

# **GOULDS PUMPS**

## **Installation, Operation and Maintenance Instructions**



**CHEMBASE**  
 **PLUS**

Goulds Pumps



ITT Industries

## TABLE OF CONTENTS

1.0 Introduction .....	2
2.0 Safety Considerations.....	2
3.0 General Overview.....	2
3.1 Warranty Statement.....	2
3.2 Application.....	2
3.3 Storage / Handling.....	3
4.0 Installation.....	4
4.1 General Description.....	4
4.2 Motor Mounting System.....	5
4.3 Foundation Mounted Baseplates .....	5
4.4 Stilt Mounted Baseplates .....	7
Appendix I. Corrosion Guide	
Appendix II. Insert Installation Guide	
Appendix III Recommended Fastener Torques	
Appendix IV Alignment	

### **Questions?**

Please contact your local Goulds Pumps representative.

## **SECTION 1.0 INTRODUCTION**

This Installation, Operation, and Maintenance Instructions manual contains instructions and guidelines for the installation of the Goulds Pumps ChemBasePlus™ baseplate.

**It is extremely important that this entire guideline be reviewed *prior* to installation and handling of the baseplate.** This is important for both safety and reliability purposes.

## **SECTION 2.0 – SAFETY CONSIDERATIONS**

The Goulds ChemBasePlus™ baseplate has been designed and packaged for safe handling and installation. It is very important to review the contents of this manual before removing the baseplate from its shipping skid. Goulds shall not be liable for physical injury, damage caused by failure to observe the instructions for installation and handling in this manual.

Please make special note of the following general precautions as listed below:

- 1. Do not remove the ChemBasePlus™ from its shipping skid until you are ready to lift it onto its foundation.**
- 2. Do not subject the ChemBasePlus™ to rough handling or unnecessary hammer shock.**
- 3. Do not attempt to lift the ChemBasePlus™ by any means other than that which is described in this manual.**
- 4. Do not hammer shock or use other impact loading techniques to adjust the positioning of the ChemBasePlus™. Do not pry against the motor mounting blocks when moving the motor during shaft alignment.**
- 5. Do not tighten the anchor bolt nuts until you have verified that the ChemBasePlus™ is properly supported.**
- 6. Do not attempt to transport, handle or install a ChemBasePlus™ when ambient temperature is below -45° F.**
- 7. Do not operate a pump installed on a ChemBasePlus™ at process fluid temperatures in excess of 290° F.**

## **SECTION 3.0 - GENERAL OVERVIEW**

### **3.1 WARRANTY STATEMENT**

All due care is taken in producing the Goulds line of baseplates and complimentary accessory items. Goulds warrants to provide equipment that meet Goulds' standards and specifications, but not to be suitable for any particular application. No warranty is made in regard to the use of the materials or finished goods, in the Purchaser's application. All design considerations and acceptance of the Goulds products for use in the Purchaser's applications are the Purchaser's sole responsibility. In no case will Goulds be responsible for more than supplying replacement products.

### **3.2 APPLICATION**

The polymer composite material used in the manufacture of the Goulds ChemBasePlus™ has been formulated for application in a broad range of corrosive fluid handling services. This material does not, however, offer universal corrosion resistance. Goulds highly recommends that the Corrosion Guide in Appendix I be reviewed prior to specifying or installing a ChemBasePlus™ baseplate. The ChemBasePlus™ is also suitable for application in a wide range of fluid process temperatures, specifically, -45° F to 290° F. For temperature boundaries exceeding these recommended limitations, please contact Goulds for assistance in determining acceptability of a specific application.

### 3.3 STORAGE / HANDLING

Goulds' normal packaging is designed to protect the ChemBasePlus™ during shipment.

#### **! CAUTION !**

*It is extremely important to observe proper handling procedures during transport and installation of the ChemBasePlus™. While the polymer composite material is constructed of inherently high strength materials, subjecting it to impact or bending loads through rough handling or improper lifting or mounting may result in irreparable damage to the baseplate as well as potential damage to the mounted equipment or put personnel at risk of injury*

Leave the ChemBasePlus™ strapped to its wooden shipping pallet until installation is ready to occur. If the ChemBasePlus™ is intended for indoor installation and comes with carbon steel inserts, but is to be stored in an outdoor location, cover the base completely with some weather resistant material so as to prevent rusting of the insert material.

#### **! WARNING !**

*Do not stand the ChemBasePlus™ on end to make more efficient use of storage space. Severe personal injury or death as well as possible permanent damage to the ChemBasePlus™ may result should it tip over.*

### LIFTING

Lifting should be performed by trained personnel only. Pumps and motors typically have integral lifting eye bolts. These are intended for use of the individual units only. Do not use these features to lift a ChemBasePlus™/ Pump and Motor Assembly.

