



**DEPARTMENT OF HEALTH CARE ACCESS AND INFORMATION  
FACILITIES DEVELOPMENT DIVISION**

**APPLICATION FOR HCAI SPECIAL SEISMIC  
CERTIFICATION PREAPPROVAL (OSP)**

OFFICE USE ONLY

**APPLICATION #: OSP-0182**

**HCAI 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: Air Conditioning Units

Product Type: Air Conditioning Units - Data Room

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

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

Mounting Description: Rigid, 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: BUEHLER ENGINEERING, INC

Contact Person: Gillian Montgomery

Mailing Address: 600 Q St., Suite 200, Sacramento, CA 95811

Telephone: (916) 443-0303

Email: gmontgomery@buehlerengineering.com

Title: Senior Associate





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

Company Name: BUEHLER ENGINEERING, INC.  
Name: Scott Hooker California License Number: S3937  
Mailing Address: 600 Q St., Suite 200, Sacramento, CA 95811  
Telephone: (916) 443-0303 Email: shooker@buehlerengineering.com

**Certification Method**

GR-63-Core       ICC-ES AC156       IEEE 344       IEEE 693       NEBS 3  
 Other (Please Specify): \_\_\_\_\_

**Testing Laboratory**

Company Name: CLARK TESTING LABORATORY, INC.  
Contact Person: Alex Rossman  
Mailing Address: 1801 Route 51, Jefferson Hills PA 15025  
Telephone: (412) 387-1676 Email: arossman@clarktesting.com





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**Seismic Parameters**

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

SDS (Design spectral response acceleration at short period, g) = 2.00

$a_p$  (Amplification factor) = 2.5

$R_p$  (Response modification factor) = 6

$\Omega_0$  (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

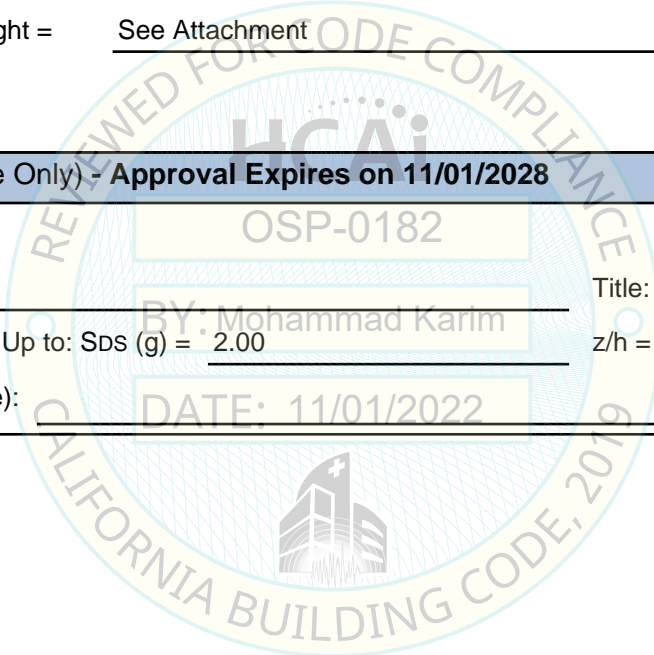
**HCAI Approval (For Office Use Only) - Approval Expires on 11/01/2028**

