}$ " packing on small 3" or 4" pumps and $\frac{1}{2}$ " packing on larger sizes. See section on operating and maintenance instructions for information regarding packing box requirements. Check stuffing box bushing, making sure it remains pressed into position.
10. Place rubber gasket (360) on packing box cover using a slight amount of grease to hold gasket into position. Bolt volute casing (100) to packing box cover (184).
11. Screw casing ring studs into casing ring (103) and place rubber gasket (360D) into position. Use a slight amount of grease to hold gasket into position.

12. Insert casing ring (103) through the volute casing (100) and bolt onto packing box cover (184). Tighten casing ring studs evenly making sure the gasket (360D) remains in place.

13. Remove protective tape from shaft threads. Place fiber gasket (211) against end of shaft sleeve (126). Position impeller key (178) so that it engages both the gasket and the sleeve.

14. Thread shaft extension onto shaft. Dress shaft and impeller bore fit.

15. Adjust bearing housing and shaft assembly with the adjusting bolt (370D) so that the shaft extends completely into the volute casing (100) area. This will assure proper placement of the impeller (101) on the shaft during the following operations.

16. Slide impeller (101) onto shaft (122) engaging impeller key. Make sure impeller (101) makes contact with sleeve (126).

17. Place fiber gasket (360R) on the impeller nut (304). Apply a light coating of grease on the gasket to eliminate tears during tightening.

18. Screw impeller nut on threaded portion of shaft. The threads are right-hand. Tighten impeller nut using piece of steel in slot.

19. Insert impeller locking capscrew (198) into end of shaft and tighten. The threads are left-hand.

20. Rotate shaft to assure that all parts are free.

21. Move impeller (101) by means of the adjusting bolt (370D) towards the casing ring (103) as far as possible.

22. Position gasket (360P) on suction liner using a slight amount of grease to hold into position. Attach suction liner (100B) to the suction head (182) by means of the suction liner studs and nuts (370J).

23. Place casing gasket (351) on suction head (182) using a slight amount of grease to hold in place. Position suction head and suction liner assembly into volute casing (100) and bolt it in place. Tighten all bolts evenly so that suction head will not become mis-aligned.

24. Adjust impeller (101) using the adjusting bolt (370D) so that it slightly rubs the suction liner (100B). Back off impeller approximately $\frac{1}{32}$ " (or until it turns freely) and lock adjusting bolt (370D) in place.