#### **ChemBasePlus™ Baseplates With No Mounted Equipment**

#### **! WARNING !**

Do not install eye bolts in the ChemBasePlus™ threaded inserts for the purpose of lifting the baseplate. This practice may induce excessive loading on the inserts, which they were not designed to withstand.

Remove the straps that secure the ChemBasePlus™ to the wooden pallet. Slip two slings underneath the baseplate between the pallet cross members as shown in **Figure 1**. Slings should be positioned to allow

for safe, even lifting. Raise the ChemBasePlus™ slightly off the pallet and verify that it suspends reasonably level and that the slings are not subject to slipping out of position.

#### **! WARNING !**

*Be sure to keep hands and feet out from under the baseplate during these steps to prevent injury.*



**FIGURE 1**  
**ChemBasePLUS™ with no mounted equipment**

Should the slinging appear unstable, set the baseplate back down on the pallet and reposition the slings for more stable condition. After satisfactory slinging has been achieved, the baseplate may be hoisted onto its foundation. Slowly lower the baseplate over the foundation using care to engage the anchor bolts in the holes provided. Place shims or wedges under the baseplate at a minimum of four locations to allow for removal of the slings.

#### **ChemBasePlus™ Baseplates With Installed Equipment:**

##### ***Pump only installed:***

Remove the straps that hold the ChemBasePlus™ to the wooden pallet. Install a sling around the pump suction nozzle using a choker hitch pulled firmly tight. Install an additional sling around the motor end of the ChemBasePlus™ using a basket hitch as shown in **Figure 2**.



**FIGURE 2 - Pump only Installed**

**Pump and motor installed:**

Remove the straps that hold the ChemBasePlus™ to the wooden pallet. Install a sling around the pump suction nozzle and around the outboard end of the motor frame using choker hitches pulled firmly

tight as shown in **Figure 3**. The motor sling should be positioned so the weight is not carried through the motor fan housing.



**FIGURE 3 - Pump and motor installed**

## **SECTION 4.0 – INSTALLATION**

### **4.1 GENERAL DESCRIPTION OF THE ChemBasePlus™**

The Goulds ChemBasePlus™ is a solid polymer composite baseplate that is manufactured to conform to ASME/ANSI B73.1M-1991 and custom versions. The Goulds ChemBasePlus™ has been designed to provide a solid and rigid foundation under the pump and its respective motor, whereby, serving the purpose of maintaining sound alignment between them.

The ChemBasePlus™ has been made available in two basic types:

- Foundation mounted (grouted in design – **Figure 4**)



**FIGURE 4 – Foundation Mounted**

- Stilt Mounted (free standing – Figure 5)



**FIGURE 5 – Stilt Mounted**

The foundation-mounted style utilizes grout to add rigidity to the structure. Because the ChemBasePlus™ by nature offers excellent rigidity, the Stilt-mounted style can be employed without sacrificing on reliability whatsoever. The Stilt-mounted base offers a free-standing rigid foundation void of any additional grouting needs.

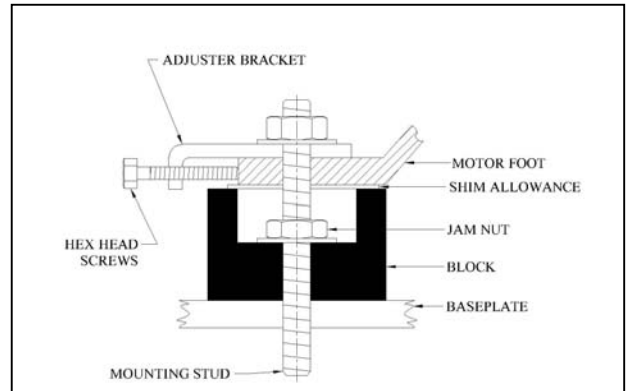
The ChemBasePlus™ performs the proper function of a reliable baseplate foundation for a pump and motor. Those basic functions are as follows:

- 1) To provide adequate rigidity to assure the pump/motor assembly can be shipped and installed without damage and to withstand the operating loads of the given assembly. The solid structure of the ChemBasePlus™ offers superior dampening to vibration associated with the rotating pump/motor assembly.
- 2) To provide a flat mounting surface for the pump and motor assembly. The ChemBasePlus™ product is designed to hold under a .005 inch flatness specification (end-to-end). The aforementioned flatness specifications are measured across the diagonal corners of the baseplate top surface. These excellent flatness specifications are achieved by the superior Epoxy

- Resin Aggregate Material utilized in the construction of these baseplates.
- 3) To allow the end user to perform final field alignment to their respective tolerance standards.

