

7030 Ryburn Dr. Millington, TN

Phone: (901) 873-5300

Fax: (901) 873-5301

www.gohispeed.com

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St. Jude Research Hospital PCC HVAC Facilities Maintenance Memphis, TN

The following is a summary of findings from the 2021-annual PCC AHU vibration survey.

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.

# PCC

## AHU 22 SF Top

All vibration data is within acceptable limits. No action recommended at this time.

## AHU 22 SF Bottom

All vibration data is within acceptable limits. No action recommended at this time.

## AHU 22 RF Top

All vibration data is within acceptable limits. No action recommended at this time.

#### AHU 22 RF Bottom

All vibration data is within acceptable limits. No action recommended at this time.

## AHU 23 SF Top

All vibration data is within acceptable limits. No action recommended at this time.

## AHU 23 SF Bottom

All vibration data is within acceptable limits. No action recommended at this time.

## AHU 23 RF Top

All vibration data is within acceptable limits. No action recommended at this time.

## AHU 23 RF Bottom

All vibration data is within acceptable limits. No action recommended at this time.

# AHU 24 SF

Unit could not be checked this survey.

# <u>AHU 24 RF</u>

All vibration data is within acceptable limits. No action recommended at this time.

# <u>AHU 25 SF</u>

All vibration data is within acceptable limits. No action recommended at this time.

#### AHU 25 RF

All vibration data is within acceptable limits. No action recommended at this time.

# AHU 26 SF

Data of the fan bearings shows a high vibration with the spectral data indicating excessive clearance in the bearing fits. Inspect inboard fan bearing for excessive looseness as scheduling allows. Ensure sheaves are aligned properly and that the sheaves have minimal face run-out. Also, ensure motor base is tight and all fasteners are tight. Rated as a **CLASS II** defect.

#### AHU 26 RF

All vibration data is within acceptable limits. No action recommended at this time.

# <u>AHU 27 SF</u>

All vibration data is within acceptable limits. No action recommended at this time.

# <u>AHU 27 RF</u>

Motor data indicates that the motor bearings are defective. **Motor needs to be changed out ASAP**. Rated as a **CLASS III** defect.

# <u>AHU 28 SF</u>

All vibration data is within acceptable limits. No action recommended at this time.

## <u>AHU 28 RF</u>

All vibration data is within acceptable limits. No action recommended at this time.

# AHU 29 SF

Unit is no longer in service.

# <u>AHU 29 RF</u>

Unit is no longer in service.

# <u>AHU 30 SF</u>

Unit is no longer in service.

## AHU 30 RF

Unit is no longer in service.

# <u>AHU 31 SF</u>

High motor axial vibration indicates an issue with the sheaves. **Overall amplitude is 1 ips-pk!** Ensure sheaves are aligned properly and that the sheaves have minimal face run-out. Ensure motor base is tight and all fasteners are tight. Rated as a **CLASS III** defect.

# <u>AHU 31 RF</u>

All vibration data is within acceptable limits. No action recommended at this time.

# AHU 32 SF

All vibration data is within acceptable limits. No action recommended at this time.

# <u>AHU 32 RF</u>

All vibration data is within acceptable limits. No action recommended at this time.

# <u>AHU 33 SF</u>

Motor vibration shows defects are present in the bearings and is likely caused by electrical fluting of the bearing races. Motor needs attention very soon. Rated as a **CLASS III** defect.

# <u>AHU 33 RF</u>

All vibration data is within acceptable limits. No action recommended at this time.

Abbreviated Last Measurement Summary \*\*\*\*\*\*\*\*\* Database: stjude~1.rbm Station: PCC Route No. 1: PCC APRIL-OCT MEASUREMENT POINT OVERALL LEVEL HFD / VHFD -----\_\_\_\_\_ \_\_\_\_\_ AHU 22 SF - AHU 22 SF (04-Aug-21) OVERALL LEVEL 1 - 20 KHz 

 .116 In/Sec
 1.019 G-s

 .115 In/Sec
 1.091 G-s

 .068 In/Sec
 .171 G-s

 .065 In/Sec
 .543 G-s

TOH - TOP MOTOR OUTBOARD HORIZONTAL TIH - TOP MOTOR INBOARD HORIZONTAL BOH - BOTTOM MTR OUTBOARD HORIZONTAL BIH - BOTTOM MTR INBOARD HORIZONTAL AHU 22 RF - AHU 22 RF (04-Aug-21) OVERALL LEVEL 1 - 20 KHz .115 In/Sec .383 G-s TOH - TOP MOTOR OUTBOARD HORIZONTAL .104 In/Sec .221 G-s TIH - TOP MOTOR INBOARD HORIZONTAL BOH - BOTTOM MTR OUTBOARD HORIZONTAL .197 G-s .056 In/Sec .040 In/Sec .235 G-s BIH - BOTTOM MTR INBOARD HORIZONTAL (04-Aug-21) AHU 23 SF - AHU 23 SF 
 OVERALL LEVEL
 1 - 20 KHz

