

January 22, 2021

Arkema

Subject: January week 3 vibration service report

Most of the machines surveyed were found to be in good condition except for the following:

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

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.

This completes our assessment of your equipment for this survey. Thank you for your business and don't hesitate to call if you have any comments or questions.

Sincerely,

David W. Shook
Senior Reliability Specialists
Hi-Speed Industrial Service
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Weekly Route Critical Equipment Observations

C Concentrator Vacuum Pump 2130-1

Vibrations appear to be slightly elevated this survey. Motor axial is slightly up at 0.173"/sec velocity peak. No actions required just yet.

Agitator, Hydrogenator C 7001-01

The highest motor overall vibration is at 0.120"/sec velocity peak for the inboard vertical. We will continue to monitor normally. Gearbox looks good. No immediate issue.

A/B Concentrator Vacuum Pump 57

The outboard pump bearing overall is 0.188"/sec peak velocity, with a dominant vibration at 16 orders, which is most likely vane pass. We will continue to watch for changes. **Rated a Class I Defect.**

Flash Vacuum Pump 2130-1

Vibrations are all under 0.1"/sec velocity peak overall. No actions required.

Air Compressor C-201

Rotor bar vibrations are low for this motor's history. The trend clearly shows that the vibrations vary considerably over time. We still believe these motors have possible weak rotor bar end connections that cause the vibrations to fluctuate higher due to loading. There are still blower case vibrations around 2.5-3 KHz. With a wide noise floor. We will continue to monitor this unit for changes. **Rated a Class I Defect.**

Air Compressor C-202

Rotor bar vibrations have returned to normal and are low for this motor's history. The trend clearly shows that the vibrations vary considerably over time. We still believe these motors have possible weak rotor bar end connections that cause the vibrations to fluctuate higher due to loading. There are still blower case vibrations around 2.5-3 KHz. With a wide noise floor. We will continue to monitor this unit for changes. **Rated a Class I Defect.**

Air Compressor C-203

Rotor bar vibrations are high for this motor's history. The trend clearly shows that the vibrations vary considerably over time. We still believe these motors have possible weak rotor bar end connections that cause the vibrations to fluctuate higher due to loading. We are still watching acceleration around 2.5-3 KHz. for the compressor section that appears to be harmonic. We will continue to monitor this unit for changes. **Rated a Class I Defect.**

Instrument Air Compressor

The male and female shaft vibrations still seem to show gear mesh and harmonics as well as a beat vibration occasionally. They continue to vary over time. Both shafts have between 6 and 7 g's RMS overall in the data. The dominant vibration appears to be the second gear mesh harmonic at near 2500 Hz. We are still watching this unit closely and will be going forward. **Rated a Class I Defect for now.**

Air Compressor NASH A 201-08A

Highest vibration is still in the pump itself at 0.312"/sec velocity peak for the outboard vertical. The vibration spectrum is still dominated by a 20-order vibration, which is thought to be vane pass. **Rated a Class I Defect.**

D Hydrogenator Agitator 9002-10

Highest overall vibration is at 0.290"/sec velocity peak. This is an increase from last week and probably indicates a process variation. We will watch carefully during the next few surveys. No immediate concern.

Reportable Monthly Equipment

North Cooling Tower (South Fan)

The outboard motor vibration shows a beat vibration due to the motor shaft speed fundamental being close to a vibration we believe to be blade pass. Overall velocity is above 0.35"/sec peak Recommend ensuring the motor fasteners and structure are sound. **Rated A Class I Defect.**

South Cooling Tower (North Fan)

Motor shaft speed vibration dominates the data. Overall is 0.315"/sec velocity peak. The vibrations have not changed significantly. These structures are more flexible than most installations. Recommend ensuring the motor fasteners and structure are sound. **Rated A Class I Defect.**

Abbreviated Last Measurement Summary *****

Database: Arkema.rbm
Station: PEROXIDE
Route No. 5: ARK WK 3
Report Date: 22-Jan-21 14:02

