



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

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

OFFICE USE ONLY

APPLICATION #: OSP-0049

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: CW026 thru CW440 downflow and CW089 thru CW114 upflow units as specified in table 1a with aluminum fan assemblies

General Description: Liebert CW Models as configured with certified sub-components specified in table 2. Seismic bracing and enhancements made to test units shall be incorporated into the product units.

Mounting Description: As specified in Table 1b, As specified in Table 1b

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 Street, 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

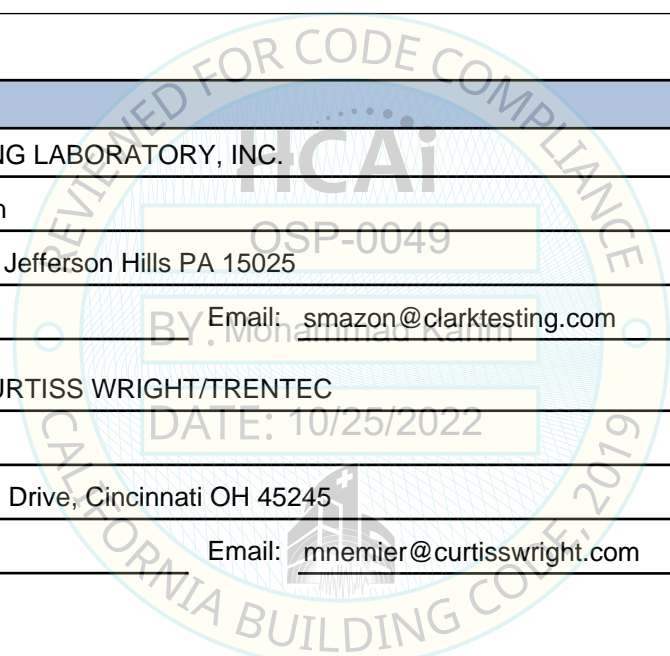
Certification Method

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: Suzanne Mazon
Mailing Address: 1801 Route 51, Jefferson Hills PA 15025
Telephone: (412) 387-1001 Email: smazon@clarktesting.com

Company Name: QUALTECH/CURTISS WRIGHT/TRENTEC
Contact Person: Marie Nemier
Mailing Address: 4600 East Tech Drive, Cincinnati OH 45245
Telephone: (513) 528-7900 Email: mnemier@curtisswright.com





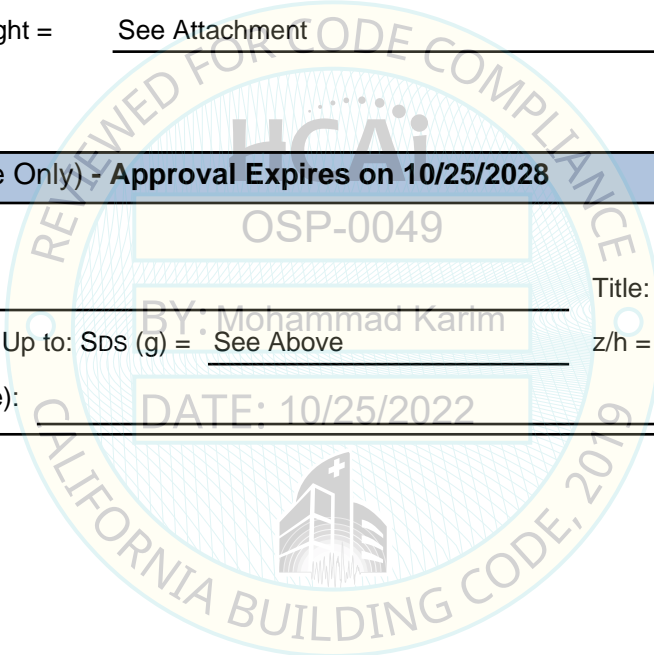
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Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) =	See table 1b
SDS (Design spectral response acceleration at short period, g) =	See table 1b
a_p (Amplification factor) =	See table 1b
R_p (Response modification factor) =	See table 1b
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 10/25/2028

Date:	10/25/2022	OSP-0049	
Name:	Mohammad Karim	BY: Mohammad Karim	Title: Supervisor, Health Facilities
Special Seismic Certification Valid Up to: SDS (g) =	See Above	DATE: 10/25/2022	$z/h = 1$
Condition of Approval (if applicable):			





Special Seismic Certification
 OSHPD Preapproval (OSP-0049-10)
 Liebert CW Product Line

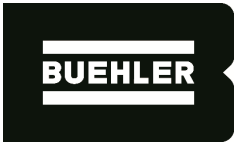


Table 1a. Approved Unit List

Type	Model Number	Nominal Capacity	Tested / Interpolated	Unit Dimensions and Weight				
				Length (in)	Width (in)	Height (in)	Max Plenum Height (in)	Max Operating Weight (lbs)
Rigid Base Mount - without floorstand								
Rigid Base Mount - with Floorstand	CW114UCSA3	114 kW	UUT-3 (2010)	122	36	76	36	1925
	CW026DC*	26 kW	Extrapolated	50	36	72	36	933
	CW038DC*	38 kW	Extrapolated	50	36	72	36	973
	CW041DC1A1	41 kW	UUT-2 (2017)	50	36	72	36	1010
	CW041DC*	41 kW	Extrapolated	50	36	72	36	1033
	CW051DC*	51 kW	Interpolated	74	36	72	31	1430
	CW060DC*	60 kW	Interpolated	74	36	72	31	1460
	CW076DC*	76 kW	Interpolated	99	36	72	31	1725
	CW084DC*	84 kW	Interpolated	99	36	72	31	1825
	CW089DC*	89 kW	Interpolated	122	36	76	31	2275
	CW106DC*	106 kW	Interpolated	122	36	76	31	2135
	CW114DC*	114 kW	Interpolated	122	36	76	31	2340
	CW146DC*	146 kW	Interpolated	122	48	76	18	2880
	CW181DC*	181 kW	Interpolated	122	48	76	18	2880
	CW440DC*	440 kW	Interpolated	180	60	114	31	6408
CW440DC1A1	440 kW	UUT-2 (2016)	180	60	114	31	6408	
Isolated Base Mount - with Floorstand	CW026DCSA3	26 kW	UUT-1 (2010)	50	36	72	none	760
	CW026DC*	26 kW	Interpolated	50	36	72	36	933
	CW038DC*	38 kW	Interpolated	50	36	72	36	973
	CW041DC*	41 kW	Interpolated	50	36	72	36	1033
	CW051DC*	51 kW	Interpolated	74	36	72	36	1430
	CW060DC*	60 kW	Interpolated	74	36	72	36	1460
	CW076DC*	76 kW	Interpolated	99	36	72	36	1725
	CW084DC*	84 kW	Interpolated	99	36	72	36	1825
	CW089DC*	89 kW	Interpolated	122	36	76	36	2275
	CW106DC*	106 kW	Interpolated	122	36	76	36	2135
	CW114DC1A3	114 kW	UUT-2 (2010)	122	36	76	36	2090
	CW114DC*	114 kW	Interpolated	122	36	76	36	2340
	CW146DC*	146 kW	Interpolated	122	48	76	18	2880
	CW181DC*	181 kW	Interpolated	122	48	76	18	2880
	CW181DCHB3	181 kW	UUT-4 (2010)	122	48	76	18	2600
CW181DC1A1	181 kW	UUT-3 (2017)	122	48	76	18	2876	

