HI-SPEED INDUSTRIAL SERVICE QualiTest® Diagnostics

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December 31, 2024

North Shelby Plant
Millington, TN

The following is a summary of findings from the December 2024 monthly vibration survey at the North Shelby site.

QualiTest® uses a four-step rating system for defects.

Class I: Defect is present, but effect on reliability is not clear; no immediate action is required. Continue to normally monitor.

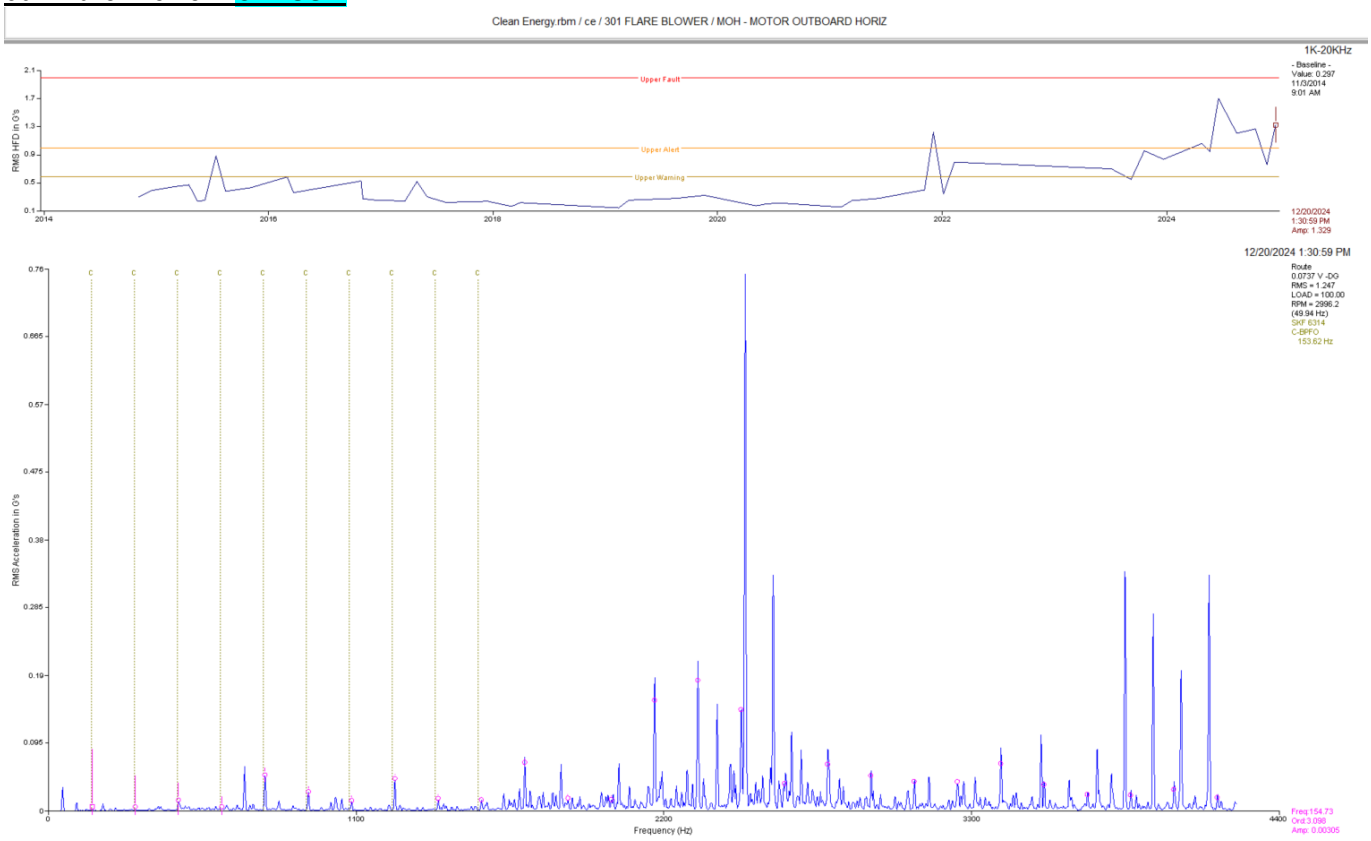
Class II: Defect (s) present that may cause problem in long term (2-6 months). Repair during normal maintenance scheduling. Continue to monitor.