## 4.2 MOTOR MOUNTING SYSTEM

The Goulds ChemBasePlus™ utilizes as standard the polymer block mounting system. This system is comprised of corrosion resistant polymer composite mounting blocks which have surface flatness to .005". Motor mounting blocks incorporate a counterbore / jam nut feature for secure attachment to the ChemBasePlus™



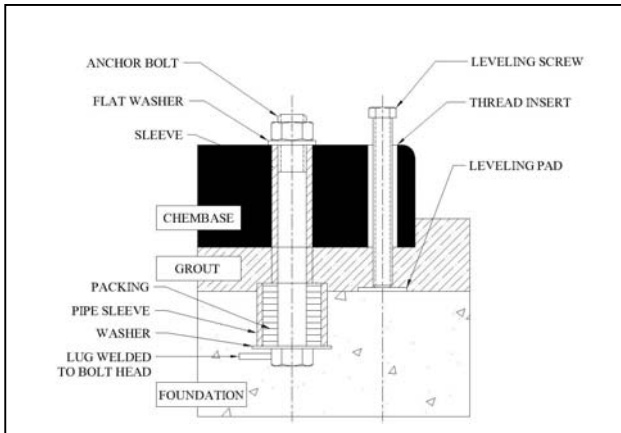
**FIGURE 6**

Optional Bi-Directional motor adjusters provide both axial and transverse motor adjustment. The top mounted adjusters assist with precise shaft alignment when critical tolerances are trying to be achieved as they do not disturb indicator equipment.

## 4.3 FOUNDATION MOUNTED BASEPLATES

- 1) The baseplate should be positioned as close to the liquid supply source as possible. There should be an adequate amount of space for personnel to install, operate and maintain the pump/motor assembly. As mentioned above, the end result of the grouted in baseplate should offer excellent rigidity and dampen any vibration associated with the operating pump/motor assembly.

- 2) Using the recommended slinging procedures shown in **Figures 2 and 3**, hoist the ChemBasePlus™ unit off its shipping pallet.
- 3) Lower the ChemBasePlus™ into position over the foundation. Proceed to engage the anchor bolts in the four holes provided. As seen in **Figure 7**, protective sleeves should be placed over the anchor bolts to prevent grout adhesion to the bolts.



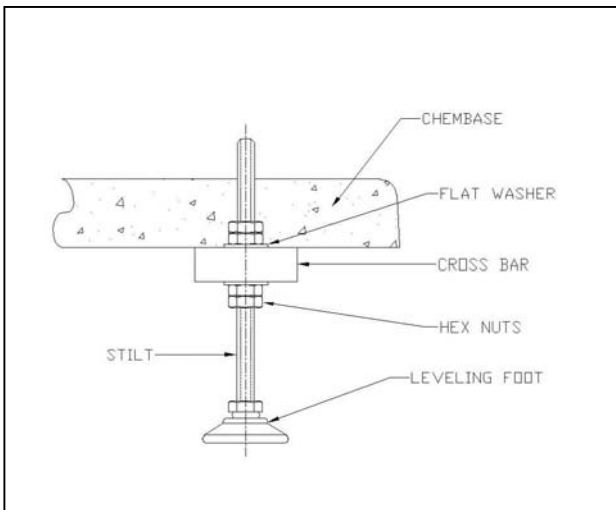
**FIGURE 7**

- 4) The baseplate assembly should be properly leveled. It is suggested to utilize the pump suction and discharge flanges as reference points for leveling purposes. If the ChemBasePlus™ is equipped with the recommended optional leveling screw inserts, install the leveling screws and thread them far enough to provide the desired grouting clearance underneath. Apply wax to screws to allow for their eventual removal.
- 5) If the ChemBasePlus™ is not equipped with leveling screws, shim under the baseplate to bring the discharge flange into proper level. Never stress the baseplate under any condition to bring the assembly into the desired level. Hold off bolting the pump's flanges until the baseplate is completely installed. A proper practice is to shim under all baseplate anchor bolt locations. Apply wax to shims to allow for their eventual removal.
- 6) Install the flat washers and nuts to the anchor bolts and snug them down but do not torque them at this point.
- 7) Alignment should now be done in accordance with procedures identified in Appendix IV.
- 8) The baseplate should now be properly grouted. Grout the baseplate in accordance with the grout manufacturer's recommended procedures. Mask off areas not intended to be grouted. Good procedure is to utilize a non-shrinking grout material. Pour or trowel the grout into the desired area until the proper level is reached. Immediately wipe away any spills as this must be done before the grout sets. Allow at least two days for the grout to fully cure.
- 9) Check for voids after the grout has properly cured. Remove the forms and withdraw the leveling screws or shims used for leveling. Remove the masking from all surfaces.
- 10) Fill the leveling screw holes (if provided) with a flexible sealer.
- 11) Lubricate the anchor bolt threads and tighten the nuts to the following torque values: ½" bolt – 22 lb/ft or ¾" – 65 lb/ft.
- 12) Connect piping to the flanges of the pump. Assure that no adverse piping loads are transmitted to the pump flanges. Perform a final alignment check for verification that there are no significant piping loads.
- 13) Final alignment of the pump/motor assembly should now be brought into the tolerances as specified in Appendix IV.
- 14) It is possible that a realignment may be deemed necessary should the temperature of the process conditions cause suspect thermal expansion of the piping.

