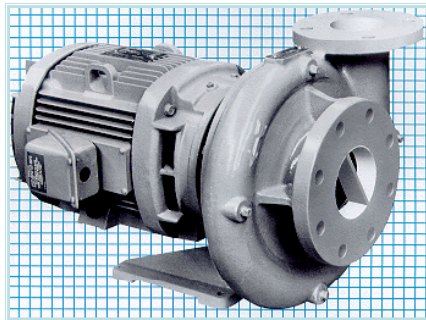


General Considerations

- Wet Pit vs. Dry Pit
- Suction Location
 - Self Prime Required?
 - Foot valves & strainers

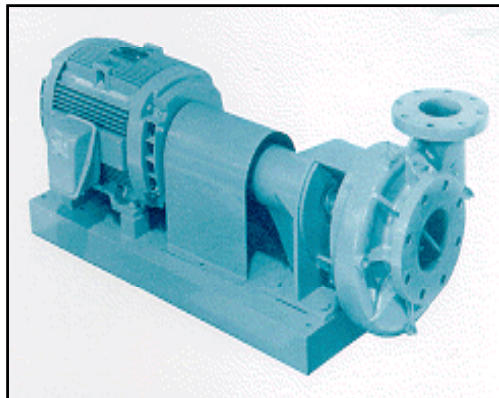
End Suction, Close Coupled



Close Coupled Considerations

- Excellent Choice
- Location---Drainage?
- Housekeeping Pad a must
- Strainer Provision
- Anchoring for servicing

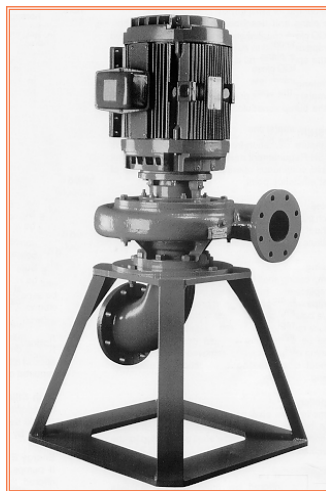
End Suction, Frame Mounted



Frame Mounted Considerations

- Require alignment
- Use “T” frame motors
- Replacement motors may be more readily available
- Over 15 HP may be lower price then CCP
- May require less trades involved in repairs
- May be more maintenance intensive than CCP.
- Use all metal lubricated couplings (Falk or =) when on VSD

End Suction, CCP Vertically Mounted

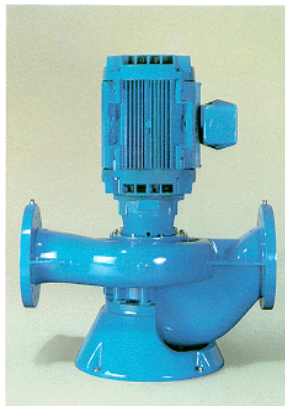


Vertical Close Coupled Considerations

- An excellent choice
- Motor is elevated---ODP should have Canopy
- Elbow choices
- Separate stand and elbow?

In Line Pump Considerations

- May be Floor mounted or Pipe mounted
- Same considerations as vertical close coupled



Split Case Considerations

- High Quality, High Initial Purchase Price.
- Horizontal will and Vertical May require alignment.
- Vertical saves floor space
- Maintenance is more complicated

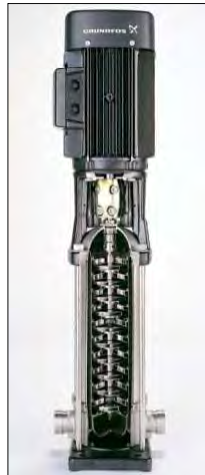
Split Case



A Vertically Mounted Split Case



Vertical Pumps



Vertical Pump Considerations

- Many different designs and pump configurations. Watch details
- High GPM low TDH, Low GPM high TDH
- Maintain level to avoid vortexing
- Watch sump design
- Motors out of pit but maybe not public

Optimize means different things to different people

- Increase efficiency/lower power consumption
- Reduce maintenance
- Increase reliability
- Redundancy
- Reduce size and cost of pumping system
- All of the above

How to optimize (existing systems)

First – conduct a pump system audit

Possible ways to improve the system:

- Trim impellers
- Add VFDs
- Upgrade/alter controls
- Add pilot pumps
- Replace pumps/system if appropriate (may be required anyway – NSF-50)

- Pump Auditors
- Knowledgeable pump people
- Mechanical Engineers
- The Department of Energy (DOE)
PSAT qualified specialists & audits
- Energy auditors (may not know pumps)

Motor Efficiency

Motor Efficiency

- The EISA (Energy Independence & Security Act of 2007) was signed into law for general purpose motors and went into effect for beginning 12-19-2010. Under the law both premium and standard efficient motors are affected. Efficiencies for specific purpose has followed suit.
- Close coupled pumps use Industry Standard JM or JP motors. These are NOT covered by EISA.
- EISA standard efficiency motors *appear* suitable for VSD applications. Check with drive and motor manufacturer.

Pump and Motor Maintenance

Check Valves and Isolation Valves

- Check Valves should be located AFTER the increaser, ideally at least 1 pipe diameter away from the pump, and BETWEEN the pump and the isolation valve.
- All pumps should have isolation valves in their suction and discharge lines.

How NOT to install a Pump



Pipe Strain







Maintenance Issues

- General
- Lubrication
- Spare Parts
- Checking alignment

General Issues

- Keep track of gauges---Keep baseline data.
- Do NOT close suction valves to balance system---Regulate at discharge.
- “Leave it alone”

General Issues

- Keep pump design curves and all submittal data.
- Keep an IOM for each style, manufacture.
- Keep spare parts list and usage.
- Keep logs indicating performance, power and, maintenance.
- Check strainers on regular basis.

Lubrication

- Close Coupled Pumps do NOT require lubrication.
- Many Flexibly Coupled Pumps and Split Case Pumps do. The manufacturer should provide grease, or at least a recommendation as to what grease to use.
- Motors that require greasing should be greased according to Manufacturer's recommendations--- Typically a Polyurea based grease. Some Pump manufacturers still use a Lithium based Grease.
- Grease motors while running if possible. Remove plugs, run until grease doesn't run out. (Overgreasing is a leading cause of excessive heat build up, and bearing failure.) (Usually about 3 squirts from the grease gun every 3 months.)

Spare Parts

- Recommend spare seals and wear rings.
- Include "auxiliary" items, such as gaskets, keys, washers, capscrews. Parts kits are an excellent solution.
- A full parts list for the specific pump furnished should be provided with the pump.

Alignment

“Flexibly Coupled pumps should be grouted and aligned in accordance with the Hydraulic Institute recommendations.”

Alignment and Pipe Strain

- The # 1 and # 2 causes of Pump Failure are Seal Failure and Bearing Failure.
- The # 1 and # 2 causes of Seal Failure and Bearing Failure are:
 1. Alignment, (of Coupling)
and
 2. Alignment (of Piping)

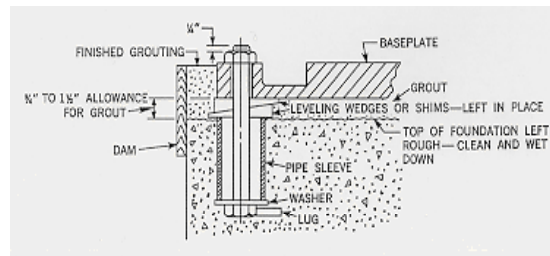
These issues **MUST** be properly accomplished at initial installation--- Fixing after the fact is next to impossible.

Installation---Getting Started

- ✓ Assure foundation is properly sized and flat.
- ✓ Place pump / drive / base plate assembly on the foundation.
- ✓ Disconnect the coupling halves. Do not reconnect until all alignment operations are complete.

Installation---Getting Started

FOUNDATION BOLT DESIGN



**As per Hydraulic Institute
recommendations**

Leveling The Unit

- ✓ **Support the base plate on metal blocks or shims and not directly on the floor**
- ✓ **Adjust the metal supports until the base plate is level.**
- ✓ **Check suction and discharge for horizontal and vertical, using a level.**

Checking ALignment

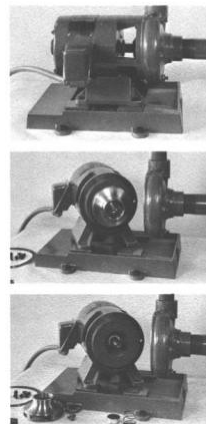
- ✓ **Check angular and parallel alignment.**

