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November 7, 2023

Tracy Irving Bio-Energy Development Memphis, TN

Tracy,

The following is a summary of findings from the Chiller vibration survey that was performed on October 20, 2023.

QualiTest® uses a four step rating system for defects.

<u>CLASS I</u>: Defect is present, but effect on reliability is not clear; no immediate action is required. Continue to normally monitor.

<u>CLASS II</u>: Defect (s) present that may cause problem in long term (2-6 months). Repair during normal maintenance scheduling. Continue to monitor.

<u>CLASS III</u>; Defect (s) present that may cause failure in short term (less than 2 months). This should be addressed as soon as practical, with a high maintenance priority. Increase monitoring frequency.

<u>CLASS IV</u>; Defect (s) present that makes continued reliability unpredictable, and possibility of secondary damage is high. Repairs should be made ASAP. An unscheduled shutdown should be considered for repairs

Hi-Speed Industrial Service tests and inspects industrial machinery and equipment and makes recommendations concerning maintenance and repairs based on its experience in the field of industrial repair and maintenance. The information contained herein is provided as an opinion only, not as a guaranty or warranty of the matters discussed herein.

Defect Summary

Chiller 2 CLASS II



Observation:

Data above is the outboard motor bearing axial. Notice the cursors marked B. This is the BSF (ball spin frequency) of the ODE bearing. This is an indication of a bearing issue causing a dominant 2 x BSF vibration. Overall vibration amplitudes are low at this time but the presence of these BSF peaks is concerning.

Recommendation:

There appears to be an issue with this motor. During our data acquisition we monitored the ODE bearing temperature and noticed that the temperature increased up to 157 degrees F. The #1 Chiller ODE bearing temp was around 95 degrees F. This may be caused by axial thrusting of the ODE bearing. It may also be contributed by the grease. We noticed brown colored grease on the grease fitting. This is not the grease that should be in the motor bearing/end bell. The grease that is being used by this bearing is Polyrex EM grease likely Mobile brand and it is colored blue. Mixing grease types can cause issues such as overheating. The possible thrusting may be due to improper spacing of the coupling spool piece. It is highly recommended to measure the face-to-face distance of the couplings with the spool piece removed. The manufacturer should have this spec. We also recommend to check the alignment during this time just to ensure alignment is within spec. It should be ok considering this is a flange mounted motor, but we have seen some misalignment with York Chillers in the past. This is rare but can occur.

We also noticed that the motor bearing temp sensors are not working properly according to the control panel display.

Abbreviated Last Measurement Summary

MEASUREMENT POINT	OVERAL	L LEVEL	HFD /	VHFD
CHILLER1 - CHILLER 1		(20-Oct-23)		
	OVERA	LL LEVEL	1 - 20) KHz
MOH	.040	In/Sec	.615	G-s
MOV	.062	In/Sec	.405	G-s
MIH	.042	In/Sec	.733	G-s
MIV	.051	In/Sec	.167	G-s
MIA	.025	In/Sec	.330	G-s
EIA	.020	In/Sec	.134	G-s
EIH	.044	In/Sec	.763	G-s
EIV	.023	In/Sec	.122	G-s
CHILLER2 - CHILLER 2	(20-Oct-23)			
	OVERA	LL LEVEL	1 - 20) KHz
MOH	.053	In/Sec	.723	G-s
MOV	.054	In/Sec	.280	G-s
MIH	.049	In/Sec	1.059	G-s
MIV	.046	In/Sec	.147	G-s
MIA	.024	In/Sec	.291	G-s
EIA	.019	In/Sec	.073	G-s
EIH	.031	In/Sec	.536	G-s
EIV	.024	In/Sec	.086	G-s
rification Of Vibration				
	PMS			
Vel> Tr/Sec	DK			
	FK			

Database: Bio Energy .rbm

As always, it has been a pleasure to serve Bio-Energy Memphis, TN. If there are any comments or questions, do not hesitate to contact us.

Sincerely,

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Kevin W. Maxwell

ISO Certified Vibration Analyst, Category III



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