#### 4.4 STILT MOUNTED BASEPLATES

As mentioned previously, the ChemBasePlus™ is inherently rigid due to its thickness of construction. The end result is a baseplate that can be stilt mounted while not sacrificing on reliability. The pump/motor alignment techniques for Goulds' Stilt Mounted baseplates follow the same methodology of the grouted in baseplates. The key difference revolves around the way the baseplate is leveled.

- 1) The stilt mounted baseplate is set on a flat surface with no anchor bolts needed.
- 2) The baseplate is leveled by using the nut stilt adjuster kit. Refer to **Figures 8 and 9** for suggested assembly instructions.



**FIGURE 8**



**FIGURE 9**

- a) Elevate the baseplate assembly above the floor to allow stilt assembly.
- b) Measure the approximate desired height of the baseplate assembly above the foundation.
- c) Locate the bottom nuts above the stilt threaded bolts to desired height.
- d) Insert the lock washer over the stilt bolt.
- e) Move the threaded stilt bolt up through the holes in the bottom of the baseplate and secure in place.
- f) Attach the remaining lock washer and nuts on to the threaded stilt bolt. Fasten the nut on to the lock washer.
- g) Secure all four threaded stilts. Now locate the baseplate assembly over the flexible leveling feet and tighten the feet to the threaded stilts. Now lower the entire assembly to the foundation.
- h) Make final level and height adjustments by simply loosening the top nuts and turning the bottom nuts to raise or lower the baseplate assembly.
- i) Finally, first tighten the top and bottom nuts located on the respective lock washers and then tighten the other nuts to insure the baseplate is properly locked in place.

At this point, follow the steps as listed above (Steps 12, 13, and 14) for grouted baseplates.



# APPENDIX I

## Corrosion Guide

ChemBasePlus™  
Corrosion Guide – Zanite™ / Novolac



Version 04 01/09/02 Page 1 of 3

Chemical	Zanite™ Rating 100°F	Novolac Rating 100°F	Chemical	Zanite™ Rating 100°F	Novolac Rating 100°F
Acetaldehyde	S	S	Calcium Chloride	R	R
Acetic Acid up to 12%	R	R	Calcium Hydroxide	R	R
Acetic Acid >12%	S	S	Calcium Hypochlorite	R	R
Acetone - 100%	R	R	Carbon Bisulfide	R	R
Acids, Dilute Inorganic	R	R	Carbon Tetrachloride	R	R
Acrylic Acid	S	S	Caustic Soda	R	R
Aldehydes	S	S	Caustic Potash	R	R
Allyl Chloride	S	S	Chlorinated Solvents	S	S
Alum, Ammonium	R	R	Chlorine Dioxide -15%	R	R
Aluminum Chloride	R	R	Chlorine Solution	S	S
Aluminum Sulfate	R	R	Chlorine Gas	R	R
Aluminum Potassium Sulfate	R	R	Chlorobenzene	S	S
Aliphatic Hydrocarbons	R	R	Chlorosulfonic Acid, Dilute	R	R
Amines	R	R	Chromic Acid up to 20%	R	R
Ammonia - 10%	R	R	Chromic Acid >20%	N	S
Ammonia - 25%	S	S	Citric Acid - 20%	R	R
Ammonium Chloride	S	S	Citric Acid - 50%	S	R
Ammonium Bicarbonate	R	R	Copper Chloride	R	R
Ammonium Bifluoride	R	R	Copper Sulfate	R	R
Ammonium Nitrate	S	S	Cyclohexanol -100%	R	R
Ammonium Phosphate	S	R	Cyclohexanone - 100%	R	R
Ammonium Sulfate	S	R			
Amyl Acetate	R	R	Detergents	R	R
Amyl Alcohol	R	R	Dibutyl Phthalate	S	R
Amyl Chloride	R	R	Diethyl Ether	R	R
Aniline	N	N	Diethylenetriamine -10%	S	S
Antimony Tri-Chloride	R	R	Dimethyl Phthalate	S	S
Aromatic Hydrocarbons	R	R	Dioxane	N	N
Aromatic Solvents	R	R			
			Ethers	R	R
Beer	R	R	Ethyl Alcohol – 96%	R	R
Benzeldhyde	N	S	Ethylenediamine	N	S
Benzene	R	R	Ethylene Dichloride	S	S
Benzene Hexzchloride	R	R	Ethylene Glycol	R	R
Benzene Sulfonic Acid	R	R			
Bleach Liquor	R	R	Fatty Acids	R	R
Boric Acid	R	R	Ferric Chloride	R	R
Bromine Water	S	S	Ferric Nitrate	S	S
Butyl Acetate	R	R	Ferric Sulfate	R	R
			Fluosilic Acid up to 30%	R	R
Calcium Chlorate	R	R	Formaldehyde - 10%	R	R

