APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0488

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: EVAPCO, INC.

Manufacturer's Technical Representative: Scott Nevins

Mailing Address: 5151 Allendale Ln, Taneytown, MD 21787

Telephone: (410) 756-2600 Email: snevins@evapco.com

Product Information

Product Name: Cooling Towers

Product Type: NA

Product Model Number: AT ADVANCED TECHNOLOGY COOLING TOWERS

General Description: Advanced technology counterflow cooling tower constructed of carbon steel or stainless steel with seismic enhancements.

Mounting Description: Rigid or Spring Vibration Isolated, Floor Mounted

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) 373-6763 Email: James.wilcoski@usace.army.mil

Company Name: CLARK TESTING LABORATORY, INC.

Contact Person: Davon Lohr

Mailing Address: 1801 Route 51, Jefferson Hills PA 15025

Telephone: (412) 387-1001 Email: dlohr@clarktesting.com

Company Name: Pacific Earthquake Engineering Research Center (PEER)

Contact Person: Amarnath Kasalanati

Mailing Address: 1301 South 46th St., Bldg. 420, Richmond CA 94720-1729

Telephone: (510) 642-3437 Email: Amarnath1@berkeley.edu

Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 2.90 (Rigid), 4.34 (Spring Vibration Isolated)

S_{DS} (Design spectral response acceleration at short period, g) = 1.93

a_p (Amplification factor) = 2.5

R_p (Response modification factor) = 3:00 (Rigid), 2.50 (Spring Vibration Isolated)

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height ratio factor) = 1

Natural frequencies (Hz) = See Attachment

Overall dimensions and weight = See Attachment

HCAI Approval (For Office Use Only) - Approval Expires on 02/23/2029

Date: 02/23/2023

Name: Mohammad Karim Title: Supervisor, Health Facilities

Special Seismic Certification Valid Up to: S_{DS} (g) = 1.93 z/h = 1

Condition of Approval (if applicable):

ATTACHMENT 1: CERTIFIED COMPONENTS

SPECIAL SEISMIC CERTIFICATION

TABLE 1

DOCUMENT NO.: 21071CR2.0

MANUFACTURER: EVAPCO, INC.

PRODUCT FAMILY: AT ADVANCED TECHNOLOGY COOLING TOWERS

MODEL NUMBER	DIMENSIONS (in)			MAX. WT. (lb)	DESCRIPTION / NOTES	BASIS
	DEPTH	WIDTH	HEIGHT			
AT						
AT 17-2*9	88.0	107.5	140.4	6,570		EXTRAP
AT 17-3*9	88.0	107.5	152.4	6,880		EXTRAP
AT 17-4*9	88.0	107.5	164.4	7,140		EXTRAP
AT 17-2*12	88.0	143.8	140.4	8,240		EXTRAP
AT 17-3*12	88.0	143.8	152.4	8,600		EXTRAP
AT 17-4*12	88.0	143.8	164.4	8,930		EXTRAP
AT 17-2*14	88.0	167.8	144.5	9,390		EXTRAP
AT 17-3*14	88.0	167.8	156.5	9,790		EXTRAP
AT 17-4*14	88.0	167.8	168.5	10,160		EXTRAP
AT 17-2*18	88.0	216.0	148.8	12,840		EXTRAP
AT 17-3*18	88.0	216.0	160.8	13,420		EXTRAP
AT 17-4*18	88.0	216.0	172.8	13,890		EXTRAP
AT 18-2*9	94.0	107.5	136.4	6,710		EXTRAP
AT 18-3*9	94.0	107.5	148.4	7,010		EXTRAP
AT 18-4*9	94.0	107.5	160.4	7,290		EXTRAP
AT 18-2*11	94.0	125.5	136.4	7,700		EXTRAP
AT 18-3*11	94.0	125.5	148.4	7,990		EXTRAP
AT 18-4*11	94.0	125.5	160.4	8,320		EXTRAP
AT 18-2*12	94.0	143.8	136.4	8,640		EXTRAP
AT 18-3*12	94.0	143.8	148.4	9,000		EXTRAP
AT 18-4*12	94.0	143.8	160.4	9,360		EXTRAP
AT 18-2*14	94.0	167.8	140.8	9,840		EXTRAP
AT 18-3*14	94.0	167.8	152.8	10,240		EXTRAP
AT 18-4*14	94.0	167.8	164.8	10,650		EXTRAP
AT 19-2*6	71.9	101.5	128.3	5,220		EXTRAP
AT 19-3*6	71.9	101.5	140.3	5,450		EXTRAP
AT 19-4*6	71.9	101.5	152.3	5,740		EXTRAP
AT 19-2*8	89.9	101.5	128.3	6,040		EXTRAP
AT 19-3*8	89.9	101.5	140.3	6,330		EXTRAP
AT 19-4*8	89.9	101.5	152.3	6,600		EXTRAP
AT 19-2*9	101.5	107.5	136.4	7,090		EXTRAP
AT 19-3*9	101.5	107.5	148.4	7,360		EXTRAP
AT 19-4*9	101.5	107.5	160.4	7,720		EXTRAP
AT 19-2*11	101.5	125.5	136.4	8,100		EXTRAP
AT 19-3*11	101.5	125.5	148.4	8,470		EXTRAP
AT 19-4*11	101.5	125.5	160.4	8,850		EXTRAP
AT 19-2*12	101.5	143.8	140.8	9,200		EXTRAP
AT 19-3*12	101.5	143.8	152.8	9,580		EXTRAP
AT 19-4*12	101.5	143.8	164.8	9,990		EXTRAP
AT 19-2*14	101.5	167.8	140.8	10,410		EXTRAP
AT 19-3*14	101.5	167.8	152.8	10,840		EXTRAP
AT 19-4M14	101.5	167.8	164.8	11,000	Carbon steel	**UUT 1**

