



OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION

APPLICATION FOR OSHPD SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP – 0182 – 10

OSHDP Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Vertiv Corporation

Manufacturer's Technical Representative: Kiel Stephens

Mailing Address: 1050 Dearborn Drive, Columbus, OH 43085

Telephone: (614) 841-8168

Email: Kiel.Stephens@Vertiv.com

Product Information

Product Name: Liebert MC Microchannel Condenser

Product Type: Air Conditioning / Air Handling Units - Data Room Air Conditioners – MC Condenser

Product Model Number: MCS025, MCS028, MCS056, MCM035, MCM040, MCM070, MCM080, MCM160, MCL055, MCL110, MCL165, MCL220

(List all unique product identification numbers and/or part numbers)

General Description: Air-cooled microchannel condenser, 25-220kW. 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 base mount

Applicant Information

Applicant Company Name: Vertiv Corporation

Contact Person: Kiel Stephens

Mailing Address: 1050 Dearborn Drive, Columbus, OH 43085

Telephone: (614) 841-8168

Email: Kiel.Stephens@Vertiv.com

I hereby agree to reimburse the Office of Statewide Health Planning and Development review fees in accordance with the California Administrative Code, 2016.

Signature of
Applicant:

Date: 05/07/2019

Title: Principal Engineer

Company Name: Vertiv Corporation

"Access to Safe, Quality Healthcare Environments that Meet California's

STATE OF CALIFORNIA – HEALTH AND HUMAN SERVICES AGENCY
OSH-FD-759 (REV 12/16/15)

OSHDP

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**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION**

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

Company Name: Buehler Engineering, Inc.

Name: Scott R. Hooker, S.E. California License Number: S3937

Mailing Address: 600 Q Street Suite 200, Sacramento, CA 95811

Telephone: (916) 443-0303 Email: shooker@buehlerengineering.com

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): _____

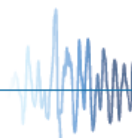
Testing Laboratory

Company Name: Clark Dynamic Test Laboratory, Inc.

Contact Name: John R. Antenucci

Mailing Address: 1801 Route 51, Jefferson Hills, PA 15025

Telephone: (412) 387-1010 Email: jrantenucci@clarckdynamic.com





**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
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Seismic Parameters

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

Design Basis of Equipment or Components (F_p/W_p) = 1.50

S_{DS} (Design spectral response acceleration at short period, g) = 2.00

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

R_p (Equipment or component response modification factor) = 6.0

Ω_0 (System overstrength factor) = 2

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1

Equipment or Component Natural Frequencies (Hz) = See attachment Table 3

Overall dimensions and weight (or range thereof) = See attachment Table 3

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) = OSP-0182-10

Ω_0 (System overstrength factor) = _____

C_d (Deflection amplification factor) = BY: Timothy J Piland

I_p (Importance factor) = 1.5

Height to Center of Gravity above base = DATE: 09/13/2019

Equipment or Component Natural Frequencies (Hz) = _____

Overall dimensions and weight (or range thereof) = _____

Tank(s) designed in accordance with ASME BPVC, 2015: ☐ Yes ☒ No

List of Attachments Supporting Special Seismic Certification

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

☒ Other(s) (Please Specify): Merger Letter/Document

OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2022

Signature: Timothy J. Piland Date: September 13, 2019

Print Name: Timothy J. Piland Title: SSE

Special Seismic Certification Valid Up to: S_{DS} (g) = 2.00 z/h = 1

Condition of Approval (if applicable): _____

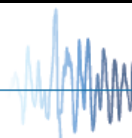


Table 1. Certified Unit List

Model Number	Rated Kilowatts	Tested/ Interpolated	Length	Width	Height *	Operating Weight **
			(in)	(in)	(in)	(lbs)
MCS025	25	UUT-1, 4, 5, 6	53.6	42.8	38.4	180
MCS028	28	Interpolated	53.6	42.8	38.4	180
MCS056	56	Interpolated	100.9	42.8	38.4	329
MCM035	35	UUT-2, 7	55.4	46.3	38.4	205
MCM040	40	Interpolated	55.4	46.3	38.4	240
MCM070	70	Interpolated	104.5	46.3	38.4	379
MCM080	80	Interpolated	104.5	46.3	38.4	450
MCM160	160	Interpolated	202.7	46.3	38.4	870
MCL055	55	Interpolated	56.0	55.5	43.6	380
MCL110	110	Interpolated	112.1	55.5	43.6	730
MCL165	165	Interpolated	168.3	55.5	43.6	1073
MCL220	220	Interpolated	224.4	55.5	43.6	1420

*Height is given for units with standard 18" legs, add 18" for optional 36" legs, add 30" for 48" legs, and add 42" for 60" legs.

