APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY	
APPLICATION #:	OSP – 0224 – 10

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Baltimore Aircoil Company, Inc.

Manufacturer's Technical Representative: Panos G. Papavizas, P.E.

Mailing Address: 7600 Dorsey Run Road, Jessup, MD 20794

Telephone: 410-799-6438 Email: ppapavizas@baltimoreaircoil.com

Product Information

Product Name: Series 3000C

Product Type: Open Cooling Tower

Product Model Number: See Attachment
(List all unique product identification numbers and/or part numbers)

General Description: Series 3000C Open Cooling Tower product line used in evaporative cooling applications. Certification covers: upgraded structure option (identified with a suffix "/S" in the model nomenclature); single and multiple cells; galvanized and stainless steel materials of construction; belt and gear drive; standard and low sound fans. Seismic enhancements made to the test units and modifications required to address anomalies observed during the tests shall be incorporated into the production units.

Mounting Description: Rigid mounted and spring isolated with restraints mounted

Applicant Information

Applicant Company Name: Baltimore Aircoil Company, Inc.

Contact Person: Panos G. Papavizas, P.E.

Mailing Address: 7600 Dorsey Run Road, Jessup, MD 20794

Telephone: 410-799-6438 Email: ppapavizas@baltimoreaircoil.com

I hereby agree to reimburse the Office of Statewide Health Planning and Development review fees in accordance with the California Administrative Code, 2013.

Signature of Applicant: _____ Date: April 5, 2013

Title: Chief Engineer Company Name: Baltimore Aircoil Company, Inc.

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

Company Name: MakeitRight, Inc.

Name: Joseph La Brie, S. E. California License Number: S3566

Mailing Address: 55 E. Huntington Drive, Suite 277, Arcadia, CA 91006

Telephone: 626-445-0366 Email: labrie@makeitright.net

Supports and Attachments Preapproval

☐ Supports and attachments are preapproved under OPM-
(Separate application for OSHPD Preapproval of Manufacturer's Certification (OPM) of Supports and attachments is required)

☒ Supports and attachments are not preapproved

Certification Method

☒ Testing in accordance with: ☒ ICC-ES AC156

☐ Other (Please Specify):

Testing Laboratory

Company Name: Structural Engineering & Earthquake Simulation Laboratory (SEESL)

Contact Name: Mark Pitman

Mailing Address: Department of Civil, Structural, and Environmental Engineering, University at Buffalo, The State University of New York, 212 Ketter Hall, North Campus, Buffalo, NY 14260

Telephone: 716-645-4377 Email: mpitman@buffalo.edu

Seismic Parameters

Design in accordance with ASCE 7-10 Chapter 13: ☒ Yes ☐ No

Design Basis of Equipment or Components (F_p/W_p) = 4.36 Vibration Isolated; 2.91 Rigid

S_{DS} (Design spectral response acceleration at short period, g) = 1.94

a_p (In-structure equipment or component amplification factor) = 2.5

R_p (Equipment or component response modification factor) = 2.0 Vibration Isolated; 3.0 Rigid

Ω_0 (System overstrength factor) = 2.5

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1.0

Equipment or Component Natural Frequencies (Hz) = See Attachment

Overall dimensions and weight (or range thereof) = See Attachment

Equipment or Components @ grade designed in accordance with ASCE 7-10 Chapter 15: ☐ Yes ☒ No

Design Basis of Equipment or Components (V/W) =

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

S_{D1} (Design spectral response acceleration at 1 second period, g) =

R (Response modification coefficient) =

Ω_0 (System overstrength factor) =

C_d (Deflection amplification factor) =

I_p (Importance factor) = 1.5

Height to Center of Gravity above base =

Equipment or Component Natural Frequencies (Hz) =

Overall dimensions and weight (or range thereof) =

Tank(s) designed in accordance with ASME BPVC, 2010: ☐ Yes ☒ No

List of Attachments Supporting Special Seismic Certification

☒ Test Report(s) ☐ Drawings ☐ Calculations ☒ Manufacturer's Catalog

☒ Other(s) (Please Specify): Group-1 Attachment

OSHPD Approval (For Office Use Only) – **Approval Expires on December 31, 2019**

Signature: Date: September 13, 2013

Print Name: Timothy J. Piland Title: SSE

Special Seismic Certification Valid Up to : S_{DS} (g) = 1.94 z/h = 1.0

Condition of Approval (if applicable):

Table 1: Certified Seismic Parameters

Building Codes	Test Criteria	S_{DS} (g)	z/h	I_p	a_p	R_p (Rigid)	R_p (Vibration Isolated)	F_p/W_p (Rigid)	F_p/W_p (Vibration Isolated)
CBC 2013	ICC-ES AC156	1.94	1	1.5	2.5	3.0	2.0	2.91	4.36