Key: R: Fully resistant to complete immersion or prolonged contact  
S: Fully resistant to splash, spill, and frequent occasional contact  
N: Not recommended based available data

Note: Coupons available upon request for evaluation in specific applications

Zanite™ is a registered trademark of ITW Corporation

# Corrosion Guide, con't.

ChemBasePlus™

Corrosion Guide – Zanite™ / Novolac



Version 04 01/09/02 Page 2 of 3

Chemical	Zanite™ Rating 100°F	Novolac Rating 100°F	Chemical	Zanite™ Rating 100°F	Novolac Rating 100°F
Formaldehyde - 37%	S	S	Nitric Acid - Concentrated	N	N
Formic Acid	S	R	Nitrobenzene - 100%	N	N
Gasoline	R	R	Oil – Mineral / Petroleum	R	R
Glycerin	R	R	Oleic Acid	S	R
Glycerol	R	R	Oxalic Acid	S	R
Hydrobromic Acid up to 50%	R	R	Phenol	N	N
Hydrochloric Acid up to 20%	R	R	Phosphoric Acid	R	R
Hydrochloric Acid >20%	R	R	Potassium Carbonate	R	R
Hydrocyanic Acid	S	R	Potassium Chloride	R	R
Hydrofluoric Acid	S	R	Potassium Dichromate	S	S
Hydrogen Peroxide - Dilute	S	S	Potassium Hydroxide – 40%	S	S
Hydrogen Sulfide	S	S	Potassium Nitrate	S	S
Hypo Solution	R	R	Seawater	R	R
Hypochlorous Acid	S	R	Sodium Bisulfate	R	R
Hexylene Glycol	R	R	Sodium Bichromate	R	R
Iodine	S	S	Sodium Carbonate	R	R
Kerosene	R	R	Sodium Chlorate	R	R
Ketones	S	S	Sodium Chloride	R	R
Lacite Acid - Dilute	R	R	Sodium Hydroxide up to 50%	R	R
Linseed Oil	R	R	Sodium Hydroxide >50%	S	S
Magnesium Chloride	R	R	Sodium Hypochlorite	S	S
Magnesium Sulfate	R	R	Sodium Methoxide	S	S
Maleic Anhydride	S	R	Sodium Nitrate	R	R
Mercuric Chloride	S	S	Sodium Triphosphate – 5%	R	R
Mercurous Nitrate	S	S	Sodium Sulfate	R	R
Methyl Alcohol	S	S	Sodium Trisulfate	S	R
Methylene Chloride	R	R	Steric Acid	R	R
Methyl Ethyl Ketone	S	S	Stanic Chloride	R	R
Mineral Oil	R	R	Styrene	N	N
Motor Oil	R	R	Sulfamic Acid	R	R
Nickel Chloride	R	R	Sulfur Dioxide	R	R
Nickel Sulfate	R	R	Sulfuric Acid 20% or less	R	R
Nitric Acid up to 30%	S	S	Sulfuric Acid 75% or less	S	R
Nitric Acid up to 50%	S	S	Sulfuric Acid >93%	N	R
			Tannic Acid	R	R
			Tartarnic Acid	R	R
			Tetrachloroethane	N	S

Key: R: Fully resistant to complete immersion or prolonged contact  
 S: Fully resistant to splash, spill, and frequent occasional contact  
 N: Not recommended based available data