NOTES: Table continues on the next page. Additional notes, information, and seismic parameters are shown at the end of the table.

MANUFACTURER: EVAPCO, INC.

PRODUCT FAMILY: AT ADVANCED TECHNOLOGY COOLING TOWERS

MODEL NUMBER	DIMENSIONS (in)			MAX. WT. (lb)	DESCRIPTION / NOTES	BASIS
	DEPTH	WIDTH	HEIGHT			
AT (continued)						
AT 19-4*14	101.5	167.8	164.8	11,290		INTERP
AT 110-2*12	117.8	143.8	161.3	11,850		INTERP
AT 110-3*12	117.8	143.8	173.3	12,330		INTERP
AT 110-4*12	117.8	143.8	185.3	13,000		INTERP
AT 110-2*18	117.8	216.0	161.3	17,060		INTERP
AT 110-3*18	117.8	216.0	173.3	18,000		INTERP
AT 110-4*18	117.8	216.0	185.3	18,630		INTERP
AT 112-2*12	142.0	143.8	162.3	13,810		INTERP
AT 112-3*12	142.0	143.8	174.3	14,350		INTERP
AT 112-4*12	142.0	143.8	186.3	15,090		INTERP
AT 112-2*14	142.0	167.8	168.3	15,820		INTERP
AT 112-3*14	142.0	167.8	180.3	16,740		INTERP
AT 112-4*14	142.0	167.8	192.3	17,260		INTERP
AT 112-2*18	142.0	216.0	174.3	20,350		INTERP
AT 112-3*18	142.0	216.0	186.3	21,190		INTERP
AT 112-4*18	142.0	216.0	198.3	22,040		INTERP
AT 112-2*20	142.0	240.0	174.3	22,200		INTERP
AT 112-3*20	142.0	240.0	186.3	22,930		INTERP
AT 112-4O20	142.0	245.0	207.0	26,360	Stainless steel	**UUT 8**
AT 112-4*20	142.0	240.0	198.3	23,940		EXTRAP

MOUNTING:	Rigid or spring vibration isolated floor mounted.	**SEISMIC LEVELS:**	S_{DS} = 1.93g for z/h = 1 S_{DS} = 1.93g for z/h = 0	I_P = 1.5

NOTES:

Product Construction & Seismic Enhancements: Carbon steel or stainless steel enclosure and basin. Seismic enhancements made to the test units must be included in the production models.