Table 2: Certified Models – Summary List

Base Model No.[1,2,3,7]	Nominal Box Size[4]	Motor HP	Fan Diam. (in)	Shipping Weight[5] (lbs)	Operating Weight[5,6] (lbs)	Unit Width (in)	Unit Length (in)	Height to Fan Deck (in)	Certification Basis
3240C/S	18X8.5X80	10	90	8371	15961	216.5	101.75	103.75	UUT A
3240C-GM/S	18X8.5X80	3	90	8371	15961	216.5	101.75	103.75	
3240C-HM/S	18X8.5X80	5	90	8371	15961	216.5	101.75	103.75	
3240C-JM/S	18X8.5X80	7.5	90	8371	15961	216.5	101.75	103.75	
3272C/S	18X8.5X80	15	90	8503	16093	216.5	101.75	103.75	
3299C/S	18X8.5X80	20	90	8569	16159	216.5	101.75	103.75	
3333C/S	18X8.5X96	20	90	8866	16996	216.5	101.75	119.75	
3333C-GM/S	18X8.5X96	3	90	8866	16996	216.5	101.75	119.75	
3333C-HM/S	18X8.5X96	5	90	8866	16996	216.5	101.75	119.75	
3333C-JM/S	18X8.5X96	7.5	90	8866	16996	216.5	101.75	119.75	
3333C-KM/S	18X8.5X96	10	90	8866	16996	216.5	101.75	119.75	
3333C-LM/S	18X8.5X96	15	90	8866	16996	216.5	101.75	119.75	
3358C/S	18X8.5X96	25	90	8899	17029	216.5	101.75	119.75	
3371C/S	18X8.5X112	25	90	9295	17965	216.5	101.75	135.75	
3371C-GM/S	18X8.5X112	3	90	9295	17965	216.5	101.75	135.75	Interpolated
3371C-HM/S	18X8.5X112	5	90	9295	17965	216.5	101.75	135.75	
3371C-JM/S	18X8.5X112	7.5	90	9295	17965	216.5	101.75	135.75	
3371C-KM/S	18X8.5X112	10	90	9295	17965	216.5	101.75	135.75	
3371C-LM/S	18X8.5X112	15	90	9295	17965	216.5	101.75	135.75	
3371C-MM/S	18X8.5X112	20	90	9295	17965	216.5	101.75	135.75	
3379C/S	18X8.5X96	30	90	8954	17084	216.5	101.75	119.75	
3393C/S	18X8.5X112	30	90	9350	18020	216.5	101.75	135.75	
3412C/S	20X10X96	25	108	10329	19939	240.5	117.25	119.75	
3412C-GM/S	20X10X96	3	108	10329	19939	240.5	117.25	119.75	
3412C-HM/S	20X10X96	5	108	10329	19939	240.5	117.25	119.75	
3412C-JM/S	20X10X96	7.5	108	10329	19939	240.5	117.25	119.75	
3412C-KM/S	20X10X96	10	108	10329	19939	240.5	117.25	119.75	
3412C-LM/S	20X10X96	15	108	10329	19939	240.5	117.25	119.75	

Base Model No.[1,2,3,7]	Nominal Box Size[4]	Motor HP	Fan Diam. (in)	Shipping Weight[5] (lbs)	Operating Weight[5,6] (lbs)	Unit Width (in)	Unit Length (in)	Height to Fan Deck (in)	Certification Basis
3412C-MM/S	20X10X96	20	108	10329	19939	240.5	117.25	119.75	
3430C/S	18X8.5X112	40	90	9526	18196	216.5	101.75	135.75	
3436C/S	20X10X96	30	108	10384	19994	240.5	117.25	119.75	
3455C/S	20X10X112	25	108	10681	20741	240.5	117.25	135.75	
3455C-GM/S	20X10X112	3	108	10681	20741	240.5	117.25	135.75	
3455C-HM/S	20X10X112	5	108	10681	20741	240.5	117.25	135.75	
3455C-JM/S	20X10X112	7.5	108	10681	20741	240.5	117.25	135.75	
3455C-KM/S	20X10X112	10	108	10681	20741	240.5	117.25	135.75	
3455C-LM/S	20X10X112	15	108	10681	20741	240.5	117.25	135.75	
3455C-MM/S	20X10X112	20	108	10681	20741	240.5	117.25	135.75	
3473C/S	21.5X12X96	25	120	11990	23820	258.5	141.75	119.75	
3473C-HM/S	21.5X12X96	5	120	11990	23820	258.5	141.75	119.75	
3473C-JM/S	21.5X12X96	7.5	120	11990	23820	258.5	141.75	119.75	
3473C-KM/S	21.5X12X96	10	120	11990	23820	258.5	141.75	119.75	
3473C-LM/S	21.5X12X96	15	120	11990	23820	258.5	141.75	119.75	
3473C-MM/S	21.5X12X96	20	120	11990	23820	258.5	141.75	119.75	
3482C/S	20X10X112	30	108	10736	20796	240.5	117.25	135.75	
3501C/S	21.5X12X96	30	120	12045	23875	258.5	141.75	119.75	
3527C/S	20X10X112	40	108	10912	20972	240.5	117.25	135.75	
3552C/S	21.5X12X11	30	120	12661	26301	258.5	141.75	135.75	
3552C-JM/S	21.5X12X11	7.5	120	12661	26301	258.5	141.75	135.75	
3552C-KM/S	21.5X12X11	10	120	12661	26301	258.5	141.75	135.75	
3552C-LM/S	21.5X12X11	15	120	12661	26301	258.5	141.75	135.75	
3552C-MM/S	21.5X12X11	20	120	12661	26301	258.5	141.75	135.75	
3552C-NM/S	21.5X12X11	25	120	12661	26301	258.5	141.75	135.75	
3583C/S	24X14X112	25	132	17215	34455	288.5	167.125	135.75	
3583C-JM/S	24X14X112	7.5	132	17215	34455	288.5	167.125	135.75	
3583C-KM/S	24X14X112	10	132	17215	34455	288.5	167.125	135.75	
3583C-LM/S	24X14X112	15	132	17215	34455	288.5	167.125	135.75	
3583C-MM/S	24X14X112	20	132	17215	34455	288.5	167.125	135.75	
3604C/S	21.5X12X11	40	120	12837	26477	258.5	141.75	135.75	
3618C/S	24X14X112	30	132	17270	34510	288.5	167.125	135.75	
3648C/S	21.5X12X11	50	120	12848	26488	258.5	141.75	135.75	
3672C/S	21.5X12X11	60	120	13684	27324	258.5	141.75	135.75	UUT B
3676C/S	24X14X112	40	132	17446	34686	288.5	167.125	135.75	
3719C/S	24X14X112	60	132	17633	34873	288.5	167.125	135.75	
3725C/S	24X14X112	50	132	17457	34697	288.5	167.125	135.75	
3728C/S	21.5X12X16	40	132	15906	32146	258.5	141.75	185.75	Interpolated
3728C-KM/S	21.5X12X16	10	132	15906	32146	258.5	141.75	185.75	
3728C-LM/S	21.5X12X16	15	132	15906	32146	258.5	141.75	185.75	
3728C-MM/S	21.5X12X16	20	132	15906	32146	258.5	141.75	185.75	