Table 1b. Approved Seismic Parameters and Mounting

Type	Model Number	Nominal Capacity	Tested / Interpolated	Seismic Parameters						Mounting
				$S_{Ds}(g)$	z/h	$F_p/W_p(g)$	a_p	R_p	Ω_0	
Rigid Base Mount - without floorstand										
Rigid Base Mount - with Floorstand	CW114UCSA3	114 kW	UUT-3 (2010)	2.00	1.00	1.50	2.5	6.0	2.0	Rigid base mount
	CW026DC*	26 kW	Extrapolated	2.00	1.00	1.50	2.5	6.0	2.0	12" to 24" tall floor stand
	CW038DC*	38 kW	Extrapolated	2.00	1.00	1.50	2.5	6.0	2.0	24" tall floor stand
	CW041DC1A1	41 kW	UUT-2 (2017)	2.00	1.00	1.50	2.5	6.0	2.0	12" to 24" tall floor stand
	CW041DC*	41 kW	Extrapolated	2.00	1.00	1.50	2.5	6.0	2.0	12" to 24" tall floor stand
	CW051DC*	51 kW	Interpolated							
	CW060DC*	60 kW	Interpolated							
	CW076DC*	76 kW	Interpolated							
	CW084DC*	84 kW	Interpolated							
	CW089DC*	89 kW	Interpolated	1.70	1.00	1.28	2.5	6.0	2.0	12" to 42" tall floor stand
	CW106DC*	106 kW	Interpolated							
	CW114DC*	114 kW	Interpolated							
	CW146DC*	146 kW	Interpolated							
	CW181DC*	181 kW	Interpolated							
	CW440DC*	440 kW	Interpolated	1.70	1.00	1.28	2.5	6.0	2.0	12" to 43" tall floor stand
CW440DC1A1	440 kW	UUT-2 (2016)	1.70	1.00	1.28	2.5	6.0	2.0	43" tall floor stand	
Isolated Base Mount - with Floorstand	CW026DCSA3	26 kW	UUT-1 (2010)	2.00	1.00	3.60	2.5	2.5	2.0	12" tall floor stand with neoprene pad
	CW026DC*	26 kW	Interpolated							
	CW038DC*	38 kW	Interpolated	2.00	1.00	3.60	2.5	2.5	2.0	12" to 24" tall floor stand with neoprene pad
	CW041DC*	41 kW	Interpolated							
	CW051DC*	51 kW	Interpolated							
	CW060DC*	60 kW	Interpolated							
	CW076DC*	76 kW	Interpolated							
	CW084DC*	84 kW	Interpolated	2.00	1.00	3.60	2.5	2.5	2.0	12" to 36" tall floor stand with neoprene pad
	CW089DC*	89 kW	Interpolated							
	CW106DC*	106 kW	Interpolated							
	CW114DC1A3	114 kW	UUT-2 (2010)	2.00	1.00	3.60	2.5	2.5	2.0	36" tall floor stand with neoprene pad
	CW114DC*	114 kW	Interpolated							
	CW146DC*	146 kW	Interpolated	2.00	1.00	3.60	2.5	2.5	2.0	12" to 48" tall floor stand with neoprene pad
	CW181DC*	181 kW	Interpolated							
	CW181DCHB3	181 kW	UUT-4 (2010)	2.00	1.00	3.60	2.5	2.5	2.0	36" tall floor stand with neoprene pad
CW181DC1A1	181 kW	UUT-3 (2017)	2.00	1.00	3.60	2.5	2.5	2.0	48" tall floor stand with neoprene pad	

* Indicates extension of model number, see Nomenclature for approved options and Table 2 for approved subcomponents



Special Seismic Certification
OSHPD Preapproval (OSP-0049-10)
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Table 2.1 Certified Sub-Component List
Rigid Base Mount - without Floorstand

Approved Seismic Parameters					
S_{DS}	z/h	F_p/W_p	a_p	R_p	Ω_0
2.00g	1.00	1.50g	2.5	6.0	2.0

In accordance with section 5.2.2.1 of ICC-ES AC 156 below is a list of qualified sub-components.

Standard Fan Motors, EC Fan Motors and Condensate Pumps are not listed per exemption CBC 1705A.13.3.1 & PIN 55, units less than 20hp.
 Disconnects are not listed per exemption CBC 1705A.13.3.1 & PIN55, component is electrical controller...up to 10lbs or less than 10 amperes.

Coil - Fin/Tube					
Tube Size	Capacity	Weight (lb/ft)	Manufacturer	Material	Interpolated / Included With Test
1/2"	All	0.5	Vertiv Corporation	aluminum, copper tube	UUT-3 (2010)

Electric Control Box					
Base dimensions (in)	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	
122 x 36	100	Vertiv Corporation	carbon steel, plastic	UUT-3 (2010)	

Reheat					
Nominal Reheat Capacity	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	
30kW	40	Vertiv Corporation	carbon steel	UUT-3(2010)	

Humidifier IR					
Nominal Humidifier Capacity	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	
22.1 lb/hr	50	Vertiv Corporation	carbon steel, aluminum, glass	UUT-3 (2010)	

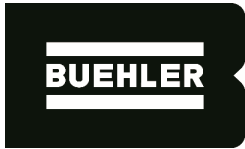
Valve					
Type	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	
3-Way	10	Johnson Controls	carbon steel, plastic	UUT-3 (2010)	

Enclosure					
Thickness	Capacity	Weight (psf)	Manufacturer	Material	Interpolated / Included With Test
20 GA	All	1.5	Vertiv Corporation	carbon steel	UUT-3 (2010)

Plenum					
Base Dims (in)	Height (in)	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test
122 x 36	36	250	Vertiv Corporation	carbon steel	UUT-3 (2010)



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Approved Seismic Parameters		
a_p	R_p	Ω_o
2.5	6.0	2.0

Table 2.2 Certified Sub-Component List

Rigid Base Mount - with Floorstand

In accordance with section 5.2.2.1 of ICC-ES AC 156 below is a list of qualified sub-components.

Standard Fan Motors, EC Fan Motors and Condensate Pumps are not listed per exemption CBC 1705A.13.3.1 & PIN 55, units less than 20hp.

Disconnects are not listed per exemption CBC 1705A.13.3.1 & PIN55, component is electrical controller...up to 10lbs or less than 10 amperes.

