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# START – UP PROCEDURES

## OF GLYCOL GS MODEL PUMPS:

Rotor-Tech GS model pumps incorporate pressure wear plates in their design. These wear plates, via a seal on the back side of the plates when working in conjunction with the fluid pressure, apply pressure to the wear plates keeping constant pressure on the sides of the gears to minimize fluid slip within the pump.

In most applications this wear plate design will allow for thermal expansion that may occur as the fluid being pumped, at the inlet side of the pump (suction piping temperature), is at a higher temperature than that of the pump casing and its internals. In cases where the differential temperature ( $\Delta T$ ) between the inlet temperature and pump casing is greater than 50°F, it will be necessary to 'jog-start' the pump a few times to allow the expansion of the pumps internals to occur slowly, preventing both thermal shocking the pump and allowing a small film of lubrication to be established across the pumps internal bushings.

The jogging process is simple:

- 1) First, start the pump for approximately 3-5 seconds, paying close attention to the sound of the pump, they are very audible and create a unique frequency sound that should be present for the duration of both the start-up procedure and during operation. Very important part is to make sure the jogging procedure is done with the bypass ( a line going back to either the surge tank, reboiler, basically atmospheric pressure but never back to the suction side of the pump) is completely open.
- 2) Secondly, shut the pump down for the same amount of time (3-5 seconds) to allow the fluid to reach the bushing at the furthest internal part, the end cap which will allow the film of fluid needed around the bushing prior to introducing it to pressure.
- 3) Thirdly, when the  $\Delta T$  is within 50°F of each other, start the pump and let it run under no load, again with the bypass completely open, monitoring the  $\Delta T$  between the inlet and end cap. This monitoring can be accomplished by utilizing a heat gun and measuring the suction piping and pump casing and comparing the temperature readings. In most cases, unless there is an extreme difference in the fluid temperature as compared to the pump casing, only two to three jogs is required, but the process must be continued until the temperature differences are less than 50 degrees F.
- 4) FINALLY, once the temperature across the pump casing has reached that of the inlet temperature and the  $\Delta T$  across the end cap bushing and inlet temperature are within 3-6°F of each other, the pump is now ready for a very slow loading which is accomplished by shutting the bypass valve very slow ( normally in increments of 200 psig) continually checking the  $\Delta T$  across the end cap bushing and inlet temperature,

until maximum pressure has been reached. During the loading between the 200 psig increments, it's very important that the pump is allowed time at each increment (10-20 seconds) to insure proper alignment and sufficient lubrication is administered prior to maximum loading on the pump. Again, the pump is very audible, as mentioned above, and if any problems should arise during start-up the pumps harmonic frequency sounds should detect this problem.

#### SPECIAL NOTES:

NOTE: Rotor-Tech pumps are bushing style pumps, and as such, it is very important to develop the fluid film between the pump shafts and the bushings for proper operation. Starting the pump under load will load one side of the gears/shafts and prevent the fluid film from developing adequately and will result in premature bushing wear which in turn will cause uneven loading on the gear teeth. Running the pump without load for 2-3 minute will also allow all entrapped air in the pump to be evacuated prior to loading.

NOTE: The discharge by-pass line should always be routed back to the surge / flash tank or reboiler as if you route it to the pump suction you could set up a turbulent flow characteristic that may cause foaming or frothing in the fluid to the suction and this will damage the pumps. Also, if the by-pass line is used to regulate flow to the contactor then routing to the suction will create a heat loop which may also damage the pump.

NOTE: The discharge by-pass line should always be large enough that it does not create back-pressure on the pumps internals during start-up, normally the size should be at least the size of the discharge pipe diameter or larger.

NOTE: Once the pump is completely loaded and in operation, if at any time afterwards, one should witness a different harmonic frequency sound from the pump, simply open the bypass valve ( normally a globe or gate valve but never a ball valve ) and allow any foreign object or possibly an air entrapment to escape or flush through and proceed with loading the pump slowly.

NOTE: A preventive maintenance directive would be to monitor the  $\Delta T$  3-4 times daily to assure proper temperatures across the pump.

NOTE: Rotor-Tech pumps will actually pull 5-7" Hg suction pressure and could draw air from leaky valves, unions, etc. If this happens, the pumps internal parts will heat up due to lack of lubricity and could vapor lock if not addressed. You may not notice leaks in the suction piping/instrumentation without running 'soap' tests on the connections, valve stems and etc. upstream of the pump suction.

If you should need further assistance, please don't hesitate in contacting ROTOR-TECH at the contact information in the letterhead.