Class III; 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.

Class IV; 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

Defects

301 Flare Blower CLASS II



Observations:

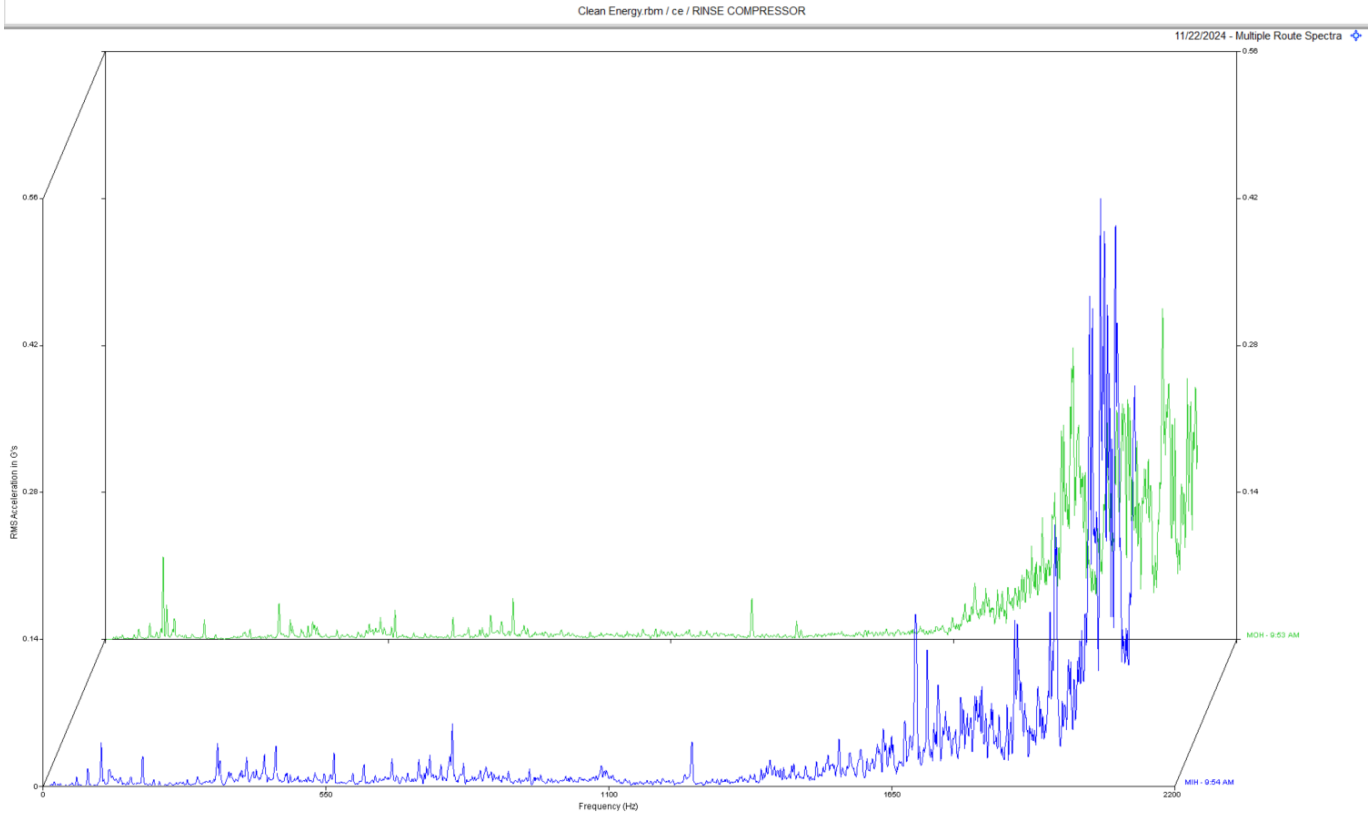
Data above is the motor outboard horizontal. There appear to be several harmonics of a non-synchronous frequency present in the spectra that line up with outer race defect fundamental and its harmonics. This is indication of bearing defects in the motor.

