



QualiTest® Diagnostics

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The following is a summary of findings from the July 2022 WEEK 1 vibration survey at the H2O2 Plant that was performed on July 1, 2022. Rotor bar vibrations previously seen in the C Compressors seems to be lower this survey.

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.

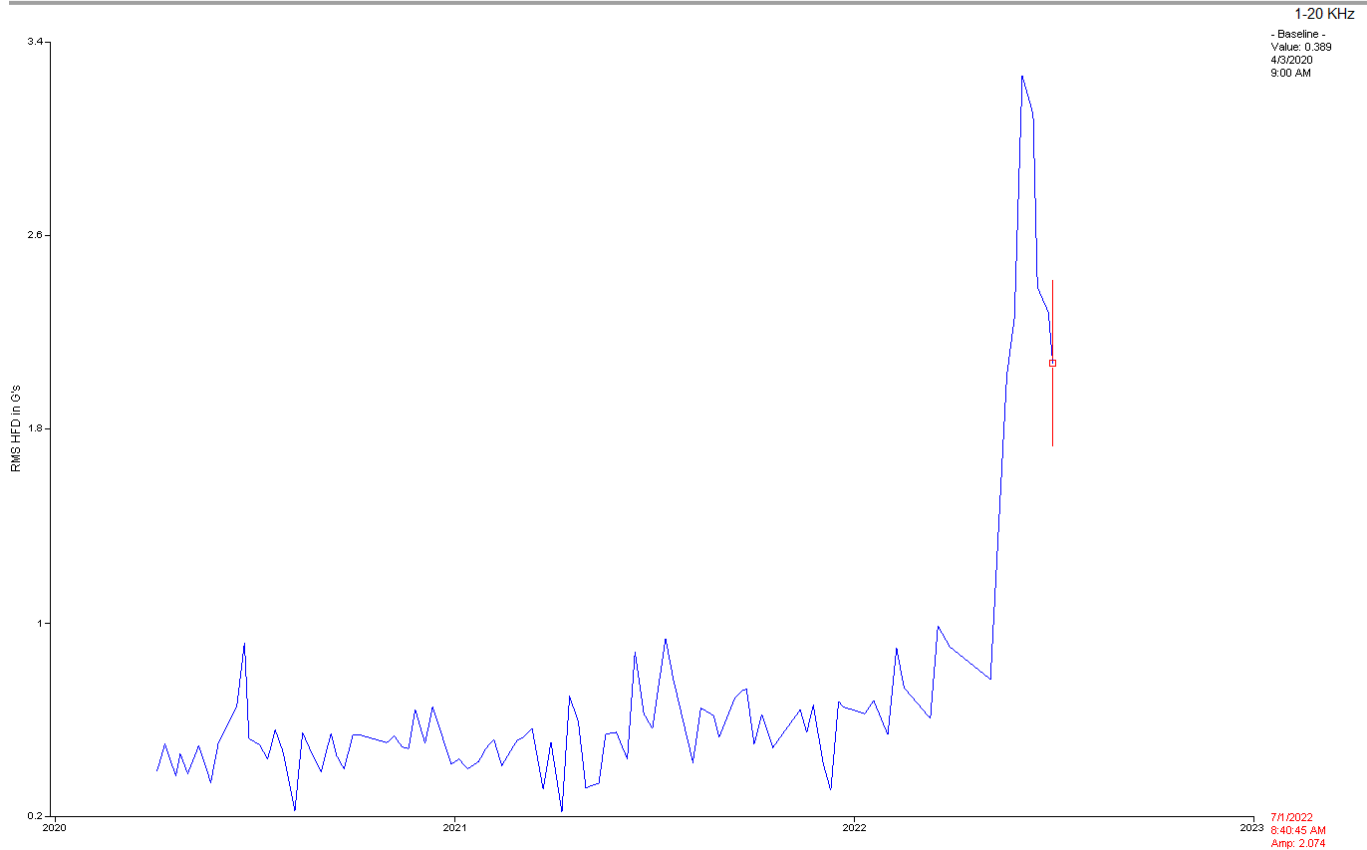
CLASS IV: Defect (s) present that makes continued reliability unpredictable, and possibility of secondary damage is high. Repairs should be made ASAP. An unscheduled shutdown should be considered for repairs

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.

