

October 29, 2021

Pennakem

Subject: October vibration service report

Most of the machines surveyed were found to be in good condition, with the exception of 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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Observations

P 24 Big Blue Water Pump

The pump trend has increased again and is dominated by a shaft speed vibration in the inboard horizontal with the overall above 0.7"/second velocity peak. The pump data still indicates possible looseness in the bearing fits as well as wear in the pump, such as imbalance, and vane pass, which we suspect is 5x RPM. **Rated a Class III Defect.**

P24-85 Degree Pump South

The pump vibrations have dropped. No further actions are warranted at this time.

P 48-7B Roto jet High Pressure Pump

The pump vibration has increased again. Clean the pump. **Rated a Class II Defect.**

R53-301 Reactor Agitator Motor and Gearbox

The motor vibrations are still almost all near 0.5"/sec velocity peak. The vibrations are dominated by shaft speed and the first two harmonics. This usually indicates a coupling and/or an alignment issue. We recommend inspecting the motor and coupling, and check the shaft alignment, fasteners and frame as time allows. **Rated a Class II Defect.**

C67-51 Twin Screw Axial Compressor Motor

Vibration data for the motor bearings look good now after replacement. No further action is required

C67-51 Twin Screw Axial Compressor End

The lobe pass vibrations at 2x and 4x input speed are dominant in the data but have not changed much. Loading could affect vibrations. **Rated a Class I Defect.**

P67-504 Hot Oil Circulation Pump 50 HP

Multiple low amplitude harmonics of shaft speed are still evident in the motor axial. We still suggest inspecting the coupling and alignment. Check for run out. **Rated a Class I Defect.**

R80-10 Agitator Motor and Gearbox

The motor overall vibrations are low due to the slow rotation speeds; however, the raw data suggest the bearings are in severe distress. The gearbox has some similar vibrations, but we believe they are from the motor. **We still recommend replacing the motor and inspecting the coupling and gearbox at the very next opportunity. Rated a Class IV Defect.**

R80-30 Agitator Motor and Gearbox

Vibrations have dropped in the motor. No action is warranted at this time.

B82-101A Southwest FD Fan 10 HP (Outside)

The motor vibrations continue to increase with dominant 1x and 2x RPM peaks and now we see a few more harmonics. We recommend cleaning and inspecting the fan wheel/hub and check all fasteners.

Rated a Class II Defect.

#5FURFURAL - #5 FURFURAL TANK PUMP

The motor has a 2x line frequency vibration that appears to be beating with the shaft speed vibration. 3600 (nominal) RPM motors (2 pole) are more prone to have this problem. Air gap issues between the rotor and stator can be enhanced by case distortion. Common causes are soft foot due to poor shimming during alignment. Electrical imbalance could also contribute to the condition. Inspect for soft foot and alignment. Check the wiring connections, and phase to phase current and voltage balance.

Rated a Class II Defect.

Abbreviated Last Measurement Summary *****

Database: penn.rbm
Station: PENNAKEM NEW CURRENT DATABASE
Report Date: 29-Oct-21 08:39

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD	MACHINE SPEED
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B4C101-877 - ZURN BOILER BLOWER		(27-Oct-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.200 In/Sec	.882 G-s	1180.0 RPM
12	.119 In/Sec	.832 G-s	
13	.136 In/Sec	.109 G-s	
21	.222 In/Sec	.704 G-s	
22	.195 In/Sec	1.871 G-s	
23	.133 In/Sec	.707 G-s	
71	.227 In/Sec	.596 G-s	
72	.111 In/Sec	.802 G-s	
73	.167 In/Sec	.387 G-s	
81	.221 In/Sec	1.194 G-s	
82	.139 In/Sec	.421 G-s	
P4C-102A - BOILER FEEDWATER PUMP		(27-Oct-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.081 In/Sec	.385 G-s	3570.0 RPM
12	.048 In/Sec	.817 G-s	
21	.132 In/Sec	.401 G-s	
22	.042 In/Sec	.991 G-s	
23	.052 In/Sec	.551 G-s	
71	.084 In/Sec	.584 G-s	
72	.025 In/Sec	.331 G-s	
73	.066 In/Sec	.327 G-s	