Coil - Fin/Tube						Approved Seismic Parameters		
Tube Size	Capacity	Weight (lb/ft)	Manufacturer	Material	Interpolated / Included With Test	S_{DS}	z/h	F_p/W_p
1/2"	All	0.5	Vertiv Corporation	aluminum, copper tube	UUT-2 (2017)	2.00g	1.00	1.50g
Electric Control Box						Approved Seismic Parameters		
Base dimensions (in)	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	S_{DS}	z/h	F_p/W_p	
50 x 36	70	Vertiv Corporation	carbon steel, plastic	UUT-2 (2017)	2.00g	1.00	1.50g	
74 x 36	80	Vertiv Corporation	carbon steel, plastic	Interpolated	1.70g	1.00	1.28g	
99 x 36	90	Vertiv Corporation	carbon steel, plastic	Interpolated	1.70g	1.00	1.28g	
122 x 36	100	Vertiv Corporation	carbon steel, plastic	Interpolated	1.70g	1.00	1.28g	
122 x 48	100	Vertiv Corporation	carbon steel, plastic	Interpolated	1.70g	1.00	1.28g	
180 x 60	200	Vertiv Corporation	carbon steel, plastic	UUT-2 (2016)	1.70g	1.00	1.28g	
Reheat						Approved Seismic Parameters		
Nominal Reheat Capacity	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	S_{DS}	z/h	F_p/W_p	
15kW	25	Vertiv Corporation	carbon steel	UUT-2 (2017)	2.00g	1.00	1.50g	
Humidifier IR						Approved Seismic Parameters		
Nominal Humidifier Capacity	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	S_{DS}	z/h	F_p/W_p	
11 lb/hr	35	Vertiv Corporation	carbon steel, aluminum, glass	UUT-2 (2017)	2.00g	1.00	1.50g	
Valve						Approved Seismic Parameters		
Type	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	S_{DS}	z/h	F_p/W_p	
2-Way	10	Schneider Electric	bronze, brass	UUT-2 (2017)	2.00g	1.00	1.50g	
2-Way	10	Belimo	carbon steel, plastic	UUT-2 (2016)	1.70g	1.00	1.28g	
Enclosure						Approved Seismic Parameters		
Thickness	Capacity	Weight (psf)	Manufacturer	Material	Interpolated / Included With Test	S_{DS}	z/h	F_p/W_p
20 GA	All	1.5	Vertiv Corporation	carbon steel	UUT-2 (2017)	2.00g	1.00	1.50g
Plenum						Approved Seismic Parameters		
Base Dims (in)	Height (in)	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	S_{DS}	z/h	F_p/W_p
50 x 36	20-36	108	Vertiv Corporation	carbon steel	Extrapolated	2.00g	1.00	1.50g
50 x 36	36	108	Vertiv Corporation	carbon steel	UUT-2 (2017)	2.00g	1.00	1.50g
74 x 36	20-36	160	Vertiv Corporation	carbon steel	Interpolated	1.70g	1.00	1.28g
99 x 36	20-36	210	Vertiv Corporation	carbon steel	Interpolated	1.70g	1.00	1.28g
122 x 36	20-36	250	Vertiv Corporation	carbon steel	Interpolated	1.70g	1.00	1.28g
122 x 48	20-36	300	Vertiv Corporation	carbon steel	Interpolated	1.70g	1.00	1.28g
180 x 60	20-31	650	Vertiv Corporation	carbon steel	Interpolated	1.70g	1.00	1.28g
180 x 60	31	650	Vertiv Corporation	carbon steel	UUT-2 (2016)	1.70g	1.00	1.28g
Floor Stand						Approved Seismic Parameters		
Base Dims (in)	Height (in)	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	S_{DS}	z/h	F_p/W_p
50 x 36	12-24	120	Vertiv Corporation	carbon steel	Extrapolated	2.00g	1.00	1.50g
50 x 36	24	120	Vertiv Corporation	carbon steel	UUT-2 (2017)	2.00g	1.00	1.50g
74 x 36	12-36	180	Vertiv Corporation	carbon steel	Interpolated	1.70g	1.00	1.28g
99 x 36	12-36	200	Vertiv Corporation	carbon steel	Interpolated	1.70g	1.00	1.28g
122 x 36	12-36	225	Vertiv Corporation	carbon steel	Interpolated	1.70g	1.00	1.28g
122 x 48	12-42	250	Vertiv Corporation	carbon steel	Interpolated	1.70g	1.00	1.28g
180 x 60	12-43	500	Vertiv Corporation	carbon steel	Interpolated	1.70g	1.00	1.28g
180 x 60	43	500	Vertiv Corporation	carbon steel	UUT-2 (2016)	1.70g	1.00	1.28g

Table 2.3 Certified Sub-Component List

Approved Seismic Parameters					
S_{DS}	z/h	F_p/W_p	a_p	R_p	Ω_0
2.00g	1.00	3.60g	2.5	2.5	2.0

Isolated Base Mount - with Floorstand

In accordance with section 5.2.2.1 of ICC-ES AC 156 below is a list of qualified sub-components.

Standard Fan Motors, EC Fan Motors and Condensate Pumps are not listed per exemption CBC 1705A.13.3.1 & PIN 55, units less than 20hp.

Disconnects are not listed per exemption CBC 1705A.13.3.1 & PIN55, component is electrical controller...up to 10lbs or less than 10 amperes.

Coil - Fin/Tube					
Tube Size	Capacity	Weight (lb/ft)	Manufacturer	Material	Interpolated / Included With Test
1/2"	All	0.5	Vertiv Corporation	aluminum, copper tube	UUT-1 UUT-2 UUT-4 (2010) UUT-3 (2017)

Electric Control Box					
Base dimensions (in)	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	
50 x 36	70	Vertiv Corporation	carbon steel, plastic	UUT-1 (2010)	
74 x 36	80	Vertiv Corporation	carbon steel, plastic	Interpolated	
99 x 36	90	Vertiv Corporation	carbon steel, plastic	Interpolated	
122 x 36	100	Vertiv Corporation	carbon steel, plastic	UUT-2 (2010)	
122 x 48	100	Vertiv Corporation	carbon steel, plastic	UUT-3 (2017) UUT-4 (2010)	

Reheat					
Nominal Reheat Capacity	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	
10kW	25	Vertiv Corporation	carbon steel	UUT-1 (2010)	
20kW	30	Vertiv Corporation	carbon steel	Interpolated	
20kW	30	Vertiv Corporation	carbon steel	Interpolated	
25kW	30	Vertiv Corporation	carbon steel	Interpolated	
30kW	40	Vertiv Corporation	carbon steel	UUT-2 UUT-4 (2010) UUT-3 (2017)	

Humidifier IR					
Nominal Humidifier Capacity	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	
11 lb/hr	35	Vertiv Corporation	carbon steel, aluminum, glass	UUT-1 (2010)	
17.4 lb/hr	45	Vertiv Corporation	carbon steel, aluminum, glass	Interpolated	
22.1 lb/hr	50	Vertiv Corporation	carbon steel, aluminum, glass	UUT-2 UUT-4 (2010) UUT-3 (2017)	

Valve					
Type	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	
2-Way	10	Belimo	carbon steel, plastic	UUT-3 (2017)	
3-Way	10	Belimo	carbon steel, plastic	UUT-4 (2010)	
3-Way	10	Johnson Controls	carbon steel, plastic	UUT-1 UUT-2 (2010)	

Transformer					
Nominal capacity	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test	
4.2 kVA	100	Vertiv Corporation	carbon steel, copper	UUT-4 (2010)	

Enclosure					
Thickness	Capacity	Weight (psf)	Manufacturer	Material	Interpolated / Included With Test
16 GA	All	2.5	Vertiv Corporation	carbon steel	UUT-4 (2010)
20 GA	All	1.5	Vertiv Corporation	carbon steel	UUT-1 UUT-2 (2010) UUT-3 (2017)