25. Tighten both housing locking studs (370C) and the bearing housing clamps located on each side of the frame.

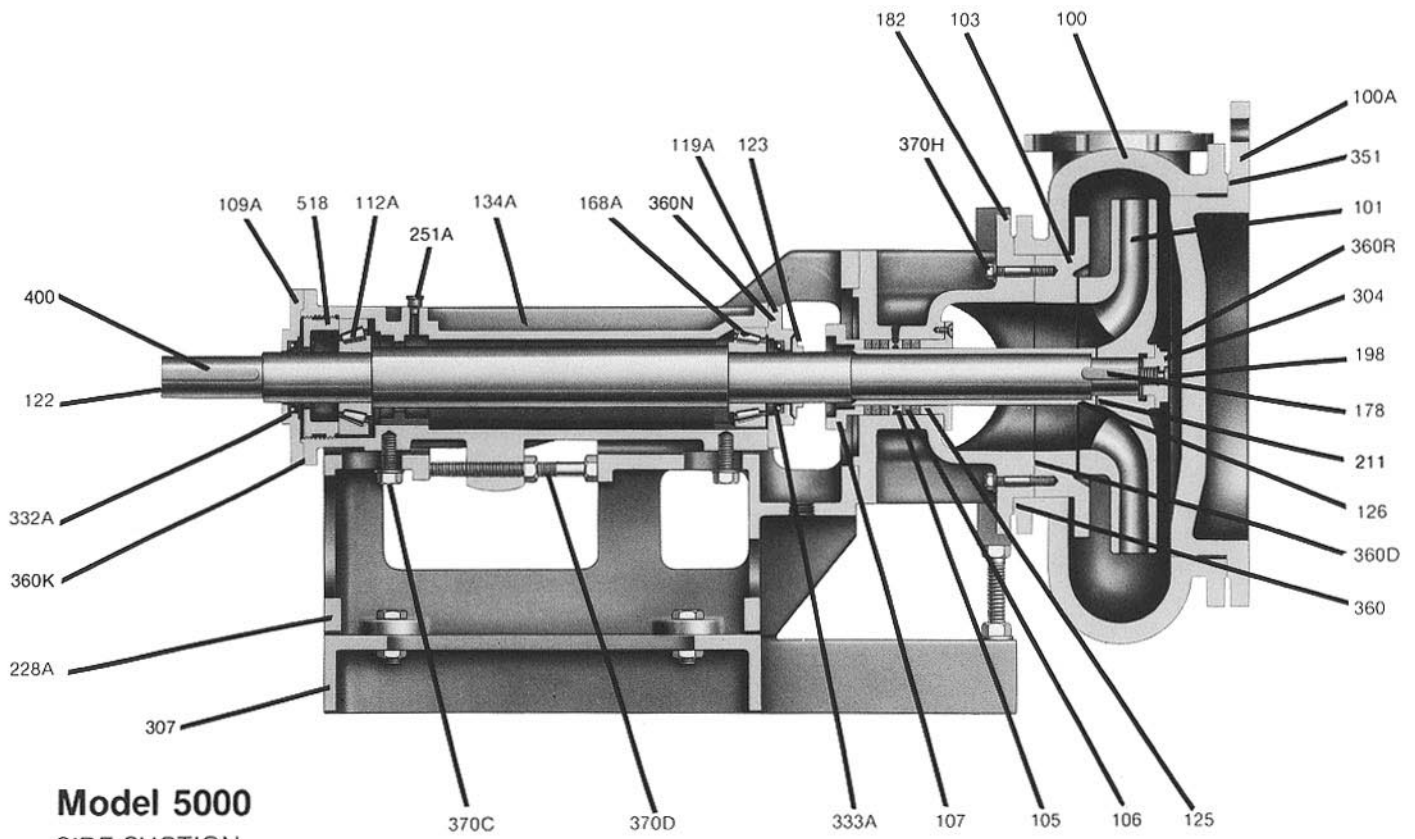
26. Attach suction pipe to suction head and re-assemble dresser coupling.

27. Follow procedures listed under "Starting a Horizontal Pump" for proper lubrication requirements.

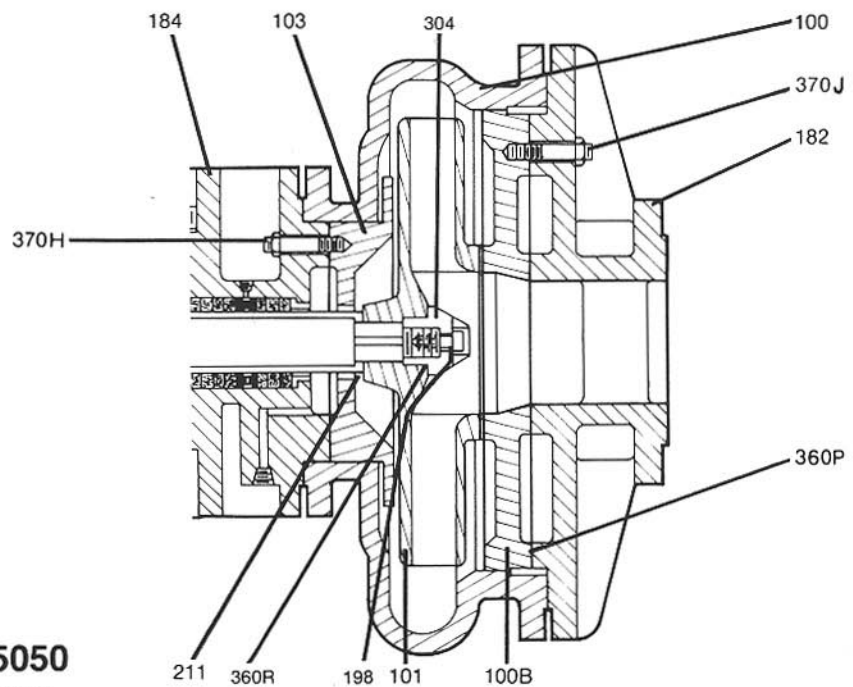
Alternate Packing Method

If it becomes necessary to remove the packing box (184), an alternate method of packing the pump may be used.