Recommendations:

Motor should be replaced in the next few months. Still low level at this time. We are monitoring this closely.

Unit was down this survey; however, the following still applies.

Rinse Compressor CLASS II



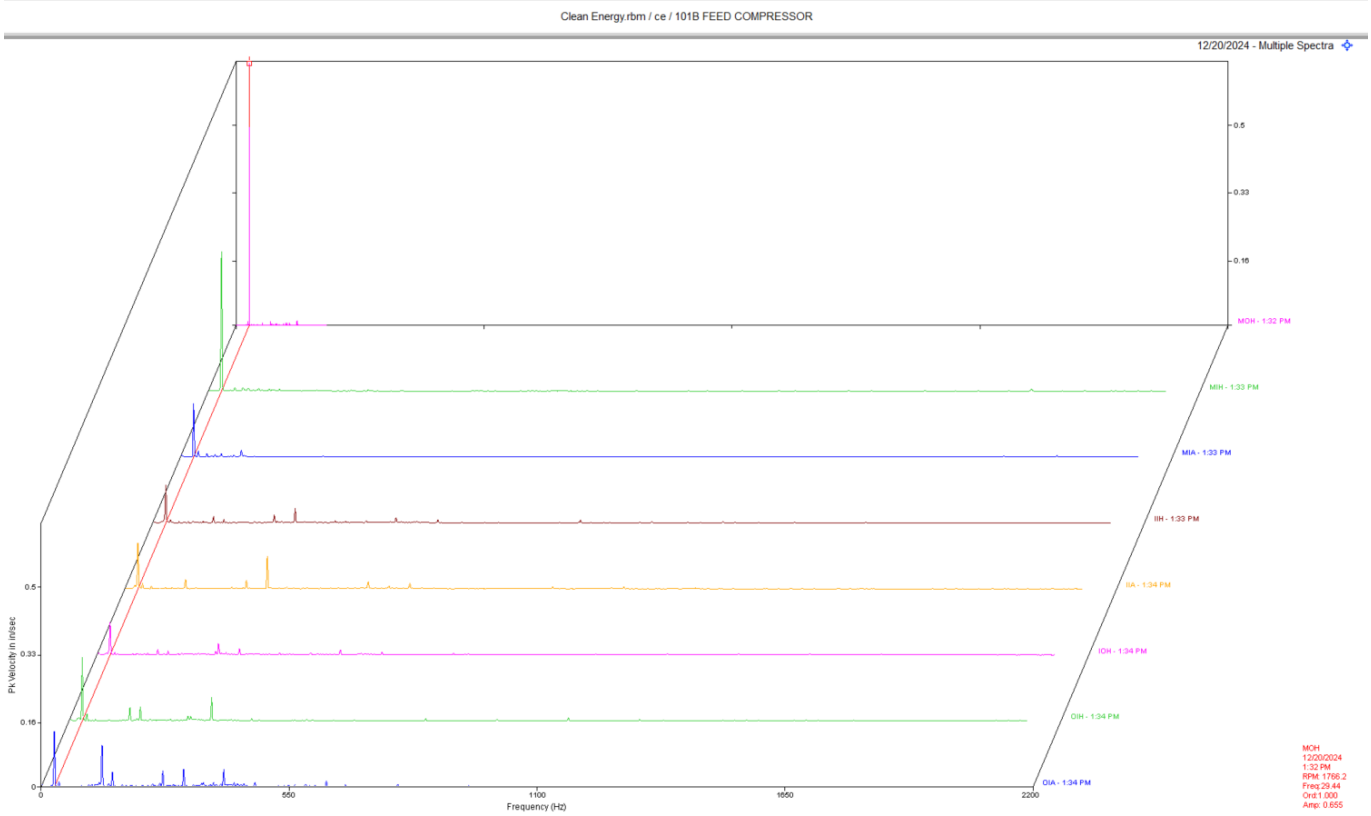
Observations:

Drive motor data shows some high frequency vibration. Motor is also making a squealing type noise. The last reading showed amplitude to be 2.1 g's on average. Spectral data shows a noise floor 1500-5000 hz range. Peak to peak waveform amplitude is 16 to 18 g's.

Recommendations:

Vibration characteristics indicate a lube issue or bearing wear. Motor likely needs attention during next extended shutdown. We are monitoring this closely. Rated as a **CLASS II** defect for now.

Feed Compressor B CLASS I



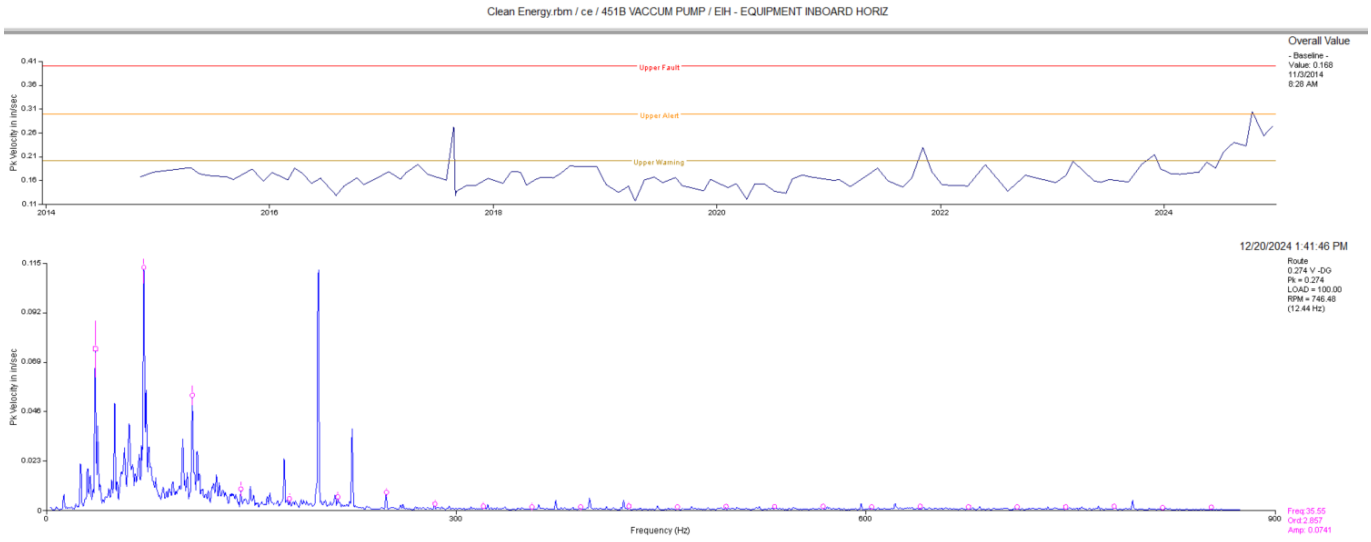
Observations:

New motor data still shows motor to have elevated 1 x rpm vibration.

Recommendations:

The 1 x rpm vibration may be due to process load and or imbalance. There could also be an issue with the motor side of the coupling. It is recommended to run the motor solo, if possible, to help diagnose issue. It may also be necessary to recheck alignment, fasteners, and check couplings at next opportunity.