81	.077 In/Sec	.285 G-s
82	.040 In/Sec	.288 G-s
83	.078 In/Sec	.374 G-s

P24-63DEGS - 63 DEG S WATER PUMP (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.067 In/Sec	.406 G-s	1750.0 RPM
12	.065 In/Sec	.389 G-s	
21	.072 In/Sec	.616 G-s	
22	.053 In/Sec	.647 G-s	
23	.065 In/Sec	.393 G-s	
71	.081 In/Sec	.418 G-s	
72	.066 In/Sec	.474 G-s	
73	.097 In/Sec	1.055 G-s	
81	.072 In/Sec	.393 G-s	
82	.044 In/Sec	.621 G-s	
83	.054 In/Sec	.705 G-s	

P24-85DEGS - 85 DEG S WATER CIRC PUMP 125 (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.064 In/Sec	.799 G-s	1750.0 RPM
12	.130 In/Sec	1.333 G-s	
21	.059 In/Sec	.864 G-s	
22	.071 In/Sec	1.148 G-s	
23	.062 In/Sec	.775 G-s	
71	.084 In/Sec	1.079 G-s	
72	.062 In/Sec	.585 G-s	
73	.115 In/Sec	1.167 G-s	
81	.064 In/Sec	.519 G-s	
82	.066 In/Sec	.988 G-s	
83	.092 In/Sec	1.293 G-s	

P24BGBL876 - BIG BLUE WATER PUMP-63 DEG (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.275 In/Sec	1.167 G-s	1180.0 RPM
12	.080 In/Sec	.644 G-s	
21	.331 In/Sec	.807 G-s	
22	.105 In/Sec	1.042 G-s	
23	.140 In/Sec	.384 G-s	
71	.706 In/Sec	.358 G-s	
72	.332 In/Sec	.502 G-s	
73	.283 In/Sec	.470 G-s	
81	.606 In/Sec	.478 G-s	
82	.145 In/Sec	.934 G-s	
83	.167 In/Sec	.452 G-s	

P36-905C - N COOL TWR-EAST PUMP (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.076 In/Sec	.161 G-s	1780.0 RPM
12	.026 In/Sec	.344 G-s	
21	.035 In/Sec	.921 G-s	
22	.031 In/Sec	.540 G-s	
23	.027 In/Sec	.039 G-s	
71	.078 In/Sec	1.411 G-s	
72	.082 In/Sec	1.901 G-s	
73	.112 In/Sec	.400 G-s	
81	.107 In/Sec	1.085 G-s	

82	.117 In/Sec	1.549 G-s	
83	.134 In/Sec	1.882 G-s	

C36-SOUTH - UTILITY AIRCOMP ROTARY 150HP (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.050 In/Sec	.697 G-s	1750.0 RPM
12	.054 In/Sec	1.207 G-s	
21	.138 In/Sec	1.796 G-s	
22	.096 In/Sec	.732 G-s	
23	.078 In/Sec	.619 G-s	
71	.054 In/Sec	.494 G-s	3570.0 RPM
72	.100 In/Sec	1.112 G-s	
73	.127 In/Sec	.869 G-s	
81	.100 In/Sec	.681 G-s	
82	.093 In/Sec	1.492 G-s	
71F	.115 In/Sec	2.849 G-s	
72F	.066 In/Sec	1.072 G-s	
81F	.088 In/Sec	.927 G-s	
82F	.107 In/Sec	1.065 G-s	

C36-WEST - UTILITY AIRCOMP ROTARY 150HP (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.137 In/Sec	1.403 G-s	1750.0 RPM
12	.104 In/Sec	.713 G-s	
21	.086 In/Sec	.608 G-s	
22	.135 In/Sec	.794 G-s	
23	.091 In/Sec	1.128 G-s	
71	.109 In/Sec	.923 G-s	3570.0 RPM
72	.120 In/Sec	1.020 G-s	
73	.193 In/Sec	.844 G-s	
81	.076 In/Sec	.922 G-s	
82	.175 In/Sec	1.817 G-s	
71F	.120 In/Sec	1.249 G-s	
72F	.094 In/Sec	1.319 G-s	
81F	.120 In/Sec	1.487 G-s	
82F	.106 In/Sec	1.505 G-s	