Note: Coupons available upon request for evaluation in specific applications

Zanite™ is a registered trademark of ITW Corporation

# Corrosion Guide, con't.

ChemBasePlus™

Corrosion Guide – Zanite™ / Novolac



Version 04 01/09/02 Page 3 of 3

Chemical	Zanite™ Rating 100°F	Novolac Rating 100°F	Chemical	Zanite™ Rating 100°F	Novolac Rating 100°F
Tetroethylene Pentamine	R	R	Vinegar	R	R
Toluene Sulfonic Acid	S	R			
Toluene	N	R	Xylene	N	R
Trisodium Phosphate – 15%	R	R			
Turpentine	N	S	Zinc Chloride	S	S
			Zinc Sulfate	S	S
Urea	R	R			
Urine	R	R			
	R	R			

Key: R: Fully resistant to complete immersion or prolonged contact  
 S: Fully resistant to splash, spill, and frequent occasional contact  
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Note: Coupons available upon request for evaluation in specific applications

Zanite™ is a registered trademark of ITW Corporation

# APPENDIX II

## Insert Guide

The following guide is to assist with the field installation of inserts if there is a need to replace a damaged thread or to install a new insert into a custom location. In order to achieve a successful installation the following procedures are recommended:

### **! WARNING !**

*Field installation should only be performed by qualified personnel using suitable drilling equipment. Personnel should be sure to use a face mask to prevent inhalation of silica dust as the ChemBasePlus™ casting is penetrated during drilling operations. If MSDS specifications are required, contact your local Goulds representative. Also, be sure to utilize protective eyewear while performing any drilling operation.*

1. It is recommended to utilize a carbide tip drill bit to perform drilling procedure. Please refer to Table 1 for drill bit size recommendation. We suggest providing a hole diameter that will allow ample space to install the insert yet still maintain a snug fit as to not need too much filler epoxy resin.

**Table 1  
Hole Drill Size Recommendation**

Insert Size	Drill Size*
1 / 4 – 20	0.625 in.
5 / 16 – 18	0.625 in.
3 / 8 – 16	0.875 in.
1 / 2 – 13	1.000 in.
5 / 8 - 11	1.375 in.

**\*NOTE:** Drill size listed above is minimum — increasing the hole diameter by an extra 0.125 inches may assist in allowing for any hole location variances established by installer.

2. Drill approximately 1/8" (.125) lower than the given length of the provided insert.

3. Drill the new hole (**Figure 1**) or drill out the damaged insert taking care not to enlarge or elongate the hole into which the new insert will be installed. Remove all dust and metal particles from the drilled hole using compressed air.



**FIGURE 1**

4. It is critical that perpendicularity in relation to the surface of the ChemBasePlus™ is maintained. Goulds prescribes two basic methods of insuring that the insert will achieve proper perpendicularity and are as follows:
  - a) Fabricate a template (i.e. constructed of plywood or metal) based off the number of inserts. The template should be designed to locate the holes off a reference point located on the respective drawing of the given baseplate (please contact your Goulds Pumps representative if you are in need of a particular drawing or consult factory). Fasten the insert to a stud with a nut on the top side of the template

(**Figure 2**). Prior to placing the template / insert assembly down on the baseplate as seen in **Figure 2**, proceed to step 5 for filling the hole with the proper amount of epoxy resin.



**FIGURE 2**

- b). With the pump assembly elevated above the baseplate, fasten the insert to the bottom of the motor hex bolt that is intended to mount the pump/motor assembly down to the baseplate. Do not fully tighten the bolt at this time as some slip is desired so as to insure that the insert drops slightly below the surface of the baseplate. Proceed to step 6.
5. Dispense epoxy resin material into the drilled hole (**Figure 3**) following the instructions provided – the two-part epoxy can be mixed together to activate in the hole. Make certain not to overfill the hole as excess material may spill over on to the top surface of the insert and down into the threads. Goulds prescribes that you fill the hole about half-way when utilizing a template device. Now locate the template arrangement down over the epoxy filled holes and allow epoxy to harden. Top off the hole accordingly after the template has been removed and wipe away any excess material so as to keep the top surface clean.



**FIGURE 3**

6. Dispense the epoxy resin material into the drilled hole as seen in **Figure 3**. Fill the hole only a third of the way. Lower the pump/motor assembly (if C-Flange motor is being used) or motor down into the epoxy filled holes (**Figure 4**). Check that all inserts are centered accordingly and allow the epoxy to harden. After the epoxy resin has hardened, remove the motor assembly and top off the holes accordingly and wipe away any excess material so as to keep the top surface clean.



**FIGURE 4**

The baseplate is now ready to be installed or shipped, respectively. Do not exceed the recommended fastener torques as shown in Appendix III.