Construction Options: Inlet: Top, Side, End, Bottom; Outlet: Side, End, Bottom; Equalizer: Side, Bottom, End; Bypass: Side, Bottom, End; Air Intake Screens; Flume Plate and Cover; Internal Piping (SCH 10 carbon steel or stainless steel or SCH 40 PVC); Sump Sweeper Piping; Cold Water Basin Covers; Remote Sump Trash Screen; Double Drift Eliminators.

Fan Options: Cylinder Extension (carbon steel or stainless steel): up to 11ft diameter X 0-3ft tall w/ 1ft max tall sections; Belt Drive or Gear Drive; Gear Drive Support (carbon or stainless steel); Fan Shaft (carbon steel or stainless steel); Fan Access Door.

Access Options: External Service Platform; Internal Drive Acces Platform; Internal Walkway; Motor Davit Base; Perimeter Handrail; Ladder with Safety Cage; Safety Gate.

Subcomponents: Subcomponents are listed in Table 2.

Multi-Cell Models: The models listed above are all single-cell models. Single-cell models may be placed next to each other and connected by a flume box or equalizer to make a multi-cell (2, 3, or 4) model. Individual cells of a multi-cell model must use construction and seismic enhancements that are identical to the single-cell models.

AXS Models: AXS Crossflow Cooling Tower test units are used primarily to certify subcomponents (see Table 2 and Attachment 2).

TABLE 2 - SUBCOMPONENTS

MANUFACTURER: EVAPCO, INC. (subcomponent manufacturer listed in bold below)

PRODUCT FAMILY: AT ADVANCED TECHNOLOGY COOLING TOWERS

MODEL NUMBER	DIMENSIONS (in)			MAX. WT. (lb)	DESCRIPTION / NOTES	BASIS
	DEPTH	WIDTH	HEIGHT			
Subcomponent: Fan - Manufacturer: Cofimco - Material: Aluminum						
63D-4B-A-70	63.0	63.0	4.6	70	24L 4-Blade, B3 Hub	EXTRAP
63D-5B-A-80	63.0	63.0	4.6	80	24L 5-Blade, B3 Hub	EXTRAP
63D-6B-A-95	63.0	63.0	4.6	95	24L 6-Blade, B3 Hub	EXTRAP
74D-4B-A-115	74.0	74.0	4.6	115	24L 4-Blade, B3 Hub	EXTRAP
74D-5B-A-130	74.0	74.0	4.6	130	24L 5-Blade, B3 Hub	EXTRAP
74D-6B-A-145	74.0	74.0	4.6	145	24L 6-Blade, B3 Hub	EXTRAP
80D-4B-A-115	80.0	80.0	4.6	115	24L 4-Blade, B3 Hub	EXTRAP
80D-5B-A-135	80.0	80.0	4.6	135	24L 5-Blade, B3 Hub	EXTRAP
80D-6B-A-150	80.0	80.0	4.6	150	24L 6-Blade, B3 Hub	EXTRAP
84D-4B-A-115	84.0	84.0	4.6	115	24L 4-Blade, B3 Hub	EXTRAP
84D-5B-A-135	84.0	84.0	4.6	135	24L 5-Blade, B3 Hub	EXTRAP
84D-6B-A-150	84.0	84.0	4.6	150	24L 6-Blade, B3 Hub	EXTRAP
92D-4B-A-125	92.0	92.0	4.6	125	24L 4-Blade, B3 Hub	EXTRAP
92D-5B-A-145	92.0	92.0	4.6	145	24L 5-Blade, B3 Hub	**UUT 1**
92D-6B-A-160	92.0	92.0	4.6	160	24L 6-Blade, B3 Hub	INTERP
108D-5B-A-150	108.0	108.0	4.6	150	24L 5-Blade, B3 Hub	INTERP
108D-6B-A-170	108.0	108.0	4.6	170	24L 6-Blade, B3 Hub	INTERP
108D-8B-A-210	108.0	108.0	4.6	210	24L 8-Blade, B3 Hub	INTERP
132D-5B-A-165	132.0	132.0	4.6	165	24L 5-Blade, B3 Hub	INTERP
132D-6B-A-190	132.0	132.0	4.6	190	24L 6-Blade, B3 Hub	INTERP
132D-7B-A-210	132.0	132.0	4.6	210	24L 7-Blade, B3 Hub	INTERP
132D-6B-A-340	132.0	132.0	4.6	340	34N 6-Blade, B3 Hub	INTERP
132D-7B-A-380	132.0	132.0	4.6	380	34N 7-Blade, B3 Hub	**UUT 3**
Subcomponent: Fan - Manufacturer: Fan TR - Material: Fiberglass						
63D-3B-F-125	63.0	63.0	26.0	125	3-Blade	EXTRAP
74D-3B-F-160	74.0	74.0	26.0	160	3-Blade	EXTRAP
84D-3B-F-200	84.0	84.0	26.0	200	3-Blade	EXTRAP
92D-3B-F-195	92.0	92.0	26.0	195	3-Blade	EXTRAP
108D-3B-F-250	108.0	108.0	26.0	250	3-Blade	EXTRAP
132D-4B-F-575	132.0	132.0	26.0	575	4-Blade	**UUT 8**
132D-5B-F-720	132.0	132.0	26.0	720	5-Blade	INTERP
156D-4B-F-620	156.0	156.0	26.0	620	4-Blade	INTERP
156D-5B-F-775	156.0	156.0	26.0	775	5-Blade	**UUT 5**
Subcomponent: Right Angle Gear Drive w/ Low Speed - Manufacturer: Amarillo						
175	44.0	20.5	33.4	825	UUT: Zero RPM duty option	**UUT 5**

