

Tech Talk

Baseplate Flatness

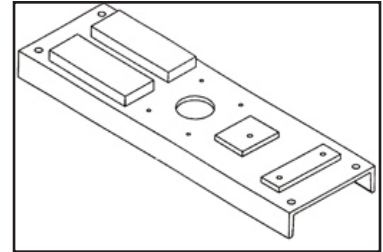
George Ceelen, Senior Product Specialist

ANSI Pumps

Baseplate flatness has become a hot issue over the last few years as equipment users are looking to simplify installation and alignment and reduce MTBF (mean time between failures).

What is flat?

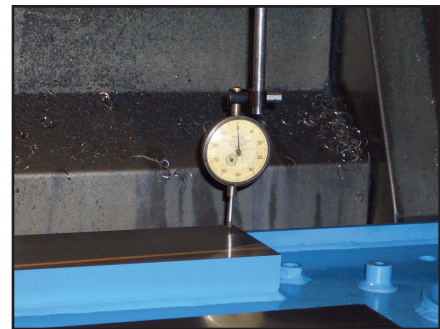
A typical fabricated steel baseplate for an ANSI or standard industrial pump will be flat to within 0.005 inches (0.127 millimeters) per foot (0.3048 meter). Example, if the distance between the pump mounting pad and the motor mounting pad is 4 feet (1.2192 meters), then the motor pad can be 0.020 inches (0.508 millimeters)



higher or lower than the pump pad. If a pump pad is one foot (0.3048 meter) long, it can be 0.005 inches (0.127 millimeters) lower or higher on one end. The Advantage Baseplate (PIP) for the same model is 0.002 inches (0.0508 millimeters) per foot (0.3048 meter), or less than half of the standard baseplate. API 610 baseplate tolerance is also 0.002/ft (0.0508/m). Some customers specify 0.0015 inches (0.0381 millimeters) per foot (0.3048 meter) flatness.

Benefits

A flat surface will allow the installer to more effectively level the baseplate prior to grouting and then align the motor to the pump by shimming under the motor feet. When attempting to align the pump and motor shaft to within 0.002 inches (0.0508 millimeters) TIR (Total Indicated Runout), it is easier to start out on a level playing field rather than have unequal shim stacks under each foot of the motor. A “soft foot” is where one or more feet are not in contact with the mounting pad when the unit is in the unbolted condition (this should be corrected by shimming, not by tightening the bolt which may distort the motor frame).



Baseplate with factory method of measuring flatness

Flatness versus level

Flatness is a measurement. During the manufacturing process baseplate flatness is measured by attaching a dial indicator to the machine head, unclamping the baseplate so it is in its free state, then measuring various points on the milled surface. Flatness is a manufacturing tolerance of the machined surface. Flatness measurement and acceptance are done at the manufacturing point.

Level is a “state” or “condition.” In the field, the installer uses a precision level and wedges (or leveling screws) to bring the flat surface of the baseplate pads to a level condition in both directions (baseplate not being twisted or bent).

Limitations

There are machine limitations such as the tolerance capability of the milling machine. As the milling tool travels the length of the baseplate, it can achieve only a certain flatness. Different baseplate designs possess varying abilities to withstand deflection during the machining operation. Similarly, fabricated baseplates may have internal stresses that as they relieve may cause the baseplate to distort from the shape during machining. All baseplates have some amount of flex and they must be properly leveled prior to grouting. Proper leveling is critical to avoid future issues with alignment, and consequently to optimize pump life.

What to do?

- Review customer specifications for any requirements for baseplate flatness.
- Compare the requirement with the published information for the pump model of interest.
- If necessary, discuss differences with the Product Specialist at the factory.
- Options to discuss include upgrade of the baseplate, training for installation and alignment, field service for supervision and installation certification, and ProSmart™ for equipment monitoring (i.e., mis-alignment can cause higher vibration and can affect bearing temperatures).