FEDERAL PUMPS

TYPES CC-CG-CK, CCB-CGB-CKB, BFC, BFV, CCF-CGF-CKF, CCH, CCV, SC-SSC, VRC CLOSE-COUPLED PUMPS

Operating & Maintenance

These instructions cover the installation and maintenance of Federal clo-ecoupled and flexibly coupled centrifugal pumps. By following the outline and suggestions, the life of the pumping unit can be extended and repairs kept to a minimum.

INSPECTION

Immediately upon receipt of the shipment, inspect and check with the packing list and report to the Transportation Company's local agent any damage or shortage. Inspect crate and wrappings before discarding. Parts and accessories are sometimes wrapped individually or fastened to the crate or box.

STORAGE

If the unit is received sometime in advance of when it can be put to use, it should be inspected, rewrapped in the mOisture-proof paper, recrated and ~tored in a dry location. Before storing, make sure that all machined surfaces are moisture-free and coated with anti~rust compound. If the unit is to be stored for a long period, rotate the shaft periodically to protect the bearings.

LOCATION

The unit should be installed in a dry location where it is accessible for inspection and maintenance. Provide clearance around the unit for free air.circulation and mount the unit on a foundation, well above wet or damp floors to prevent moisture from being drawn into the motor by the cooling fan. The pump should be located close to the source of supply so that the suction line is short and direct.

Where the unit is located above the source of supply, it will normally lift 15 feet. When liquids at or near their boiling points are to be handled, the unit must be located below the source of supply. For high suction lifts or for required suction heads for specific pumps, refer to factory.

The construction of the motor must meet the requirements of local conditions. Excessive moisture, heat, hazardous fumes or dust may require special enclosures for the motors.

SUCTION PIPING

The suction piping should be as short and direct as possible and free of air leaks. Generally, suction and discharge pipe size is the same as or one pipe size larger than the applicable pump suction and discharge connection size.

For more exact computation, consult pipe friction charts. Do not use reducing elbows or concentric reducers adjacent to the pump. Particularly on suction piping, use eccentric reducers to eliminate air pockets. Suction lines should have a continuous rise to the pump from the source. Install isolation valves and 1/4" pipe tap (for pressure gauges) in the suction and discharge lines for future inspection and repairs.

To prevent foreign matter from damaging the pump, install a strainer having a net open area three to four times the suction pipe size. When the pump has a suction lift, install a foot valve or combination foot valve and strainer on the end of the suction line, to facilitate priming.

DISCHARGE PIPING

A union, check valve and gate valve should be installed in the discharge line near the pump discharge connection. Install the check valve between the pump and the gate valve for accessibility. The check valve protects the pump against excessive pressure and water hammer, and eliminates the possibility of the pump running backwards due to back pressure.

The piping must be independently supported near the pump so that no strains will be transmitted to the unit. External loads distort the unit, causing possible failure of bearings and internal parts. All piping must have its total weight supported independently of the pump unit and flanges must be accurately aligned with faces parallel before bolting up. Ample provision must be made for pipe expansion and contraction on hot service to avoid placing strains on the unit.

CLOSE-COUPLED PUMP MOUNTING

Close-coupled pumps are usually mounted horizontally on permanent foundations but can be mounted in other positions. Do not use a vertical mounting with the pump end above the motor as liquid leakage may damage he bearings, etc. In all cases, the foundation or support must be rigid, flat and plumb, and the unit must be bolted in place. The unit should not be held in place or supported by the piping, unless the pump is of the in-line type.

Before bolting the pump to the foundation, rotate the shaft by hand to be sure that there is no rubbing or binding. Shim under feet of unit to obtain full bearing at all points and tighten bolts gradually and evenly, constantly checking that shaft rotates freely. Binding or rubbing will indicate distortion and must be corrected by shimming. Failure to do so will result in misalignment with conse9uent bearing failure.