** Weight of unit only. See table 2 for certified options.

Table 2. Certified Product Line Sub-Component List

Fan/Motor							
Type	Voltage	Nominal Watts	Manufacturer	P/N	Material	Model Usage	Interpolated / Included with test
EC Fan	208/230	530	EBM	S3G630-AQ54-19	Plastic blade, Aluminum motor housing	MCS	UUT1
	460	530	EBM	S3G630-AQ48-09	Plastic blade, Aluminum motor housing	MCS	Interpolated
	208/230	930	EBM	S3G710-A087-19	Plastic blade, Aluminum motor housing	MCM	Interpolated
	460	930	EBM	S3G710-A081-09	Plastic blade, Aluminum motor housing	MCM	UUT7
	208/230	1100	EBM	S3G800-AT22-16	Aluminum blade, Aluminum motor housing	MCL	Interpolated
	460	1100	EBM	S3G800-AT21-06	Aluminum blade, Aluminum motor housing	MCL	UUT8
	208/230	500	Ziehl-Abegg	FN063-ZIK.DG.V7P2	Plastic blade, Aluminum motor housing	MCS	UUT5
	460						
	208/230	750	Ziehl-Abegg	FN071-ZIK.DG.V7P3	Plastic blade, Aluminum motor housing	MCM	UUT3
	460						
	208/230	1100	Ziehl-Abegg	FN080-ZIK.GL.V7P3	Aluminum blade, Aluminum motor housing	MCL	UUT8
	460						
AC Fan	208/230	530	EBM	S6D630-A011-13	Plastic blade, Aluminum motor housing	MCS	UUT6
	460						
	208/230	930	EBM	S6D710-AR05-06	Plastic blade, Aluminum motor housing	MCM	UUT2
	460						
	208/230	1100	EBM	S6D800-AI01-01	Aluminum blade, Aluminum motor housing	MCL	UUT8
	460						
	208/230	500	Ziehl-Abegg	FB063-6DK.4I.V4L	Plastic blade, Aluminum motor housing	MCS	UUT4
	460						
	208/230	750	Ziehl-Abegg	FE071-6DK.6F.V3	Plastic blade, Aluminum motor housing	MCM	UUT3
	460						
	208/230	1100	Ziehl-Abegg	VR080-6DK.6N.V5K	Aluminum blade, Aluminum motor housing	MCL	UUT8
	460						

Note: Fans are used singly or in multiples

Table 2. Certified Product Line Sub-Component List (Cont'd)

Coil					
<i>Type</i>	<i>Manufacturer</i>	<i>Material</i>	<i>P/N</i>	<i>Model Usage</i>	<i>Interpolated / Included with test</i>
Micro Channel Heat Exchanger	Danfoss Sanhua	Aluminum	CDH-2121-4040-XE08	MCS	UUT 1, 4, 5, 6
Micro Channel Heat Exchanger	Danfoss Sanhua	Aluminum	CDH-4223-4343-XE10	MCM	UUT 2, 3, 7
Micro Channel Heat Exchanger	Danfoss Sanhua	Aluminum	CDH-4323-5353-XE11-2	MCL	UUT8

Note: Coils are used singly or in multiples

Control Box - NEMA 3R				
<i>Type</i>	<i>Material</i>	<i>Manufacturer</i>	<i>P/N</i>	<i>Interpolated / Included with test</i>
NEMA 3R	Aluminum	Vertiv Corporation	300307*	UUT 1, 2, 3, 4, 5, 6, 7, 8

* With suffixes

Controller			
<i>Type</i>	<i>Manufacturer</i>	<i>P/N</i>	<i>Interpolated / Included with test</i>
Standard	Jabil	FSC3P08U1	UUT 1, 3, 5, 7, 8
Premium	Jabil	2351988	UUT 2, 4, 6

Unit Cabinet			
<i>Type</i>	<i>Material</i>	<i>Manufacturer</i>	<i>Interpolated / Included with test</i>
Standard	Galvanized carbon steel structure with aluminum skin	Vertiv Corporation	UUT 1, 2, 3, 4, 5, 6, 7, 8

Table 2. Certified Product Line Sub-Component List (Cont'd)

