APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0548

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Trane

Manufacturer's Technical Representative: Kristoffer Knickrehm, P.E.

Mailing Address: 2213 South 20th Street, La Crosse, WI 54601-7599

Telephone: (608) 787-3304 Email: KKnickrehm@trane.com

Product Information

Product Name: Chillers

Product Type: Chillers - Water Cooled

Product Model Number: See Attachment

General Description: Catalogued shell and tube chillers with single compressor

Mounting Description: Base mounted upon elastomeric pads, Base mounted upon elastomeric pads

Tested Seismic Enhancements: None

Applicant Information

Applicant Company Name: The VMC Group

Contact Person: John Giuliano

Mailing Address: 113 Main Street, Boomingdale, NJ 07403

Telephone: (973) 838-1780 Email: John.giuliano@thevmcgroup.com

Title: President

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

Company Name: THE VMC GROUP

Name: Kenneth Tarlow California License Number: S2851

Mailing Address: 980 9th Street, 16th Floor, Sacramento, CA 95814

Telephone: (832) 627-2214 Email: ken.tarlow@thevmcgroup.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) 352-6511 Email: James.wilcoski@usace.army.mil

Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 1.37 (z/h = 0.0); 2.61 (z/h = 1.0)

S_{DS} (Design spectral response acceleration at short period, g) = 2.28g (z/h = 0.0); 1.45g (z/h = 1.0)

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 10/10/2028

Date: 10/10/2022

Name: Mohammad Karim Title: Supervisor, Health Facilities

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

Condition of Approval (if applicable):

Table 1 - Certified Product Table - Trane ECTV Centrifugal Water Cooled Liquid Chiller

Model	Stage	Hertz	Comp Size [ton]	Shell Sizes [Evap/Cond]	Shell Lengths [Evap/Cond]	Voltage Range [V]	Motor Range [HP]	Pressure Range [Psi]	Max Length [in]	Max Width [in]	Max Height [in]	Max Weight [lbs]	UUT
CVHH	2-Stage Single	60	900-1200	100	MM	380-4160	575-1575	150-300	160.00	109.10	124.90	55,930	Extrapolated
				100	LL	380-4160	575-1575	150-300	180.25	109.10	124.90	57,901	Extrapolated
				100	M-HM	380-4160	575-1575	150-300	160.00	123.20	124.90	63,476	Extrapolated
				130	MM	380-4160	575-1575	150-300	160.00	109.30	131.60	62,856	Extrapolated
				130	M-HM	380-4160	575-1575	150-300	160.00	123.30	131.60	71,476	Extrapolated
			1000	160/ 200	MM	460	946	300	160.00	113.50	139.10	60,590	UUT-01
			900-1200	160/ 200	MM	380-4160	575-1575	150-300	160.00	113.50	139.10	75,187	Interpolated
				160/ 200	M-HM	380-4160	575-1575	150-300	160.00	127.40	139.10	82,620	Interpolated
				200/220	LL	380-4160	575-1575	150-300	180.25	112.30	141.40	84,500	Interpolated
				220	LL	380-4160	575-1575	150	180.25	119.40	145.40	84,500	Interpolated
			1500-1700	200	LL	380-4160	832-1575	150-300	180.25	114.30	141.40	84,500	Interpolated
				200	L-HL	380-4160	653-1228	150	180.25	132.10	141.40	84,500	Interpolated
				220	LL	380-4160	653-1228	150-300	180.25	119.40	145.40	84,500	Interpolated
			1500	220	L-HL	4160	1575	150	180.25	142.50	145.40	84,500	UUT-02

Table 2 - Certified Subcomponent Tables - Economizer Shells

Model	Size	Type	Dimensions		Materials	MFR	UUT
			OD [in]	L [in]			
ECTV	100 - 160	2 stage	29.9	99.3	Low Carbon Steel	Trane	UUT-01
	200 - 220	2-stage	32.0	99.3	Low Carbon Steel	Trane	UUT-02

Table 3 - Certified Subcomponent Tables - Evaporator Shells

Model	Size	Max Weight [lbs]	Dimensions		Materials	MFR	UUT
			OD [in]	L [in]			
ECTV	100M	12,982	42.9	160.0	Low Carbon Steel	Trane	Extrapolated
	100L	13,647	42.9	180.3	Low Carbon Steel	Trane	Extrapolated
	130M	15,312	48.0	160.0	Low Carbon Steel	Trane	Extrapolated
	160M	16,813	53.7	160.0	Low Carbon Steel	Trane	UUT-01
	160M	19,817	53.7	160.0	Low Carbon Steel	Trane	Interpolated
	200L	22,846	59.5	180.3	Low Carbon Steel	Trane	Interpolated
	220L	23,974	66.0	180.3	Low Carbon Steel	Trane	UUT-02