Defect Summary

A/B Concentrator Vacuum Pump **CLASS II**

Arkema.rbm / H2O2 / A/B Concentr Vac Pmp-var RPM / 81 - Compressor OB Horiz



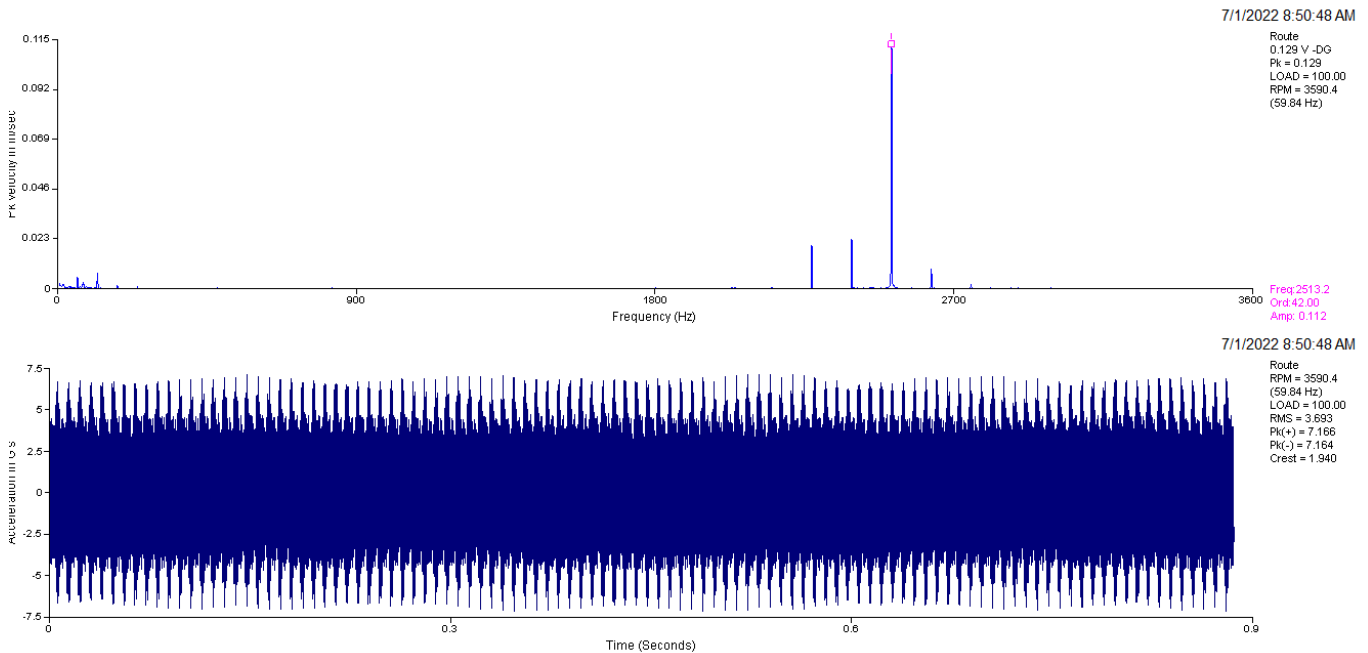
Observation:

1-20 kHz. trend data of POH shows a decrease in amplitude but still high compared to past.

Recommendation:

Pump has had elevated vane pass vibrations and high frequency non-synchronous peaks present in spectrum in the recent past. Process has a lot of influence on pump vibration, but pump bearings still appear to have defects according to the spectral data. Impeller and other pump internal components may also have wear. Pump may need some attention in the near months.