Plenum					
Base Dims (in)	Height (in)	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test
50 x 36	20-36	108	Vertiv Corporation	carbon steel	Extrapolated
74 x 36	20-36	160	Vertiv Corporation	carbon steel	Extrapolated
99 x 36	20-36	210	Vertiv Corporation	carbon steel	Extrapolated
122 x 36	36	250	Vertiv Corporation	carbon steel	UUT-2 (2010)
122 x 36	20-36	250	Vertiv Corporation	carbon steel	Interpolated
122 x 48	18	180	Vertiv Corporation	carbon steel	UUT-3 (2017) UUT-4 (2010)

Floor Stand					
Base Dims (in)	Height (in)	Weight (lb)	Manufacturer	Material	Interpolated / Included With Test
50 x 36	12	120	Vertiv Corporation	carbon steel	UUT-1 (2010)
50 x 36	12-24	120	Vertiv Corporation	carbon steel	Interpolated
74 x 36	12-36	180	Vertiv Corporation	carbon steel	Interpolated
99 x 36	12-36	200	Vertiv Corporation	carbon steel	Interpolated
122 x 36	12-36	225	Vertiv Corporation	carbon steel	Interpolated
122 x 36	36	225	Vertiv Corporation	carbon steel	UUT-2 (2010)
122 x 48	12-48	250	Vertiv Corporation	carbon steel	Interpolated
122 x 48	36	250	Vertiv Corporation	carbon steel	UUT-4 (2010)
122 x 48	48	250	Vertiv Corporation	carbon steel	UUT-3 (2017)

UUT-1 (2010) Test Summary

Testing Lab: Curtis Wright Trentec in Cincinnati, Ohio
 Testing Report: Q0031.00, REV. 1
 Testing Unit Num: Q0031-01-01-01

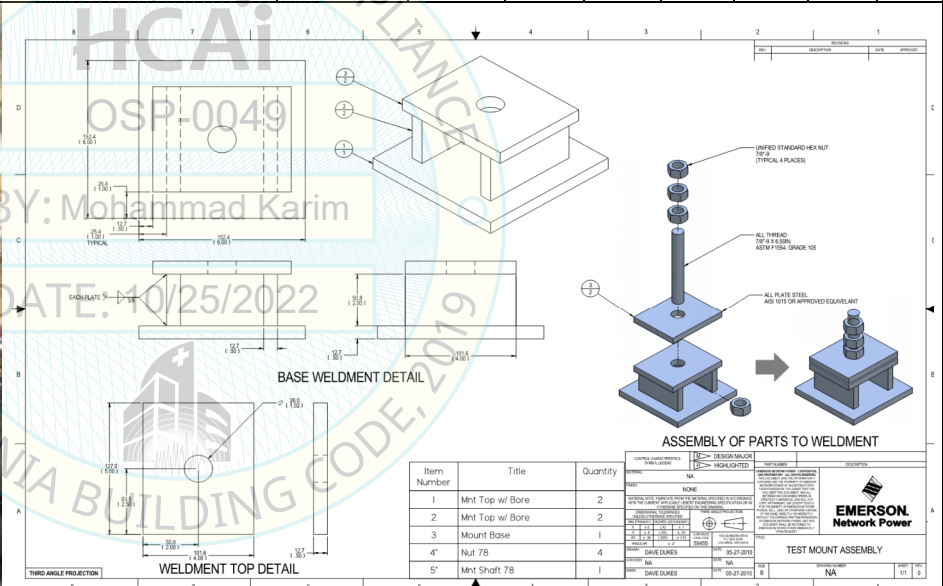
Model Number	Nominal Capacity	Mounting	Excitation Direction	Frequency* (Hz)	Unit Dimensions and Weight					
					Length (in)	Width (in)	Height (in)	Plenum Height (in)	Operating Weight (lbs)	
CW026DCSA3	26 kW	Isolated base mount w/ floorstand	X	Front - Back	6.60	50	36	72	none	760
			Y	Side - Side	11.40					
			Z	Vertical	>33 Hz					

* Frequencies are for units prior to ICC ES AC-156 testing.

Attachment Method	Seismic Parameters							
	Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
Seismic Enhancements	CBC 2022	AC 156	2.00	1.0	A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-V} (g)
Base mount to 12" tall floorstand with 1/4" x 6" long fillet weld each side each corner. Floorstand to steel test mount with 7/8" diameter F1554 gr 55 bolt and 1/8" neoprene pad under four (4) floor stand legs. Steel test mount clamped to table. Seismic bracing kit provided/manufactured by Vertiv Corporation					3.20	2.40	1.34	0.54



Unit on shake table



Notes: The UUTs were full of contents during the test.
 Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-1 (2010) Summary Tested Sub-Component

Sub-Component	Identifier (Part #, Capacity, Size, etc.)	Manufacturer	Material
Coil - Fin/Tube	1/2"	Vertiv Corporation	aluminum, copper tube
Electric Control Box	50 x 36	Vertiv Corporation	plastic, carbon steel
Reheat	10kW	Vertiv Corporation	carbon steel
Humidifier IR	11 lb/hr	Vertiv Corporation	carbon steel, aluminum, glass
Valve	3-Way	Johnson Controls	carbon steel, plastic
Enclosure	20 GA	Vertiv Corporation	carbon steel
Floorstand	50" x 36" - 12" height	Vertiv Corporation	carbon steel
Standard Fan Motor	FH82 - 5 hp	Nidec	carbon steel, copper

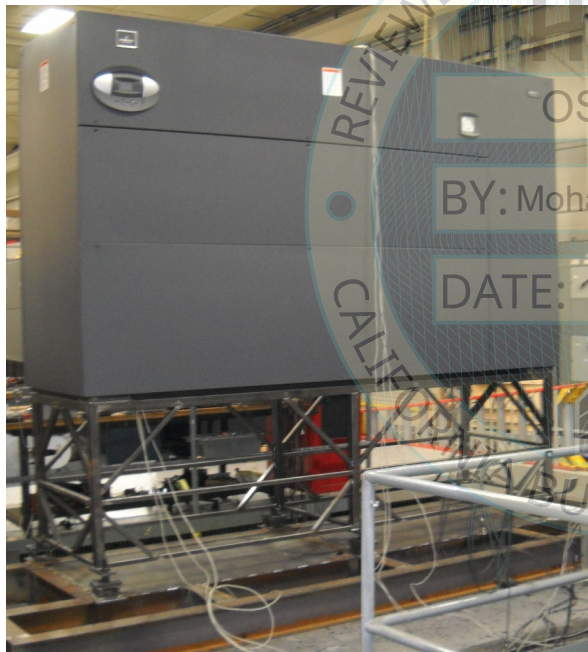
UUT-2 (2010) Test Summary

Testing Lab: Curtis Wright Trentec in Cincinnati, Ohio
 Testing Report: Q0031.00, REV. 1
 Testing Unit Num: Q0031-02-01-01