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FLEXIBLE COUPLED PUMP ALIGNMENT

All flexibly coupled centrifugal pumps are aligned at the factory before testing. However, shipment, handling and installation of the unit require realignment of the coupling after the unit is placed on its foundation.

This requirement should be accomplished as follows:

1. Insure the foundation is deep emough to carry the weight of the unit without vibration or deflection.

2. The foundation should be from 3" to 6" wider and longer than the unit bedplate.

3. Place the unit on the foundation with bolts in their proper holes and insert wedges under the bedplate near the bolts.

4. Check the alignment of the coupling with a straight edge at four points 90 apart.

5. Where parallel or angular misalignment is indicated, manipulate the wedges to correct the situation.

6. When the coupling faces are parallel and concentric, complete the bolting down of the bedplate. If a cast iron bedplate is being used, provide a form around the contour of the bedplate, and pour grout throught the grouting hole so that the grout reaches to l" above the bottom of the bedplate. Allow the grout to set and continue with the piping.

Vibration isolation equipment can be used under the pump unit to prevent transmission of vibration down to the floor. Such equipment can take the form of vibration rail sets (Type VR), cork mats (TypeCM) or spring mounts (Type SM). Fed-Flex flexible metal hose connections can also be installed on the pump suction and discharge connections to reduce vibration transmission to the piping system.

PIPING CONNECTIONS

Before securing piping, flush the pump and piping to be sure they are clear of foreign material. Before bolting piping to unit, check flanges for both lateral and angular misalignment. Piping must be concentric and square before final assembly.

OPERATION

For motor information, refer to the manufacturer's instruction tag or booklet attached to the unit or crate. On motor driven units, check motor characteristics on nameplate and connect wiring in accordance with the attached instruction tag. Check rotation of the s6aft against the rotation arrow on the pump casing. Any motor problems which may develope should be reported to the Federal Pump Corp. local representative immediately or to the local authorized service center of the motor manufacturer.

PRIMING

Never run a centrifugal pump dry. If the pump is operated when dry, the wearing surfaces may gall or sieze and damage the pump. Where the pump is operating with a suction lift and the suction line 5i equipped with a foot valve, the system is filled with water in one of several ways:

1. When a separate supply of water is available, a permanent pipe connection having a shut-off valve may be installed from the supply to the pipe tap at the bottom of the volute for filling the suction pipe and pump. The pet cock in the top of the casing should be opened to allow trapped air to escape. When water flows from this opening, the pump is full and the cock can be closed.

2. When a separate source of water is not available, a priming funnel with a shut-off valve, connected as described above, can be used. Water is poured into the pump through the funnel, the cock at the top of the casing being open while filling. When the pump is full, close the cock and funnel valve and the pump is ready to start.

3. Instead of the above methods, one of a number of air removal units may be used, particularly when the pump is operating with a suction lift and no foot valve in the suction line.

4. Where the source of supply is above the pump centerline. the pump is primed upon venting the casing by opening the pet cock at the top of the casing, thus releasing any trapped air.

STARTING THE PUMP

Before starting the unite, check the following:

1. Be sure that the pump rotates freely when turned by hand.

2. Be sure that the voltage and cycles of the electric current corresponds to the motor nameplate.

3. To start unit, close discharge valve, prime pump, start driver and immediately check discharge pressure. If the gauge does not register positive pressure, check for air leakage or other difficulties listed under "Operating Difficulties". If the pressure is satisfactory, slowly open the discharge valve. Do not run pump dry or with discharge valve closed more than a few-inutes as pump will overheat and may sieze. After the pump has been running for about a half hour, check for quiet operation and temperature of bearings.

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STOPPING THE PUMP

In order to prevent surges in the system and shock on the equipment, close the gate valve in the discharge line and then shut off the driver.