451B Vacuum Pump CLASS II



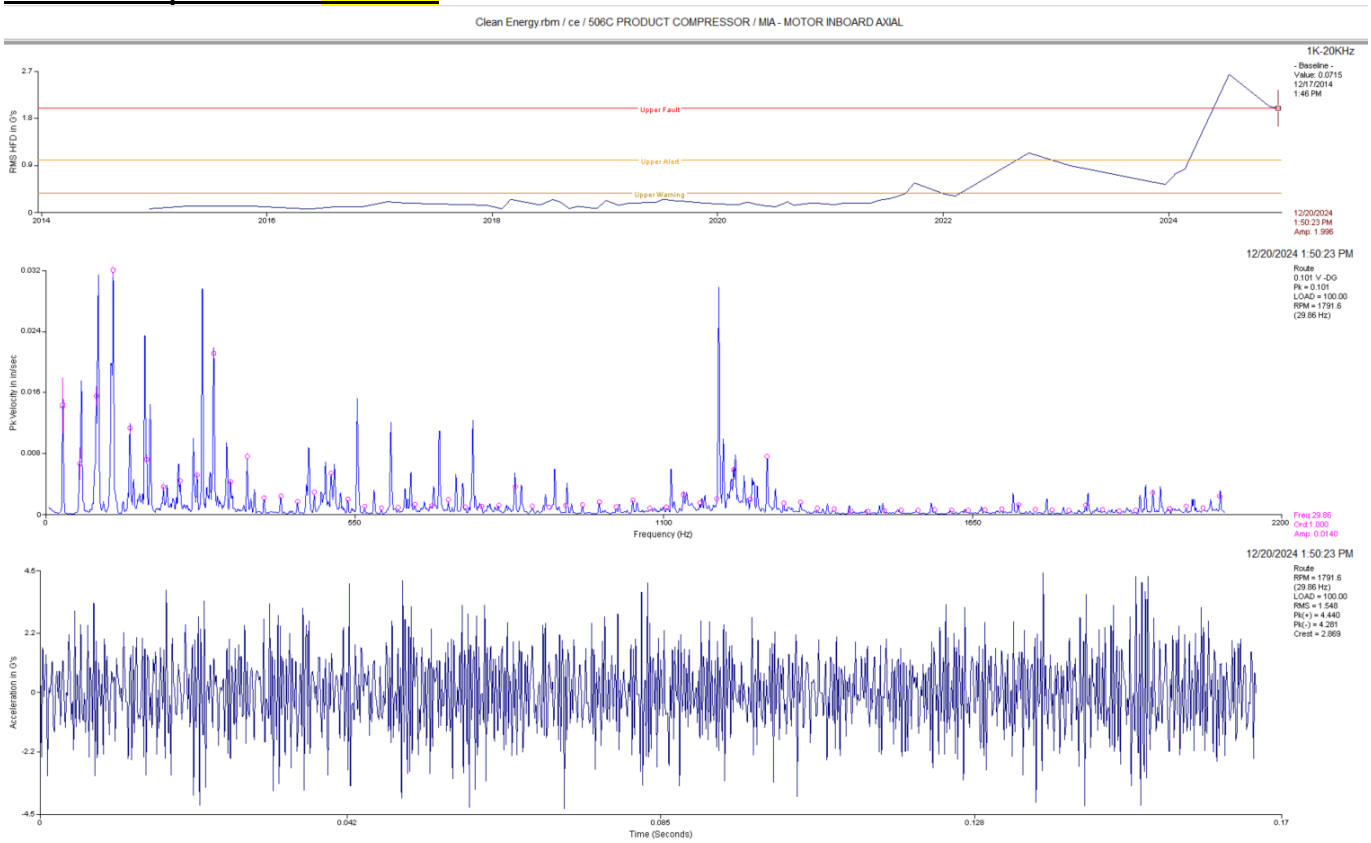
Observations:

DE compressor data shows appearance of peaks that may related to ball spin frequency.

Recommendations:

The possible ball spin frequency peaks indicate roller defects of the bearing. Ensure bearings are lubed good and inspect bearings for defects as best as possible soon.

Product Compressor C CLASS III



Observations:

Trend data shows increase in G's in motor data. Spectral waterfall of motor DE shows an increase in non-synchronous peaks over the past few surveys.