 .135 In/Sec
 1.207 G-s

 .083 In/Sec
 .502 G-s

 .215 In/Sec
 .797 G-s

 .201 In/Sec
 1.027 G-s
 TOH - TOP MOTOR OUTBOARD HORIZONTAL TIH - TOP MOTOR INBOARD HORIZONTAL BOH - BOTTOM MTR OUTBOARD HORIZONTAL BIH - BOTTOM MTR INBOARD HORIZONTAL (04-Aug-21) AHU 23 RF - AHU 23 RF OVERALL LEVEL 1 - 20 KHz .102 In/Sec .100 In/Sec .232 G-s .199 G-s TOH - TOP MOTOR OUTBOARD HORIZONTAL TIH - TOP MOTOR INBOARD HORIZONTAL .058 In/Sec BOH - BOTTOM MTR OUTBOARD HORIZONTAL .212 G-s BIH - BOTTOM MTR INBOARD HORIZONTAL .044 In/Sec .281 G-s AHU 24 RF - AHU 24 RF (04-Aug-21) OVERALL LEVEL 1 - 20 KHz TOH - TOP MOTOR OUTBOARD HORIZONTAL .114 In/Sec .106 In/Sec .060 In/Sec .073 In/Sec .321 G-s .154 G-s TIH - TOP MOTOR INBOARD HORIZONTAL .238 G-s BOH - BOTTOM MTR OUTBOARD HORIZONTAL BIH - BOTTOM MTR INBOARD HORIZONTAL .255 G-s AHU 25 SF - AHU 25 SF (04-Aug-21) OVERALL LEVEL 1 - 20 KHz TOH - TOP MOTOR OUTBOARD HORIZONTAL .057 In/Sec .076 G-s .142 G-s TIH - TOP MOTOR INBOARD HORIZONTAL .069 In/Sec .096 G-s BOH - BOTTOM MTR OUTBOARD HORIZONTAL .072 In/Sec BIH - BOTTOM MTR INBOARD HORIZONTAL .072 In/Sec .137 G-s (04-Aug-21) AHU 25 RF - AHU 25 RF OVERALL LEVEL 1 - 20 KHz TOH - TOP MOTOR OUTBOARD HORIZONTAL .083 In/Sec .173 G-s .091 In/Sec .061 In/Sec .067 In/Sec .270 G-s TIH - TOP MOTOR INBOARD HORIZONTAL BOH - BOTTOM MTR OUTBOARD HORIZONTAL .212 G-s BIH - BOTTOM MTR INBOARD HORIZONTAL .142 G-s AHU 26 SF - AHU 26 SF (04-Aug-21) 
 OVERALL LEVEL
 1 - 20 KHz

 .108 In/Sec
 .563 G-s

 .102 In/Sec
 .255 G-s
 MOH - MOTOR OUTBOARD HORIZONTAL MIH - MOTOR INBOARD HORIZONTAL MIA - MOTOR INBOARD AXIAL .548 In/Sec .212 G-s .117 In/Sec .224 G-s FIH - FAN INBOARD HORIZONTAL .153 In/Sec .345 G-s FOH - FAN OUTBOARD HORIZONTAL

AHU 26 RF - AHU 26 RF (04-Aug-21) 

 (04-Aug-21)

 OVERALL LEVEL
 1 - 20 KHz

 .092 In/Sec
 .278 G-s

 .098 In/Sec
 .359 G-s

 .048 In/Sec
 .222 G-s

 .100 In/Sec
 .775 G-s

 .077 In/Sec
 .043 G-s

MOH - MOTOR OUTBOARD HORIZONTAL MIH - MOTOR INBOARD HORIZONTAL MIA - MOTOR INBOARD AXIAL FIH - FAN INBOARD HORIZONTAL FOH - FAN OUTBOARD HORIZONTAL (04-Aug-21) AHU 27 SF - AHU 27 SF 
 OVERALL LEVEL
 1 - 20 KHz

 .115 In/Sec
 .449 G-s

 .185 In/Sec
 1.157 G-s

 .064 In/Sec
 .320 G-s

 .062 In/Sec
 .262 G-s
 MOH - MOTOR OUTBOARD HORIZONTAL MIH - MOTOR INBOARD HORIZONTAL FIH - FAN INBOARD HORIZONTAL FOH - FAN OUTBOARD HORIZONTAL AHU 27 RF - AHU 27 RF (04-Aug-21) 
 OVERALL LEVEL
 1 - 20 KHz

