APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0839

HCAI Special Seismic Certification Preapproval (OSP)

Type: [X] New [ ] Renewal

Manufacturer Information

Manufacturer: Johnson Controls

Manufacturer's Technical Representative: Ismail Erdi Kurtyigit

Mailing Address: 5000 Renaissance Drive, New Freedom, PA 17349

Telephone: (717) 668-7356 Email: ismail.erdi.kurtyigit@jci.com

Product Information

Product Name: CYK - Centrifugal Liquid Heat Pump Chiller

Product Model Number(s): CYK-P8QD-ETEVACS

Product Category: Chillers

Product Sub-Category: Chillers - Water Cooled

General Description: Self-contained heat pump or heat recovery chiller package with two compressors and motors, economizer, PLC panel, and remote mounted VSDs for indoor use.

Mounting Description: Base Mounted Neoprene Vibration Isolated - VSD: Rigidly mounted at the base and secured to the wall at the top.

Tested Seismic Enhancements: Seismic enhancements made to the test units and/or modifications required to address anomalies during the tests shall be incorporated into the production units.

Applicant Information

Applicant Company Name: Manwill Engineering LLC

Contact Person: Derek Manwill

Mailing Address: PO Box 1194, Bend, OR 97709

Telephone: (541) 241-2102 Email: derek@manwillse.com

Title: President

California Licensed Structural Engineer Responsible for the Engineering and Test Report(s)

Company Name: MANWILL ENGINEERING LLC

Name: Derek Manwill California License Number: S6266

Mailing Address: PO Box 1194, Bend, OR 97709

Telephone: (541) 241-2102 Email: derek@manwillse.com

Certification Method

☐ GR-63-Core ☒ ICC-ES AC156 ☐ IEEE 344 ☐ IEEE 693 ☐ NEBS 3

☐ Other (Please Specify):

Testing Laboratory

Company Name: U.S. ARMY ENGINEER RESEARCH AND DEVELOPMENT CENTER, CONSTRUCTION ENGINEERING RESEARCH LABORATORY (CERL)

Contact Person: James Wilcoski

Mailing Address: 2902 Newmark Dr., Champaign IL 61822-1076

Telephone: (217) 373-4565 Email: james.wilcoski@usace.army.mil

Company Name: ENVIRONMENTAL TESTING LABORATORIES, INC. (ETL)

Contact Person: Jeremy Lange

Mailing Address: 11034 Indian Trail, Dallas TX 75229-3513

Telephone: (972) 247-9657 Email: jeremy@etldallas.com

Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 3.15 (SDS=1.75, z/h=1), 1.50 (SDS=2.50, z/h=0)

S_{DS} (Design spectral response acceleration at short period, g) = 1.75 (z/h=1), 2.50 (z/h=0)

a_p (Amplification factor) = 2.5

R_p (Response modification factor) = 2.5

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height ratio factor) = 1 and 0

Natural frequencies (Hz) = See Attachment

Overall dimensions and weight = See Attachment

HCAI Approval (For Office Use Only) - Approval Expires on 04/19/2031

Date: 02/11/2025

Name: Mohammad Karim Title: Supervisor, Health Facilities Review

Special Seismic Certification Valid Up to: S_{DS} (g) = 1.75 z/h = 1

Condition of Approval (if applicable):

JOHNSON CONTROLS
CYK - Centrifugal Liquid Heat Pump Chiller

TABLE 1 - CYK

Model Number	Dimensions (in)			Max. Wt. (lb)	Description / Notes	Basis
	Depth	Width	Height			
CYK - Centrifugal Liquid Heat Pump Chiller						
CYK-P8QD-ETEVACS	108.0	222.0	143.0	48,400		**UUT 1**
Mounting: Base Mounted Neoprene Vibration Isolated.				**Seismic Levels:**	S_{DS} = 1.75g for z/h = 1 S_{DS} = 2.50g for z/h = 0	I_P = 1.5

Product Construction: Welded carbon steel vessels. NEMA 1 carbon steel electrical panels. Copper tubes.
Options/Subcomponents: Since only one unit was tested, variations are not allowed. The following option selections are required: 300psi, no insulation, flanged nozzle connection, 2 pass evaporator, 3 pass double bundle condenser, marine water boxes, no hinges, no condenser epoxy coating, no sound attenuation, no falling film bypass, hot gas bypass, isolation valve.