Recommendations:

Data indicates defects in motor bearings. Motor will need attention in the next couple of months.

Abbreviated Last Measurement Summary

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Database: Clean Energy.rbm
Area: millington plant

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
301 FLARE - 301 FLARE BLOWER	(20-Dec-24)	
	OVERALL LEVEL	1K-20KHz
MOH	.074 In/Sec	1.329 G-s
MOV	.152 In/Sec	.210 G-s
MIH	.064 In/Sec	.676 G-s
MIV	.081 In/Sec	.147 G-s
MIA	.058 In/Sec	.220 G-s
EIH	.141 In/Sec	.251 G-s
EIV	.085 In/Sec	.385 G-s
EIA	.059 In/Sec	.095 G-s
EOH	.105 In/Sec	.260 G-s
EOV	.111 In/Sec	.132 G-s
RINSE COMP - RINSE COMPRESSOR	(22-Nov-24)	
	OVERALL LEVEL	1K-20KHz
MOH	.115 In/Sec	2.026 G-s
M1P	.018 In/Sec	
MIH	.123 In/Sec	4.009 G-s
M2P	.022 In/Sec	
MIA	.085 In/Sec	.442 G-s
IIH	.084 In/Sec	1.391 G-s
IIA	.166 In/Sec	.199 G-s
IOH	.101 In/Sec	.584 G-s
OIH	.089 In/Sec	1.083 G-s
OIA	.114 In/Sec	.177 G-s
OOH	.107 In/Sec	.931 G-s
VAC COMP - VACUUM COMPRESSOR	(22-Nov-24)	
	OVERALL LEVEL	1K-20KHz
MOH	.138 In/Sec	1.756 G-s
MIH	.065 In/Sec	1.361 G-s
MIA	.057 In/Sec	.155 G-s
IIH	.103 In/Sec	.595 G-s
IIA	.050 In/Sec	.123 G-s
IOH	.131 In/Sec	.860 G-s
OIH	.096 In/Sec	.910 G-s
OIA	.062 In/Sec	.217 G-s
OOH	.100 In/Sec	.780 G-s
101B COMP - 101B FEED COMPRESSOR	(20-Dec-24)	
	OVERALL LEVEL	1K-20KHz
MOH	.696 In/Sec	.413 G-s
MIH	.358 In/Sec	.286 G-s
MIA	.141 In/Sec	.568 G-s
IIH	.116 In/Sec	1.235 G-s
IIA	.158 In/Sec	.789 G-s
IOH	.102 In/Sec	.943 G-s
OIH	.186 In/Sec	2.361 G-s
OIA	.212 In/Sec	.750 G-s
* OOH	.209 In/Sec	1.648 G-s
HX132B FAN - HX132B GAS OIL COOLER FAN	(20-Dec-24)	
	OVERALL LEVEL	1K-20KHz
MOH	.071 In/Sec	.020 G-s
MIH	.097 In/Sec	.183 G-s
EIH	.106 In/Sec	.107 G-s
EOH	.071 In/Sec	.033 G-s

451A PUMP - 451A VACCUM PUMP (20-Dec-24)

	OVERALL LEVEL	1K-20KHz
MOH	.079 In/Sec	.855 G-s
MOV	.080 In/Sec	.285 G-s
MIH	.076 In/Sec	.581 G-s
MIV	.103 In/Sec	.450 G-s
MIA	.059 In/Sec	.440 G-s
EIH	.160 In/Sec	4.611 G-s
EIV	.178 In/Sec	.524 G-s
EIA	.131 In/Sec	1.067 G-s
EOH	.117 In/Sec	.625 G-s
EOV	.137 In/Sec	.150 G-s

HX453A FAN - HX453A VAC PUMP OIL COOL FAN (20-Dec-24)

	OVERALL LEVEL	1K-20KHz
MOH	.218 In/Sec	.109 G-s
MIH	.123 In/Sec	.062 G-s

451B PUMP - 451B VACCUM PUMP (20-Dec-24)