# APPENDIX III

## Recommended Fastener Torques

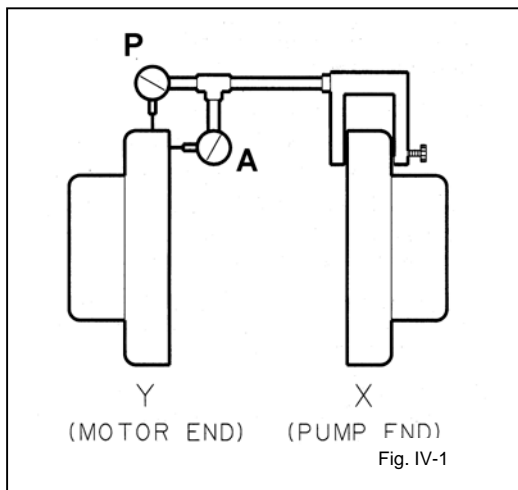
FASTENER STANDARD	FASTENER NOMINAL SIZE	RECOMMENDED TORQUE LB/FT
S A E	1/4"	4
	5/16"	8
	3/8"	13
	1/2"	34
	5/8"	66
	3/4"	118

# APPENDIX IV

## Alignment

### SET UP

1. Mount two dial indicators on one of the coupling halves (X) so they contact the other coupling half (Y) (Fig. IV-1).
2. Check setting of indicators by rotating coupling half X to ensure indicators stay in contact with coupling half Y but do not bottom out. Adjust indicators accordingly.



### MEASUREMENT

1. To ensure accuracy of indicator readings, always rotate both coupling halves together so indicators contact the same point on coupling half Y. This will eliminate any measurement problems due to runout on coupling half Y.
2. Take indicator measurements with driver feet hold-down bolts tightened. Loosen hold down bolts prior to making alignment corrections.
3. Take care not to damage indicators when moving driver during alignment corrections.

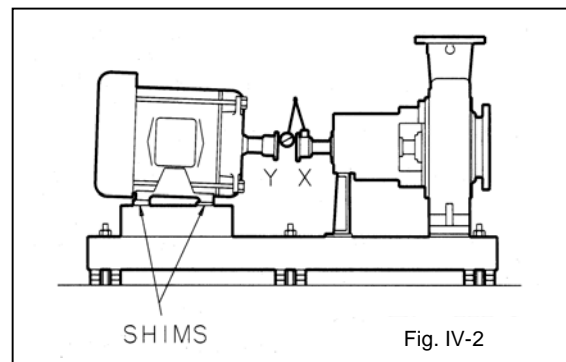
### ANGULAR ALIGNMENT

A unit is in angular alignment when indicator A (Angular indicator) does not vary by more than .002 in. (.05 mm) as measured at four points 90° apart.

### Vertical Correction (Top-to-Bottom)

1. Zero indicator A at top dead center (12 o'clock) of coupling half Y.
2. Rotate indicators to bottom dead center (6 o'clock). Observe needle and record reading.
3. **Negative Reading** - The coupling halves are further apart at the bottom than at the top. Correct by either raising the driver feet at the shaft end (add shims) or lowering the driver feet at the other end (remove shims), (Fig. IV-2).

**Positive Reading** - The coupling halves are closer at the bottom than at the top. Correct by either lowering the driver feet at the shaft end (remove shims) or raising the driver feet at the other end (add shims).



4. Repeat steps 1-3 until indicator A reads .002 in (.05 mm) or less.

### Horizontal Correction (Side-to-Side)

1. Zero indicator A on left side of coupling half Y, 90° from top dead center (9 o'clock).
2. Rotate indicators through top dead center to the right side, 180° from the start (3 o'clock). Observe needle and record reading.

- 3) **Negative Reading** - The coupling halves are further apart on the right side than the left. Correct by either sliding the shaft end of the driver to the left or the other end to the right.

**Positive Reading** - The coupling halves are closer together on the right side than the left. Correct by either sliding the shaft end of the driver to the right or the other end to the left (Fig. IV-3).

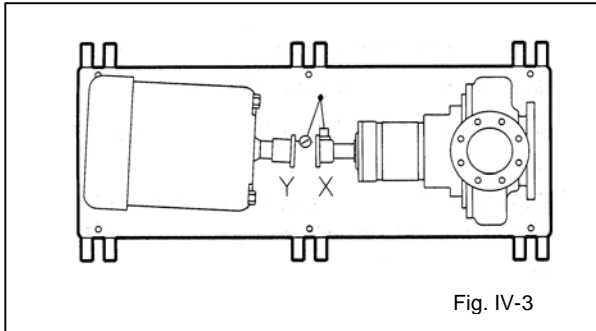


Fig. IV-3

- 4) Repeat steps 1 through 3 until indicator A reads .002 in. (.05 mm) or less.
- 5) Re-check both horizontal and vertical readings to ensure adjustment of one did not disturb the other. Correct as necessary.