Table 4 - Certified Subcomponent Tables - Condenser Shells

Model	Size	Max Weight [lbs]	Dimensions		Materials	MFR	UUT
			OD [in]	L [in]			
ECTV	100M	11,261	36.0	160.0	Low Carbon Steel	Trane	Extrapolated
	100L	12,075	36.0	180.3	Low Carbon Steel	Trane	Extrapolated
	130M	13,808	40.3	160.0	Low Carbon Steel	Trane	Extrapolated
	200M	15,643	45.0	160.0	Low Carbon Steel	Trane	UUT-01
	200M	18,998	45.0	160.0	Low Carbon Steel	Trane	Interpolated
	200L	19,533	45.0	180.3	Low Carbon Steel	Trane	Interpolated
	220L	21,898	49.0	180.3	Low Carbon Steel	Trane	Interpolated
	10HM	15,774	50.1	160.0	Low Carbon Steel	Trane	Interpolated
	13HM	19,102	55.1	160.0	Low Carbon Steel	Trane	Interpolated
	20HM	22,388	60.1	160.0	Low Carbon Steel	Trane	Interpolated
	20HL	29,490	60.1	180.3	Low Carbon Steel	Trane	Interpolated
	22HL	31,353	66.7	180.3	Low Carbon Steel	Trane	Interpolated
	22HL	31,353	66.7	180.3	Low Carbon Steel	Trane	UUT-02

Table 5 - Certified Subcomponent Tables - Compressor Drives and Starters

Model	Description	Max Input Voltage	Input Phase	Max Input Current [A]	Output HP	Max Dimensions [in]			Max Weight [lbs]	MFR	Materials	UUT
						Length	Width	Height				
AFDE	LV Drive	600V	3	1210	850	25"	98"	75"	3,300	Rockwell	Steel	UUT-01
CVKF	MV Starter	13800V	3	360	N/A	20"	38"	60"	1,702	Eaton	Steel	UUT-02
UATR	Auto Tranformer / Primary Reactor	13800V	3	360	N/A	40"	26"	27"	1,702	Eaton	Steel	UUT-02
CPTR	Control Power Transformer	600V	3	40	N/A	26"	14"	34"	230	Trane	Steel	UUT-02

Table 6 - Certified Subcomponent Tables - Control Panel

Model	Max Dimensions [in]			Max Weight [lbs]	MFR	Material	UUT
	Length	Width	Height				
AdaptiView™	6	33	36	130	Trane	Steel	UUT-01, UUT-02

Table 7 - Certified Subcomponent Tables - Purge

Model	Max Dimensions [in]			Max Weight [lbs]	MFR	Material	UUT
	Length	Width	Height				
EarthWise™	27.5	21.75	25.75	140	Trane	Steel	UUT-01, UUT-02

Table 8 - Certified Subcomponent Tables - Compressors

Model	Configuration	Frequency [Hz]	Size [ton]	MFR	Materials	Dimensions [in]			Max Weight [lbs]	UUT
						Length	Width	Height		
ECTV	2-Stage Single	60	1200	Trane	Cast Iron / Aluminum	95	76	67	14,865	UUT-01
			1700			94	76.5	63	15,089	UUT-02

Table 9 - Certified Subcomponent Tables - Cooling/Bypass Option

Model	MFR	Material	Description	Max Weight [lbs]	UUT
ECTV	Trane	Steel	Valve Actuators and Piping	82	UUT-01
				1,200	UUT-02

Table 10 - Certified Subcomponent Tables - Valve Actuators for Cooling/Bypass Option

Model Number	Size [in]	Max Weight [lbs]	Materials	MFR	UUT
X13680933	3"	24	STL / SST	Bray	Extrapolated
X13680933	4"	32	STL / SST	Bray	UUT-01
X13680933	5"	39	STL / SST	Bray	Interpolated
X13680933	6"	49	STL / SST	Bray	Interpolated
X13680933	8"	104	STL / SST	Bray	Interpolated
X13680933	10"	120	STL / SST	Bray	Interpolated
X13680933	12"	184	STL / SST	Bray	Interpolated
X13680933	14"	309	STL / SST	Bray	Interpolated
X13680933	16"	472	STL / SST	Bray	UUT-02