#5FURFURAL - #5 FURFURAL TANK PUMP (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.241 In/Sec	.212 G-s	1780.0 RPM
21	.303 In/Sec	.201 G-s	
23	.221 In/Sec	.091 G-s	
31	.294 In/Sec	.380 G-s	
41	.055 In/Sec	.256 G-s	
33	.133 In/Sec	.336 G-s	

C42-4 - AXIAL TWIN SCREW COMPRESSOR (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.117 In/Sec	1.144 G-s	1750.0 RPM
12	.048 In/Sec	1.466 G-s	
13	.047 In/Sec	.405 G-s	
21	.107 In/Sec	1.185 G-s	
22	.074 In/Sec	1.597 G-s	
23	.064 In/Sec	1.163 G-s	
71	.097 In/Sec	2.401 G-s	3570.0 RPM
72	.086 In/Sec	1.534 G-s	
73	.085 In/Sec	5.258 G-s	

71F	.163 In/Sec	3.094 G-s
72F	.069 In/Sec	2.665 G-s
73F	.080 In/Sec	4.304 G-s

P42-4A - CENTRIFUGAL HOT OIL PUMP 5HP (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.019 In/Sec	.076 G-s	1760.0 RPM
21	.012 In/Sec	.075 G-s	
23	.021 In/Sec	.077 G-s	
71	.022 In/Sec	.190 G-s	
73	.012 In/Sec	.065 G-s	
81	.010 In/Sec	.113 G-s	

P42-4B - CENTRIFUGAL HOT OIL PUMP 5HP (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.032 In/Sec	.045 G-s	1760.0 RPM
21	.023 In/Sec	.138 G-s	
23	.048 In/Sec	.149 G-s	
71	.019 In/Sec	.177 G-s	
73	.016 In/Sec	.062 G-s	
81	.044 In/Sec	.110 G-s	

P42-4D - CENTRIFUGAL HOT OIL PUMP 5HP (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.024 In/Sec	.091 G-s	1760.0 RPM
21	.018 In/Sec	.094 G-s	
23	.016 In/Sec	.077 G-s	
71	.020 In/Sec	.179 G-s	
81	.037 In/Sec	.055 G-s	

P45-VAC - NEW VACUUM PUMP PILOT PLANT (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.122 In/Sec	.743 G-s	1760.0 RPM
21	.098 In/Sec	.810 G-s	
23	.144 In/Sec	.287 G-s	
71M	.075 In/Sec	.297 G-s	
71F	.127 In/Sec	.068 G-s	
73M	.106 In/Sec	.941 G-s	
81M	.110 In/Sec	.315 G-s	
81F	.103 In/Sec	.395 G-s	

P48-7B - ROTOJET HIGH PRESS PUMP 15HP (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ	
11	.086 In/Sec	.196 G-s	1750.0 RPM
12	.426 In/Sec	.387 G-s	
21	.098 In/Sec	.692 G-s	
22	.378 In/Sec	.600 G-s	
23	.106 In/Sec	.521 G-s	
71	.458 In/Sec	2.579 G-s	
72	.267 In/Sec	2.630 G-s	
73	.188 In/Sec	1.355 G-s	
81	.545 In/Sec	1.605 G-s	
82	.186 In/Sec	1.165 G-s	
83	.176 In/Sec	.974 G-s	

C53-1A-050 - C1-A H2 COMPRESSOR (27-Oct-21)