- ✓ **Repeat as necessary!!!!**

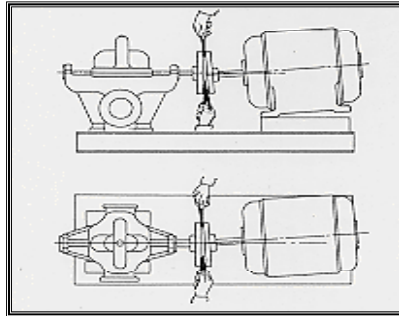
Baseplates

- Each Manufacturer may have different recommendations for baseplate securing. Generally, baseplates are intended to be grouted in place.
- The stronger the baseplate, the better.
- Check local codes for vibration isolation requirements.
- Close coupled pumps are usually NOT furnished with baseplates. They still must be leveled. Without baseplates, utilization of “back pull out” is difficult, since most contractors will use “All-Thread” or the like through the motor feet. Some manufacturers offer close coupled baseplates as an option.

Close-coupled pump on base

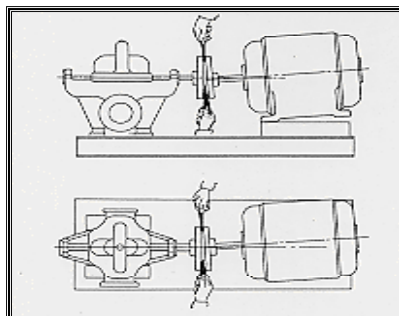


Checking Angular Alignment



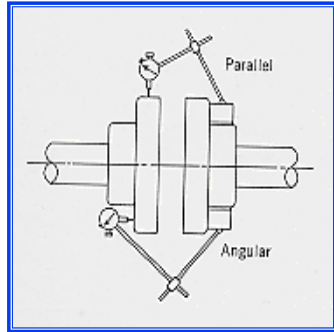
**USE TAPER GAUGES OR
FEELERS AT 90° INTERVALS
(Check on 2 planes)**

Checking Angular Alignment



**USE TAPER GAUGES OR
FEELERS AT 90° INTERVALS
(Check on 2 planes)**

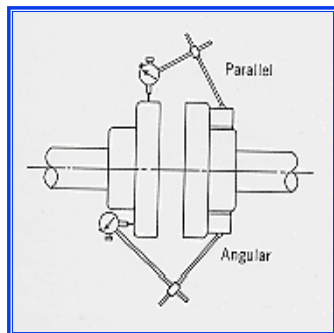
Dial Indicator Alignment



✓ Prior to dial aligning, do rough alignment using straight edge and feelers.

✓ After adjustment, re-check both angular and parallel alignment.

Dial Indicator Alignment



✓ Prior to dial aligning, do rough alignment using straight edge and feelers.

✓ After adjustment, re-check both angular and parallel alignment.

Tighten, Recheck, Grout

- ✓ Tighten foundation bolts evenly, but not too firmly. Do not fully tighten foundation bolts until grout has fully set. (Approximately 48 hrs.)
- ✓ Recheck alignment.
- ✓ Grout. Leave shims in place.

Align, Pipe, Align

- ✓ **Align couplings.**
- ✓ **Pipe the unit. Pipe from the pump, taking care to properly support all piping.**
- ✓ **Check alignment and realign as necessary.**

Prime, Run, Check

- ✓ **Prime the pump.**
- ✓ **Run the pump long enough for operating temperature to be stabilized.**
- ✓ **Shut the pump down and recheck alignment.**

Run, Check, Dowel

- ✓ **After the pump has been running for about a week, the coupling halves should be given a “final” check for misalignment, caused by pipe or temperature strains.**
- ✓ **If alignment has remained correct, dowel both pump and motor.**

Maintenance

- ✓ **Make sure to include alignment checking an integral part of your preventative maintenance program.**

Some Helpful Websites

- www.pacopumps.com
- www.thinkingbuildings.com
- www.grundfos.us/
- www.nsf.org
- www.pumpsystemsmater.org
- www.pumps.org (HI)
- www1.eere.energy.gov/industry/bestpractices/ (DOE)
- www.asme.org

Today almost every reputable major pump manufacture has their own website for help, technical information and O&M Manuals.