Note: STL = Steel and SST = Stainless Steel

Table 11 - Certified Subcomponent Tables - Compressor Motors

Hertz	Motor Model [HP]	Compatible Motor Frame	Max Weight [lbs]	MFR	UUT
60	575	440E	3,468	Trane	Extrapolated
	650	440E	3,475	Trane	Extrapolated
	743	440E	3,540	Trane	Extrapolated
	743	5000	3,516	Trane	Extrapolated
	832	440E	3,663	Trane	Extrapolated
	832	5000	4,101	Trane	Extrapolated
	946	440E	3,696	Trane	UUT-01
	946	5000	4,101	Trane	Interpolated
	1088	5000	4,028	Trane	Interpolated
	1088	5800	4,544	Trane	Interpolated
	1220	5000	4,166	Trane	Interpolated
	1220	5800	4,698	Trane	Interpolated
	1360	5800	4,787	Trane	Interpolated
	1575	5800	4,965	Trane	UUT-02

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-01

DCL 30246-1701

Model Line	Model Number	Manufacturer
ECTV	Size 160	Trane

Product Construction Summary

Carbon Steel Base Frame

Options / Subcomponent Summary

Evaporator: Trane; Condenser: Trane; Economizer: Trane; AFDE: Rockwell; Control Panel: Trane; Purge: Trane; Compressor: Trane; Cooling/Bypass Option: Trane; Valve Acutators: Trane; Compressor Motor: Trane

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
60,590	160.0	114.0	139.0	9.0	11.0	20.0

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2022	ICC-ES AC156	1.45	1.0	1.50	2.32	1.74	-	-
		2.28	0.0		-	-	1.52	0.61

Test Mounting Details

UUT-1 was mounted ot the fixture using twenty-four (24) 3/4" grade 8 bolts with VMC 119-A-100334-05 neoprene pads between the UUT base and the fixture.

All units were filled with contents and maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-02

DCL 30246-1701

Model Line	Model Number	Manufacturer
ECTV	Size 220	Trane

Product Construction Summary

Carbon Steel Base Frame

Options / Subcomponent Summary

Evaporator: Trane; Condenser: Trane; Economizer: Trane; CVKF: Eaton; UATR: Eaton; CPTR: Trane; Control Panel: Trane; Purge: Trane; Compressor: Trane; Cooling/Bypass Option: Trane; Valve Acutators: Trane; Compressor Motor: Trane

UUT Properties

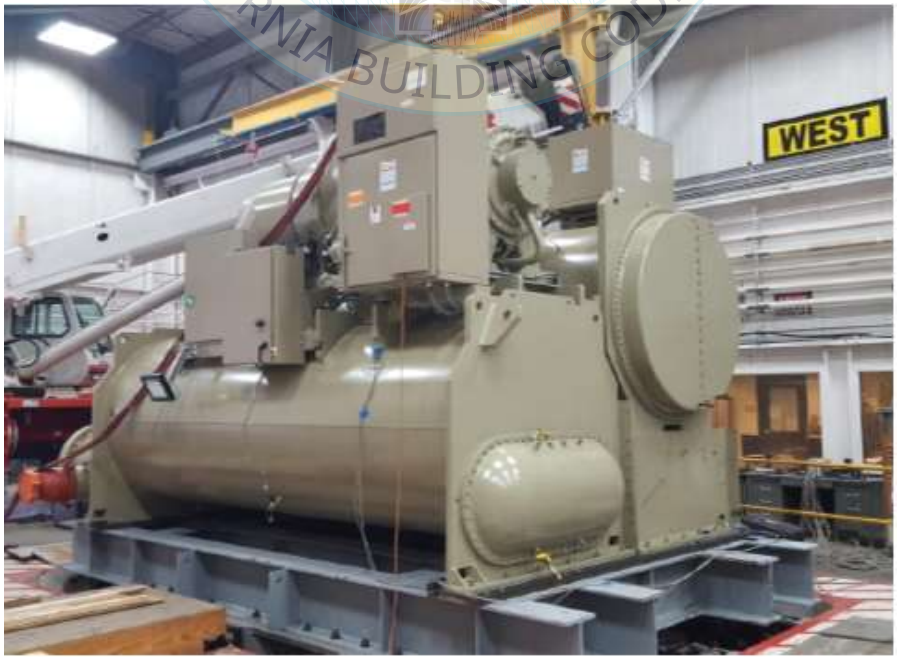
Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
89,550	180.3	143.0	146.0	11.0	11.0	20.0

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2022	ICC-ES AC156	1.45	1.0	1.50	2.32	1.74	-	-
		2.28	0.0		-	-	1.52	0.61

Test Mounting Details

UUT-2 was mounted ot the fixture using twenty-four (24) 3/4" grade 8 bolts with VMC 119-A-100334-05 neoprene pads between the UUT base and the fixture.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.