Base Model No.[1,2,3,7]	Nominal Box Size[4]	Motor HP	Fan Diam. (in)	Shipping Weight[5] (lbs)	Operating Weight[5,6] (lbs)	Unit Width (in)	Unit Length (in)	Height to Fan Deck (in)	Certification Basis
3728C-NM/S	21.5X12X16	25	132	15906	32146	258.5	141.75	185.75	
3728C-OM/S	21.5X12X16	30	132	15906	32146	258.5	141.75	185.75	
3781C/S	21.5X12X16	50	132	16082	32322	258.5	141.75	185.75	
3828C/S	21.5X12X16	60	132	16093	32333	258.5	141.75	185.75	
3871C/S	21.5X12X16	75	132	17149	33389	258.5	141.75	185.75	
3872C/S	21.5X12X19	50	132	16918	35238	258.5	141.75	217.75	
3872C-KM/S	21.5X12X19	10	132	16918	35238	258.5	141.75	217.75	
3872C-LM/S	21.5X12X19	15	132	16918	35238	258.5	141.75	217.75	
3872C-MM/S	21.5X12X19	20	132	16918	35238	258.5	141.75	217.75	
3872C-NM/S	21.5X12X19	25	132	16918	35238	258.5	141.75	217.75	
3872C-OM/S	21.5X12X19	30	132	16918	35238	258.5	141.75	217.75	
3872C-PM/S	21.5X12X19	40	132	16918	35238	258.5	141.75	217.75	
3918C/S	21.5X12X20	60	132	17457	36687	258.5	141.75	233.75	
3918C-KM/S	21.5X12X20	10	132	17457	36687	258.5	141.75	233.75	
3918C-LM/S	21.5X12X20	15	132	17457	36687	258.5	141.75	233.75	
3918C-MM/S	21.5X12X20	20	132	17457	36687	258.5	141.75	233.75	
3918C-NM/S	21.5X12X20	25	132	17457	36687	258.5	141.75	233.75	
3918C-OM/S	21.5X12X20	30	132	17457	36687	258.5	141.75	233.75	
3918C-PM/S	21.5X12X20	40	132	17457	36687	258.5	141.75	233.75	
3918C-QM/S	21.5X12X20	50	132	17457	36687	258.5	141.75	233.75	
3923C/S	21.5X12X19	60	132	17149	35469	258.5	141.75	217.75	
3970C/S	21.5X12X19	75	132	18205	36525	258.5	141.75	217.75	
3984C/S	21.5X12X20	75	132	17622	36852	258.5	141.75	233.75	
3985C/S	21.5X12X22	60	132	17996	38136	258.5	141.75	249.75	
3985C-LM/S	21.5X12X22	15	132	17996	38136	258.5	141.75	249.75	
3985C-MM/S	21.5X12X22	20	132	17996	38136	258.5	141.75	249.75	
3985C-NM/S	21.5X12X22	25	132	17996	38136	258.5	141.75	249.75	
3985C-OM/S	21.5X12X22	30	132	17996	38136	258.5	141.75	249.75	
3985C-PM/S	21.5X12X22	40	132	17996	38136	258.5	141.75	249.75	
3985C-QM/S	21.5X12X22	50	132	17996	38136	258.5	141.75	249.75	
31056C/S	21.5X12X22	75	132	18084	38234	258.5	141.75	249.75	
31130C/S	24X14X208	75	156	23298	46538	288.5	167.125	233.75	
31130C-LM/S	24X14X208	15	156	23298	46538	288.5	167.125	233.75	
31130C-MM/S	24X14X208	20	156	23298	46538	288.5	167.125	233.75	
31130C-NM/S	24X14X208	25	156	23298	46538	288.5	167.125	233.75	
31130C-OM/S	24X14X208	30	156	23298	46538	288.5	167.125	233.75	
31130C-PM/S	24X14X208	40	156	23298	46538	288.5	167.125	233.75	
31130C-QM/S	24X14X208	50	156	23298	46538	288.5	167.125	233.75	
31130C-RM/S	24X14X208	60	156	23298	46538	288.5	167.125	233.75	
31132C/S	24X14X192	75	156	22913	45163	288.5	167.125	217.75	
31132C-LM/S	24X14X192	15	156	22913	45163	288.5	167.125	217.75	

Base Model No.[1,2,3,7]	Nominal Box Size[4]	Motor HP	Fan Diam. (in)	Shipping Weight[5] (lbs)	Operating Weight[5,6] (lbs)	Unit Width (in)	Unit Length (in)	Height to Fan Deck (in)	Certification Basis
31132C-MM/S	24X14X192	20	156	22913	45163	288.5	167.125	217.75	
31132C-NM/S	24X14X192	25	156	22913	45163	288.5	167.125	217.75	
31132C-OM/S	24X14X192	30	156	22913	45163	288.5	167.125	217.75	
31132C-PM/S	24X14X192	40	156	22913	45163	288.5	167.125	217.75	
31132C-QM/S	24X14X192	50	156	22913	45163	288.5	167.125	217.75	
31132C-RM/S	24X14X192	60	156	22913	45163	288.5	167.125	217.75	
31133C/S	21.5X12X22	100	132	20196	40346	258.5	141.75	249.75	
31186C/S	24X14X192	100	156	25025	47275	288.5	167.125	217.75	
31212C/S	24X14X208	100	156	25410	48650	288.5	167.125	233.75	
31213C/S	24X14X224	75	156	23683	47913	288.5	167.125	249.75	
31213C-MM/S	24X14X224	20	156	23683	47913	288.5	167.125	249.75	
31213C-NM/S	24X14X224	25	156	23683	47913	288.5	167.125	249.75	
31213C-OM/S	24X14X224	30	156	23683	47913	288.5	167.125	249.75	
31213C-PM/S	24X14X224	40	156	23683	47913	288.5	167.125	249.75	
31213C-QM/S	24X14X224	50	156	23683	47913	288.5	167.125	249.75	
31213C-RM/S	24X14X224	60	156	23683	47913	288.5	167.125	249.75	
31301C/S	24X14X224	100	156	25795	50025	288.5	167.125	249.75	UUT C