MEASUREMENT POINT -----	OVERALL LEVEL -----	HFD / VHFD -----	MACHINE SPEED -----
2130-1old - C Concentrator Vacuum Pump		(22-Jan-21)	

		OVERALL LEVEL	1-20 KHz	
11		.052 In/Sec	.593 G-s	1200.0 RPM
21		.060 In/Sec	.500 G-s	
23		.173 In/Sec	.187 G-s	
71		.120 In/Sec	.927 G-s	
81		.165 In/Sec	.687 G-s	
83		.075 In/Sec	1.334 G-s	
7000-01	- AGITATOR, HYDROGENATOR C		(22-Jan-21)	
		OVERALL LEVEL	1-20 KHz	
02		.047 In/Sec	.023 G-s	45.00 RPM
03		.052 In/Sec	.061 G-s	
11		.066 In/Sec	.856 G-s	1400.0 RPM
12		.068 In/Sec	.668 G-s	
13		.093 In/Sec	.371 G-s	
21		.076 In/Sec	.240 G-s	
22		.120 In/Sec	.076 G-s	
23		.091 In/Sec	.651 G-s	
31		.099 In/Sec	.990 G-s	
32		.083 In/Sec	.877 G-s	
33		.051 In/Sec	.347 G-s	
41		.090 In/Sec	.873 G-s	
42		.088 In/Sec	1.136 G-s	
51		.084 In/Sec	.911 G-s	375.0 RPM
53		.073 In/Sec	.473 G-s	
61		.046 In/Sec	.366 G-s	
71		.053 In/Sec	.751 G-s	45.00 RPM
81		.020 In/Sec	.343 G-s	
83		.049 In/Sec	.302 G-s	
57	- A/B Concentr Vac Pmp-var RPM		(22-Jan-21)	
		OVERALL LEVEL	1-20 KHz	
11		.046 In/Sec	.246 G-s	900.0 RPM
12		.054 In/Sec	.214 G-s	
21		.071 In/Sec	.213 G-s	
23		.063 In/Sec	.187 G-s	
71		.126 In/Sec	.489 G-s	
81		.188 In/Sec	.605 G-s	
83		.039 In/Sec	.864 G-s	
2130-1	- FLASH VAP VAC PUMP-var speed		(22-Jan-21)	
		OVERALL LEVEL	1-20 KHz	
11		.042 In/Sec	.156 G-s	1200.0 RPM
12		.032 In/Sec	.171 G-s	
21		.038 In/Sec	.215 G-s	
22		.045 In/Sec	.402 G-s	
23		.049 In/Sec	.367 G-s	
71		.066 In/Sec	.380 G-s	
72		.074 In/Sec	.587 G-s	
81		.078 In/Sec	.207 G-s	
82		.087 In/Sec	.525 G-s	
83		.039 In/Sec	.406 G-s	
C-203	- C-203 Comp		(22-Jan-21)	
		OVERALL LEVEL	1-20 KHz	
11		.070 In/Sec	2.759 G-s	3588.0 RPM
12		.028 In/Sec	.679 G-s	