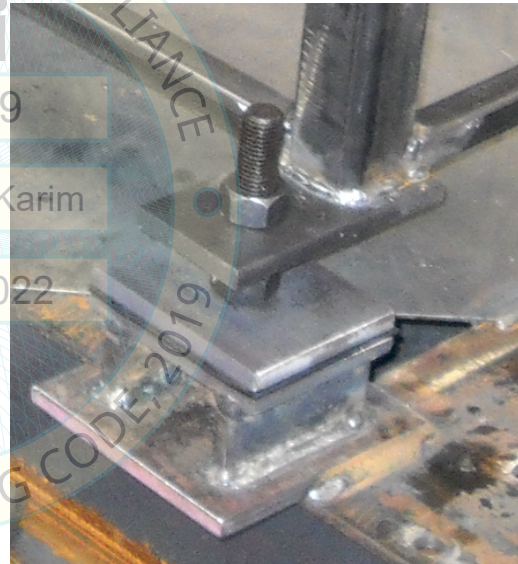
Model Number	Nominal Capacity	Mounting	Excitation Direction	Frequency* (Hz)	Unit Dimensions and Weight					
					Length (in)	Width (in)	Height (in)	Plenum Height (in)	Operating Weight (lbs)	
CW114DC1A3	114 W	Isolated base mount w/ floorstand	X	Front - Back	4.30	122	36	76	36	2,090
			Y	Side - Side	5.90					
			Z	Vertical	12.90					

* Frequencies are for units prior to ICC ES AC-156 testing.

Attachment Method	Seismic Parameters							
Base mount to 36" tall floorstand with 1/4" x 6" long fillet weld each side each corner. Floorstand to steel test mount with 7/8" diameter F1554 gr 55 bolt and 1/8" neoprene pad under six (6) floor stand legs. (6 bolts total). Steel test mount welded to steel fixture extension	Building Code	Test Criteria	S _{Ds} (g)	z/h	Horizontal		Vertical	
	A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-V} (g)				
Seismic Enhancements	CBC 2022	AC 156	2.00	1.0	3.20	2.40	1.34	0.54
Seismic bracing kit provided/manufactured by Vertiv Corporation								



Unit on steel fixture extension and shake table



Detail view of unit mounting

Notes: The UUTs were full of contents during the test.
 Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-2 (2010) Summary Tested Sub-Component

Sub-Component	Identifier (Part #, Capacity, Size, etc.)	Manufacturer	Material
Coil - Fin/Tube	1/2"	Vertiv Corporation	aluminum, copper tube
Electrical Control Box	122" x 36"	Vertiv Corporation	plastic, carbon steel
Reheat	30kW	Vertiv Corporation	carbon steel
Humidifier IR	22.1 lb/hr	Vertiv Corporation	carbon steel, aluminum, glass
Disconnect	SEDA36AN0150+(6)TCAL 18	General Electric	plastic, copper, carbon steel
Valve	3-Way	Johnson Controls	carbon steel, plastic
Enclosure	20 GA	Vertiv Corporation	carbon steel
Plenum	122" x 36" - 36" height	Vertiv Corporation	carbon steel
Floorstand	122" x 36" - 36" height	Vertiv Corporation	carbon steel
EC Fan Motor	R3G560-AH23-64 - 4.2 hp	EBM Papst	carbon steel, copper

UUT-3 (2010) Test Summary

Testing Lab:	Curtis Wright Trentec in Cincinnati, Ohio
Testing Report:	Q0031.00, REV. 1
Testing Unit Num:	Q0031-03-01-01

Model Number	Nominal Capacity	Mounting	Excitation Direction	Frequency* (Hz)	Unit Dimensions and Weight				
					Length (in)	Width (in)	Height (in)	Plenum Height (in)	Operating Weight (lbs)
CW114UCSA3	114 kW	Rigid base mount	X Front - Back	4.20	122	36	76	36	1,925
			Y Side - Side	3.40					
			Z Vertical	10.80					

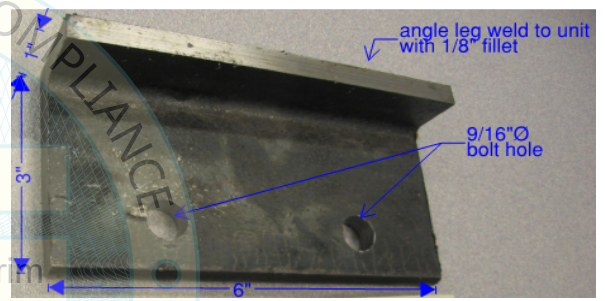
* Frequencies are for units prior to ICC ES AC-156 testing.

Attachment Method	Seismic Parameters							
	Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
					A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-V} (g)
Base mount to steel fixture with six (6) steel angles with 1/8" x 6" long fillet weld to unit and two (2) - 1/2" A325 bolt each angle (12 bolts total) to fixture. Steel fixture clamped to table.	CBC 2022	AC 156	2.00	1.0	3.20	2.40	1.34	0.54

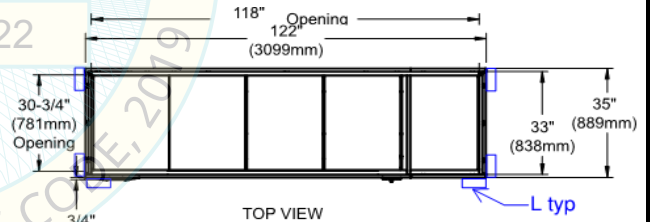
Seismic Enhancements
 Seismic bracing kit provided/manufactured by Vertiv Corporation



Unit on steel fixture extension and shake table



Angle Bracket (1/4" thick)

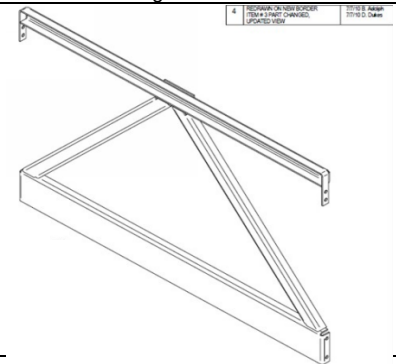


TOP VIEW
 Plan View - Angle locations

Test Damage



Internal Bracket Failure



New brace design

Notes: The UUTs were full of contents during the test.
 Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-3 (2010) Summary Tested Sub-Component

Sub-Component	Identifier (Part #, Capacity, Size, etc.)	Manufacturer	Material
Coil - Fin/Tube	1/2"	Vertiv Corporation	aluminum, copper tube
Electrical Control Box	122" x 36"	Vertiv Corporation	plastic, carbon steel
Reheat	30kW	Vertiv Corporation	carbon steel
Humidifier IR	22.1 lb/hr	Vertiv Corporation	carbon steel, aluminum, glass
Valve	3-Way	Johnson Controls	carbon steel, plastic
Enclosure	20 GA	Vertiv Corporation	carbon steel
Plenum	122" x 36" - 36" height	Vertiv Corporation	carbon steel
Standard Fan Motor	FP86 - 15 hp	Nidec	carbon steel, copper