Date: 11/1/2022

Name: Mohammad Karim Title: Supervisor, Health Facilities

Special Seismic Certification Valid Up to: SDS (g) = 2.00 z/h = 1

Condition of Approval (if applicable): DATE: 11/01/2022



**Table 1. Certified Unit List**

Model Number	Rated Kilowatts	Tested/ Interpolated	Length	Width	Height *	Operating Weight **
			(in)	(in)	(in)	(lbs)
<b>MCS025</b>	<b>25</b>	<b>UUT-1, 4, 5, 6</b>	<b>53.6</b>	<b>42.8</b>	<b>38.4</b>	<b>180</b>
MCS028	28	Interpolated	53.6	42.8	38.4	180
MCS056	56	Interpolated	100.9	42.8	38.4	329
<b>MCM035</b>	<b>35</b>	<b>UUT-2, 7</b>	<b>55.4</b>	<b>46.3</b>	<b>38.4</b>	<b>205</b>
MCM040	40	Interpolated	55.4	46.3	38.4	240
MCM070	70	Interpolated	104.5	46.3	38.4	379
<b>MCM080</b>	<b>80</b>	<b>UUT-3</b>	<b>104.5</b>	<b>46.3</b>	<b>38.4</b>	<b>450</b>
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
<b>MCL220</b>	<b>220</b>	<b>UUT-8</b>	<b>224.4</b>	<b>55.5</b>	<b>43.6</b>	<b>1420</b>

\*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)**

<b>Coil</b>					
<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

<b>Control Box - NEMA 3R</b>				
<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

<b>Controller</b>			
<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

<b>Unit Cabinet</b>			
<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

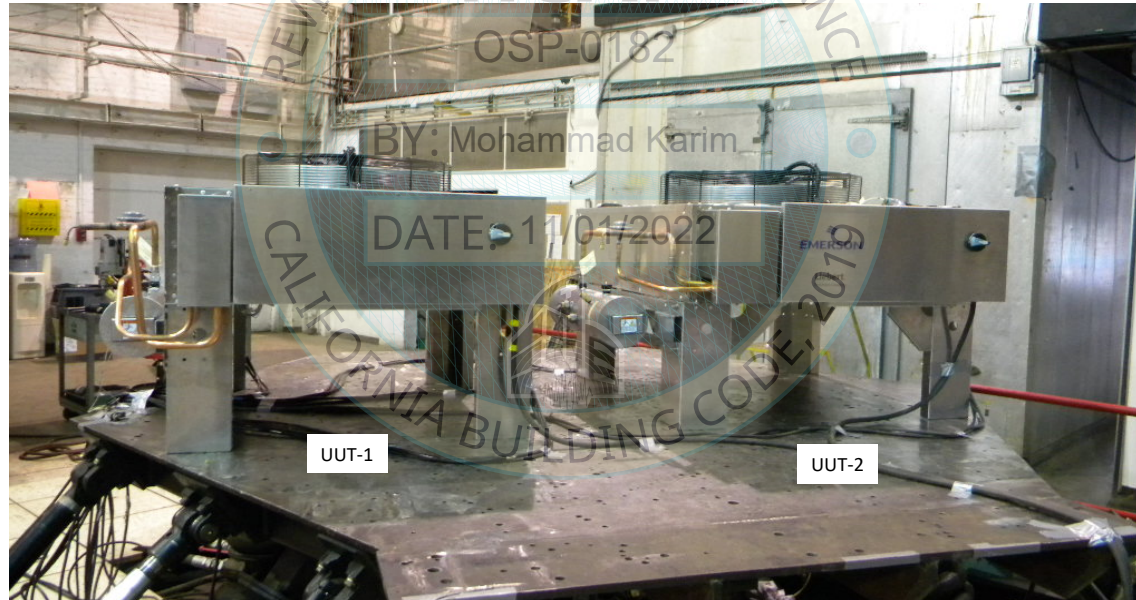
Note: System may consist of one or two refrigerant receivers

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.

**Shake Table Test Setup**

UUT Designation	UUT-1	UUT Designation	UUT-2	Seismic Parameters							
				Building Code	Test Criteria	S <sub>DS</sub> (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 <sub>FLX-H</sub>	A <sub>RIG-H</sub>	A <sub>FLX-V</sub>	A <sub>RIG-V</sub>				
Seismic Modifications	LeeTemp piping strap Reinforcing Foot Plates	Seismic Modifications	LeeTemp piping strap & seismic leg bracing Reinforcing Foot Plates	CBC 2022	ICC-ES AC156	2.50	1.0	4.00g	3.00g	1.68g	0.68g