	OVERALL LEVEL	1-20 KHZ
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11	.077 In/Sec	1.448 G-s	1800.0 RPM
12	.045 In/Sec	.659 G-s	
13	.091 In/Sec	.865 G-s	
21	.095 In/Sec	1.140 G-s	
22	.082 In/Sec	1.213 G-s	
23	.063 In/Sec	2.015 G-s	
71	.127 In/Sec	.088 G-s	
72	.017 In/Sec	.040 G-s	
73	.038 In/Sec	.038 G-s	
81	.129 In/Sec	.052 G-s	
82	.049 In/Sec	.060 G-s	
C53-301B	- C-301B RECIP COMPRESSOR	(27-Oct-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.043 In/Sec	.715 G-s	1800.0 RPM
12	.051 In/Sec	.613 G-s	
13	.058 In/Sec	.123 G-s	
21	.054 In/Sec	.351 G-s	
22	.045 In/Sec	.368 G-s	
23	.061 In/Sec	.158 G-s	
71	.054 In/Sec	.074 G-s	237.0 RPM
72	.027 In/Sec	.052 G-s	
73	.085 In/Sec	.063 G-s	
81	.054 In/Sec	.078 G-s	
82	.026 In/Sec	.055 G-s	
P53-301	- ANSI CENTRIFUGAL PUMP 50 HP	(27-Oct-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.070 In/Sec	.163 G-s	1750.0 RPM
12	.060 In/Sec	.299 G-s	
21	.077 In/Sec	.322 G-s	
22	.112 In/Sec	.448 G-s	
23	.141 In/Sec	.455 G-s	
71	.070 In/Sec	.271 G-s	
72	.085 In/Sec	.253 G-s	
73	.068 In/Sec	.472 G-s	
81	.048 In/Sec	.906 G-s	
82	.060 In/Sec	.329 G-s	
R53-301	- AGITATOR GBX CHEMINEER 15HP	(27-Oct-21)	
	OVERALL LEVEL		
11	.428 In/Sec		1760.0 RPM
12	.158 In/Sec		
21	.350 In/Sec		
22	.227 In/Sec		
23	.433 In/Sec		
31	.372 In/Sec		
32	.063 In/Sec		
33	.251 In/Sec		
41	.265 In/Sec		
42	.066 In/Sec		
51	.230 In/Sec		
61	.169 In/Sec		
63	.066 In/Sec		
71	.053 In/Sec		
C54--115	- COMP 2CYL 2 STAGE 75 HP	(27-Oct-21)	

	OVERALL LEVEL	1-20 KHZ	
11	.077 In/Sec	.455 G-s	1800.0 RPM
12	.137 In/Sec	.345 G-s	
21	.075 In/Sec	.670 G-s	
22	.059 In/Sec	.316 G-s	
23	.160 In/Sec	.120 G-s	
71	.041 In/Sec	.050 G-s	
72	.028 In/Sec	.069 G-s	
73	.052 In/Sec	.034 G-s	
81	.042 In/Sec	.052 G-s	
82	.062 In/Sec	.032 G-s	
P54-112	- CANNED MOTOR CENTRIFUG PUMP	(27-Oct-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.049 In/Sec	.016 G-s	1800.0 RPM
12	.034 In/Sec	.025 G-s	
13	.039 In/Sec	.204 G-s	
21	.022 In/Sec	.063 G-s	
22	.013 In/Sec	.117 G-s	
71	.024 In/Sec	.074 G-s	
72	.012 In/Sec	.067 G-s	
81	.047 In/Sec	.026 G-s	
82	.013 In/Sec	.084 G-s	
R55-102	- REACTOR AGIT R-102	(27-Oct-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.071 In/Sec	.174 G-s	1760.0 RPM
12	.045 In/Sec	.140 G-s	
13	.037 In/Sec	.364 G-s	
21	.050 In/Sec	.156 G-s	
22	.057 In/Sec	.205 G-s	
23	.068 In/Sec	.114 G-s	
31	.047 In/Sec		
32	.040 In/Sec		
33	.063 In/Sec		
41	.042 In/Sec		
42	.069 In/Sec		
51	.045 In/Sec		
61	.059 In/Sec		
63	.014 In/Sec		
71	.010 In/Sec		
R55-104	- REACTOR AGIT R-104 (B55)	(27-Oct-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.056 In/Sec	.650 G-s	1760.0 RPM
12	.045 In/Sec	.164 G-s	
21	.056 In/Sec	.623 G-s	
22	.087 In/Sec	.372 G-s	
23	.027 In/Sec	.256 G-s	
31	.043 In/Sec		
32	.019 In/Sec		
33	.038 In/Sec		
41	.042 In/Sec		
42	.035 In/Sec		
51	.065 In/Sec		
61	.039 In/Sec		