Refrigerant Receiver Assembly (Lee-Temp)						
Material	Manufacturer	Nominal Volume cuin.	Maximum Operating Mass (lbs)	P/N	Model Usage	Interpolated / Included with test
Carbon Steel shell attached to galvanized carbon steel mounting rail with aluminum cover	Vertiv Corporation	661	70	307069G17, 307069G18	MCS, MCM, MCL	UUT 1, 2
		728	58	307069G1, 307069G7	MCS, MCM, MCL	Interpolated
		1459	102	307069G2, 307069G8	MCL	Interpolated
		2342	160	307069G3, 307069G4	MCL	Interpolated
		2887	190	307069G9, 307069G10	MCL	Interpolated
		1101	112	307069G38, 307069G40	MCM	Interpolated
		1214	94	307069G34, 307069G36	MCM	Interpolated
		1324	144	307069G19, 307069G20	MCL	Interpolated
		2125	192	307069G21, 307069G22	MCL	Interpolated
		2620	235	307069G23, 307069G24	MCL	UUT 8

Note: System may consist of one or two refrigerant receivers

Condenser Legs				
Type	Material	Manufacturer	P/N	Interpolated / Included with test
18" Tall (Standard)	Aluminum	Vertiv Corporation	199552P1	UUT 1, 2, 3, 4, 6, 7
36" Tall	Galvanized carbon steel	Vertiv Corporation	308790P3*	Interpolated
48" Tall	Galvanized carbon steel	Vertiv Corporation	308790P1*	Interpolated
60" Tall	Galvanized carbon steel	Vertiv Corporation	308790P2*	UUT 5, 8

*Included in assemblies containing 4, 6, or 8 legs with cross bracing.

Table 3. UUT Summary

Model Number	Rated Kilowatts	UUT Mark	Specimen Designation	Mounting **	Length	Width	Height	Tested Weight	Excitation Direction	Frequency	Notes***
					(in)	(in)	(in)	(lbs)		(Hz)	
MCS025*	25	UUT-1	MCS025E7Y	Base - Hard Mounted	53.6	42.8	38.4	267	F-B	20.6	LeeTemp piping strap Fan - EC EBM
									S-S	20.7	
									V	>33.3	
MCM035*	35	UUT-2	MCM035F7A	Base - Hard Mounted	55.4	46.3	38.4	297	F-B	21.2	LeeTemp piping strap & seismic leg bracing Fan - AC EBM
									S-S	21.1	
									V	31.6	
MCM080*	80	UUT-3	MCM080E1Y	Base - Hard Mounted	104.5	46.3	38.4	450	F-B	19.8	Seismic leg bracing Fan - (1) AC ZA & (1) EC ZA
									S-S	19.5	
									V	23.3	
MCS025	25	UUT-4	MCS025F7A	Base - Hard Mounted	53.6	42.8	38.4	180	F-B	17.8	Fan - AC ZA
									S-S	27.8	
									V	>33.3	
MCS025	25	UUT-5	MCS025E7A	Base - Hard Mounted on braced 60" legs	53.6	42.8	80.4	363	F-B	26.6	Fan - EC ZA
									S-S	28.4	
									V	>33.3	
MCS025	25	UUT-6	MCS025F7Y	Base - Hard Mounted	53.6	42.8	38.4	179	F-B	18.7	Fan - AC EBM
									S-S	30.4	
									V	>33.3	
MCM035	35	UUT-7	MCM035E7A	Base - Hard Mounted	55.4	46.3	38.4	205	F-B	21.5	Seismic leg bracing Fan - EC EBM
									S-S	26.1	
									V	>33.3	
MCL220	220	UUT-8	MCL220E7A	Base - Hard Mounted on braced 60" legs	224.4	55.5	85.6	1621	F-B	11.4	LeeTemp (4) fan, one of each manuf/style
									S-S	11.7	
									V	11.5	

* Tested at Clark Dynamics Testing Laboratory Report No.:EL:9543. Others tested at Clark Dynamics Testing Laboratory Report No.: JID1991-R

**All use standard 18" legs, unless noted otherwise

*** All units require reinforcing foot plates

Table 4. UUT Sub-Component List

UUT #1: MCS025E7Y (230/3ph/60Hz)				
Sub-Component	Description	Material	Manufacturer	Part Number
Fan #1	EC (208/230VAC)	Plastic blade, aluminum motor housing	EBM	S3G630-AQ54-19
Coil	Micro Channel Heat Exchanger	Aluminum	Danfoss Sanhua	CDH-2121-4040-XE08
Control Box	NEMA 3R Houses control & unit electrical components	Aluminum	Vertiv Corporation	300307
Controller	Premium	-	Jabil	2351988
Refrigerant Receiver	LeeTemp	Carbon Steel shell attached to galvanized steel mounting rail w/ aluminum cover	Vertiv Corporation	301456
Unit Cabinet	Cabinet	Galvanized carbon steel structure with aluminum skin	Vertiv Corporation	303363
Condenser Legs	Standard 18" legs	Aluminum	Vertiv Corporation	199552P1