C 203 Compressor CLASS I



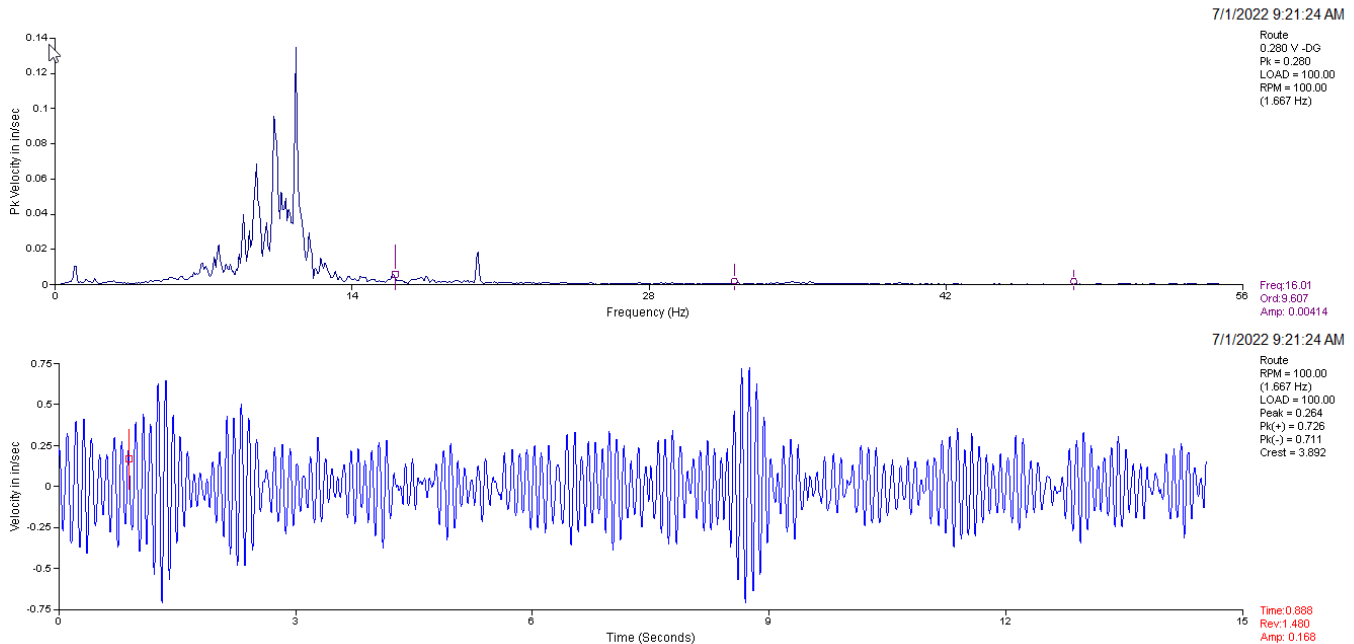
Observation:

Motor inboard vertical data shows a high 1 x rotor bar pass frequency vibration. Waveform shows a strong beat vibration with amplitude of 14 g's pk to pk.

Recommendation:

Motor data is back up and suggests that the rotor has heavy load. This vibration comes and goes based on load. For now, ensure compressor is operating under normal parameters.

D Hydrogenator Agitator **CLASS II**



Observation:

Motor axial is higher than normal. Gearbox does have physical torsional type movement and may be causing some of the motor axial vibration. Data shown is output top end of gearbox N-S direction. Dominant vibration is around 10 Hz. Gearbox seems to have some high vibration at a sub harmonic of motor 1 x rpm which may indicate some slight int. shaft and or output shaft gear wear.

Recommendation:

Ensure motor/gearbox does not have misalignment. Inspect couplings and drive shaft for issues. Gearbox also seemed to have excessive movement while taking data. This is causing excessive axial movement of the jack shaft. Inspect structure/gearbox mounts for signs of fatigue, cracks, etc.