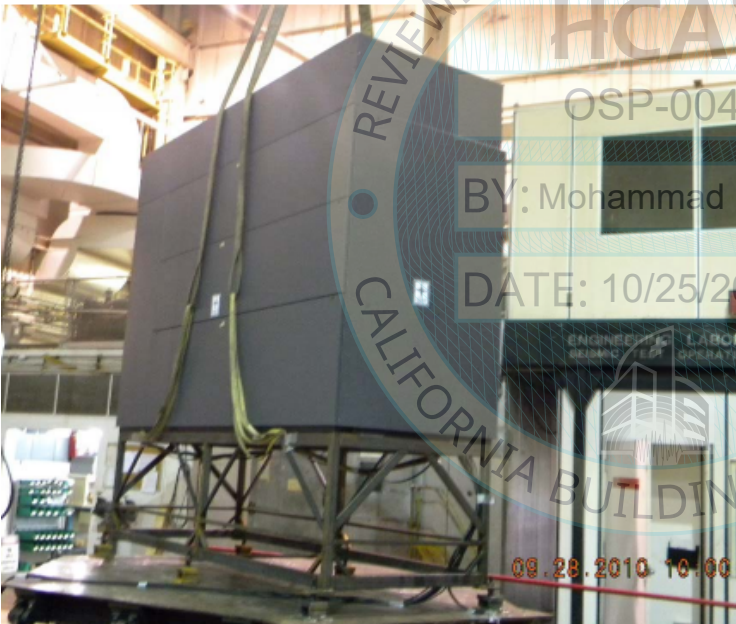
UUT-4 (2010) Test Summary

Testing Lab: Clark Dynamic Test Laboratory, Inc. in Jefferson Hills, Pennsylvania
 Testing Report: EL 9375 October 2010
 Testing Unit Num: CW181

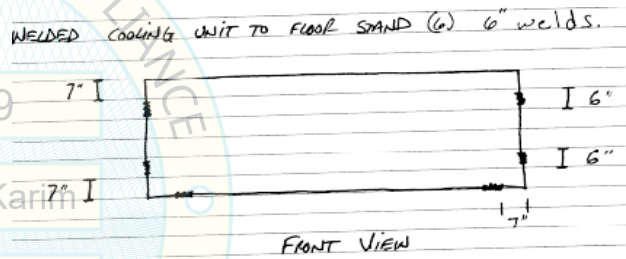
Model Number	Nominal Capacity	Mounting	Excitation Direction	Frequency* (Hz)	Unit Dimensions and Weight					
					Length (in)	Width (in)	Height (in)	Plenum Height (in)	Operating Weight (lbs)	
CW181DCHB3	181 kW	Isolated base mount w/ floorstand	X	Front - Back	5.60	122	48	76	18	2,600
			Y	Side - Side	6.40					
			Z	Vertical	14.10					

* Frequencies are for units prior to ICC ES AC-156 testing.

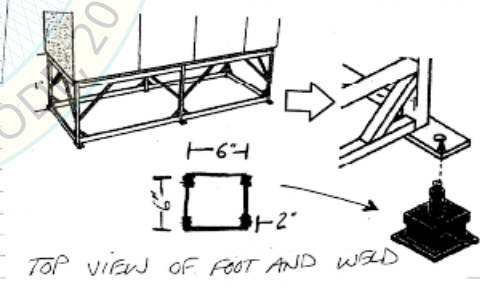
Attachment Method	Seismic Parameters							
Base mount to 36" tall floorstand with 1/4" x 6" long fillet weld (6 locations). Floorstand leg (6 total) to shake table with 1/4" x 2" long fillet weld (4 locations each leg). 1/8" thick neoprene pad attached to floorstand leg base.	Building Code	Test Criteria	S _{ds} (g)	z/h	Horizontal		Vertical	
	A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-V} (g)				
Seismic Enhancements	CBC 2022	AC 156	2.00	1.0	3.20	2.40	1.34	0.54
Seismic bracing kit provided/manufactured by Vertiv Corporation								



Unit on shake table



Unit to Floorstand Weld Locations



Floorstand to Shake Table Weld Detail

Notes: The UUTs were full of contents during the test.
 Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-4 (2010) Summary Tested Sub-Component

Sub-Component	Identifier (Part #, Capacity, Size, etc.)	Manufacturer	Material
Coil - Fin/Tube	1/2"	Vertiv Corporation	aluminum, copper tube
Electrical Control Box	122" x 48"	Vertiv Corporation	plastic, carbon steel
Reheat	30kW	Vertiv Corporation	carbon steel
Humidifier IR	22.1 lb/hr	Vertiv Corporation	carbon steel, aluminum, glass
Valve	3-Way	Belimo	carbon steel, plastic
Transformer	4.2 kVa	Vertiv Corporation	carbon steel, copper
Enclosure	16 GA	Vertiv Corporation	carbon steel
Plenum	122" x 48" - 18" height	Vertiv Corporation	carbon steel
Floorstand	122" x 48" - 36" height	Vertiv Corporation	carbon steel
EC Fan Motor	R3G630-AB21-66 - 5 hp	EBM Papst	carbon steel, copper
Disconnect	P3-100	Moeller Electric	plastic, copper, carbon steel

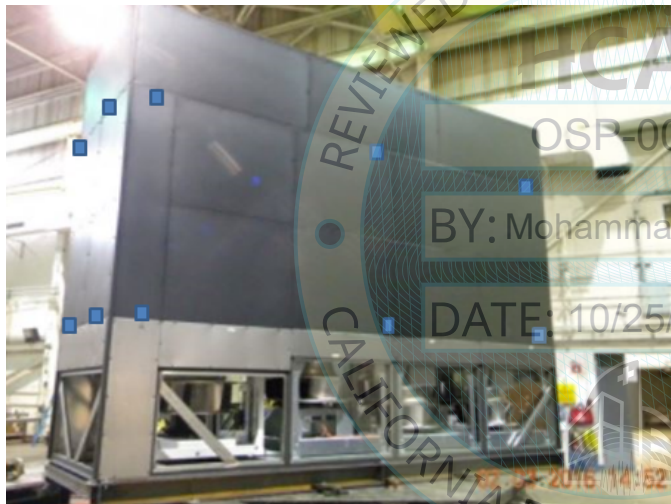
UUT-2 (2016) Test Summary

Testing Lab:	Clark Testing Laboratory in Jefferson Hills, Pennsylvania
Testing Report:	JID 15-01475
Testing Unit Num:	UUT-2