21	.202 In/Sec	9.093 G-s	
22	.153 In/Sec	6.129 G-s	
23	.022 In/Sec	.685 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.068 In/Sec	3.815 G-s	
72M	.058 In/Sec	2.912 G-s	
73M	.054 In/Sec	5.741 G-s	
81M	.061 In/Sec	3.109 G-s	
82M	.072 In/Sec	2.986 G-s	
71F	.067 In/Sec	3.030 G-s	
72F	.087 In/Sec	2.919 G-s	
73F	.114 In/Sec	5.844 G-s	
81F	.077 In/Sec	2.859 G-s	
82F	.060 In/Sec	1.788 G-s	
C-202	- C-202 Comp	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.067 In/Sec	2.308 G-s	3588.0 RPM
12	.117 In/Sec	1.007 G-s	
21	.085 In/Sec	2.076 G-s	
22	.102 In/Sec	2.511 G-s	
23	.042 In/Sec	.760 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.050 In/Sec	2.085 G-s	
72M	.067 In/Sec	2.853 G-s	
73M	.081 In/Sec	2.172 G-s	
81M	.080 In/Sec	3.998 G-s	
82M	.075 In/Sec	4.104 G-s	
71F	.059 In/Sec	2.542 G-s	
72F	.068 In/Sec	1.852 G-s	
73F	.078 In/Sec	3.428 G-s	
81F	.071 In/Sec	2.739 G-s	
82F	.065 In/Sec	1.462 G-s	
C-201	- C-201 Comp	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.085 In/Sec	1.305 G-s	3588.0 RPM
12	.074 In/Sec	.664 G-s	
21	.103 In/Sec	1.990 G-s	
22	.052 In/Sec	1.237 G-s	
23	.053 In/Sec	1.481 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.061 In/Sec	1.882 G-s	
72M	.056 In/Sec	2.259 G-s	
73M	.079 In/Sec	2.353 G-s	
81M	.097 In/Sec	5.224 G-s	
82M	.078 In/Sec	2.852 G-s	
71F	.048 In/Sec	2.962 G-s	
72F	.050 In/Sec	1.047 G-s	
73F	.056 In/Sec	3.039 G-s	
81F	.078 In/Sec	3.351 G-s	
82F	.098 In/Sec	3.285 G-s	
new AC	- INSTRUMENT AIR COMPRESSOR	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.118 In/Sec	.594 G-s	1780.0 RPM
12	.117 In/Sec	.621 G-s	

13	.057 In/Sec	.522 G-s	
21	.130 In/Sec	1.283 G-s	
22	.094 In/Sec	.470 G-s	
23	.050 In/Sec	.524 G-s	
	OVERALL LEVEL	1-20 KHZ	
71F	.209 In/Sec	7.178 G-s	
72F	.153 In/Sec	4.435 G-s	
73F	.196 In/Sec	5.680 G-s	
81F	.154 In/Sec	2.971 G-s	
82F	.244 In/Sec	6.615 G-s	
83F	.233 In/Sec	6.776 G-s	
71M	.117 In/Sec	4.512 G-s	
72M	.195 In/Sec	5.955 G-s	
73M	.139 In/Sec	4.369 G-s	
81M	.189 In/Sec	5.658 G-s	
82M	.208 In/Sec	5.549 G-s	
83M	.258 In/Sec	1.198 G-s	
201-08A	- COMPRESSOR,NASH A 201-08A	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.073 In/Sec	.188 G-s	506.3 RPM
12	.075 In/Sec	.150 G-s	
13	.165 In/Sec	.084 G-s	
21	.079 In/Sec	.149 G-s	
22	.099 In/Sec	.153 G-s	
23	.144 In/Sec	.095 G-s	
71	.176 In/Sec	1.119 G-s	
72	.289 In/Sec	.927 G-s	
73	.186 In/Sec	.176 G-s	
81	.179 In/Sec	.349 G-s	
82	.312 In/Sec	.308 G-s	
83	.172 In/Sec	.241 G-s	
9002-10	- D-HYDROGENATOR AGITATOR	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.080 In/Sec	.040 G-s	1185.0 RPM
21	.071 In/Sec	.083 G-s	
23	.047 In/Sec	.093 G-s	
	OVERALL LEVEL	1-20 KHZ	
31	.196 In/Sec	.577 G-s	
31L	.117 In/Sec	.479 G-s	
	OVERALL LEVEL	1-20 KHZ	
51	.137 In/Sec	.195 G-s	
51L	.237 In/Sec	.205 G-s	100.0 RPM
52	.290 In/Sec	.357 G-s	
52L	.284 In/Sec	.357 G-s	
53	.124 In/Sec	.865 G-s	
53L	.035 In/Sec	.906 G-s	
61	.138 In/Sec	.130 G-s	
61L	.140 In/Sec	.134 G-s	
81	.030 In/Sec	.023 G-s	
82	.033 In/Sec	.023 G-s	
83	.027 In/Sec	.141 G-s	
NTC-SF	- N CT-SOUTH FAN, N TWR	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	
1	.358 In/Sec	.554 G-s	1780.0 RPM