Notes:

1. Base models listed are for standard fan option. Actual unit model number may include a suffix "Q" designating low sound fan option (e.g., 3728C/QS or 3728C-KM/QS).
2. Actual unit model number may include a suffix "-2", "-3", or "-4" designating number of cells per unit (e.g., 3728C-3/S or 3728C-KM-3/S for a three cell unit). Each cell of multi-cell units is a structurally independent cooling tower. All tabulated values are provided per cell.
3. Actual unit model number may include a suffix "X" designating non-CTI certified (e.g., 3728C/SX or 3728C-KM/SX).
4. Nominal Box Size nomenclature: nominal width in feet X nominal length in feet X total fill height in inches
5. Weights are base unit weights. Actual weights may include accessory weight adds.
6. Operating weights at overflow water level. UUT test weight at operating water level. UUT B tested at shipping weight.
7. Cooling tower material of construction options (i.e., structural frame, enclosure, and basins) are listed in Table 3.

Table 3: Certified Materials of Construction (MOC)

Structural Frame and Basin MOC Option[1,2,3]	MOC of Structural Elements	Certification Basis
Galvanized Steel	All Galvanized Steel	UUT A
Galvanized Steel with Stainless Steel Cold Water Basin	Galvanized Steel and Stainless Steel	Interpolated
Galvanized Steel with TriArmor® Cold Water Basin	Galvanized Steel	
Galvanized Steel with Stainless Steel Hot & Cold Water	Galvanized Steel and Stainless Steel	
BALTIBOND® Corrosion Protection System with	Galvanized Steel	
BALTIBOND® Corrosion Protection System with Stainless	Galvanized Steel and Stainless Steel	
BALTIBOND® Corrosion Protection System with Stainless	Galvanized Steel and Stainless Steel	
EVERTOUGH™ Construction	Galvanized Steel and Stainless Steel	
JE PREMIER SERIES® Construction	All Stainless Steel	UUT C
Enclosure and Air Inlet Louver MOC Option	**MOC of Casing/Louvers**	**Certification Basis**
FRP Casing Panels and Louvers	FRP/FRP	UUT A
Fire Retardant FRP Casing Panels and Louvers	FRP/FRP	Interpolated
FRP Casing Panels and Combined Air Inlet Shields	FRP/PVC	
Fire Retardant FRP Casing Panels and Combined Air Inlet	FRP/PVC	
Steel Casing Panels and FRP Louvers	Steel/FRP	
Steel Casing Panels and Combined Air Inlet Shields	Steel/PVC	UUT C
Steel Casing Panels and Louvers	Steel/Steel	UUT C

Notes:

1. BALTIBOND® and TriArmor® are coating systems. Base material is Galvanized Steel.
2. EVERTOUGH™ Construction includes FRP hot water basins.
3. Structural frames and basins are manufactured by Baltimore Aircoil Company.

Table 4: Certified Water Inlet/Outlet Configurations

Water Inlet and Outlet Connection Option[1,2]	Inlet Location	Outlet Location	Internal Piping	Certification Basis
Top Inlet - Bottom Outlet - Pump Suction	Top	Bottom	No	UUT C
Top Inlet - End Outlet - Pump Suction	Top	End	No	Interpolated
Top Inlet - Bottom Outlet - Remote Sump	Top	Bottom	No	
End Inlet EASY CONNECT® - Bottom Outlet - Pump Suction	End	Bottom	Yes	
End Inlet EASY CONNECT® - Bottom Outlet - Remote Sump	End	Bottom	Yes	
Bottom Inlet EASY CONNECT® - Bottom Outlet - Pump Suction	Bottom	Bottom	Yes	
Bottom Inlet EASY CONNECT® - Bottom Outlet - Remote Sump	Bottom	Bottom	Yes	
End Inlet EASY CONNECT® - End Outlet - Pump Suction	End	End	Yes	UUT A

Notes:

1. Water inlet and outlet connection material of construction matches the MOC of the structural frame or basin to which it is attached.
2. Water inlet and outlet connections are manufactured by Baltimore Aircoil Company.

Table 5: Certified Equalizer/Bypass Configurations

Equalizer and Bypass Connection Option[1,2]	Connection Location	Certification Basis
End Equalizer	End	UUT C
End Bypass	End	Interpolated
Bottom Equalizer	Bottom	
Bottom Bypass	Bottom	UUT A

Notes:

1. Equalizer and bypass material of construction matches the MOC of the cold water basin.
2. Equalizer and bypass connections are manufactured by Baltimore Aircoil Company.