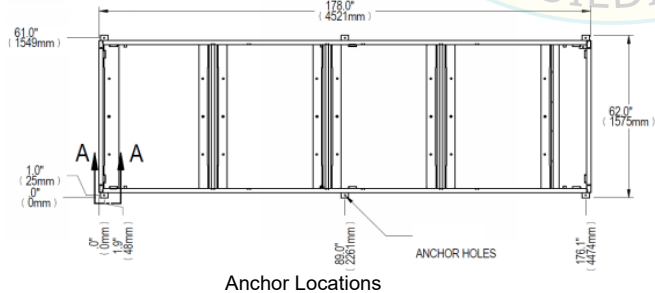
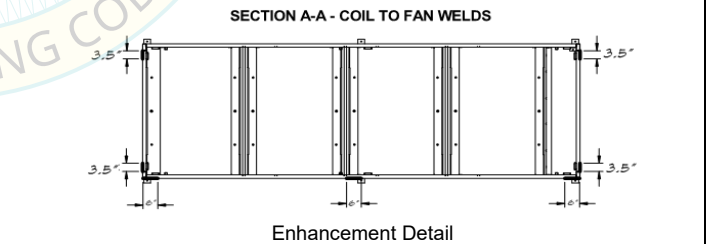
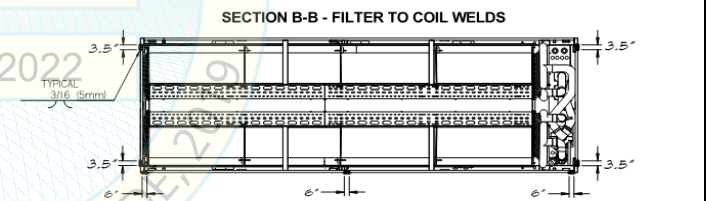
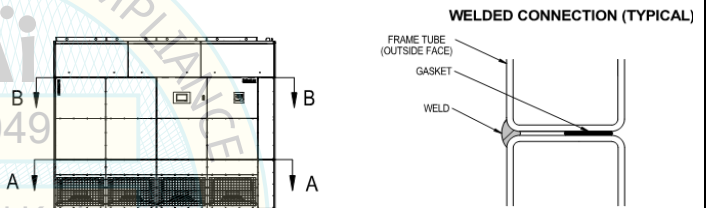
Model Number	Nominal Capacity	Mounting	Excitation Direction	Frequency* (Hz)	Unit Dimensions and Weight					
					Length (in)	Width (in)	Height (in)	Plenum Height (in)	Operating Weight (lbs)	
CW440DC1A1	440 kW	Rigid base mount w/ floorstand	X	Front - Back	26.04	180	60	114	31	6,408
			Y	Side - Side	18.05					
			Z	Vertical	16.09					

* Frequencies are for units prior to ICC ES AC-156 testing.

Attachment Method	Seismic Parameters							
Unit attached to fixture with six (6) 5/8" diameter, grade 5 bolt per plate (6 bolts total)	Building Code	Test Criteria	S _{Ds} (g)	z/h	Horizontal		Vertical	
Seismic Enhancements					A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-V} (g)
Seismic bracing kit provided/manufactured by Vertiv Corporation Three (3) - 3/16" x 6" butt weld filter to coil & coil to fan on front Two (2) - 3/16" x 3 1/2" butt weld filter to coil & coil to fan on each side (14 welds total)	CBC 2022	AC 156	1.70	1.0	2.72	2.04	1.14	0.46



Unit on the shake table



Notes: The UUTs were full of contents during the test.
 Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-2 (2016) Summary Tested Sub-Component

Sub-Component	Identifier (Part #, Capacity, Size, etc.)	Manufacturer	Material
Coil - Fin/Tube	1/2"	Vertiv Corporation	aluminum, copper tube
Electrical Control Box	180" x 60"	Vertiv Corporation	plastic, carbon steel
Disconnect	OS100GJ03	ABB Control	plastic, copper, carbon steel
Valve	2-Way	Belimo	carbon steel, plastic
Enclosure	20 GA	Vertiv Corporation	carbon steel
Plenum	180" x 60" - 31" height	Vertiv Corporation	carbon steel
Floorstand - Integral with Fan Section	180" x 60" - 43" height	Vertiv Corporation	carbon steel
EC Fan Motor	K3G710-AS06-63 - 16.1 hp	EBM Papst	carbon steel, copper

UUT-2 (2017) Test Summary

Testing Lab: Clark Testing Laboratory in Jefferson Hills, Pennsylvania
 Testing Report: JID 16-01031
 Testing Unit Num: UUT-2

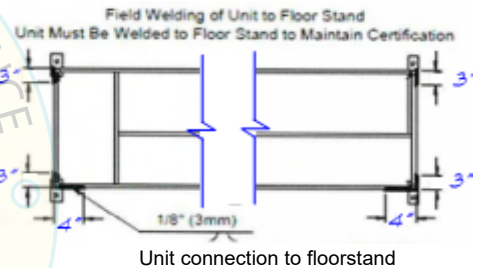
Model Number	Nominal Capacity	Mounting	Excitation Direction	Frequency* (Hz)	Unit Dimensions and Weight					
					Length (in)	Width (in)	Height (in)	Plenum Height (in)	Operating Weight (lbs)	
CW041DC1A1A964	41 kW	Rigid base mount w/ floorstand	X	Front - Back	9.41	50	36	72	36	1,010
			Y	Side - Side	7.18					
			Z	Vertical	>33 Hz					

* Frequencies are for units prior to ICC ES AC-156 testing.

Attachment Method	Seismic Parameters							
Base mount to 24" tall floorstand with 1/8" welds per figure. Floorstand to fixture with four (4) 7/8" diameter, grade 5 bolt per plate (4 bolts total)	Building Code	Test Criteria	S _{Ds} (g)	z/h	Horizontal		Vertical	
					A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-V} (g)
Seismic Enhancements	CBC 2022	AC 156	2.00	1.0	3.20	2.40	1.34	0.54
Seismic bracing kit provided/manufactured by Vertiv Corporation								



Unit on the shake table



Unit connection to floorstand



Anchor Detail

Notes: The UUTs were full of contents during the test.
 Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-2 (2017) Summary Tested Sub-Component

Sub-Component	Identifier (Part #, Capacity, Size, etc.)	Manufacturer	Material
Coil - Fin/Tube	1/2"	Vertiv Corporation	aluminum, copper tube
Electrical Control Box	50" x 36"	Vertiv Corporation	plastic, carbon steel
Reheat	15kW	Vertiv Corporation	carbon steel
Humidifier IR	11 lb/hr	Vertiv Corporation	carbon steel, aluminum, glass
Disconnect	OS60GJ03	ABB Control	plastic, copper, carbon steel
Valve	2-Way	Schneider Electric	bronze, brass
Enclosure	20 GA	Vertiv Corporation	carbon steel
Plenum	50" x 36" - 36" height	Vertiv Corporation	carbon steel
Floorstand	50" x 36" - 24" height	Vertiv Corporation	carbon steel
EC Fan Motor	R3G560-AH23-64 - 4.2 hp	EBM Papst	carbon steel, copper

UUT-3 (2017) Test Summary

Testing Lab: Clark Testing Laboratory in Jefferson Hills, Pennsylvania
 Testing Report: JID 16-01031
 Testing Unit Num: UUT-3

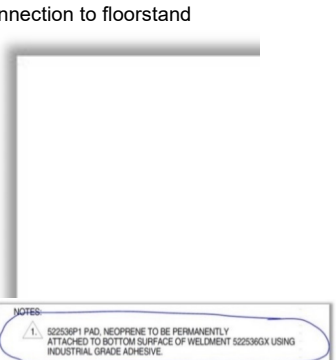
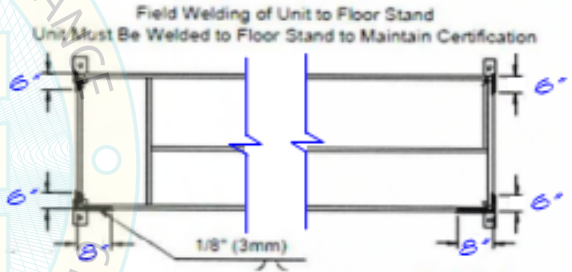
Model Number	Nominal Capacity	Mounting	Excitation Direction	Frequency* (Hz)	Unit Dimensions and Weight				
					Length (in)	Width (in)	Height (in)	Plenum Height (in)	Operating Weight (lbs)
CW181DC1A1A193	181 kW	Isolated base mount w/ floorstand	X Front - Back	4.51	122	48	76	18	2,876
			Y Side - Side	4.45					
			Z Vertical	13.20					

* Frequencies are for units prior to ICC ES AC-156 testing.