Abbreviated Last Measurement Summary

Database: Arkema.rbm
Station: PEROXIDE
Route No. 3: ARK WK 1

MEASUREMENT POINT -----	OVERALL LEVEL -----	HFD / VHFD -----
2130-1old - C Concentrator Vacuum Pump	(01-Jul-22)	
	OVERALL LEVEL	1-20 KHz
11 - Motor OB HOR	.051 In/Sec	.386 G-s
21 - Motor IB HOR	.058 In/Sec	.396 G-s
23 - Motor IB AXIAL	.107 In/Sec	.180 G-s
71 - Compressor IB HOR	.105 In/Sec	1.509 G-s
81 - Compressor OB Horiz	.124 In/Sec	.524 G-s
83 - Compressor OB Axial	.079 In/Sec	.697 G-s
7000-01 - AGITATOR, HYDROGENATOR C	(01-Jul-22)	
	OVERALL LEVEL	1-20 KHz
02 - DRIVESHAFT BRG-EAST-WEST	.047 In/Sec	.285 G-s
03 - DRIVESHAFT BRG-VERTICAL	.053 In/Sec	.262 G-s
11 - C Hydro Agitator MOTOR OB HORIZ	.068 In/Sec	.895 G-s
12 - C Hydro Agitator MOTOR OB VERT	.064 In/Sec	.690 G-s
13 - C Hydro Agitator Motor OB Axial	.110 In/Sec	.309 G-s
21 - C Hydro Agitator MOTOR IB HORIZ	.069 In/Sec	.823 G-s
22 - C Hydro Agitator MOTOR IB VERT	.105 In/Sec	1.106 G-s
23 - C Hydro Agitator Motor IB Axial	.074 In/Sec	.282 G-s
31 - C Hydro Agitator GrBx In Horizon	.064 In/Sec	.323 G-s
32 - C Hydro Agitator GrBx In VERT	.068 In/Sec	.554 G-s
33 - C Hydro Agitator GrBx In Axial	.033 In/Sec	.408 G-s
41 - C HY AG GBX INPUT OUTBOARD HZ	.066 In/Sec	1.190 G-s
42 - C HY AG GBX INPUT OUTBOARD VERT	.052 In/Sec	.525 G-s
51 - C Hydro GrBx shaft 2 Top HZ E-W	.057 In/Sec	.199 G-s
53 - C Hydro GrBx shaft 2 Top AXIAL	.148 In/Sec	.215 G-s
61 - C Hydro GrBx shaft 2 BOT HZ E-W	.038 In/Sec	.195 G-s
71 - C Hydro GrBx OUTPUT TOP HZ E-W	.052 In/Sec	.538 G-s
81 - C Hydro GrBx OUTPUT BOT HZ E-W	.023 In/Sec	.199 G-s
83 - C Hydro GrBx OUTPUT Top Axial	.048 In/Sec	.641 G-s
57 - A/B Concentr Vac Pmp-var RPM	(01-Jul-22)	
	OVERALL LEVEL	1-20 KHz
11 - Motor OB HOR	.056 In/Sec	.290 G-s
12 - Motor OB VERT	.054 In/Sec	.296 G-s
21 - Motor IB HOR	.044 In/Sec	.311 G-s
23 - Motor IB AXIAL	.036 In/Sec	.129 G-s
71 - Compressor IB HOR	.073 In/Sec	.426 G-s
81 - Compressor OB Horiz	.086 In/Sec	2.933 G-s
83 - Compressor OB Axial	.034 In/Sec	2.140 G-s
2130-1 - FLASH VAP VAC PUMP-var speed	(01-Jul-22)	
	OVERALL LEVEL	1-20 KHz
11 - Motor OB HOR	.043 In/Sec	.310 G-s
12 - Motor OB VERT	.029 In/Sec	.355 G-s
21 - Motor IB HOR	.037 In/Sec	.483 G-s
22 - Motor IB VERT	.036 In/Sec	.522 G-s
23 - Motor IB AXIAL	.050 In/Sec	.482 G-s
71 - Compressor IB HOR	.059 In/Sec	.419 G-s
72 - Compressor IB VERT	.057 In/Sec	.212 G-s
81 - Compressor OB Horiz	.072 In/Sec	1.327 G-s
82 - Compressor OB VERT	.067 In/Sec	1.790 G-s
83 - Compressor OB Axial	.040 In/Sec	.778 G-s