SECTION VI — SECTION VIEW AND MATERIALS OF CONSTRUCTION



Model 5000
SIDE SUCTION



Model 5050
END SUCTION

PARTS LIST AND MATERIALS OF CONSTRUCTION

Item No.	No. Req'd. Per Pump	Part Name	Material				
			Goyne Alloy	CC60	HC600	Goyne 420	Goyne 316
100	1	Casing	G.A.	CC60	HC600	G420	316
100A	1	Rear Head	4250	CC60	HC600	G420	316
100B	1	Suction Liner	HC600	CC60	HC600	G420	316
101	1	Impeller	HC600	CC60	HC600	G420	316
103	1	Casing Ring	HC600	CC60	HC600	G420	316
105	1	Lantern Ring	Bronze				
106	1 Set	Stuffing Box Packing	Asbestos				
107	1	Gland	Cast Iron				
109A	1	End Cover — Outboard End	Cast Iron				
112A	1	Bearing — Outboard End	Steel				
119A	1	End Cover — Impeller End	Cast Iron				
122	1	Shaft	Steel				316
123	1	Deflector	Bronze				
124	1	Shaft Sleeve Nut	Bronze				
125	1	Stuffing Box Bushing	CC60				
125A	1	Excluder Ring	Buna Rubber				
126	1	Shaft Sleeve	CC60				316
134A	1	Bearing Housing	Cast Iron				
136	1	Brg. Locknut & Washer (Outboard)	Steel				
140	1	Brg. Locknut & Washer (Inboard)	Steel				
168A	1	Bearing — Inboard End	Steel				
178	1	Impeller Key	Steel				316
182	1	Suction Head	G.A.	CC60	HC600	G420	316
184	1	Packing Box Cover	Cast Iron				
198	1	Impeller Locking Screw	Steel	18-8	Steel	Steel	316
211	1	Gasket (Impeller-Sleeve) — 1/64"	Fiber				
228A	1	Frame	Ductile Iron				
251A	1	Oil Filler Cup	Steel				
304	1	Impeller Nut	Bronze	CC60	Bronze		316
307	1	Sub-Base					
332A	1	Oil Seal — Outboard End	Buna Rubber				
333A	1	Oil Seal — Inboard End	Buna Rubber				
351	1	Casing Gasket	Rubber				
360	1	Gasket (Cas. — S.H./S.B.)	Rubber				
360D	1	Gasket — (Casing Ring — S.H./S.B.)	Rubber				
360K	1	Gasket — (Brg. End Cover) (INBD)	Vellumoid				
360N	1	Gasket—Imp. End (Brg. End Cover) (INBD)	Vellumoid				
360P	1	Gasket (Suction Liner)	Rubber				
360R	1	Gasket (Impeller Nut) — 1/32"	Fiber				
370C	2	Bearing Housing Lkg. Stud	Steel				
370D	1	Impeller Adj. Bolt	Steel				
370H	2-4	Stud (Cas. Ring — S.H./S.B.)	Steel				316
370J	2-4	Studs (Liner-Suction Head)	Steel				
400	1	Drive Key (Not Shown)	Steel				
412F	1	O-Ring	Rubber				
518	1	Bearing Adj. Ring	Cast Iron				

1. Place packing box cover (184) on floor with the gland side up.
2. Press stuffing box bushing (125) into position.
3. Insert shaft sleeve (126) through packing box.
4. Insert packing and lantern ring (105) into packing

box using preassembled gland (107) as a press.