Attachment Method	Seismic Parameters							
Base mount to 48" tall floorstand with 1/8" welds per figure. Floorstand to leg with one (1) 7/8" diameter, grade 5 bolt per leg (6 bolts total). Floorstand leg to table with two (2) 1/2" diameter, grade 5 per leg (12 total). 1/8" neoprene pad permanently fixed to floorstand base.	Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
					A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-V} (g)
Seismic Enhancements	CBC 2022	AC 156	2.00	1.0	3.20	2.40	1.34	0.54
Seismic bracing kit provided/manufactured by Vertiv Corporation								



Unit on the shake table



Anchor Detail

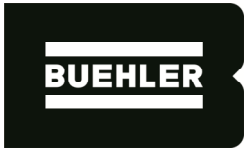
Notes: The UUTs were full of contents during the test.
 Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-3 (2017) Summary Tested Sub-Component

Sub-Component	Identifier (Part #, Capacity, Size, etc.)	Manufacturer	Material
Coil - Fin/Tube	1/2"	Vertiv Corporation	aluminum, copper tube
Electrical Control Box	122" x 48"	Vertiv Corporation	plastic, carbon steel
Reheat	30kW	Vertiv Corporation	carbon steel
Humidifier IR	22.1 lb/hr	Vertiv Corporation	carbon steel, aluminum, glass
Disconnect	OS30FAJ12, OS100GJ03	ABB Control	plastic, copper, carbon steel
Valve	2-Way	Belimo	carbon steel, plastic
Enclosure	20 GA	Vertiv Corporation	carbon steel
Plenum	122" x 48" - 18" height	Vertiv Corporation	carbon steel
Floorstand	122" x 48" - 48" height	Vertiv Corporation	carbon steel
EC Fan Motor	R3G630-AB21-66 - 5 hp	EBM Papst	carbon steel, copper
Condensate Pump	A5X-2LI-460 REV-M - 0.5 hp	Milton Roy	carbon steel, plastic, copper



Special Seismic Certification
 OSHPD Preapproval (OSP-0049-10)
 Liebert CW Product Line



Model Number Nomenclature

Configuration Number Breakdown

Model Number * - Part 1 / 2										Model Details										Part 2/2				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
C	W	1	8	1	D	C	1	A	1	H	D	1	8	H	1	G	0	2	F	P	A	*	*	*

* The 14-digit model number is comprised of the first 10-digits and the last 4-digits of the Configuration Number.

Digits 1-2

CW

Digit 3-5

Nominal Capacity, kW

Digit 6 - Air Discharge

U = Upflow
 D = Downflow

Digit 7

C = Chilled Water System

Digit 8 - Fan type

S = Forward curved centrifugal fan w/ std motor
~~V = Forward curved centrifugal fan w/ variable speed drive (2)~~
 1 = EC motorized impeller
 H = EC motorized impeller with THD Transformer
 (1) Option requires extended lead times.

Digit 9 - Power Supply

A = 460/3/60
 B = 575/3/60
 C = 208/3/60
 D = 230/3/60
 2 = 380/3/60 (1)
 F = 380/3/50 (1)
 G = 415/3/50 (1)
 M = 380-415/3/50 (1)
 (1) Option requires extended lead times.

Digit 10 - Valve

2 = 2-Way Valve
 3 = 3-Way Valve
 1 = 2-Way Valve High Pressure
 T = 3-Way Valve High Pressure

Digit 11 - Humidifier

H = Infrared w/Auto-Flush
~~S = Steam Generating Canister~~
~~G = Steam Grid~~

Digit 12 - Display

H = ICOM (9 inch touch color screen display)

Digit 13 - Reheat

1 = Electric
~~4 = Hot Water~~
~~7 = Steam~~

Digit 14 - Filters

8 = 4" MERV 8
 9 = 4" MERV 11
~~5 = MERV 8 + 2" Pre-Filters~~
~~6 = MERV 11 + 2" Pre-Filters~~

Digit 15 - Piping Options

H = No Piping Options
 A = Balancing Valve
 C = Flow Switch
 D = Balancing Valve & Flow Switch

Digit 16 - Enclosure

~~1 = Standard Color~~
~~2 = Special Color~~
~~E = Standard Color & Cut Down Frame~~
~~F = Special Color & Cut Down Frame~~
~~C = Standard Color & Heavy Gauge~~
~~D = Special Color & Heavy Gauge~~
 3 = Standard Color & IBC/OSHPD
 4 = Special Color & IBC/OSHPD
 8 = Standard Color & IBC/OSHPD & Heavy Gauge
 A = Special Color & IBC/OSHPD & Heavy Gauge
 9 = Standard Color & Heavy Gauge & Cut Down Frame
 U = Special Color & Heavy Gauge & Cut Down Frame

Digit 17 - High Voltage Options

(65 KAIC SCCR is Standard for 60 Hz)
 (5 KAIC SCCR is Standard for 5 Hz)
 (Voltage Code B (575V) delivers 25 KAIC SCCR in lieu of 65 KAIC

SCCR

0 = No Disconnect or Condensate Pump
 D = Non-locking Disconnect
 L = Locking Disconnect
 3 = No Disconnect w/ Condensate Pump
 4 = Non-locking Disconnect w/ Condensate Pump
 5 = Locking Disconnect w/ Condensate Pump
 7 = Dual Locking Disconnect w/ Reversing Starter
 G = Dual Locking Disconnect w/ Reversing Starter w/ Condensate

Digit 18 - Low Voltage Options

0 = None
 L = Low Voltage Terminal Package
 H = Reheat Humidity Lock Out
 R = Remote Humidity Contact
 C = Low Voltage Terminal Package & Reheat/Humidity Lockout
 D = Low Voltage Terminal Package & Remote Humidity Contact
 E = Low Voltage Terminal Package, Reheat/Humidity Lockout, & Remote Humidity Contact
 F = Reheat/Humidity Lockout & Remote Humidity Contact

Digit 19 - Monitoring

0 = None
 U = (1) IS-Unity-DP Card
 C = (1) Sitelink-E card
 6 = (1) IS-Unity-DP Card & (1) Sitelink-E card
 7 = (2) IS-Unity-DP Cards

Digit 20 - Sensors

0 = None
 S = Smoke
 H = High Temperature
 F = Smoke & High Temperature

Digit 21

Packaging
 P = Domestic Packaging
 C = Export Packaging

Digit 22

Special Requirement

A = No SFA
 S = SFA Included

Digit 23-25

Factory Configuration Number