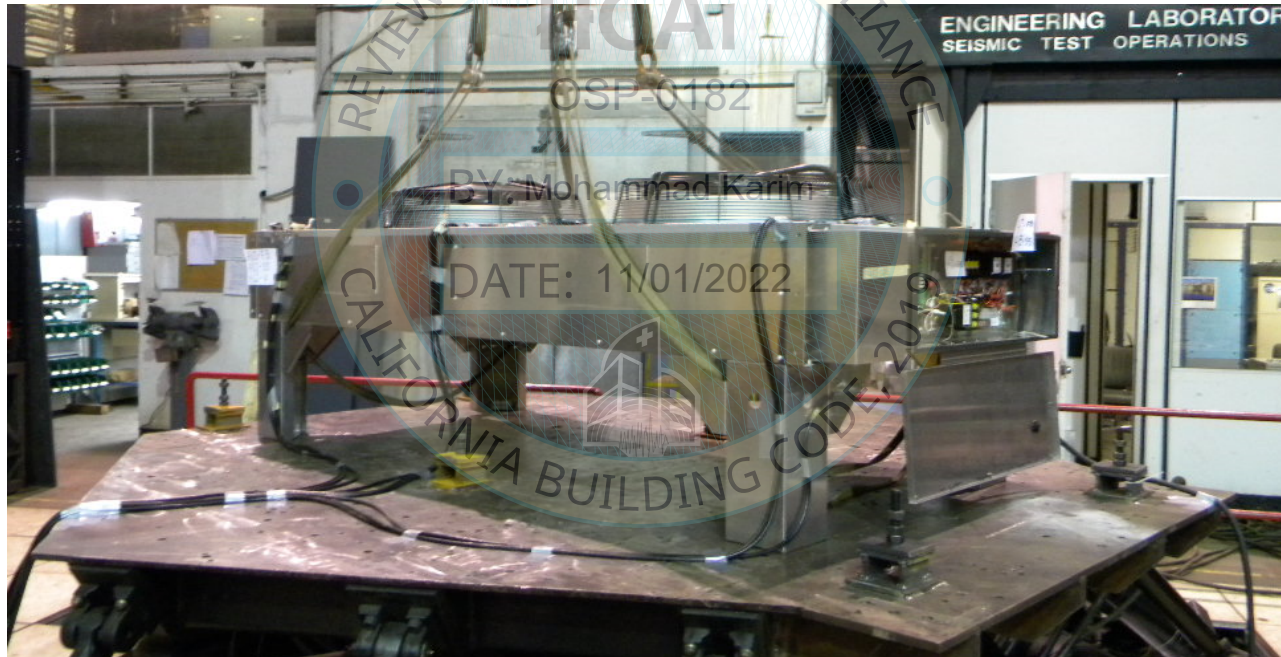
Clark Testing JID 9543

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					$A_{FLX-H}$	$A_{RIG-H}$	$A_{FLX-V}$	$A_{RIG-V}$
Seismic Modifications	Seismic leg bracing Reinforcing Foot Plates	CBC 2022	ICC-ES AC156	2.00	1.0	3.20g	2.40g	1.33g	0.54g