C67-51	- AXIAL TWIN SCREW COMPRESSOR	(27-Oct-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.064 In/Sec	5.374 G-s	1750.0 RPM
12	.029 In/Sec	3.388 G-s	
13	.103 In/Sec	1.071 G-s	
21	.070 In/Sec	1.754 G-s	
22	.054 In/Sec	2.480 G-s	
23	.089 In/Sec	4.281 G-s	
71	.160 In/Sec	.146 G-s	3570.0 RPM
72	.236 In/Sec	.067 G-s	
73	.151 In/Sec	.720 G-s	
81	.129 In/Sec	.976 G-s	
82	.172 In/Sec	.437 G-s	
83	.171 In/Sec	.395 G-s	
71F	.245 In/Sec	.035 G-s	
72F	.219 In/Sec	.075 G-s	
73F	.282 In/Sec	.414 G-s	
81F	.232 In/Sec	.416 G-s	
82F	.167 In/Sec	.113 G-s	
83F	.286 In/Sec	.324 G-s	
P67-54	- HOT OIL CIRC PMP CENT 15HP	(27-Oct-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.127 In/Sec	.607 G-s	1750.0 RPM
12	.041 In/Sec	.372 G-s	
13	.041 In/Sec	.088 G-s	
21	.122 In/Sec	.321 G-s	
22	.042 In/Sec	.174 G-s	
23	.029 In/Sec	.066 G-s	
71	.070 In/Sec	.199 G-s	
72	.034 In/Sec	.159 G-s	
73	.032 In/Sec	.303 G-s	
81	.037 In/Sec	.199 G-s	
82	.031 In/Sec	.298 G-s	
P67-504	- HOT OIL CIRC PMP CENT 50HP	(27-Oct-21)	
	OVERALL LEVEL	1-20 KHZ	
11	.174 In/Sec	.217 G-s	1750.0 RPM
12	.112 In/Sec	.122 G-s	
21	.186 In/Sec	.278 G-s	
22	.207 In/Sec	.329 G-s	
23	.199 In/Sec	.167 G-s	
71	.221 In/Sec	.313 G-s	
72	.165 In/Sec	.379 G-s	
73	.144 In/Sec	.269 G-s	
81	.151 In/Sec	.512 G-s	
82	.138 In/Sec	.297 G-s	
R80-10	- AGITATOR GBX	(27-Oct-21)	
	OVERALL LEVEL		
11	.127 In/Sec		1760.0 RPM
12	.089 In/Sec		
21	.067 In/Sec		
22	.055 In/Sec		
23	.054 In/Sec		
31	.047 In/Sec		
32	.056 In/Sec		

33	.035 In/Sec
41	.046 In/Sec
42	.050 In/Sec
51	.049 In/Sec
52	.060 In/Sec
61	.043 In/Sec
62	.062 In/Sec
63	.040 In/Sec
71	.016 In/Sec

R80-30 - AGITATOR GBX 15HP CHEMINEER (27-Oct-21)

OVERALL LEVEL

11	.126 In/Sec	1760.0 RPM
12	.277 In/Sec	
21	.067 In/Sec	
22	.109 In/Sec	
23	.092 In/Sec	
31	.052 In/Sec	
32	.035 In/Sec	
33	.119 In/Sec	
41	.054 In/Sec	
42	.024 In/Sec	
51	.042 In/Sec	
61	.031 In/Sec	
63	.018 In/Sec	
71	.015 In/Sec	

B82-101A - FAN FORCED DRAFT 10HP SOUTH (27-Oct-21)

OVERALL LEVEL 1-20 KHZ

11	.214 In/Sec	.155 G-s	1800.0 RPM
12	.206 In/Sec	.223 G-s	
* 13	.264 In/Sec	.091 G-s	
21	.236 In/Sec	.142 G-s	
22	.397 In/Sec	.240 G-s	
23	.576 In/Sec	.086 G-s	

B82-102 - INDUCED DRAFT 150 HP (27-Oct-21)

OVERALL LEVEL 1-20 KHZ

11	.059 In/Sec	.036 G-s	1800.0 RPM
12	.039 In/Sec	.068 G-s	
21	.047 In/Sec	.292 G-s	
22	.061 In/Sec	.358 G-s	
23	.048 In/Sec	.147 G-s	
31	.045 In/Sec	.439 G-s	
32	.029 In/Sec	.652 G-s	
41	.036 In/Sec	.101 G-s	
42	.036 In/Sec	.389 G-s	

Clarification Of Vibration Units:

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

* - Indicates Data Has Date/Time Different From Machine Date/Time