Pro-Vibe Condition Monitoring

Pro-Vibe Condition Monitoring
Predictive Maintenance Services
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Location: Field use
Subject: **CVHE Balancing**

CVHE Balancing Steps (Air Run) using Accelerometer on Motor Outboard End

1.) **Check TIR Cold chiller (shaft deflection) on extended part of shaft.**
2.) **Monitor Motor Winding Temperatures**
3.) **Remove all prior balancing weights on balancing nut before running the reference run. Do note the weight and location of those older balancing weights on nut.**
4.) **Mount accelerometers at (12:00 or 6:00 Vertical & 3:00 or 9:00 Horizontal at Motor Outboard Bearing location. I also recommend installing the axial by mounting using stud. This reading and the others should be collected on reference run on route that is setup prior to balance and then also collect after balance readings at these same locations for use in reports or chiller history info.**
5.) **Install brace across the suction end of motor. Have assembly for laser or photo optic tach. (Make sure the brace is tight). Leave the inlet guide vanes in chiller. (*You will have to open vanes for setup and installation of balancing weights, but always close vanes when running chiller on air.*)**
6.) **Put black paint on shaft end by using Nissen Solid Paint Marker**
7.) **After paint dries put ¼ inch wide reflective tape from TDC hole to center and note the leading edge should be from left side of tape to center of shaft. Cut off any excess tape that goes over the outer edge of shaft.**
8.) **Aim laser or photo optic light to a point that is at 12:00 in center of the reflective tape path.**
9.) **Take output of the laser or photo tach and put into the input of vibration analyzer.**
10.) **Use one or both vertical or horizontal accelerometer inputs in to analyzer. Note the phase between vertical and horizontal should be approximately 90 degrees. If you do not see this 90-degree shift then only use the location with the higher amplitude even though you may have the ability to balance using both inputs.**
11.) **Balance is a single plane balance. (Only one plane to attach weights) this is balance nut where depending on the size of chiller you will have 12, 18, or 24 holes. Use ¼-20 machine bolts of various sizes and weights and also make sure the washers do not rest or apply stress on the thread area of the**

shaft. (You may have to trim washers so the weights are free of the threaded area of the shaft. Also make sure the bolt or setscrew does not bottom out to the tab washer. This can bend the shaft and cause additional problems.

12.) Always allow the chiller to warm up 8-10 minutes before collecting any balance data. You can monitor or save initial vibration data during the initial or reference run so you can compare before balance with after balance runs. You can also monitor the amplitude and phase of one or both of the directional data to see if the chiller amplitude is stable or the phase is steady. Never collect balance data if one or both of these are continuing to vary and are not settled out.

13.) I have normally noticed that levels start high and have a tendency to drift down for 5 minutes, but the drift is not significant.

14.) Take reference run data after the 8 or 10 minutes run time. 1st run.

15.) Install trial weight of 20-25 grams initially at a selected location.

16.) If amplitude does not change by 30% or the phase does not change by 30 degrees. You may want to redo the trial run and get at least this 30-30 change from reference readings. You can change the location or increase the amount of weight in order to get the change in amplitude or phase.

17.) If the change is noted then continue to balance on the analyzer or computer software.

18.) Install the recommended weight at recommended location and run chiller to see how the balance worked out. You can continue on to a second trim balance, but I would redo if the 2nd trim balance did not get the amplitude down to ½ of manufacturers spec.

19.) Check TIR on shaft in hot motor status.

20.) Manufacturers spec is .10 ips on air, .15 ips on air with elbow in place and .25 ips with chiller on refrigerant as measured on motor outboard end in vertical, horizontal, and axial locations.

21.) I recommend balancing to ½ of air run spec. I have seen the air run levels increase 3-7 times air run levels when back on refrigerant. .1 ips would go to .7 ips and therefore be over spec. If you balance to .03 ips, which is not too difficult to achieve even with a 7xtimes increase you are still within spec and .21 ips.

22.) On CVHE model numbers CVHE080-CVHE1250 if you get continue to get high levels when chiller is at full load I recommend checking the motor winding temperatures and then call manufacturer to see if removing the motor cooling orifice may help reduce the vibration on chiller. Some of these models have higher vibration at loads near 100% that is attributed to increase motor shaft deflection because of higher heat in motor. Keeping the motor cooler may help reduce this heat and lower higher load vibration levels.

23.) If the condition exists where the balance was good and the near 100% load levels are high (above limit) then I recommend collection profile on chiller prior to calling manufacturer by running at 50%, 75%, and 100% loads and collect vibration and motor winding temperatures at each of the

aforementioned loads. Additional motor cooling may reduce the higher load vibration levels.

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