NOTES: Table continues on the next page. Additional notes, information, and seismic parameters are shown at the end of the table.

MANUFACTURER: EVAPCO, INC. (subcomponent manufacturer listed in bold below)

PRODUCT FAMILY: AT ADVANCED TECHNOLOGY COOLING TOWERS

MODEL NUMBER	DIMENSIONS (in) DEPTH	WIDTH	HEIGHT	MAX. WT. (lb)	DESCRIPTION / NOTES	BASIS
Subcomponent: Motor - Manufacturer: WEG - Type: W22 NEMA Premium						
182T	14.9	8.7	9.3	90	3hp, 1800 rpm	EXTRAP
184T	15.9	8.7	9.3	95	5hp, 1800 rpm	EXTRAP
213T/5T	18.0	10.7	10.8	172	3-10hp, 1200-1800rpm	EXTRAP
254T	23.2	13.0	12.6	289	7.5-15hp, 1200-1800rpm	EXTRAP
256T	24.9	13.0	12.6	291	10-20hp, 1200-1800rpm	EXTRAP
284T	26.4	14.2	14.1	388	15-25hp, 1200-1800rpm	EXTRAP
286T	27.9	14.2	14.1	437	20-30hp, 1200-1800rpm	EXTRAP
324T	29.6	15.8	16.0	560	25-40hp, 1200-1800rpm	EXTRAP
326T	31.1	15.8	16.0	560	30-50hp, 1200-1800rpm	EXTRAP
364/5T	34.3	17.9	18.0	919	40-75hp, 1200-1800rpm	**UUT 8**
404/5T	39.7	19.1	19.6	1,140	60-100hp, 1200-1800rpm	INTERP
444/5T	45.0	23.6	22.8	1,590	125hp, 1800rpm, heater, ground ring	**UUT 5**
Subcomponent: Motor - Manufacturer: Nidec						
182T	14.9	8.7	9.3	130	3hp, 1800 rpm	EXTRAP
184T	15.9	8.7	9.3	130	5hp, 1800 rpm	EXTRAP
213T/5T	18.0	10.7	10.8	200	3-10hp, 1200-1800rpm	EXTRAP
254T	23.2	13.0	12.6	325	7.5-15hp, 1200-1800rpm	EXTRAP
256T	24.9	13.0	12.6	325	10-20hp, 1200-1800rpm	EXTRAP
284T	26.4	14.2	14.1	380	15-25hp, 1200-1800rpm	EXTRAP
286T	27.9	14.2	14.1	410	20-30hp, 1200-1800rpm	**UUT 1**
324T	29.6	15.8	16.0	605	25-40hp, 1200-1800rpm	INTERP
326T	31.1	15.8	16.0	605	30-50hp, 1200-1800rpm	INTERP
364/5T	34.3	17.9	18.0	910	40-75hp, 1200-1800rpm	INTERP
404/5T	39.7	19.1	19.6	1,000	60-100hp, 1200-1800rpm	**UUT 3**
Subcomponent: Water Level Control - Manufacturer: Gems Sensors ASCO						
3 probe						**UUT 5**
5 probe						**UUT 5**
Subcomponent: Basin Heater - Manufacturer: Chromalox						
2kW						**UUT 5**
…					Interpolated sizes	INTERP
20kW						**UUT 5**
Subcomponent: Float Switch - Manufacturer: M-Tech						
017-00207PA						**UUT 5**
Subcomponent: Vibration Switch - Manufacturer: Metrix						
5550						**UUT 5**
Subcomponent: Vibration Switch - Manufacturer: Balmac						
550						**UUT 5**
Subcomponent: Mechanical Makeup Brass Valve - Manufacturer: Evapco						
1"						**UUT 5**
2"						**UUT 5**