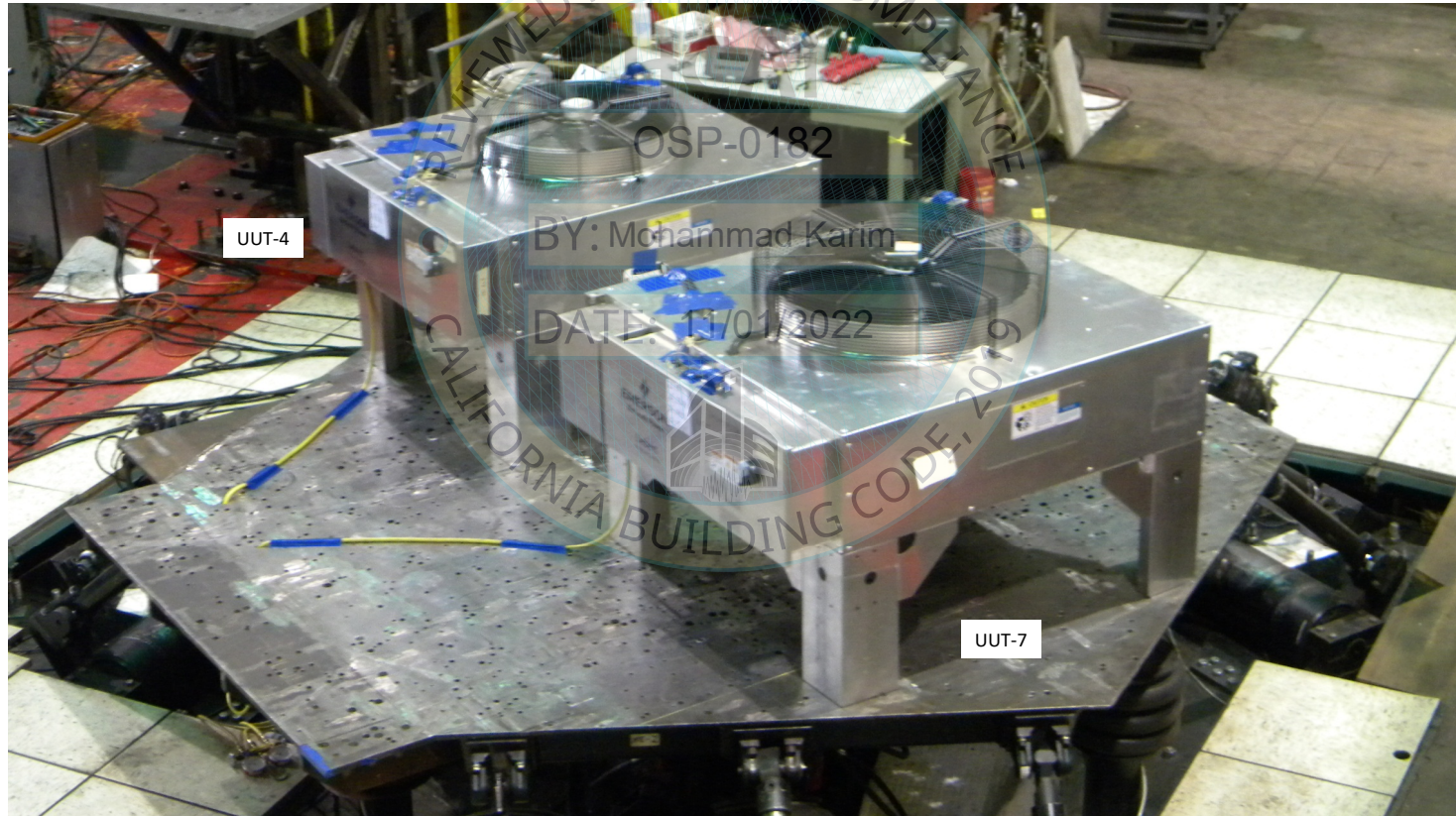


Clark Testing JID 9543

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**

UUT Designation Identification No.	UUT-4 MCS025F7AD	Attachment Method	Base mounted with (8) 3/8" dia. Grade 5 bolts	Seismic Modifications	Reinforcing Foot Plates	UUT Designation Identification No.	UUT-7 MCM035E1AD	Attachment Method	Base mounted with (8) 3/8" dia. Grade 5 bolts	Seismic Modifications	Seismic leg bracing Reinforcing Foot Plates	Seismic Parameters							
												Building Code	Test Criteria	$S_{Ds}$ (g)	z/h	Horizontal		Vertical	
												$A_{FLX-H}$	$A_{RIG-H}$	$A_{FLX-V}$	$A_{RIG-V}$				
												CBC 2022	ICC-ES AC156	2.00	1.0	3.20g	2.40g	1.33g	0.53g