 .341 In/Sec
 .613 G-s

 .523 In/Sec
 1.204 G-s
 MOH - MOTOR OUTBOARD HORIZONTAL MIH - MOTOR INBOARD HORIZONTAL .120 In/Sec .137 In/Sec .783 G-s .072 G-s FIH - FAN INBOARD HORIZONTAL FOH - FAN OUTBOARD HORIZONTAL AHU 28 SF - AHU 28 SF (04-Aug-21) 

 (04-Aug-21)

 OVERALL LEVEL
 1 - 20 KHz

 .230 In/Sec
 .537 G-s

 .205 In/Sec
 .495 G-s

 .103 In/Sec
 .367 G-s

 .068 In/Sec
 .243 G-s

 .057 In/Sec
 .333 G-s

MOH - MOTOR OUTBOARD HORIZONTAL MIH - MOTOR INBOARD HORIZONTAL MIA - MOTOR INBOARD AXIAL FIH - FAN INBOARD HORIZONTAL FIR - FAN INBUARD HORIZONTAL FOH - FAN OUTBOARD HORIZONTAL AHU 28 RF - AHU 28 RF (04-Aug-21) 
 (04-Aug-21)

 OVERALL LEVEL
 1 - 20 KHz

 .076 In/Sec
 .488 G-s

 .110 In/Sec
 .696 G-s

 .087 In/Sec
 .594 G-s

 .126 In/Sec
 .183 G-s

 .154 In/Sec
 .060 G-s
 MOH - MOTOR OUTBOARD HORIZONTAL MIH - MOTOR INBOARD HORIZONTAL MIA - MOTOR INBOARD AYTAT FIH - FAN INBOARD HORIZONTAL FOH - FAN OUTBOARD HORIZONTAL AHU 31 SF - AHU 31 SF (04-Aug-21) MOH - MOTOR OUTBOARD HORIZONTAL OVERALL LEVEL 1 - 20 KHz .055 In/Sec .392 G-s .119 In/Sec 1.019 In/Sec .193 In/Sec .184 In/Sec .315 G-s .259 G-s MIA - MOTOR INBOARD AXIAL .673 G-s FIH - FAN INBOARD HORIZONTAL FOH - FAN OUTBOARD HORIZONTAL .494 G-s AHU 31 RF - AHU 31 RF (04-Aug-21) OVERALL LEVEL 1 - 20 KHz .052 In/Sec MOH - MOTOR OUTBOARD HORIZONTAL .253 G-s MIH - MOTOR INBOARD HORIZONTAL .057 In/Sec .294 G-s .077 In/Sec .072 In/Sec .194 G-s FIH - FAN INBOARD HORIZONTAL FOH - FAN OUTBOARD HORIZONTAL .129 G-s AHU 32 SF - AHU 32 SF (04-Aug-21) 
 OVERALL LEVEL
 1 - 20 KHz

 .075 In/Sec
 1.017 G-s

 .075 In/Sec
 .017 G-s
 MOH - MOTOR OUTBOARD HORIZONTAL MIH - MOTOR INBOARD HORIZONTAL .087 In/Sec .777 G-s AHU 32 RF - AHU 32 RF (04-Aug-21) 
 OVERALL LEVEL
 1 - 20 KHz

 .058 In/Sec
 .256 G-s

 .053 In/Sec
 .094 G-s
 MOH - MOTOR OUTBOARD HORIZONTAL MIH - MOTOR INBOARD HORIZONTAL AHU 33 SF - AHU 33 SF (04-Aug-21) 
 OVERALL LEVEL
 1 - 20 KHz

 .103 In/Sec
 .343 G-s

 .115 In/Sec
 1.076 G-s
 MOH - MOTOR OUTBOARD HORIZONTAL MIH - MOTOR INBOARD HORIZONTAL

AHU 33 RF - AHU 33 RF MOH - MOTOR OUTBOARD HORIS MIH - MOTOR INBOARD HORIS	ZONTAL DNTAL	(04-Aug-21) OVERALL LEVEL .026 In/Sec .029 In/Sec	1 - 20 KHz .079 G-s .050 G-s
Clarification Of Vibration Acc> G-s Vel> In/Sec	n Units: RMS PK		

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

Sincerely,

Kevin W. Maxuell

ISO Certified Vibration Analyst, Category III



QualiTest Diagnostics Cell: 901-486-4565 Email: <u>kwilliam@gohispeed.com</u>