236-06	- HYDRO FD PUMP N 236-06 -2FLR	(01-Jul-22)	
		OVERALL LEVEL	1-20 KHz
11	- Hydro Fd Pmp B No. Motor Top	.095 In/Sec	.513 G-s
21	- Hydro Fd Pmp B No. Motor Bottom	.083 In/Sec	.580 G-s
7007-24	- ABC SEC. FILT FEED PMP-SOUTH	(01-Jul-22)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OUTBOARD HORIZONTAL	.044 In/Sec	.039 G-s
21	- MOTOR INBOARD HORIZONTAL	.039 In/Sec	.022 G-s
23	- MOTOR INBOARD AXIAL	.031 In/Sec	.016 G-s
71	- PUMP HORIZONTAL	.115 In/Sec	.022 G-s
72	- PUMP VERTICAL	.119 In/Sec	.065 G-s
2130-6	- ABC SEC FILT FEED PUMP-NORTH	(01-Jul-22)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OUTBOARD HORIZONTAL	.042 In/Sec	.441 G-s
21	- MOTOR INBOARD HORIZONTAL	.046 In/Sec	.477 G-s
23	- MOTOR INBOARD AXIAL	.037 In/Sec	.275 G-s
71	- PUMP HORIZONTAL	.165 In/Sec	.839 G-s
72	- PUMP VERTICAL	.113 In/Sec	.926 G-s
9001-1	- EAST OXIDIZER FEED PUMP	(01-Jul-22)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OUTBOARD HORIZONTAL	.031 In/Sec	1.858 G-s
21	- MOTOR INBOARD HORIZONTAL	.037 In/Sec	2.933 G-s
23	- MOTOR INBOARD AXIAL	.057 In/Sec	.543 G-s
71	- PUMP HORIZONTAL	.176 In/Sec	2.878 G-s
72	- PUMP VERTICAL	.101 In/Sec	2.446 G-s
9001-2	- MIDDLE OXIDIZER FEED PUMP	(01-Jul-22)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OUTBOARD HORIZONTAL	.029 In/Sec	1.857 G-s
21	- MOTOR INBOARD HORIZONTAL	.030 In/Sec	1.725 G-s
23	- MOTOR INBOARD AXIAL	.084 In/Sec	.276 G-s
71	- PUMP HORIZONTAL	.081 In/Sec	2.059 G-s
72	- PUMP VERTICAL	.085 In/Sec	1.409 G-s
7016-11	- WEST OXIDIZER FEED PUMP	(01-Jul-22)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OUTBOARD HORIZONTAL	.036 In/Sec	1.745 G-s
21	- MOTOR INBOARD HORIZONTAL	.041 In/Sec	2.111 G-s
23	- MOTOR INBOARD AXIAL	.054 In/Sec	.462 G-s
71	- PUMP HORIZONTAL	.121 In/Sec	1.366 G-s
72	- PUMP VERTICAL	.151 In/Sec	1.485 G-s
234-01	- CHILL WATER PUMP 234-01	(01-Jul-22)	
		OVERALL LEVEL	1-20 KHz
11	- Chilled H2O Pump Motor OB Horizo	.053 In/Sec	1.166 G-s
21	- Chilled H2O Pump Motor IB Horizo	.043 In/Sec	.814 G-s
23	- MOTOR INBOARD AXIAL	.107 In/Sec	
71	- Chilled H2O Pump IB Horizontal	.060 In/Sec	.178 G-s
72	- PUMP VERTICAL	.067 In/Sec	.223 G-s
C-203	- C-203 Comp	(01-Jul-22)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OB HOR	.033 In/Sec	.903 G-s
12	- MOTOR OB VERT	.028 In/Sec	.713 G-s
21	- MOTOR IB HOR	.053 In/Sec	1.602 G-s
22	- MOTOR IB VERT	.129 In/Sec	5.579 G-s
23	- MOTOR IB AXIAL	.031 In/Sec	1.071 G-s
		OVERALL LEVEL	1-20 KHz
71M	- COMP MALE SHAFT IB HOR	.058 In/Sec	3.557 G-s
72M	- COMP MALE SHAFT IB VERT	.048 In/Sec	2.615 G-s
73M	- COMP MALE SHAFT IB AXIAL	.055 In/Sec	2.067 G-s
81M	- COMP MALE SHAFT OB HOR	.033 In/Sec	4.286 G-s
82M	- COMP MALE SHAFT OB VERT	.059 In/Sec	2.676 G-s
71F	- COMP FEMALE SHAFT IB HOR	.037 In/Sec	2.471 G-s
72F	- COMP FEMALE SHAFT IB VERT	.048 In/Sec	1.682 G-s
73F	- COMP FEMALE SHAFT IB AXIAL	.080 In/Sec	3.005 G-s
81F	- COMP FEMALE SHAFT OB HOR	.028 In/Sec	3.672 G-s

82F - COMP FEMALE SHAFT OB VERT .032 In/Sec 2.815 G-s

9000-02 - D HYDROGENATOR FD PUMP- EAST (01-Jul-22)