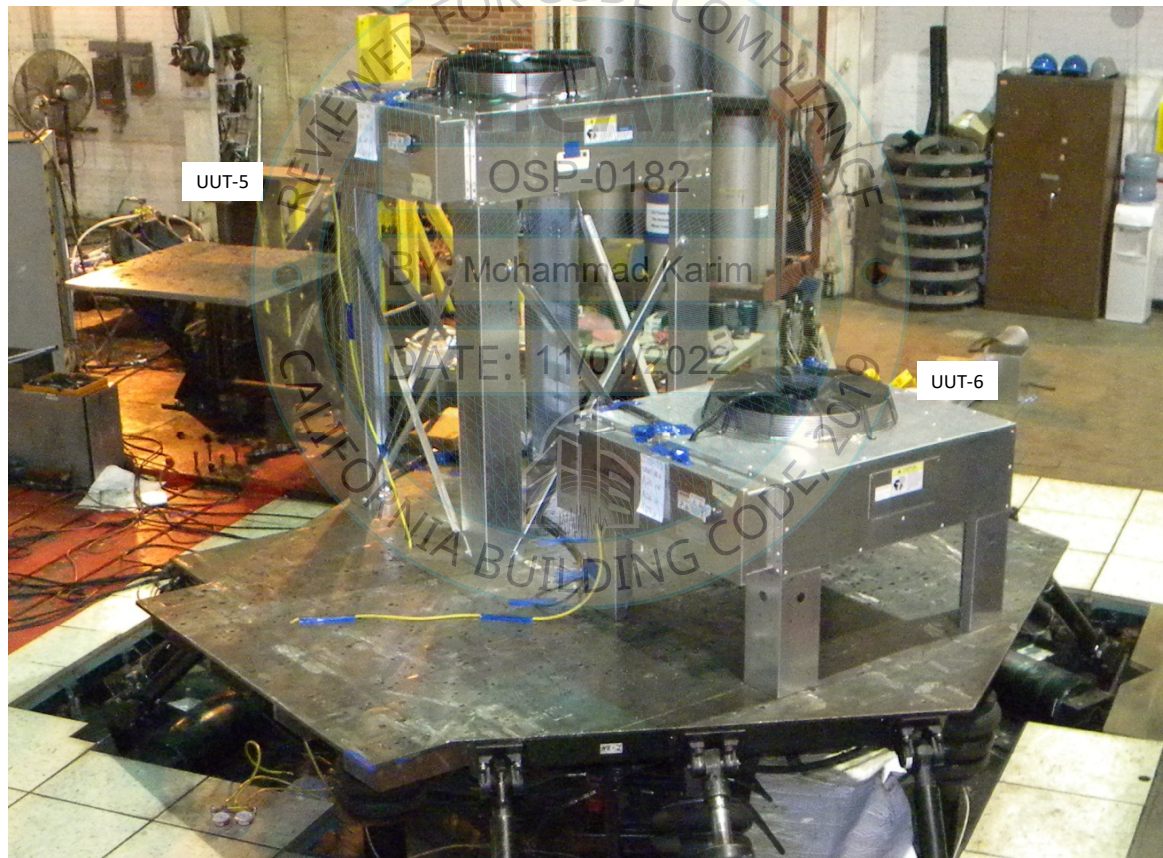
**Clark Testing JID 1991**

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-5	UUT Designation	UUT-6	Seismic Parameters							
				Building Code	Test Criteria	$S_{Ds}$ (g)	z/h	Horizontal		Vertical	
Identification No.	MCS025E7AD	Identification No.	MCS025F7YD	CBC 2022	ICC-ES AC156	2.00	1.0	$A_{FLX-H}$	$A_{RIG-H}$	$A_{FLX-V}$	$A_{RIG-V}$
Attachment Method	Base mounted with (8) 3/8" dia. Grade 5 bolts	Attachment Method	Base mounted with (8) 3/8" dia. Grade 5 bolts					3.20g	2.40g	1.33g	0.53g
Seismic Modifications	Reinforcing Foot Plates	Seismic Modifications	Reinforcing Foot Plates								