BEARING LUBRICATION

All pump bearings are grease lubricated. However, since they are sealed type bearings, they do not require periodic field lubrication for the life of the bearings. All motor bearings are grease lubricated. Most motor bearings are sealed type and do not require periodic field lubrication for the life of the bearings. However, some motor bearing do require periodic field lubrication. If the motor has grease fittings, grease periodically in accordance with instructions on the motor mnaufacturer's instruction plate, instruction tag or instruction sheet. Do not overlubricate.

REPAIR PARTS

When ordering pump repair parts, always give the UNIT NO. (MODEL NO.) and RECORD NO. of the pump. These numbers are stamped on the rectangular Federal Pump Corporation nameplate. Be sure to state the number of each part that is required. Motor parts should be ordered directly from the motor manufacturer or his authorized representative.

PACKING THE STUFFING BOX

In starting, especially a new pump, do not have the packing too tight. Unduly tight packing causes unnecessary power consumption and rapid wear of shaft sleeves. Upon starting, back off on stuffing box gland nuts until free leakage occurs. Then tighten the stuffing box gland with thumb and finger. Do not use a wrench and do not tighten packing sufficiently to stop all leakage. A slight leakage is necessary to provide lubrication and avoid unnecessary wear of sleeves.

Eventually, when undue suffing box leakage occurs and cannot be reduced by drawing down on stuffing box gland, add one ring of new packing. This will create sufficient pressure to stop the leakage. When excessive leakage again occurs, remove all the original packing.

To remove old packing without the use of a special packing hook, use the pressure I generated by the pump. Remove the gland nuts or back off to the last thread or two. Run the pump against normal pressure only untii the pump pressure forces the packing from the stuffing box. Repeat if necessary, to reach the last ring or two of packing. A lantern ring is furnished only for suctign lift conditions.

The new rings of packing should be staggered at 180. Only soft and pliable packing should be used. The packing brand is not important. For ordinary service, hot or cold water, a good grade of asbestos packing imprgnated with graphite is satisfactory.

If a pump has been furnished with lantern rings, care should be used in repacking so that the ring will line up with and intersect the hole drilled for fresh water or grease seal. Such fresh water or grease seals are recommended for pumps used for handling abrasive liquids.

OPERATING PROBLEMS

If the recommended proceedures have been followed in installing the pump, it should operate satisfactorily with no attention other than routine adjustment and lubrication. A list of common pump operating difficulties and their probable causes follows:

1. FAILURE TO DELIVER LIQUID: (a) Pump not primed. (b) Insufficient speed (Check voltage and current of each phase.) (c) Discharge pressure required by the system is greater than that for which pump was designed. (d) Net positive suction head available to the pump is too little. (e) Impeller plugged up. (f) Incorrect direction of rotation.

2. INSUFFICIENT CAPACITY: (a) Air leaks in suction line. (b) Speed to low. (c) Discharge pressure required by the system is greater than that for which the pump was designed. (d) Impeller partly clogged. (e) Insufficient suction head (cavitation occurring). (f) Mechanical defects (wearing rings worn, impeller damaged). (g) Foot valve too small, clogged or not sufficiently submerged (on suction lift application).

3. INSUFFIENT PRESSURE: (a) Leaks in the suction line. (b) Air or vapor in the liquid. (c) Mechanical defects (see above).

4. PUMP LOSES PRIME AFTER STARTING: (a) Leaks in the suction line. (b) Suction lift too high. (c) Air or vapor in the liquid. (d) Air leakage through the mechanical seal.

5. PUMP OVERLOADS DRIVER: (a) Speed to high. (b) Total dynamic head too low (pump is pumping too much liquid). (c) Liquid pumped is of different specific gravity and/or viscosity than that for which pump was designed. (d) Mechanical defects (see above).

6. PUMP VIBRATES: (a) Misalignment. (b) Foundation not rigid. (c) Impeller partially clogged, causing imbalance. (d) Mechanical defects (shaft bent). (e) Rotating elements bind. (f) Worn motor bearings. (g) Pump dry, wearing rings rubbing. (h) Cavitation.

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