OVERALL LEVEL	1-20 KHz
11 - MOTOR OUTBOARD HORIZONTAL .067 In/Sec	.264 G-s
21 - MOTOR INBOARD HORIZONTAL .053 In/Sec	.543 G-s
23 - MOTOR INBOARD AXIAL .045 In/Sec	.578 G-s
71 - PUMP HORIZONTAL .087 In/Sec	.619 G-s
72 - PUMP VERTICAL .079 In/Sec	.547 G-s

C-202 - C-202 Comp

(01-Jul-22)

OVERALL LEVEL	1-20 KHz
11 - MOTOR OB HOR .047 In/Sec	1.393 G-s
12 - MOTOR OB VERT .116 In/Sec	.971 G-s
21 - MOTOR IB HOR .083 In/Sec	1.641 G-s
22 - MOTOR IB VERT .072 In/Sec	2.679 G-s
23 - MOTOR IB AXIAL .053 In/Sec	1.114 G-s
OVERALL LEVEL	1-20 KHz
71M - COMP MALE SHAFT IB HOR .038 In/Sec	2.070 G-s
72M - COMP MALE SHAFT IB VERT .052 In/Sec	2.643 G-s
73M - COMP MALE SHAFT IB AXIAL .066 In/Sec	2.172 G-s
81M - COMP MALE SHAFT OB HOR .037 In/Sec	4.770 G-s
82M - COMP MALE SHAFT OB VERT .059 In/Sec	2.676 G-s
71F - COMP FEMALE SHAFT IB HOR .027 In/Sec	3.214 G-s
72F - COMP FEMALE SHAFT IB VERT .068 In/Sec	3.044 G-s
73F - COMP FEMALE SHAFT IB AXIAL .076 In/Sec	3.304 G-s
81F - COMP FEMALE SHAFT OB HOR .035 In/Sec	2.898 G-s
82F - COMP FEMALE SHAFT OB VERT .057 In/Sec	3.699 G-s

C-201 - C-201 Comp

(01-Jul-22)

OVERALL LEVEL	1-20 KHz
11 - MOTOR OB HOR .085 In/Sec	.913 G-s
12 - MOTOR OB VERT .090 In/Sec	1.522 G-s
21 - MOTOR IB HOR .077 In/Sec	1.341 G-s
22 - MOTOR IB VERT .067 In/Sec	1.449 G-s
23 - MOTOR IB AXIAL .055 In/Sec	1.628 G-s
OVERALL LEVEL	1-20 KHz
71M - COMP MALE SHAFT IB HOR .054 In/Sec	3.763 G-s
72M - COMP MALE SHAFT IB VERT .050 In/Sec	2.520 G-s
73M - COMP MALE SHAFT IB AXIAL .073 In/Sec	2.177 G-s
81M - COMP MALE SHAFT OB HOR .044 In/Sec	11.19 G-s
82M - COMP MALE SHAFT OB VERT .048 In/Sec	3.709 G-s
71F - COMP FEMALE SHAFT IB HOR .034 In/Sec	5.862 G-s
72F - COMP FEMALE SHAFT IB VERT .053 In/Sec	4.195 G-s
73F - COMP FEMALE SHAFT IB AXIAL .099 In/Sec	5.243 G-s
81F - COMP FEMALE SHAFT OB HOR .052 In/Sec	13.47 G-s
82F - COMP FEMALE SHAFT OB VERT .065 In/Sec	9.862 G-s

new AC - INSTRUMENT AIR COMPRESSOR

(01-Jul-22)