	OVERALL LEVEL	1K-20KHz
MOH	.069 In/Sec	.338 G-s
MOV	.093 In/Sec	.174 G-s
MIH	.110 In/Sec	.401 G-s
MIV	.119 In/Sec	.180 G-s
MIA	.078 In/Sec	.073 G-s
EIH	.274 In/Sec	.417 G-s
EIV	.210 In/Sec	.239 G-s
EIA	.183 In/Sec	.276 G-s
* EOH	.202 In/Sec	.799 G-s
* EOV	.236 In/Sec	.158 G-s

HX453B FAN - HX453B VAC PUMP OIL COOL FAN (20-Dec-24)

	OVERALL LEVEL	1K-20KHz
MOH	.142 In/Sec	.241 G-s
MIH	.120 In/Sec	.155 G-s

451C PUMP - 451C VACCUM PUMP (20-Dec-24)

	OVERALL LEVEL	1K-20KHz
MOH	.246 In/Sec	.725 G-s
MOV	.161 In/Sec	.147 G-s
MIH	.296 In/Sec	.729 G-s
MIV	.205 In/Sec	.284 G-s
MIA	.081 In/Sec	.295 G-s
EIH	.197 In/Sec	.700 G-s
EIV	.124 In/Sec	.141 G-s
EIA	.101 In/Sec	.210 G-s
EOH	.144 In/Sec	.776 G-s
EOV	.140 In/Sec	.156 G-s

HX453C FAN - HX453C VAC PUMP OIL COOL FAN (20-Dec-24)

	OVERALL LEVEL	1K-20KHz
MOH	.171 In/Sec	.352 G-s
MIH	.107 In/Sec	.231 G-s

451D PUMP - 451D VACCUM PUMP (20-Dec-24)

	OVERALL LEVEL	1K-20KHz
MOH	.063 In/Sec	1.002 G-s
MOV	.074 In/Sec	.512 G-s
MIH	.082 In/Sec	1.097 G-s
MIV	.085 In/Sec	.186 G-s
MIA	.034 In/Sec	.289 G-s
EIH	.157 In/Sec	.432 G-s
EIV	.134 In/Sec	.068 G-s
EIA	.098 In/Sec	.092 G-s
EOH	.136 In/Sec	.582 G-s
EOV	.130 In/Sec	.142 G-s

HX453D FAN - HX453D VAC PUMP OIL COOL FAN (20-Dec-24)

	OVERALL LEVEL	1K-20KHz
MOH	.210 In/Sec	.159 G-s

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            MIH                        .221 In/Sec       .151 G-s

      506C COMP  - 506C PRODUCT COMPRESSOR       (20-Dec-24)
                                    OVERALL LEVEL     1K-20KHz
            MOH                      .152 In/Sec      1.612 G-s
            MIH                      .158 In/Sec      5.915 G-s
            MIA                      .101 In/Sec      1.996 G-s
            IIH                      .216 In/Sec       .872 G-s
            IIA                      .208 In/Sec      1.326 G-s
            IOH                      .220 In/Sec      3.240 G-s
            OIH                      .222 In/Sec      1.599 G-s
            OOH                      .264 In/Sec       .514 G-s

      HX507C FAN - HX507C GAS COOL FAN           (20-Dec-24)
                                    OVERALL LEVEL     1K-20KHz
            MOH                      .214 In/Sec       .063 G-s
            MIH                      .253 In/Sec       .093 G-s

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   Clarification Of Vibration Units:
      Acc       -->  G-s       RMS
      Vel       -->  In/Sec    PK
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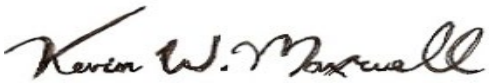
As always, it has been a pleasure to serve North Shelby-Archaea Energy. If there are any comments or questions, do not hesitate to contact us.

Sincerely,



ISO Certified Vibration Analyst, Category III

HI-SPEED INDUSTRIAL SERVICE

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