MOUNTING:	Mounted within unit.	**SEISMIC LEVELS:**	S_{DS} = 1.93g for z/h = 1 S_{DS} = 1.93g for z/h = 0	I_P = 1.5
NOTES:	**Construction/Options:** Model number uniquely identifies manufacturer, materials, and configuration of subcomponents.			

ATTACHMENT 2: UNIT UNDER TEST SUMMARIES

SPECIAL SEISMIC CERTIFICATION

DOCUMENT NO.: 21071CR2.0

UUT 1

MANUFACTURER:	EVAPCO, INC.
MODEL NUMBER:	AT 19-4M14
UNIT FUNCTION:	COOLING TOWER
SERIAL NUMBER:	N/A

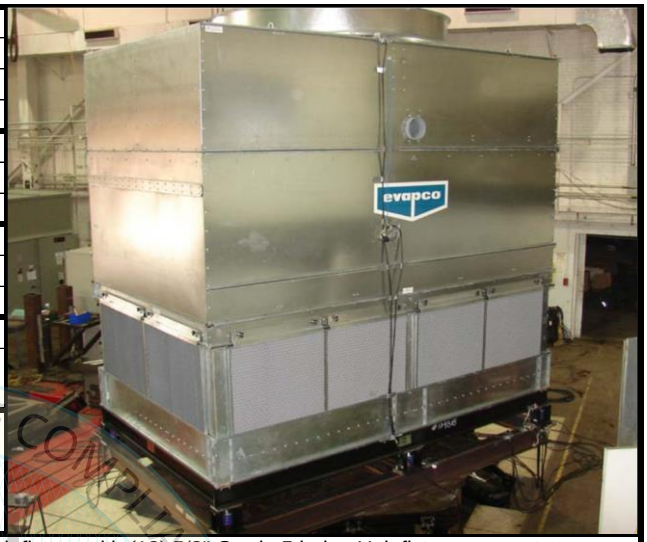
DIMENSIONS (in)			WEIGHT	RES. FREQ. (Hz)		
DEPTH	WIDTH	HEIGHT	(lb)	F-B	S-S	V
101.5	167.8	164.8	11,000	1.6	1.6	3.9

CODE & CRITERIA:	2022 CBC	ICC-ES AC156	
TEST LABORATORY:	Clark Dynamic Test Laboratory		
REPORT: T4838, Rev. 1 (dated Oct. 2009), tested on 9/21/2009			

S_{DS} (g)	z/h	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
1.93	1	3.09	2.32	1.29	0.52
1.93	0				

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:	Spring isolated floor mounted. Unit connects to unit fixture with (12) 5/8" Grade 5 bolts. Unit fixture connects to spring isolators with fillet welds on (2) sides of each isolator. (6) VMC AWMR-R-1-1628 spring isolators connect to the table with fillet welds on (2) sides of each isolator.
CONSTRUCTION:	Upgraded seismic construction. Carbon steel enclosure and basin.
OPTIONS/ SUBCOMPONENTS:	**Construction:** Inlet: Side; Outlet: Side; Equalizer: Side; Bypass: Side. **Fan:** Belt Drive. **Subcomponents:** Cofimco - Fan (92D-5B-A-145), Nidec - Motor (286T).
TESTING NOTES:	Only the spring isolated configuration was tested to the full seismic level. Rigid configuration is not considered.