OVERALL LEVEL	1-20 KHz
11 - MOTOR OB HOR .126 In/Sec	1.564 G-s
12 - MOTOR OB VERT .108 In/Sec	2.106 G-s
13 - MOTOR OB AXIAL .067 In/Sec	.779 G-s
21 - MOTOR IB HOR .126 In/Sec	2.696 G-s
22 - MOTOR IB VERT .061 In/Sec	.996 G-s
23 - MOTOR IB AXIAL .048 In/Sec	1.592 G-s
OVERALL LEVEL	1-20 KHz
71F - COMP FEMALE SHAFT IB HOR .186 In/Sec	7.320 G-s
72F - COMP FEMALE SHAFT IB VERT .185 In/Sec	7.087 G-s
73F - COMP FEMALE SHAFT IB AXIAL .172 In/Sec	4.570 G-s
81F - COMP FEMALE SHAFT OB HOR .111 In/Sec	2.893 G-s
82F - COMP FEMALE SHAFT OB VERT .237 In/Sec	6.251 G-s
83F - COMP FEMALE SHAFT OB AXIAL .188 In/Sec	5.301 G-s
71M - COMP MALE SHAFT IB HOR .221 In/Sec	9.554 G-s
72M - COMP MALE SHAFT IB VERT .141 In/Sec	8.783 G-s
73M - COMP MALE SHAFT IB AXIAL .131 In/Sec	8.587 G-s
81M - COMP MALE SHAFT OB HOR .128 In/Sec	5.827 G-s
82M - COMP MALE SHAFT OB VERT .345 In/Sec	3.094 G-s
83M - COMP MALE SHAFT OB AXIAL .249 In/Sec	7.807 G-s

201-08A	- COMPRESSOR,NASH A 201-08A	(01-Jul-22)	
		OVERALL LEVEL	1-20 KHz
11	- Nash Compr A Motor OB Horiz	.049 In/Sec	.120 G-s
12	- Nash Compr A Motor OB Vertical	.063 In/Sec	.121 G-s
13	- Nash Compr A Motor OB Axial	.154 In/Sec	.151 G-s
21	- Nash Compr A Motor IB Horiz	.052 In/Sec	.108 G-s
22	- Nash Compr A Motor IB VERT	.062 In/Sec	.116 G-s
23	- Nash Compr A Motor IB AXIAL	.112 In/Sec	.095 G-s
71	- Nash Compr A COMP IB HORIZ	.142 In/Sec	.414 G-s
72	- Nash Compr A Compressor IB Verti	.168 In/Sec	.286 G-s
73	- Nash Compr A COMP IB AXIAL	.136 In/Sec	.114 G-s
81	- Nash Compr A COMP OB HORIZ	.153 In/Sec	.191 G-s
82	- Nash Compr A Compressor OB Verti	.177 In/Sec	.271 G-s
83	- Nash Compr A Compressor OB Axial	.129 In/Sec	.149 G-s
9002-10	- D-HYDROGENATOR AGITATOR	(01-Jul-22)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OUTBOARD HORIZONTAL	.099 In/Sec	.103 G-s
21	- MOTOR INBOARD HORIZONTAL	.069 In/Sec	.166 G-s
23	- MOTOR INBOARD AXIAL	.233 In/Sec	.103 G-s
		OVERALL LEVEL	1-20 KHz
31	- GEARBOX INPUT SHAFT -HORIZONTAL	.204 In/Sec	.666 G-s
31L	- GEARBOX INPUT SHAFT-N-S-LOW FRQ	.208 In/Sec	.727 G-s
		OVERALL LEVEL	1-20 KHz
51	- GEARBOX OUTPUT TOP E-W	.249 In/Sec	.688 G-s
51L	- GEARBOX OUTPUT TOP E-W- 100RPM	.236 In/Sec	.673 G-s
52	- GEARBOX TOP PLATE- N-S	.229 In/Sec	.263 G-s
52L	- GEARBOX OUTPUT TOP N-S 100RPM	.280 In/Sec	.272 G-s
53	- GEARBOX OUTPUT TOP -AXIAL	.054 In/Sec	.482 G-s
53L	- GEARBOX OUTPUT TOP AXIAL 100RPM	.023 In/Sec	.451 G-s
61	- GEARBOX OUTPUT BOTTOM E-W-HZ	.208 In/Sec	.310 G-s
61L	- GEARBOX OUTPUT BOTTOM-E-W 100RPM	.186 In/Sec	.292 G-s
81	- AGIT INTERMED BRG @ SEAL- N-S	.255 In/Sec	.170 G-s
82	- AGIT INTERMED BRG @ SEAL- E-W	.240 In/Sec	.257 G-s
83	- AGIT INTERMED BRG @ SEAL- VERT	.025 In/Sec	.449 G-s

Clarification Of Vibration Units:

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

As always, it has been a pleasure to serve Arkema. If there are any comments or questions, do not hesitate to contact us.

Sincerely,



ISO Certified Vibration Analyst, Category III



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