JOHNSON CONTROLS
CYK - Centrifugal Liquid Heat Pump Chiller

TABLE 2 - VSD

Model Number	Dimensions (in)			Max. Wt. (lb)	Description / Notes	Basis
	Depth	Width	Height			
VSD						
VSD790KFT-46	26.0	59.0	52.0	1,900		EXTRAP
VSD1055KFT-46	26.0	64.0	56.0	2,104		**UUT 6**
VSD1300KFT-46	36.0	75.0	59.0	2,522		**UUT 7**
Mounting: Rigidly mounted at the base and secured to the wall at the top.				**Seismic Levels:**	S_{DS} = 1.75g for z/h = 1 S_{DS} = 2.50g for z/h = 0	I_P = 1.5

Product Construction: NEMA 1 carbon steel enclosure.
Options/Subcomponents: Model number uniquely identifies the configuration, manufacturers, and materials of the sub-components within the unit. Subcomponent manufacturers and materials within the tested units used for interpolation are the same. Subcomponent manufacturers and materials within the interpolated units are the same as the tested units used for interpolation. Configuration of the interpolated units is similar to the tested units used for interpolation.

JOHNSON CONTROLS
CYK - Centrifugal Liquid Heat Pump Chiller

TABLE 3. SUBCOMPONENTS for CYK

Model Number	Dimensions (in)			Max. Wt. (lb)	Description / Notes	Basis
	Depth	Width	Height			
Type: Evaporator - Mfr: Johnson Controls						
FA2914-373CZXXS3FMLX	168.0	38.0	47.0	10,493		**UUT 1**
Type: Condenser - Mfr: Johnson Controls						
DA3614-262CZCZW3FMLL	168.0	47.0	79.0	13,403		**UUT 1**
Type: Economizer - Mfr: Johnson Controls						
26 ODx52 LG	64.0	35.0	45.0	1,043		**UUT 1**
Type: Compressor - Mfr: Johnson Controls						
QD	35.0	34.0	35.0	1,669	High stage	**UUT 1**
P8	45.0	49.0	41.0	2,575	Low stage	**UUT 1**
Type: Motor - Mfr: WEG						
ET	47.0	22.0	27.0	2,470	Low stage	**UUT 1**
EV	47.0	22.0	27.0	2,536	High stage	**UUT 1**
Type: Control Panel - Mfr: Trola						
PLC	36.0	11.0	42.0	250		**UUT 1**
Mounting: Mounted within unit.				**Seismic Levels:**	S_{DS} = 1.75g for z/h = 1 S_{DS} = 2.50g for z/h = 0	I_P = 1.5

Construction/Options: Model number uniquely identifies manufacturer, materials, and configuration of subcomponents.

UUT 1

Manufacturer: Johnson Controls
Model number: CYK-P8QD-ETEVACS
Unit function: Water-Cooled Centrifugal Chiller
Serial number: N/A

Dimensions (in)			Weight	Res. Freq. (Hz)		
Depth	Width	Height	(lb)	F-B	S-S	V
108.0	222.0	143.0	48,400	5.8	4.9	18.9

Code & criteria: 2022 CBC, ICC-ES AC156
Test laboratory: US Army ERDC-CERL
Report: 24025TR1.0 (dated 2-7-25), tested on 12-11-24

S_{DS} (g)	z/h	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
1.75	1.00	2.80	2.10	1.68	0.68
2.50	0.00				

Importance Factor, I_P = 1.5: Unit was full of operating content during the shake table test. Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.

Mounting: Base mounted neoprene vibration isolated. UUT was mounted on (4) Mason neoprene pad assemblies (P/N 028-12850-000) with a total of (16) 1-1/4-in Grade 8 bolts (4 per pad). Pad assembly consists of: 15x15x3/8-in A36 plate on 14x14x3/4-in 60 duro neoprene pad, bolt goes through steel sleeve that sits inside neoprene sleeve, bolt head rests on structural washer and 4-in OD x 1/4-in thick washer which sits on 1/4-in neoprene washer.

Construction: Welded carbon steel vessels. NEMA 1 carbon steel electrical panels. Copper tubes.
The following options were selected for the test unit: 300psi, no insulation, flanged nozzle connection, 2 pass evaporator, 3 pass double bundle condenser, marine water boxes, no hinges, no condenser epoxy coating, no sound attenuation, no falling film bypass, hot gas bypass, isolation valve.