ATTACHMENT 2: UNIT UNDER TEST SUMMARIES

SPECIAL SEISMIC CERTIFICATION

DOCUMENT NO.: 21071CR2.0

UUT 3

MANUFACTURER:	EVAPCO, INC.
MODEL NUMBER:	AXS 12-20R22
UNIT FUNCTION:	COOLING TOWER
SERIAL NUMBER:	N/A

DIMENSIONS (in)			WEIGHT	RES. FREQ. (Hz)		
DEPTH	WIDTH	HEIGHT	(lb)	F-B	S-S	V
273.0	142.0	271.0	41,790	5.9	3.2	8.5

CODE & CRITERIA:	2022 CBC	ICC-ES AC156	
TEST LABORATORY:	ERDC-CERL		
REPORT: 15021-TR-001, Rev. 1 (dated 1/3/17), tested on 6/5/2015			

S_{DS} (g)	z/h	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
2.0	1	3.20	2.40	2.14	0.86
3.2	0				

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:	Rigid floor mounted using (16) 5/8" A325 bolts.
CONSTRUCTION:	Upgraded seismic construction. Carbon steel enclosure and basin.
OPTIONS/ SUBCOMPONENTS:	**Construction:** Inlet: Top, Outlet: Side. **Fan:** Belt Drive. **Subcomponents:** Cofimco - Fan (132D-7B-A-380), Nidec - Motor (405T).
TESTING NOTES:	AXS Crossflow Cooling Tower used primarily to certify subcomponents. The spring isolators were completely bypassed to make a rigid connection to the table.

UUT 5

MANUFACTURER:	EVAPCO, INC.
MODEL NUMBER:	AXS 14-22S24
UNIT FUNCTION:	COOLING TOWER
SERIAL NUMBER:	N/A

DIMENSIONS (in)			**WEIGHT (lb)**	**RES. FREQ. (Hz)**		
DEPTH	**WIDTH**	**HEIGHT**		**F-B**	**S-S**	**V**
297.0	167.0	307.0	52,200	3.3	1.9	3.1

CODE & CRITERIA:	2022 CBC	ICC-ES AC156
TEST LABORATORY:	PEER-Berkeley	

REPORT: 15050-TR-001, Rev. 2 (dated 1/3/17), tested on 4/19/2016

S_{DS} (g)	z/h	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
2.0	**1**	**3.20**	**2.40**	**2.14**	**0.86**
3.2	**0**				

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:	Spring isolated floor mounted. Unit connects to unit fixture with (24) 5/8" Grade 5 bolts. Unit fixture connects to spring isolators with (2) 3/4" Grade 5 bolts per isolator (20 total). (4) Mason SLFADA-600-2-109 and (6) Mason SLFADA-600-2-111 spring isolators connect to the table with (2) 3/4" Grade 8 bolts per isolator (20 total).
CONSTRUCTION:	Upgraded seismic construction. Stainless steel enclosure and basin.
OPTIONS/ SUBCOMPONENTS:	**Construction:** Inlet: Bottom; Outlet: Bottom; Equalizer: Bottom; Bypass: Bottom; Air Intake Screens; Flume Plate and Cover; Internal Piping (SCH 40 PVC); Sump Sweeper Piping; Cold Water Basin Covers; Remote Sump Trash Screen; Double Drift Eliminators. **Fan:** Cylinder Extension (stainless steel): 13ft diameter X 3ft tall w/ 1ft tall sections; Gear Drive; Gear Drive Support (stainless steel); Fan Access Door. **Access:** External Service Platform; Internal Drive Acces Platform; Internal Walkway; Motor Davit Base; Perimeter Handrail; Ladder with Safety Cage; Safety Gate. **Subcomponents:** Fan TR - Fan (156D-5B-F-775), WEG - W22 Motor (444/5T with shaft grounding ring and space heater), Amarillo - Gear Drive (175), Gems Sensors ASCO - Water Level Controls (3 probe, 5 probe), Chromalox - Basin Heaters (2kW, 20kW), M-Tech - Float Switch (017-00207PA), Metrix - Vibration Switch (5550), Balmac - Vibration Switch (550), Evapco - Mechanical Makeup Brass Valve (1", 2").
TESTING NOTES:	AXS Crossflow Cooling Tower used primarily to certify subcomponents. Additional plate washers were required to address an anomaly during testing. At each 2-bolt group connecting the unit to the fixture (12 total), a 6"x1.5"x1/4" thick plate washer was added to spread the forces and strengthen the connection at the base.

