Industrial Gas Technology, Inc.

Side Channel Pump Installation Guide

Like any pump, the Side Channel pump will work best if properly installed. Fortunately, the guidelines for a trouble-free pump installation are fairly simple. A little extra effort spent during the design and installation will easily pay for itself later. Following are some rules for a successful Side Channel pump installation.

Strainer

The Side Channel pump has relatively tight tolerances so the installation of a suitable strainer upstream of the pump is important. The manufacturer recommends a 100 mesh strainer for all Side Channel pumps. A 100 mesh screen has roughly 20% greater pressure drop than a 20 mesh screen so care must be used to ensure that the strainer is not too restrictive. In some cases, it could be necessary to use a strainer on size larger than the piping. This is especially important when pumping liquefied gasses such as anhydrous ammonia, propane, or refrigerants since these products readily vaporize. Although the Side Channel pump can handle up to 50% entrained vapor, any vaporized product displaces liquid, which will reduce the effective capacity of the pump.

Inlet Piping

The goal of a properly designed suction pipe is to supply liquid to the pump with as little disruption as possible. Thus, the pump should be located as close to the supply tank as possible and the inlet piping should be short and simple – with as few elbows and other fittings as feasible. The inlet pipe should have a straight run or "steadying distance" just ahead of the pump. The length of the steadying distance should be equal to 10 times the pipe's nominal diameter. There should be no strainer, elbows, or other restrictions within this distance. Undue turbulence induced in the flow just before the pump could cause cavitation inside the pump. Both the suction and discharge pipes should be at least the same diameter as the pump's connections. When reducing pipe size in the inlet line, use an eccentric reducer with the flat side up to prevent the accumulation of a vapor bubble. The inlet line must be level or slope downward to the pump.

Pressure Controls

The exact pressure controls chosen can vary depending on the pump's function within the system. However, there are some general guidelines that should be used when selecting the system's pressure controls. Operating the Side Channel pump at a differential pressure that that exceeds its rating will damage the pump. The rated differential pressure varies depending on the model number and pump speed so it is best to refer to the performance curve for the particular model in question (the left end of the curve indicates the maximum pressure differential). All installations should include a differential pressure bypass valve with a setting at or below the maximum differential pressure rating of the pump. The valve must be large enough to handle the full flow of the pump. Corken's B166 bypass valve is commonly used for this purpose and has the added advantage of a built-in vapor release device to help the pump prime quickly. The B166 is made of ductile iron but stainless steel bypass valves are also available. Depending on the application, a second pressure control valve might be needed as well. A back-pressure control valve is commonly used for systems that require a constant discharge pressure – such as a vaporizer feed pump. In this system, the differential pressure bypass valve protects the pump from damage, and downstream. The outlet pressure remains constant even though the inlet pressure can vary. Both valves return product back to the supply tank.

It is also possible to operate with too little differential pressure (the right end of the curve indicates the minimum differential pressure). This can cause the pump to run "out of balance" and cause wear on the impellers. In a properly designed system, the combination of the differential pressure valve and the back-pressure control valve will maintain the pump within its desired operating envelope.

Pump/Motor Alignment

The alignment of the pump and motor is also an important consideration. The pump's shaft was not designed for side loading, axial loading, or moments. A misalignment can cause premature bearing and seal failure. In severe cases, it can cause the pump to lock up. If the motor was supplied at the factory, a preliminary alignment was done. However, the pump or motor could have shifted from freight handling. Also, when a pump is installed in the field, a small amount of baseplate deflection can occur when the baseplate is tightened to the foundation or when the piping is installed to the pump. Thus, the pump and motor alignment MUST be rechecked after installation. Shims can be added under the feet of the pump and/or motor to bring the two shafts into alignment. The accuracy of the alignment should be consistent with the requirements of the coupling used.

Pipe Stress

Pipe stress is another important factor when installing a pump. The pump should not be used to support heavy pipe loads or moments. The piping should be supported by pipe supports – not by the pump. The pipe should not "spring away" when unbolted from the pump flange. Such excessive pipe loads can cause bearing and seal failures. Any stresses resulting from thermal expansion of the pipe must also be considered. Flex hose or expansion joints can be used to minimize pipe loads transmitted to the pump.

Side Channel Pump Installation Notes

1. With some of our customers who've had leak problems in the past, the first thing we tell them to do is re-torque the tie bolts upon arrival (shouldn't be necessary, but could be helpful in the case of temperature change or rough handling during shipping).

2. Set pump on base plate and make sure flanges are aligned with piping without having to force the piping. If they do not easily align, piping adjustments are necessary.

3. Lift pump to piping, and start flanged bolts, keeping in mind not to pry or pull the piping around to get the flanges to fit together.

4. Tighten pump to piping

5. Place shims between the pump feet and the base plate until any gaps are removed.

6. Tighten pump to base bolts

7. Align motor to pump, shim motor if required

The basic principle here is to take the pump to the piping, then shim everything else to fit and align.