5. Attach gland (107) to packing box cover (184) with sleeve in place.
6. Slide entire packing box assembly into place.

SECTION VII — CHECK LIST FOR LOCATING TROUBLE

VII-A. INSUFFICIENT CAPACITY

1. Pump not primed, check for air leaks in suction line and packing box.
2. Speed too low.
3. Total head higher than pump rating.
4. Suction lift too great or insufficient NPSH of system.
5. Impeller passages partially blocked.
6. Suction Line partially blocked.
7. Wrong direction of rotation.
8. Mechanical defects: Impeller worn or damaged; defective gasket causing leakage.

VII-B. INSUFFICIENT PRESSURE

1. Speed too low.
2. Air in slurry.
3. Wrong direction of rotation.

4. Mechanical defects: Impeller worn or damaged; defective gasket causing leakage.

VII-C. MOTOR OVERLOAD

1. Speed too high.
2. Total head *lower* than pump rating (pump will attempt to pump too much water).
3. Slurry being pumped has higher specific gravity than that for which pump is rated.
4. Mechanical defects: Packing too tight; shaft bent; worn bearings; worn impeller or other water end parts.

VII-D. PUMP VIBRATION

1. Foundation not sufficiently rigid.
2. Impeller partially blocked causing unbalance.
3. Mis-alignment.
4. Mechanical defects: shaft bent; worn bearings; impeller worn.

SECTION VIII — RECOMMENDED SPARE PARTS LIST

To insure against possible long and costly down-time periods, especially on critical services, it is advisable to have spare parts on hand. A list of recommended spare parts is found in the parts list. (See Section VI.)

Repair orders will be handled with a minimum of delay if the following directions are followed:

1. Give model number, size of pump, and serial number. These can be obtained from the nameplate on the pump.
2. Write plainly the name and part number of each part required. These names and numbers should agree with those on the sectional drawings.
3. Give the number of parts required.
4. Give complete shipping instructions.

VIII-A. HORIZONTAL SIDE SUCTION PUMP

Goyne Pump Division suggests that the following spare parts be carried by the customer before start-up.

Qty.	Part No.	Item
1	103	Casing Ring
1	101	Impeller
1	126	Shaft Sleeve with "O" Ring
1	304	Impeller Nut with Locking Capscrew (198)
1 set		Fiber Gaskets
1 set		Rubber Gaskets
1 set		Packing

After start-up the following parts may be added to the above:

Qty.	Part No.	Item
1	100	Volute Casing
1	100A	Rear Head
1	182	Suction Head with Stuffing Box Bushing (125)
1	125A	Excluder Ring (if pump has CV packing)
1	168A	*Inboard Bearing
1	140	*Inboard Bearing Nut & Washer (when used)
1	112A	*Outboard Bearing
1	136	*Outboard Bearing Nut & Washer (when used)
1	332A	*Oil Seal
1	333A	*Oil Seal
1 set	GV	*Vellumoid Gaskets

*In place of these items a complete bearing housing and shaft assembly may be carried in customer's stock.

In keeping with Goyne Pump Div. policy, the majority of parts for this pump will be stocked in distributors' warehouses and at the plant in Ashland, Pennsylvania. Items which may not be in stock are:

122	Shaft
134A	Bearing Housing
228A	Frame
307	Sub-base

VIII-B. HORIZONTAL END SUCTION PUMP

Goyne Pump Division suggests that the following spare parts be carried by the customer before start-up.

