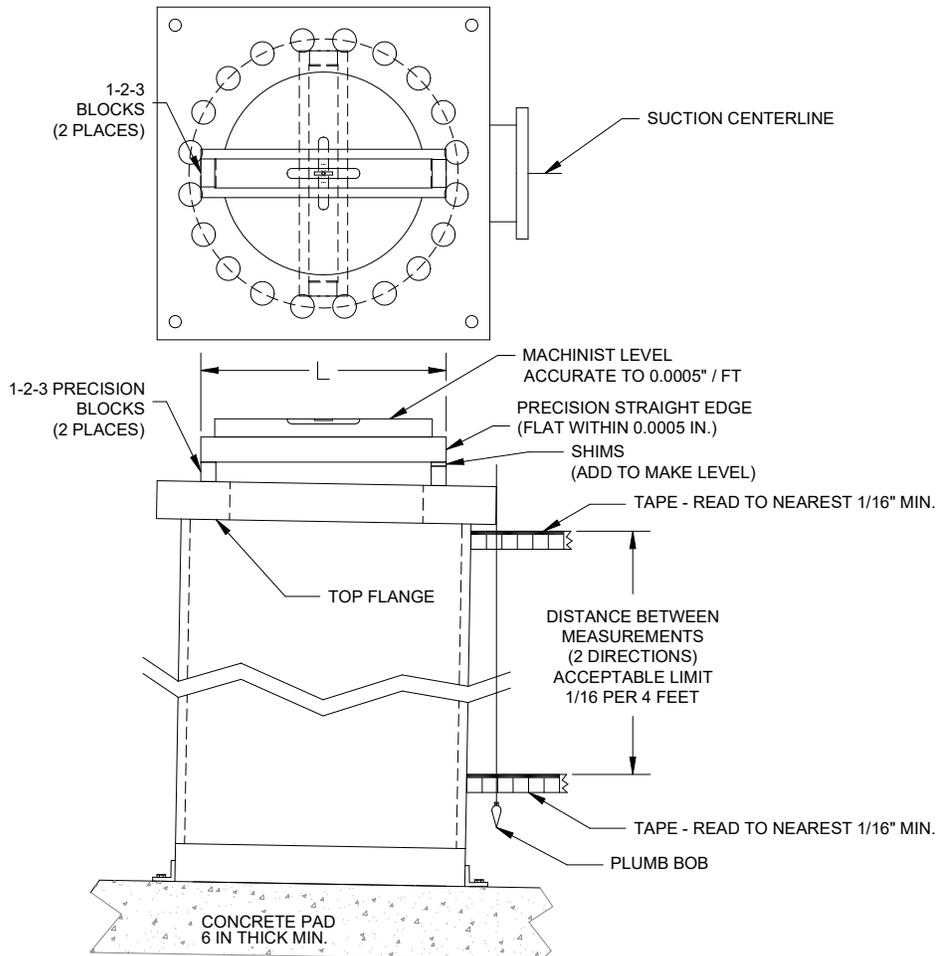


## Suction Barrel Installation Recommendations

## Suction Barrel Installation Recommendations

Correct installation of the suction barrel is critical to proper and trouble free operation of the vertical turbine pump. The barrel must be plumbed (vertical) so the pump and column are centered in the barrel. More critical is the level of the barrel's top flange. An unlevel barrel top flange can lead to excessive vibration resulting in reduced life of the bearings and voiding the pump warranty.



The barrel must be plumb within 0.015 inches / foot of barrel length along the entire length of the barrel. Once positioned plumb, the barrel must be secured and held plumb throughout the back filling operation. Anchor bolt holes are generally provided in or near the bottom plate. Using nuts above and below the anchor plate, the barrel may be adjusted. The anchor bolts are not always sufficient to hold the barrel in place, so guy wires near the barrel top are recommended for holding the barrel in place.

For barrels with top flanges which are seal welded to the barrel, the top flange must be held level at the same time and throughout the back filling process.

## Barrel Flange Welding and Leveling Procedure

### a. Required Equipment

- a.1. Machinist level accurate to 0.0005" minimum
- a.2. 123 precision blocks
- a.3. Precision straight edge (long enough to span barrel opening)

b. This procedure generally requires two persons. A millwright type person, referred to as the "leveler". The second person is a qualified welder.

b.1. The elevation should be verified prior to starting.

b.2. The flange should be at ambient temperature and in complete sun or complete shade during entire process.

c. The leveler finds highest point on flange. Once highest point is found all other tacks are removed. Starting at the low point, with the opposite high point still tacked, begin jacking up flange. Stop a few thousands below level, because the tack weld will cause the flange to rise. Tacking is done on top side of flange. The amount of rise will depend on the size of the tack and the size of the gap, if any. If it draws up to much you cut the tack out and start a little lower. This is a trial and error process.