Subcomponents: Johnson Controls - Evaporator (FA2914-373CZXXS3FMLX), Johnson Controls - Condenser (DA3614-262CZCZW3FMLL), Johnson Controls - Economizer (26 ODx52 LG), Johnson Controls - Compressor (QD, P8), WEG - Motor (ET, EV), Trola - Control Panel (PLC).

Testing notes: Testing at non-accredited laboratory meets the requirements of PIN 58 Item #16.

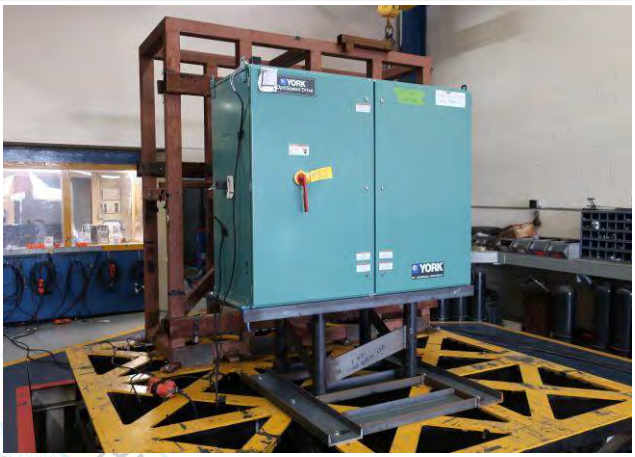
UUT 6

Manufacturer: Johnson Controls
Model number: VSD1055KFT-46
Unit function: Variable Speed Drive
Serial number: N/A

Dimensions (in)			Weight	Res. Freq. (Hz)		
Depth	Width	Height	(lb)	F-B	S-S	V
26.0	64.0	56.0	2,104	N/A	N/A	N/A

Code & criteria: 2022 CBC, ICC-ES AC156
Test laboratory: Environmental Testing Laboratory
Report: 17033TR2.0 (dated 4-4-23), tested on 12-13-22

S_{DS} (g)	z/h	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
3.74	1.00	5.98	4.49	2.51	1.01
3.74	0.00				



Importance Factor, I_P = 1.5: Unit was full of operating content during the shake table test. Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.

Mounting: Rigidly mounted at the base and secured to the wall at the top. VSD was bolted down at its base with (4) 7/16-in Grade 5 bolts and bolted to its top brace with (2) 1/2-in Grade 5 bolts. The welded base support structure was rigid mounted to the table. The welded structural steel top brace assembly was rigid mounted to a wall structure.

Construction: NEMA 1 carbon steel enclosure.

Subcomponents: Model number uniquely identifies the configuration, manufacturers, and materials of the subcomponents within the unit.

Testing notes: Testing was performed to an amplified level on a welded structural steel support structure to mimic the worst case scenario mounted on a chiller. Only remote mounting (not on a chiller) is considered here.

UUT 7

Manufacturer: Johnson Controls
Model number: VSD1300KFT-46
Unit function: Variable Speed Drive
Serial number: N/A

Dimensions (in)			Weight	Res. Freq. (Hz)		
Depth	Width	Height	(lb)	F-B	S-S	V
36.0	75.0	59.0	2,522	N/A	N/A	N/A

Code & criteria: 2022 CBC, ICC-ES AC156
Test laboratory: Environmental Testing Laboratory
Report: 17033TR2.0 (dated 4-4-23), tested on 12-14-22

S_{DS} (g)	z/h	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
3.74	1.00	5.98	4.49	2.51	1.01
3.74	0.00				

Importance Factor, I_P = 1.5: Unit was full of operating content during the shake table test. Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.

Mounting: Rigidly mounted at the base and secured to the wall at the top. VSD was bolted down at its base with (4) 7/16-in Grade 5 bolts and bolted to its top brace with (2) 1/2-in Grade 5 bolts. The welded base support structure was rigid mounted to the table. The welded structural steel top brace assembly was rigid mounted to a wall structure.

Construction: NEMA 1 carbon steel enclosure.

Subcomponents: Model number uniquely identifies the configuration, manufacturers, and materials of the subcomponents within the unit.

Testing notes: Testing was performed to an amplified level on a welded structural steel support structure to mimic the worst case scenario mounted on a chiller. Only remote mounting (not on a chiller) is considered here.