2	.175 In/Sec	.481 G-s	
3	.216 In/Sec	.490 G-s	
	OVERALL LEVEL	1-20 KHZ	
4	.232 In/Sec	.405 G-s	
5	.0041 In/Sec	.0012 G-s	
6	.279 In/Sec	.391 G-s	
6L	.270 In/Sec	.397 G-s	
NCT - NF	- N CT -NORTH FAN, N TWR	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	
7	.106 In/Sec	.310 G-s	1780.0 RPM
8	.079 In/Sec	.249 G-s	
9	.091 In/Sec	.233 G-s	
	OVERALL LEVEL	1-20 KHZ	
10	.143 In/Sec	.159 G-s	
11	.089 In/Sec	.167 G-s	
12	.103 In/Sec	.190 G-s	
530-02	- PUMP,N.COOLING TWR,MIDDLE	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.119 In/Sec	.715 G-s	1780.0 RPM
12	.102 In/Sec	.534 G-s	
530-03	- PUMP,N.COOLING TWR,SOUTH	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.106 In/Sec	.502 G-s	1780.0 RPM
12	.101 In/Sec	.461 G-s	
548-7	- IRON-FREE H2O BOOSTER PUMP	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.032 In/Sec	.511 G-s	1800.0 RPM
21	.028 In/Sec	.412 G-s	
23	.055 In/Sec	.327 G-s	
71	.041 In/Sec	.145 G-s	
72	.037 In/Sec	.151 G-s	
STC-NF	- S CT - NORTH FAN, S TWR	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	
1	.315 In/Sec	.964 G-s	1780.0 RPM
2	.282 In/Sec	.586 G-s	
3	.224 In/Sec	.152 G-s	
	OVERALL LEVEL	1-20 KHZ	
4	.181 In/Sec	.376 G-s	
5	.126 In/Sec	.488 G-s	
STC-MF	- S CT - MID FAN, S TWR	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	
1	.299 In/Sec	.627 G-s	1780.0 RPM
2	.257 In/Sec	.220 G-s	
3	.130 In/Sec	.215 G-s	
	OVERALL LEVEL	1-20 KHZ	
4	.099 In/Sec	.310 G-s	
5	.126 In/Sec	.437 G-s	
6	.086 In/Sec	.496 G-s	
STC-SF	- S CT - SOUTH FAN, S TWR	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHZ	

1	.205 In/Sec	.439 G-s	1780.0 RPM
2	.281 In/Sec	.253 G-s	
3	.287 In/Sec	.106 G-s	
	OVERALL LEVEL	1-20 KHz	
4	.155 In/Sec	.528 G-s	
5	.089 In/Sec	.558 G-s	
6	.239 In/Sec	.695 G-s	
SCT-1	- SOUTH CT PUMP - EAST	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHz	
11	.061 In/Sec	1.254 G-s	1800.0 RPM
21	.046 In/Sec	1.054 G-s	
23	.042 In/Sec	.354 G-s	
71	.100 In/Sec	1.014 G-s	
72	.067 In/Sec	.965 G-s	
SCT-2	- SOUTH CT PUMP - MID	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHz	
11	.036 In/Sec	.906 G-s	1800.0 RPM
21	.046 In/Sec	.445 G-s	
23	.077 In/Sec	.362 G-s	
71	.157 In/Sec	.888 G-s	
72	.091 In/Sec	.954 G-s	
SCT-3	- SOUTH CT PUMP - WEST	(22-Jan-21)	
	OVERALL LEVEL	1-20 KHz	
11	.030 In/Sec	1.587 G-s	1800.0 RPM
21	.048 In/Sec	.575 G-s	
23	.069 In/Sec	.297 G-s	
71	.166 In/Sec	.538 G-s	
72	.119 In/Sec	.567 G-s	

Clarification Of Vibration Units:

Acc	-->	G-s	PK
Vel	-->	In/Sec	PK