Table 6: Certified Fan Motors

Component	Manufacturer	Material of Construction	Drive Type	Horsepower	Voltage[1]	Approximate Weight (lbs)	Certification Basis
Motor	Nidec	Cast Iron	Belt	3	200, 230, 380, 415, 230/460, 460, or 575	60	Extrapolated
Motor	Nidec	Cast Iron	Belt	5		70	UUT $G_{a,b}$ OSP-0001-10
Motor	Nidec	Cast Iron	Belt	7.5		100	Interpolated
Motor	Nidec	Cast Iron	Belt	10		110	
Motor	Nidec	Cast Iron	Belt	15		180	
Motor	Nidec	Cast Iron	Belt	20		200	UUT $F_{a,b}$ OSP-0001-10
Motor	Nidec	Cast Iron	Belt	25		340	Interpolated
Motor	Nidec	Cast Iron	Belt	30		390	
Motor	Nidec	Cast Iron	Belt	40		530	
Motor	Nidec	Cast Iron	Belt	50		590	
Motor	Nidec	Cast Iron	Belt	60		750	UUT B; UUT $H1_{a,b}$ OSP-0001-10
Motor	Nidec	Cast Iron	Belt	75		800	Extrapolated
Motor	Nidec	Cast Iron	Gear	7.5		100	Extrapolated
Motor	Nidec	Cast Iron	Gear	10		110	UUT A
Motor	Nidec	Cast Iron	Gear	15		180	Interpolated
Motor	Nidec	Cast Iron	Gear	20		200	
Motor	Nidec	Cast Iron	Gear	25		340	
Motor	Nidec	Cast Iron	Gear	30		390	
Motor	Nidec	Cast Iron	Gear	40		530	
Motor	Nidec	Cast Iron	Gear	50		590	
Motor	Nidec	Cast Iron	Gear	60		750	
Motor	Nidec	Cast Iron	Gear	75		800	
Motor	Nidec	Cast Iron	Gear	100		1200	UUT C
Motor	WEG	Cast Iron	Belt	3		60	Extrapolated
Motor	WEG	Cast Iron	Belt	5		70	UUT $G_{a,b}$ OSP-0001-10
Motor	WEG	Cast Iron	Belt	7.5		100	Interpolated
Motor	WEG	Cast Iron	Belt	10		110	
Motor	WEG	Cast Iron	Belt	15		180	
Motor	WEG	Cast Iron	Belt	20		200	
Motor	WEG	Cast Iron	Belt	25		340	
Motor	WEG	Cast Iron	Belt	30		390	
Motor	WEG	Cast Iron	Belt	35		530	UUT $F_{a,b}$ OSP-0001-10
Motor	WEG	Cast Iron	Belt	40		530	Interpolated
Motor	WEG	Cast Iron	Belt	50		590	
Motor	WEG	Cast Iron	Belt	60		750	UUT $H2_{a,b}$ OSP-0001-10
Motor	WEG	Cast Iron	Belt	75		800	Extrapolated
Motor	WEG	Cast Iron	Gear	7.5		100	Extrapolated
Motor	WEG	Cast Iron	Gear	10		110	UUT A
Motor	WEG	Cast Iron	Gear	15		180	

Component	Manufacturer	Material of Construction	Drive Type	Horsepower	Voltage[1]	Approximate Weight (lbs)	Certification Basis
Motor	WEG	Cast Iron	Gear	20		200	Interpolated
Motor	WEG	Cast Iron	Gear	25		340	
Motor	WEG	Cast Iron	Gear	30		390	
Motor	WEG	Cast Iron	Gear	40		530	
Motor	WEG	Cast Iron	Gear	50		590	
Motor	WEG	Cast Iron	Gear	60		750	
Motor	WEG	Cast Iron	Gear	75		800	
Motor	WEG	Cast Iron	Gear	100		1200	UUT C

Notes:

1. UUT C tested with 460 V motors. All other UUT's tested with 230/460 dual voltage motors.

Table 7: Certified Gears

Component	Manufacturer	Material of Construction	Model	Approximate Weight (lbs)	Certification Basis
Gear	Amarillo	Cast Iron	A-65	100	UUT A
Gear	Amarillo	Cast Iron	A-85	215	Interpolated
Gear	Amarillo	Cast Iron	A-110	350	
Gear	Amarillo	Cast Iron	A-135	530	
Gear	Amarillo	Cast Iron	A-155	705	
Gear	Amarillo	Cast Iron	A-175	855	UUT C

Table 8: Certified Fans

Component	Manufacturer	Material of Construction	Diameter (in)	No. of Blades	Approximate Weight (lbs)	Certification Basis
Standard Fan	Cofimco	Aluminum	90	4	123	UUT A
Standard Fan	Cofimco	Aluminum	90	5	146	Interpolated
Standard Fan	Cofimco	Aluminum	108	4	198	
Standard Fan	Cofimco	Aluminum	108	5	126	
Standard Fan	Cofimco	Aluminum	108	5	238	
Standard Fan	Cofimco	Aluminum	108	6	278	
Standard Fan	Cofimco	Aluminum	120	4	205	
Standard Fan	Cofimco	Aluminum	120	5	132	
Standard Fan	Cofimco	Aluminum	120	5	247	
Standard Fan	Cofimco	Aluminum	120	6	287	UUT B
Standard Fan	Cofimco	Aluminum	132	5	254	Interpolated
Standard Fan	Cofimco	Aluminum	132	5	333	
Standard Fan	Cofimco	Aluminum	132	6	390	
Standard Fan	Cofimco	Aluminum	156	5	419	
Standard Fan	Cofimco	Aluminum	156	6	642	
Standard Fan	Cofimco	Aluminum	156	7	730	UUT C
Low Sound Fan	Cofimco	Aluminum	90	7	172	UUT A
Low Sound Fan	Cofimco	Aluminum	90	8	311	Interpolated
Low Sound Fan	Cofimco	Aluminum	108	6	375	
Low Sound Fan	Cofimco	Aluminum	120	6	419	
Low Sound Fan	Cofimco	Aluminum	132	5	333	
Low Sound Fan	Cofimco	Aluminum	132	7	589	
Low Sound Fan	Cofimco	Aluminum	156	7	646	UUT C