UUT #2: MCM035F7A (460/3ph/60Hz)				
Sub-Component	Description	Material	Manufacturer	Part Number
Fan #1	AC (460VAC)	Plastic blade, aluminum motor housing	EBM	S6D710-AR05-06
Coil	Micro Channel Heat Exchanger	Aluminum	Danfoss Sanhua	CDH-4223-4343-XE10
Control Box	NEMA 3R Houses control & unit electrical components	Aluminum	Vertiv Corporation	300307
Controller	Standard	-	Jabil	FSC3P08U1
Refrigerant Receiver	LeeTemp	Carbon Steel shell attached to galvanized steel mounting rail w/ aluminum cover	Vertiv Corporation	301456
Unit Cabinet	Cabinet	Galvanized carbon steel structure with aluminum skin	Vertiv Corporation	199651
Condenser Legs	Standard 18" legs	Aluminum	Vertiv Corporation	199552P1

UUT #3: MCM080E1Y (230/3ph/60Hz)				
Sub-Component	Description	Material	Manufacturer	Part Number
Fan #1	AC (208/230VAC)	Plastic blade, aluminum motor housing	Ziehl-Abegg	FE071-6DK.6F.V3
Fan #2	EC (208/230VAC)	Plastic blade, aluminum motor housing	Ziehl-Abegg	FN071-ZIK.DG.V7P3
Coil(s)	Micro Channel Heat Exchanger	Aluminum	Danfoss Sanhua	CDH-4223-4343-XE10
Control Box	NEMA 3R Houses control & unit electrical components	Aluminum	Vertiv Corporation	300307
Controller	Premium	-	Jabil	2351988
Unit Cabinet	Cabinet	Galvanized carbon steel structure with aluminum skin	Vertiv Corporation	199659
Condenser Legs	Standard 18" legs	Aluminum	Vertiv Corporation	199552P1

Table 4. UUT Sub-Component List (Cont'd)

UUT #4: MCS025F7A (460/3ph/60Hz)				
Sub-Component	Description	Material	Manufacturer	Part Number
Fan #1	AC (460VAC)	Plastic blade, aluminum motor housing	Ziehl-Abegg	FB063-6DK.4I.V4L
Coil	Micro Channel Heat Exchanger	Aluminum	Danfoss Sanhua	CDH-2121-4040-XE08
Control Box	NEMA 3R Houses control & unit electrical components	Aluminum	Vertiv Corporation	300307
Controller	Standard		Jabil	FSC3P08U1
Unit Cabinet	Cabinet	Galvanized carbon steel structure with aluminum skin	Vertiv Corporation	303363
Condenser Legs	Standard 18" legs	Aluminum	Vertiv Corporation	199552P1

UUT #5: MCS025E7A (460/3ph/60Hz)				
Sub-Component	Description	Material	Manufacturer	Part Number
Fan #1	EC (460VAC)	Plastic blade, aluminum motor housing	Ziehl-Abegg	FN063.ZIK.DG.V7P2
Coil	Micro Channel Heat Exchanger	Aluminum	Danfoss Sanhua	CDH-2121-4040-XE08
Control Box	NEMA 3R Houses control & unit electrical components	Aluminum	Vertiv Corporation	300307
Controller	Premium		Jabil	2351988
Unit Cabinet	Cabinet	Galvanized carbon steel structure with aluminum skin	Vertiv Corporation	303363
Condenser Legs	60" legs	G90 Galvanized steel	Vertiv Corporation	305923P2

UUT #6: MCM025F7Y (230/3ph/60Hz)				
Sub-Component	Description	Material	Manufacturer	Part Number
Fan #1	AC (208/230VAC)	Plastic blade, aluminum motor housing	EBM	S6D630-A011-13
Coil	Micro Channel Heat Exchanger	Aluminum	Danfoss Sanhua	CDH-2121-4040-XE08
Control Box	NEMA 3R Houses control & unit electrical components	Aluminum	Vertiv Corporation	300307
Controller	Standard	-	Jabil	FSC3P08U1
Unit Cabinet	Cabinet	Galvanized carbon steel structure with aluminum skin	Vertiv Corporation	303363
Condenser Legs	Standard 18" legs	Aluminum	Vertiv Corporation	199552P1