ATTACHMENT 2: UNIT UNDER TEST SUMMARIES

SPECIAL SEISMIC CERTIFICATION

DOCUMENT NO.: 21071CR2.0

UUT 8

MANUFACTURER:	EVAPCO, INC.
MODEL NUMBER:	AT 112-4O20
UNIT FUNCTION:	COOLING TOWER
SERIAL NUMBER:	N/A

DIMENSIONS (in)			**WEIGHT**	**RES. FREQ. (Hz)**		
DEPTH	**WIDTH**	**HEIGHT**	**(lb)**	**F-B**	**S-S**	**V**
240.0	142.0	207.0	26,360	2.8	3.2	3.1

CODE & CRITERIA:	2022 CBC	ICC-ES AC156
TEST LABORATORY:	PEER-Berkeley	

REPORT: 15050-TR-001, Rev. 2 (dated 1/3/17), tested on 4/21/2016

S_{DS} (g)	z/h	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
1.94	**1**	**3.10**	**2.33**	**2.00**	**0.80**
2.98	**0**				

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:	Spring isolated floor mounted. Unit connects to unit fixture with (36) 5/8" ASTM A325 bolts. Unit fixture connects to spring isolators with (2) 3/4" Grade 8 bolts per isolator (20 total). (4) Mason SLFADA-600-2-109 and (6) Mason SLFADA-600-2-111 spring isolators connect to the table with (2) 3/4" Grade 8 bolts per isolator (20 total).
CONSTRUCTION:	Upgraded seismic construction. Stainless steel enclosure and basin.
OPTIONS/ SUBCOMPONENTS:	**Construction:** Inlet: Bottom; Outlet: Bottom/End; Equalizer: Bottom/End; Bypass: Bottom/End; Internal Piping (SCH 40 PVC). **Fan:** Cylinder Extension (carbon steel): 11ft diameter X 1ft tall; Belt Drive; Fan Shaft (stainless steel); Fan Access Door. **Access:** External Service Platform; Ladder. **Subcomponents:** Fan TR - Fan (132D-4B-F-575), WEG - W22 Motor (364/5T with space heater).
TESTING NOTES:	N/A

ATTACHMENT 3: MODEL NOMENCLATURE

SPECIAL SEISMIC CERTIFICATION

AT COOLING TOWERS

DOCUMENT NO.: 21071CR2.0

DIGIT:	1	2	3	4	5	6	7	8	9	10	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SAMPLE:	A	T		1	1	2	-	4	P	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

DIGIT	DIGIT DESCRIPTION	CODES	DEFINITIONS
1-2	Product Line Name	AT	Advanced Technology Tower
4	Number of Cells	1	Single Cell
		2	Multi-Cell (Two) - See Table 1 Notes
		3	Multi-Cell (Three) - See Table 1 Notes
		4	Multi-Cell (Four) - See Table 1 Notes
5-6	Unit Width (ft)	7	7-ft Nominal Width
		8	8-ft Nominal Width
		9	9-ft Nominal Width
		10	10-ft Nominal Width
		12	12-ft Nominal Width
8	Fill Layers	2	2 fill layers (1-ft tall each)
		3	3 fill layers (1-ft tall each)
		4	4 fill layers (1-ft tall each)
9	Motor Designator	F	3-hp
		G	5-hp
		H	7.5-hp
		I	10-hp
		J	15-hp
		K	20-hp
		L	25-hp
		M	30-hp
		N	40-hp
		O	50-hp
		P	60-hp
		Q	75-hp
		R	100-hp
10-11	Unit Length (ft)	6	6-ft Nominal Length
		8	8-ft Nominal Length
		9	9-ft Nominal Length
		11	11-ft Nominal Length
		12	12-ft Nominal Length
		14	14-ft Nominal Length
		18	18-ft Nominal Length
		20	20-ft Nominal Length