Table 9: Certified Options and Accessories

Option or Accessory	Certification Basis
Internal Walkway	UUT C
Internal Platform and Ladder	UUT C
Fan Deck Handrails	UUT C
Aluminum Ladder(s) to Fan Deck	UUT C
Ladder Safety Cages	UUT C
Ladder Safety Gates	UUT C
Mechanical Makeup	UUT C
Stainless Steel Trash Screen	UUT C
1'- 9" Fan Cylinder Extension	UUT C
10 1/2" Fan Cylinder Extension	UUT A
Stainless Steel Outlet Strainer	UUT A
Stainless Steel Fan Guard	UUT A
Full Air Intake Screens	UUT A
Hot Water Basin Weir Dams	UUT A
Motor Shaft Grounding Ring	UUT A
Basin Heaters and Standard Heater Controls	UUT A
Penn F63 Float Switches	UUT A
Vibration Cutout Switches	UUT A
Electric Water Level Control (EWLC) with Solenoid Valve	UUT A
External Gear Oil Fill Line	UUT A
External Gear Oil Level Sight Glass	UUT A
No Minimum Speed Gear Option	UUT A

TEST UNIT DATA

Test Unit Identification		
Unit Under Test (UUT)	A	
Unit Configuration		
Product Line	Series 3000 Open Cooling Tower	
Model(s)	3240C/S and 3240C/QS	
Nominal Box Size	18X8.5X80	
No. of Sections	1	
Unit Length (in)	101.25	
Unit Width (in)	216.5	
Height to Top of Fan Deck (in)	103.75	
Overall Height (in)	122.125	
Shipping Weight (lbs)	8,370	
Operating Weight (lbs)	15,960	
Test Weight (lbs)	14,881	
Structure MOC	Galvanized steel	
Casing and Louver MOC	FRP	
Component Configuration		
Drive Type	Gear	
Motor Horsepower	10	
Motor Manufacturer(s)	Nidec and WEG	
Gear Model	A-65	
Fan Type(s)	Standard and Low Sound	
Fan Diameter (in)	90	
No. of Fan Blades	4 (Standard); 7 (Low Sound)	
Mounting Configuration		
Support Type	Rigid and Vibration Isolated	
Support Configuration	Plan A – 2 Beam	
Attachment Hardware	(8) ¾” diameter bolts, SAE J429 Grade 5, 150 ft-lbs	
Vibration Isolator Model(s)	(4) SLFADA600, each with (2) SLF-110	
Vibration Isolator Manufacturer	Mason Industries, Inc.	
Highest Seismic Test Parameters		
Building Code(s)	2013 CBC	
Test Criteria	ICC-ES AC156 (February 2012)	
	Rigid	**Vibration Isolated**
S_{DS} (g)	2.19	2.00
z/h	1.0	1.0
I_p	1.5	1.5
$A_{FLX\text{-}H}$ (g)	3.50	3.20
$A_{RIG\text{-}H}$ (g)	2.62	2.40
$A_{FLX\text{-}V}$ (g)	1.45	1.33
$A_{RIG\text{-}V}$ (g)	0.58	0.53
Lowest Resonance Frequency		
	Rigid	**Vibration Isolated**
Front-to-Back (Hz)	6.3	1.4

Side-to-Side (Hz)	7.8	1.7
Vertical (Hz)	32.0	3.3

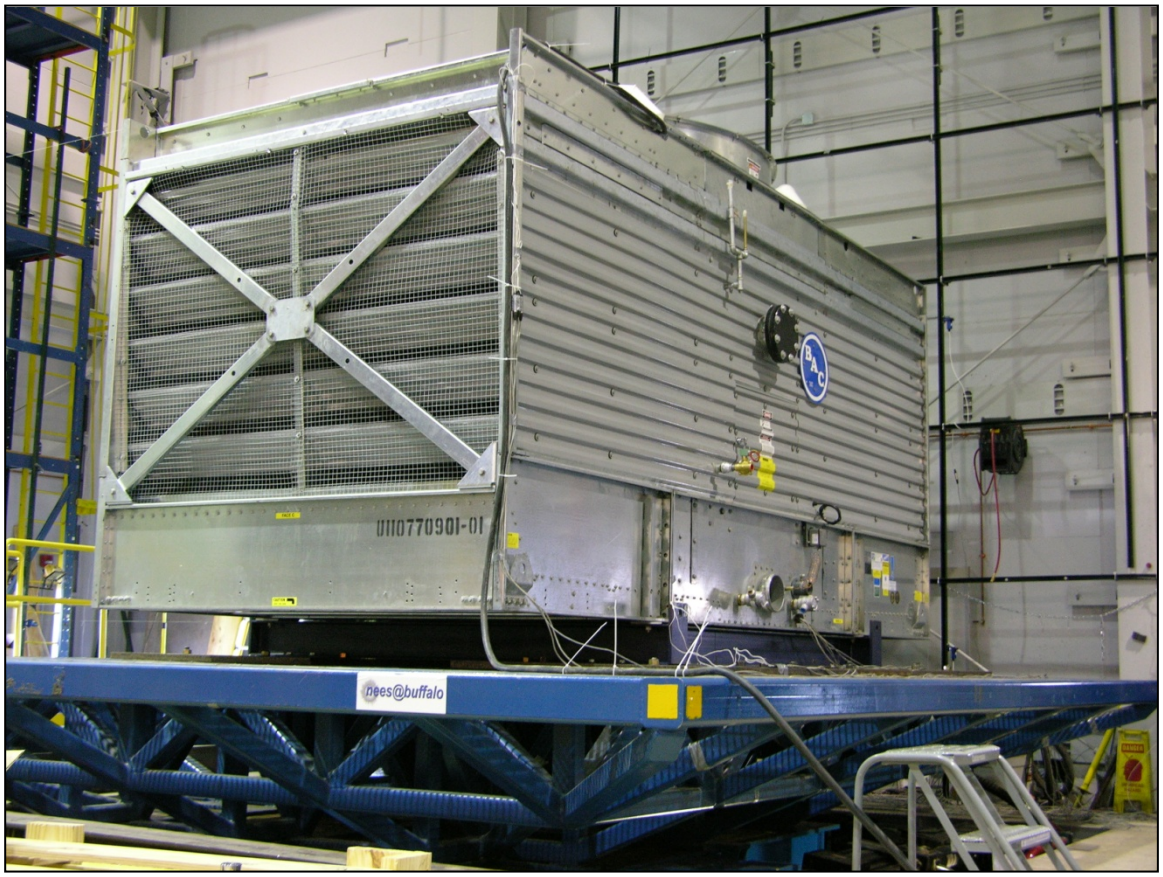
Test Notes

The UUT operating contents were simulated as follows:

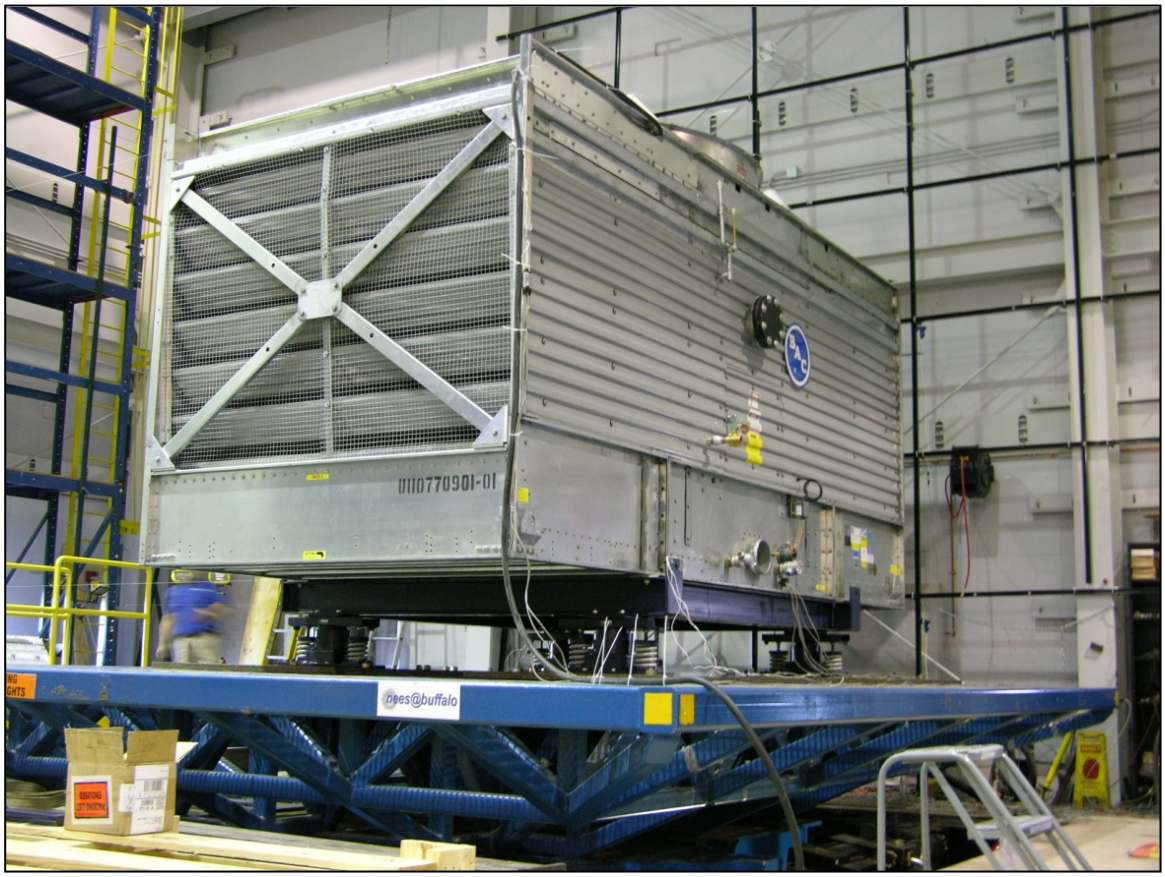
1. Water in the hot water and cold water basins simulated with sand bags.
2. Water in internal piping simulated by sealing the piping and filling with water.
3. Water in the fill simulated by adding extra fill sheets.

The UUT maintained structural and functional integrity in accordance with the requirements of ICC-ES AC156.

UUT A Test Setup (Rigid)



UUT A Test Setup (Vibration Isolated)



Test Unit Identification	
Unit Under Test (UUT)	B
Unit Configuration	
Product Line	Series 3000 Open Cooling Tower
Model(s)	3672C
Nominal Box Size	21.5X12X112
No. of Sections	1
Unit Length (in)	141.75
Unit Width (in)	258.5
Height to Top of Fan Deck (in)	135.75
Overall Height (in)	156.625
Shipping Weight (lbs)	13,684
Operating Weight (lbs)	27,320
Test Weight (lbs)	13,684
Structure MOC	Galvanized steel
Casing and Louver MOC	FRP
Component Configuration	
Drive Type	Belt
Motor Horsepower	60
Motor Manufacturer(s)	Nidec
Fan Type(s)	Standard
Fan Diameter (in)	120
No. of Fan Blades	6
Mounting Configuration	
Support Type	Rigid
Support Configuration	Plan A – 2 Beam
Attachment Hardware	(8) ¾” diameter bolts, SAE J429 Grade 5, 250 ft-lbs
Highest Seismic Test Parameters	
Building Code(s)	2013 CBC
Test Criteria	ICC-ES AC156 (February 2012)
S_{DS} (g)	2.19
z/h	1.0
I_p	1.5
$A_{FLX\text{-}H}$ (g)	3.50
$A_{RIG\text{-}H}$ (g)	2.63
$A_{FLX\text{-}V}$ (g)	2.33
$A_{RIG\text{-}V}$ (g)	1.75
Lowest Resonance Frequency	
Front-to-Back (Hz)	5.8
Side-to-Side (Hz)	7.7
Vertical (Hz)	9.1

Test Notes
The UUT operating contents were not simulated.
The UUT maintained structural and functional integrity in accordance with the requirements of ICC-ES AC156.