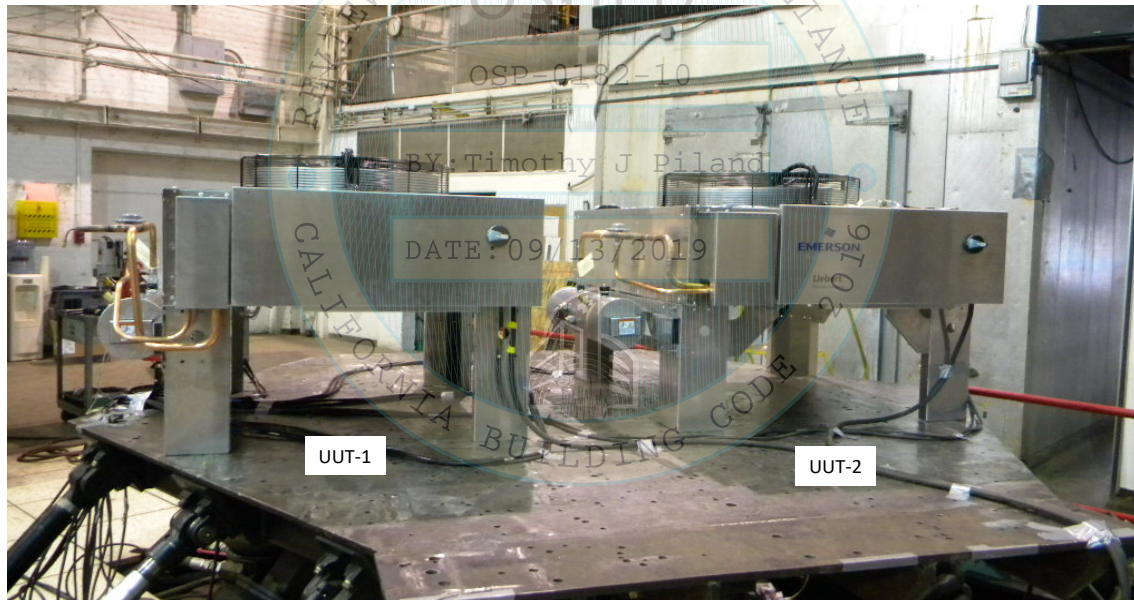
Table 4. UUT Sub-Component List (Cont'd)

UUT #7: MCM035E7A (460/3ph/60Hz)				
Sub-Component	Description	Material	Manufacturer	Part Number
Fan #1	EC (460VAC)	Plastic blade, aluminum motor housing	EBM	S3G710-A087-19
Coil	Micro Channel Heat Exchanger	Aluminum	Danfoss Sanhua	CDH-4223-4343-XE10
Control Box	NEMA 3R Houses control & unit electrical components	Aluminum	Vertiv Corporation	300307
Controller	Standard		Jabil	FSC3P08U1
Unit Cabinet	Cabinet	Galvanized carbon steel structure with aluminum skin	Vertiv Corporation	199651
Condenser Legs	Standard 18" legs	Aluminum	Vertiv Corporation	199552P1

UUT #8: MCL220E7A (460/3ph/60Hz)				
Sub-Component	Description	Material	Manufacturer	Part Number
Fan #1	EC (460VAC)	Aluminum blade and motor housing	Ziehl-Abegg	FN080-ZIK.GL.V7P3
Fan #2	EC (460VAC)	Aluminum blade and motor housing	EBM	S3G800-BT21-01
Fan #3	AC (460VAC)	Aluminum blade and motor housing	Ziehl-Abegg	VR080-6NK.6N.V5K
Fan #4	AC (460VAC)	Aluminum blade and motor housing	EBM	S6D800-AI01-01
Coil	Micro Channel Heat Exchanger	Aluminum	Danfoss Sanhua	CDH-4323-5353-XE11-2
Control Box	NEMA 3R Houses control & unit electrical components	Aluminum	Vertiv Corporation	300307
Controller	Premium		Jabil	2351988
Refrigerant Receiver	LeeTemp	Carbon steel shell attached to galvanized steel mounting rail w/ aluminum cover	Vertiv Corporation	307069
Unit Cabinet	Cabinet	Galvanized carbon steel structure with aluminum skin	Vertiv Corporation	303519
Condenser Legs	60" legs	G90 Galvanized carbon steel	Vertiv Corporation	305923P2

Shake Table Test Setup

Seismic Parameters	Building Code	Test Criteria	S_{Ds} (g)	z/h	Horizontal		Vertical	
					A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
UUT Designation UUT-1 Identification No. MCS025E7Y Attachment Method Base mounted with (8) 3/8" dia. Grade 5 bolts Seismic Modifications LeeTemp piping strap Reinforcing Foot Plates	CBC 2016	ICC-ES AC156	2.50	1.0	4.00g	3.00g	1.68g	0.68g
UUT Designation UUT-2 Identification No. MCM035F7A Attachment Method Base mounted with (8) 3/8" dia. Grade 5 bolts Seismic Modifications LeeTemp piping strap & seismic leg bracing Reinforcing Foot Plates								



Notes: The UUTs were full of contents during the test.
After the test, the UUTs were functional and the structural integrity of the component attachment and force-resisting systems were maintained.