Qty.	Part No.	Item
1	100B	Suction Liner
1	103	Casing Ring
1	101	Impeller
1	126	Shaft Sleeve with "O" Ring
1	304	Impeller Nut with Locking Capscrew (198)
1 set		Fiber Gaskets
1 set		Rubber Gaskets
1 set		Packing

After start-up, the following parts may be added:

Qty.	Part No.	Item
1	100	Volute Casing
1	182	Suction Head
1	168A	*Inboard Bearing
1	333A	*Oil Seal
1	112A	*Outboard Bearing
1	332A	*Oil Seal
1 set		*Vellumoid Gaskets

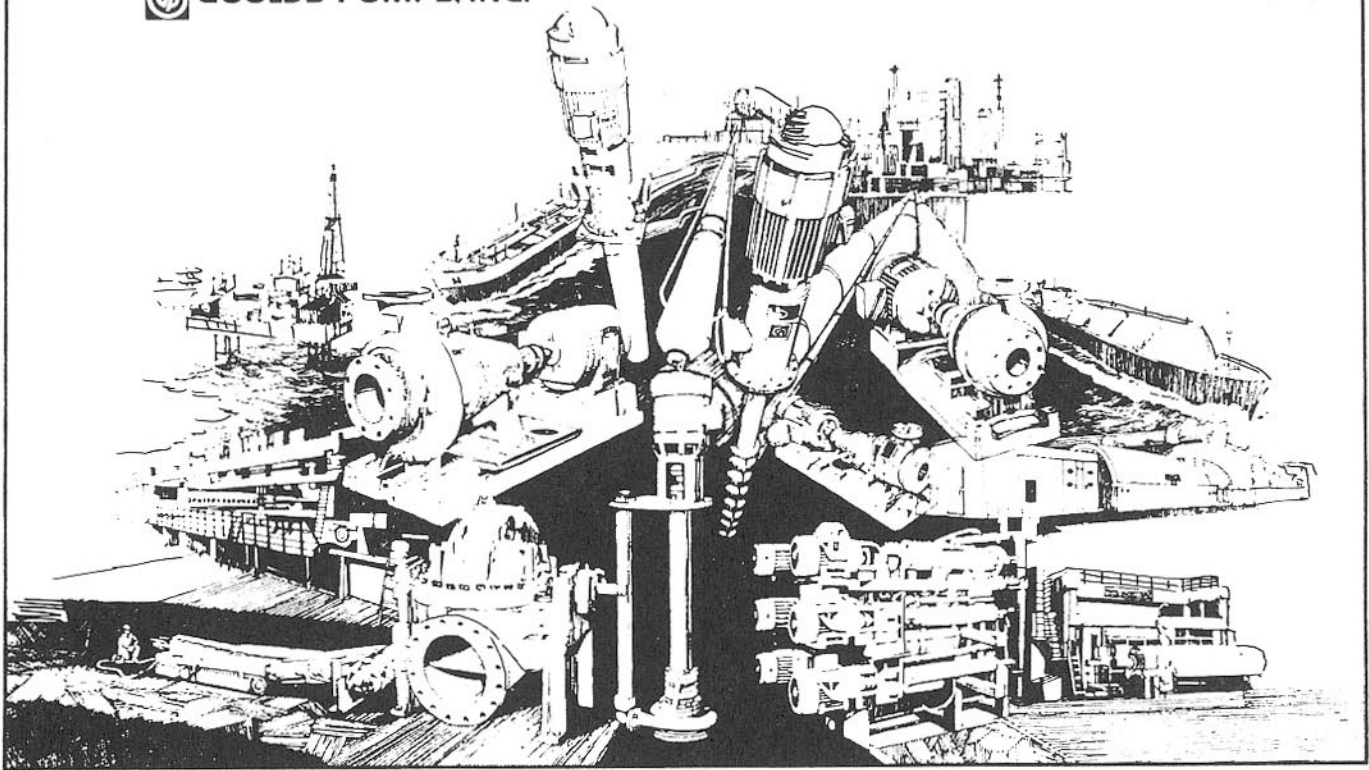
*In place of these items, a complete bearing housing and shaft assembly may be carried in customer's stock.

In keeping with Goyne Pump Div. policy, the majority of parts for this pump will be stocked in distributors' warehouses and at the plant in Ashland, Pennsylvania. Items which may not be in stock are:

122	Shaft
134A	Bearing Housing
228A	Frame
307	Sub-base

Pumps, and nothing but.

 GOULDS PUMPS, INC.



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