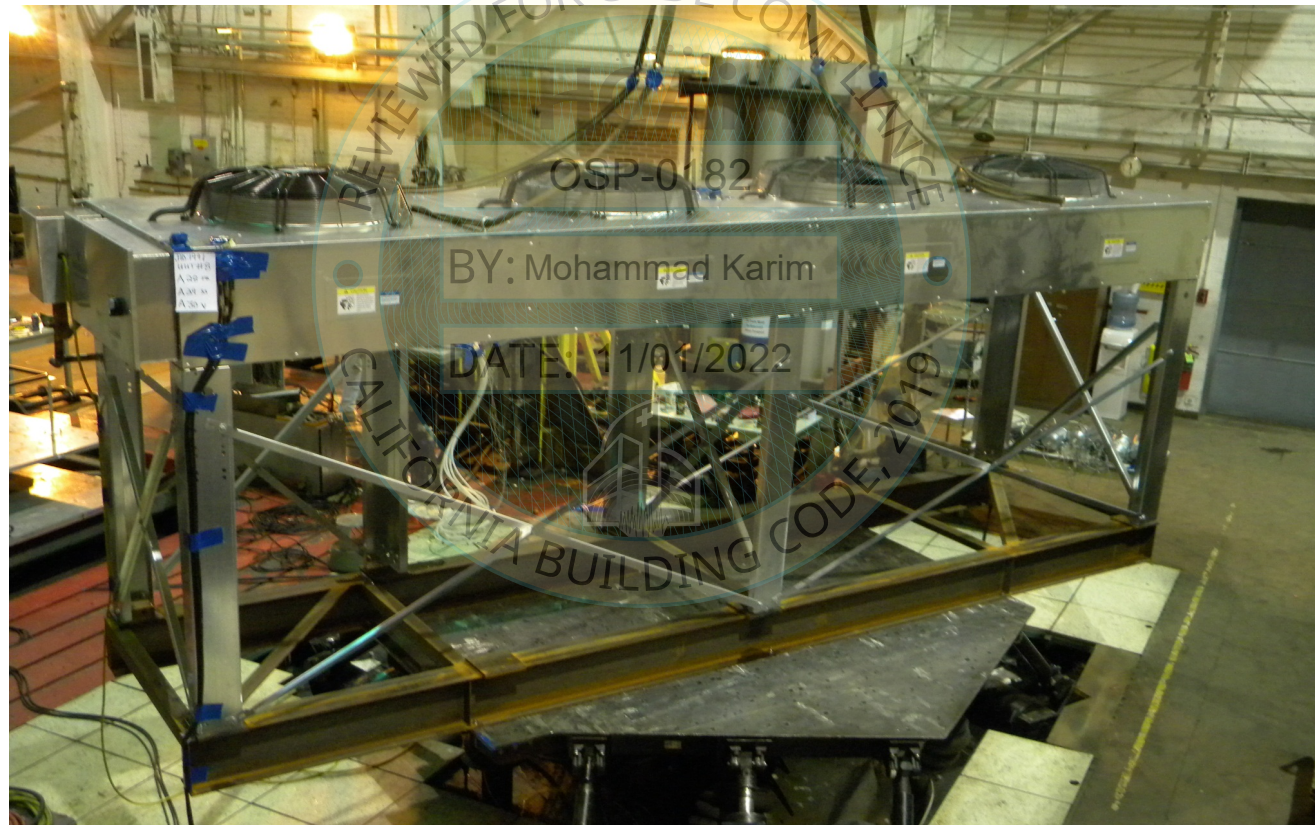
Clark Testing JID 1991

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					$A_{FLX-H}$	$A_{RIG-H}$	$A_{FLX-V}$	$A_{RIG-V}$
Seismic Modifications	Reinforcing Foot Plates	CBC 2022	ICC-ES AC156	2.00	1.0	3.20g	2.40g	1.33g	0.53g



Clark Testing JID 1991

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.

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)	
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.

\*\*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