Shake Table Test Setup

UUT Designation	UUT-3	Seismic Parameters						
Identification No.	MCM080E1Y	Building Code	Test Criteria	S_{DS} (g)	z/h	Horizontal		Vertical
Attachment Method	Base mounted with (16) 3/8" dia. Grade 5 bolts					A_{FLX-H}	A_{RIG-H}	A_{FLX-V}
Seismic Modifications	Seismic leg bracing Reinforcing Foot Plates							A_{RIG-V}
		CBC 2016	ICC-ES AC156	2.00	1.0	3.20g	2.40g	1.33g
								0.54g

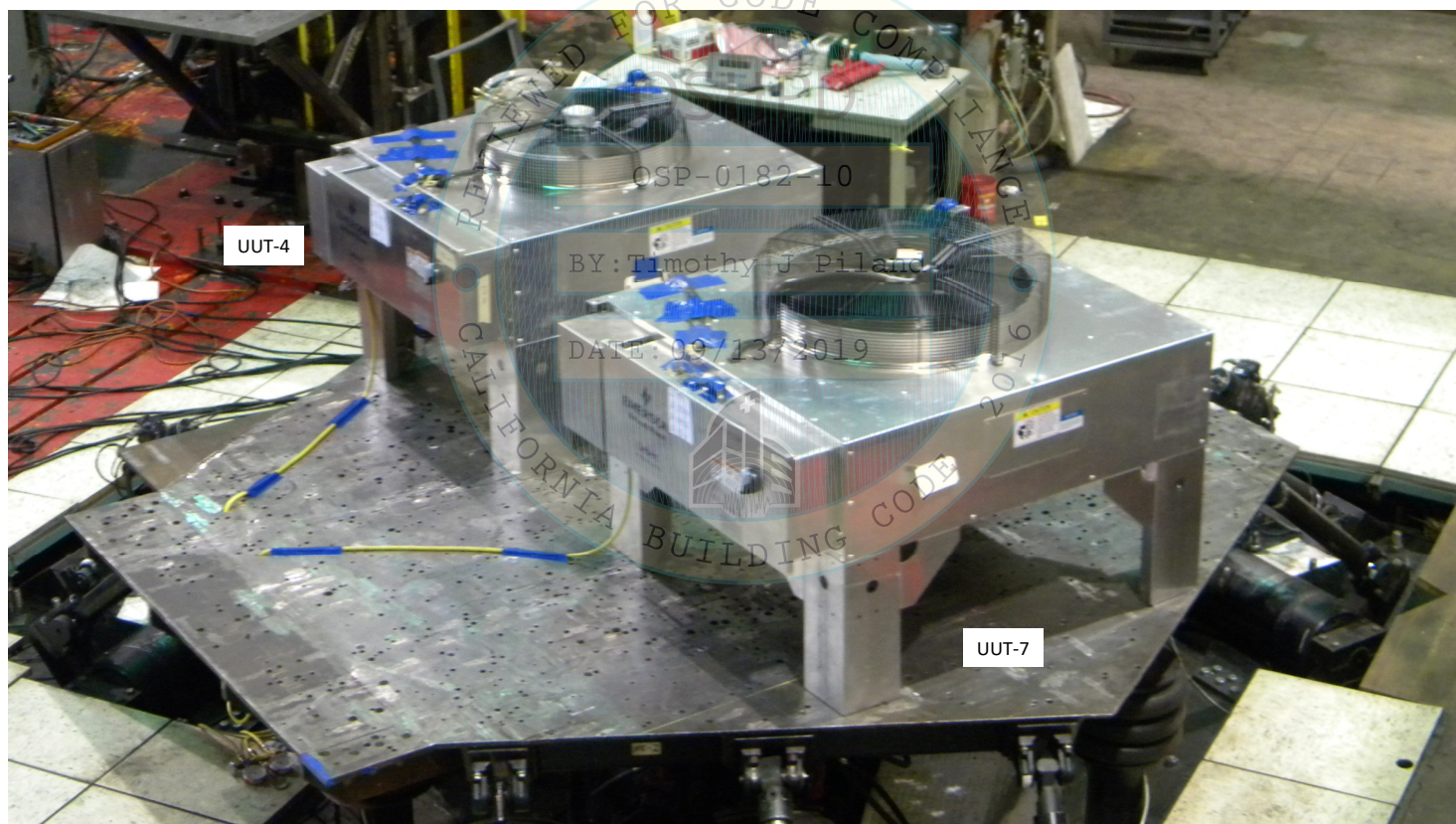


Notes: The UUT was full of contents during the test.
After the test, the UUT was functional and the structural integrity of the component attachment and force-resisting systems were maintained.