UUT B Test Setup

Test Unit Identification		
Unit Under Test (UUT)	C	
Unit Configuration		
Product Line	Series 3000 Open Cooling Tower	
Model(s)	31301C/S and 31301C/QS	
Nominal Box Size	24X14X224	
No. of Sections	2	
Unit Length (in)	167.125	
Unit Width (in)	288.5	
Height to Top of Fan Deck (in)	249.75	
Overall Height (in)	293.25	
Shipping Weight (lbs)	29,840	
Operating Weight (lbs)	54,070	
Test Weight (lbs)	45,731	
Structure MOC	Stainless steel	
Casing and Louver MOC	Stainless steel casing; Stainless steel and PVC louvers	
Component Configuration		
Drive Type	Gear	
Motor Horsepower	100	
Motor Manufacturer(s)	Nidec and WEG	
Gear Model	A-175	
Fan Type(s)	Standard and Low Sound	
Fan Diameter (in)	156	
No. of Fan Blades	7 (Standard and Low Sound)	
Mounting Configuration		
Support Type	Rigid and Vibration Isolated	
Support Configuration	Plan A – 4 Beam	
Attachment Hardware	(16) 7/8” diameter bolts, SAE J429 Grade 5, 200 ft-lbs	
Vibration Isolator Model(s)	(4) SLFADA600, each with (2) SLF-110	
Vibration Isolator Manufacturer	Mason Industries, Inc.	
Highest Seismic Test Parameters		
Building Code(s)	2013 CBC	
Test Criteria	ICC-ES AC156 (February 2012)	
	Rigid	**Vibration Isolated**
S_{DS} (g)	1.94	1.94
z/h	1.0	1.0
I_p	1.5	1.5
$A_{FLX\text{-}H}$ (g)	3.10	3.10
$A_{RIG\text{-}H}$ (g)	2.33	2.33
$A_{FLX\text{-}V}$ (g)	1.29	1.29
$A_{RIG\text{-}V}$ (g)	0.52	0.52
Lowest Resonance Frequency		
	Rigid	**Vibration Isolated**
Front-to-Back (Hz)	4.0	0.8
Side-to-Side (Hz)	6.7	1.4

Vertical (Hz)	9.1	2.8

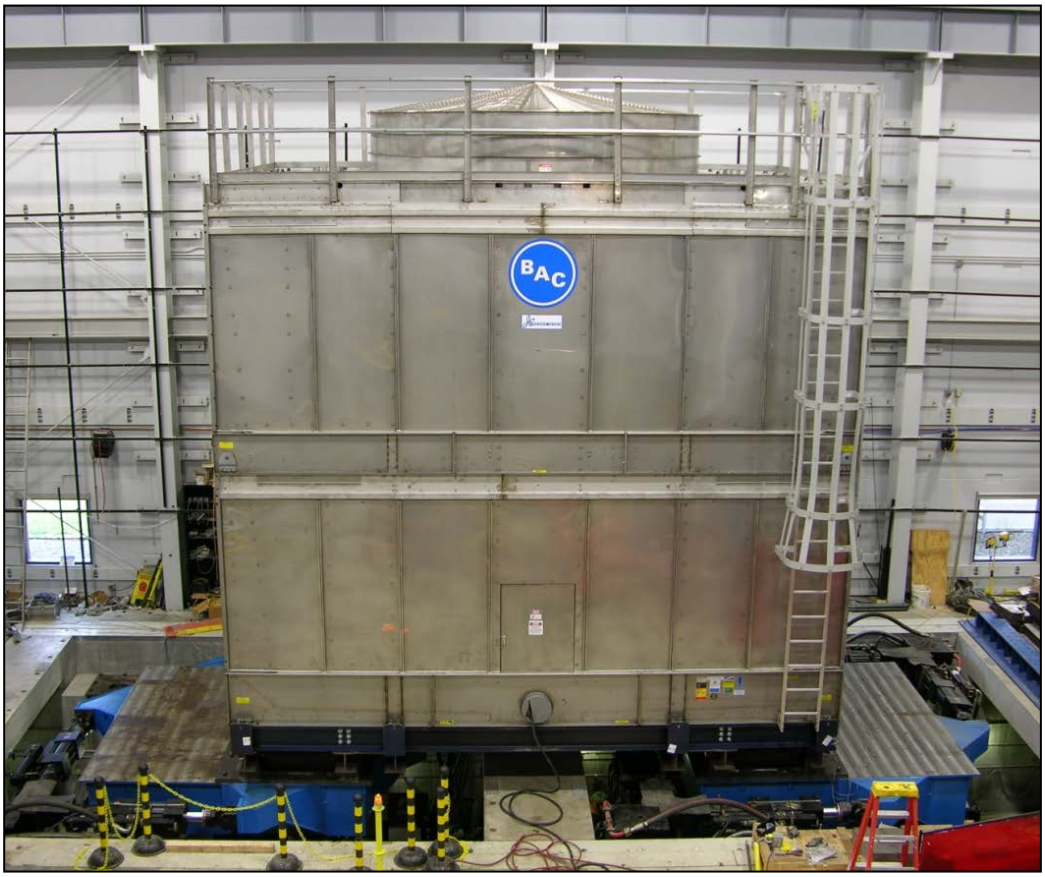
Test Notes

The UUT operating contents were simulated as follows:

1. Water in the hot water and cold water basins simulated with sand bags.
2. Water in the fill simulated by adding extra fill sheets.

The UUT maintained structural and functional integrity in accordance with the requirements of ICC-ES AC156.

UUT C Test Setup (Rigid)



UUT C Test Setup (Vibration Isolated)