Once you have this point level and tacked then you turn 90 degrees.

d. Repeat previous steps, tacking high side and jacking up low side until the flange is level. When this is accomplished, proceed on 45 degrees and on very large O.D. pipe, you may have to go to 22-1/2 degrees increments.

e. When all sides have been leveled and tacked, recheck level at least on center line of suction and 90 degrees, preferably all the way around the flange.

f. Now the welder is ready to start welding out top side. The quartering and back step method is recommended. For instance, if you call the suction center line 12 O'clock, then you weld about 3" there and move to 6 O'clock and weld 3", go to 3 O'clock and then 9 O'clock. Remembering while welder is welding, he stops and allows leveler to check and make sure flange is not moving out of tolerances. Continue welding in above mentioned pattern until top joint is complete.

g. Now the welder can seal weld the bottom side of flange to pipe using as small of pass as possible to minimize warping. There are many variables that affect this procedure and much has to be dealt with through experience and good common sense. For instance, if there is a larger gap on one side, it may draw more than the other side. The welder may have to put a larger weld or a couple of passes on the side that draws less. Also, while welding out, if the leveler finds that flange has been drawn up to much in one spot and it has been welded too much to try to cut loose, the welder can try to weld the underside to try to get it to draw down.

h. This is a trial and error procedure to achieve the levelness specified on the drawing.

## Procedure for Checking Level

After the top flange is completely welded to the barrel and prior to the top flange grouting and pump installation, the top flange level must be verified by Smith Pump Company personnel.

### a. Required Equipment

- a.1. Machinist level accurate to 0.0005" minimum.
- a.2. 123 precision blocks
- a.3. Precision straight edge (long enough to span barrel opening)

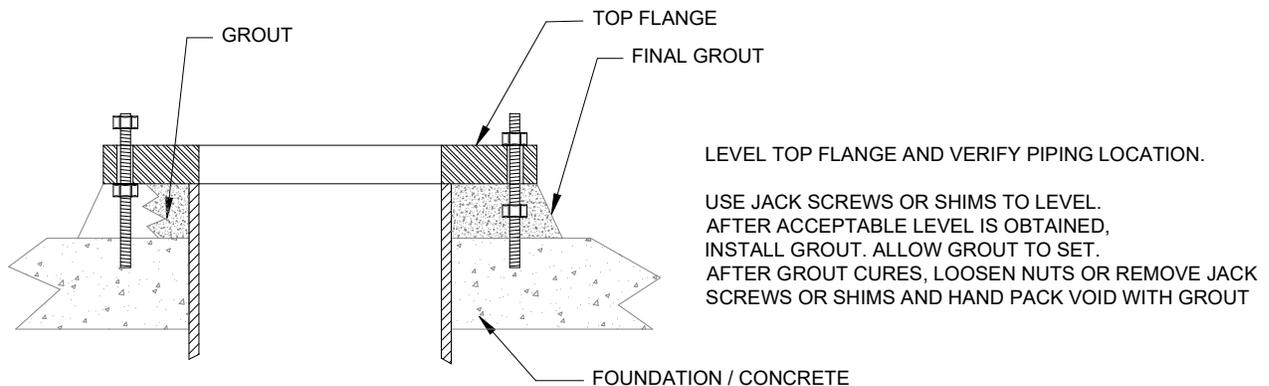
### b. The top flange surface must be clean, smooth and free of loose particles.

- b.1. The elevation should be verified prior to starting.
- b.2. The flange should be at ambient temperature and in complete sun or complete shade during entire process.

c. Using a machinist level and precision straight edge, that person will place 123 blocks at the positions as shown above and measure the levelness in line and perpendicular to the barrel suction. On larger barrels and flanges, the level is also checked at 45 degrees from suction. Shims will be added to the low side to center the bubble of the level.

d. The slope of the top flange is equal to the shim thickness, in inches, divided by the distance between the 123 blocks, in feet. The dimensions are recorded as part of the start-up report. The minimal acceptable slope is 0.001 inches per foot in any direction. **Slope exceeding these criteria must be corrected prior to grouting.**

e. It is recommended that the Contractor verify the top flange level prior to requesting Smith Pump Company personnel come to the site.



## Grouting Recommendations

- a. Always shim near the foundation bolts at each side and then back off the leveling nuts. Then tighten the foundation nuts. If done otherwise, there is a risk of significantly lowering the structural natural frequency that could result in separation of the base from the grout and vibration problems.
- b. If leveling nuts are used to level the base, they must be backed off as far as possible prior to grouting.
- c. Allow grout to set or cure for 72- 80 hours, then recheck flange level using above procedure before installing the pump.
- d. The minimal acceptable slope is 0.002 inches per foot in any direction after grouting is cured.

### Notes:

1. If recommended flange level is not maintained throughout back filling and grouting operation, corrective action must be performed, at the Contractor's expense.
2. These recommendations do not over rule the Engineer's requirements.