Shake Table Test Setup

Seismic Parameters	Building Code	Test Criteria	S_{DS} (g)	z/h	Horizontal		Vertical	
					A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
Seismic Modifications	CBC 2016	ICC-ES AC156-12	2.00	1.0	3.20g	2.40g	1.33g	0.53g

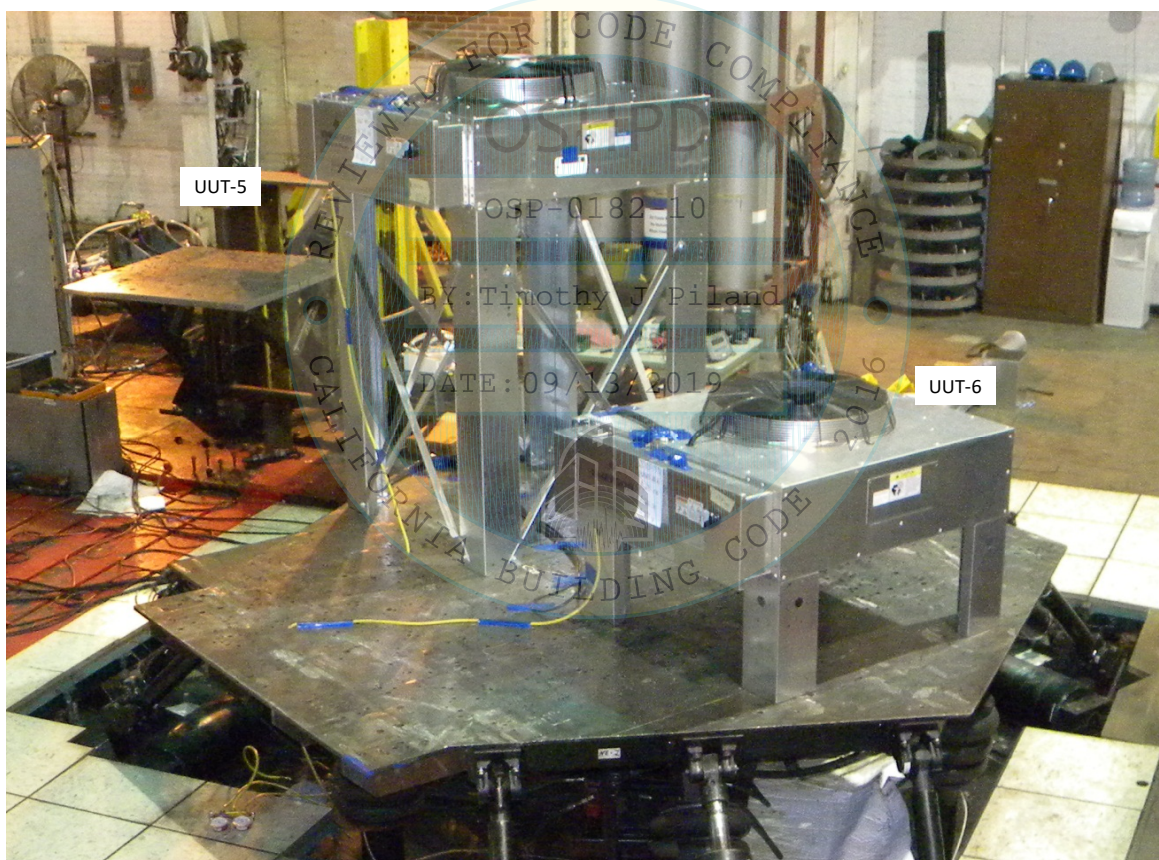
UUT Designation	UUT-4	UUT Designation	UUT-7
Identification No.	MCS025F7AD	Identification No.	MCM035E1AD
Attachment Method	Base mounted with (8) 3/8" dia. Grade 5 bolts	Attachment Method	Base mounted with (8) 3/8" dia. Grade 5 bolts
Seismic Modifications	Reinforcing Foot Plates	Seismic Modifications	Seismic leg bracing Reinforcing Foot Plates



Notes: The UUTs were full of contents during the test.
After the test, the UUTs were functional and the structural integrity of the component attachment and force-resisting systems were maintained.