#### PARALLEL ALIGNMENT

A unit is in parallel alignment when indicator P (parallel indicator) does not vary by more than .002 in. (.05 mm) as measured at four points 90° apart at operating temperature. Note the preliminary vertical cold setting criteria, Table 1.

#### Vertical Correction (Top-to-Bottom)

1. Zero indicator P at top dead center of coupling (12 o'clock) half Y (Fig. III-1).
2. Rotate indicator to bottom dead center (6 o'clock). Observe needle and record reading.
- 3) **Negative Reading** - Coupling half X is lower than coupling half Y. Correct by removing shims of thickness equal to half of the indicator reading under each driver foot.

**Positive Reading** - Coupling half X is higher than coupling half Y. Correct by adding shims of thickness equal to half of

the indicator reading from each driver foot (Fig. IV-4).

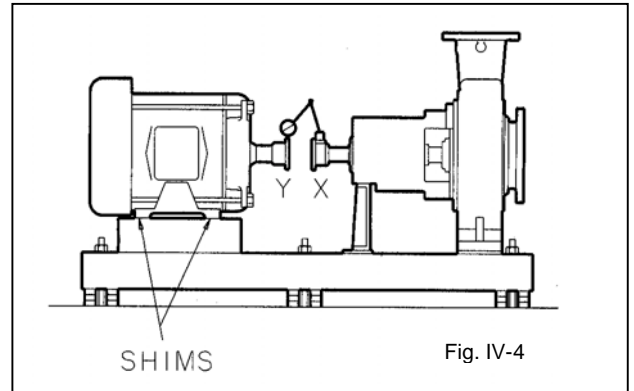


Fig. IV-4

**NOTE:** Equal amounts of shims must be added to or removed from each driver foot. Otherwise the vertical angular alignment will be affected.

4. Repeat steps 1 through 3 until indicator P reads within .002 in. (.05 mm) or less when hot, or per Table 1 when cold.

#### Horizontal Correction (Side-to-Side)

1. Zero indicator P on the left side of coupling half Y, 90° from top dead center (9 o'clock).
2. Rotate indicators through top dead center to the right side, 180° from the start (3 o'clock). Observe needle and record reading.
- 3) **Negative Reading** - Coupling half Y is to the left of coupling half X. Correct by sliding driver evenly in the appropriate direction (Fig. IV-5).

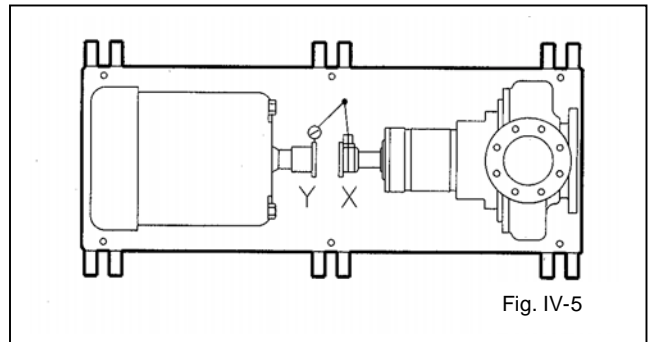


Fig. IV-5

5. Re-check both horizontal and vertical readings to ensure adjustment of one did not disturb the other. Correct as necessary.



### **COMPLETE ALIGNMENT**

A unit is in complete alignment when both indicators A (angular) and P (parallel) do not vary by more than .002 in. (.05 mm) as measured at four points 90° apart.

Vertical Correction (Top-to-Bottom)

1. Zero indicators A and P at top dead center (12 o'clock) of coupling half Y.
2. Rotate indicator to bottom dead center (6 o'clock). Observe the needles and record the readings.
3. Make corrections as outlined previously.

### **Horizontal Correction (Side-to-Side)**

1. Zero indicators A and P on the left side of coupling half Y, 90° from top dead center (9 o'clock).
2. Rotate indicators through top dead center to the right side, 180° from the start (3 o'clock). Observe the needle, measure and record the reading.
3. Make corrections as outlined previously.
4. Recheck both vertical and horizontal readings to ensure adjustment of one did not disturb the other. Correct as necessary.

**NOTE:** With experience, the installer will understand the interaction between angular and parallel and will make corrections appropriately.

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Goulds Pumps



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