Shake Table Test Setup

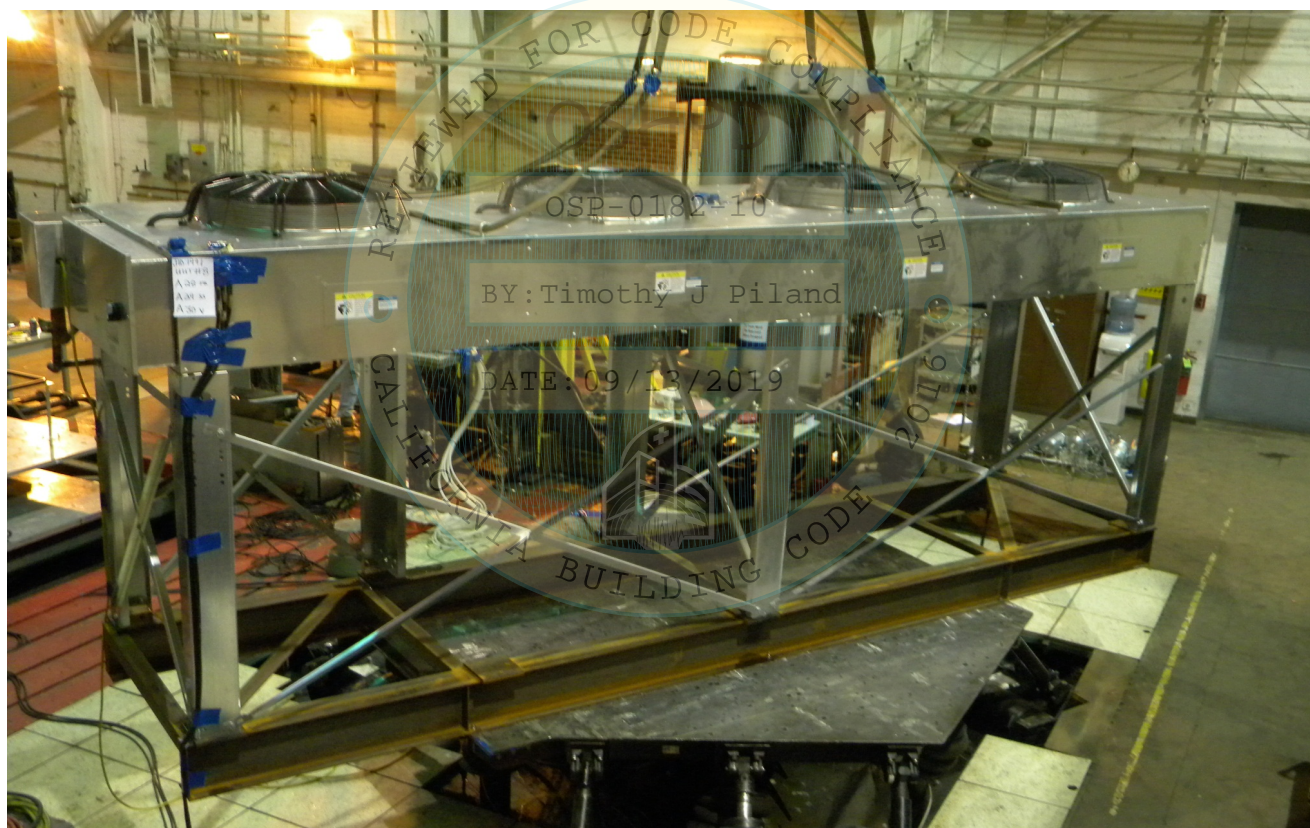
UUT Designation				Seismic Parameters											
Identification No.		MCS025E7AD		Identification No.		MCS025F7YD		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
Attachment Method		Base mounted with (8) 3/8" dia. Grade 5 bolts		Attachment Method		Base mounted with (8) 3/8" dia. Grade 5 bolts						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
Seismic Modifications		Reinforcing Foot Plates		Seismic Modifications		Reinforcing Foot Plates		CBC 2016	ICC-ES AC156-12	2.00	1.0	3.20g	2.40g	1.33g	0.53g



Notes: The UUTs were full of contents during the test.
After the test, the UUTs were functional and the structural integrity of the component attachment and force-resisting systems were maintained.

Shake Table Test Setup

UUT Designation	UUT-8	Seismic Parameters						
Identification No.	MCL220E1AD	Building Code	Test Criteria	S_{DS} (g)	z/h	Horizontal		Vertical
Attachment Method	Base mounted with (16) 3/8" dia. Grade 5 bolts					A_{FLX-H}	A_{RIG-H}	A_{FLX-V}
Seismic Modifications	Reinforcing Foot Plates							A_{RIG-V}
		CBC 2016	ICC-ES AC156-12	2.00	1.0	3.20g	2.40g	1.33g
								0.53g



Notes: The UUT was full of contents during the test.
After the test, the UUT was functional and the structural integrity of the component attachment and force-resisting systems were maintained.