



OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION

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

OFFICE USE ONLY

APPLICATION #: OSP – 0366 – 10

OSHPD 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 DSE Air Conditioned Unit – Downflow

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

Product Model Number: DA050D, DA080D, DA125D, DA150D and DA165D

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

General Description: Air-cooled unit, 50-165kW. Seismic enhancements made to the units and modifications required to address anomalies observed during the tests shall be incorporated into production units.

Mounting Description: Rigid base mount to carbon steel floorstand (7" to 48" tall)

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: 4/18/2019

Title: Principal Engineer

Company Name: Vertiv Corporation

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

OSHPD



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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: S 3937
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

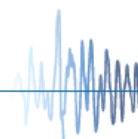
- ☒ Testing in accordance with: ☒ ICC-ES AC156
☐ Other (Please Specify): _____

Testing Laboratory (DA050D)

Company Name: Curtis-Wright Qual Tech NP
Contact Name: Ed G. Roundtree
Mailing Address: 4600 East Tech Drive, Cincinnati, Ohio 45245
Telephone: (513) 528-7900 Email: eroundtree@curtiswright.com

Testing Laboratory (DA080D, DA085D, DA125D, DA150D and DA165D)

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@clarkdynamic.com





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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) = 1.5 ($S_{DS} = 2.00$, $z/h = 1$); 1.13 ($S_{DS} = 2.50$, $z/h = 0$)

S_{DS} (Design spectral response acceleration at short period, g) = 2.00($z/h = 1$); 2.50($z/h = 0$)

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($S_{DS} = 2.00$); 0($S_{DS} = 2.50$)

Equipment or Component Natural Frequencies (Hz) = See attachment Table 1b

Overall dimensions and weight (or range thereof) = See attachment Table 1a

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-0366-10

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: 09/17/2019

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): Equipment Matrices/Tables, Merger Letter/Document

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

Signature: Timothy J. Piland Date: September 17, 2019

Print Name: Timothy J. Piland Title: SSE

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

Condition of Approval (if applicable): _____

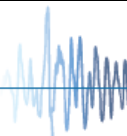


Table 1a. Certified Models and Configurations

Model Number	Nominal Capacity (kW)	Tested/ Interpolated	Length (in)	Width (in)	Height (in)	Operating Weight (lbs)
DA050D	50 kW	Tested (UUT-3b)	77	36	130	1,980
DA080D	80 kW	extrapolated	100	36	119	2,150
DA085D	85 kW	Tested (UUT-1)	100	36	119	2,150
DA125D	125 kW	interpolated	144	48	142	4,150
DA150D	150 kW	interpolated	144	48	142	4,250
DA165D	165 kW	Tested (UUT-2)	144	48	142	4,250

^ ^

Height includes floorstand
Height includes plenum

Table 1b. Shake Table Tested Units Summary**

Configuration	kW	UUT Mark	Mounting	Excitation Direction	Frequency* (Hz)	Length (in)	Width (in)	Height (in)	Tested Weight (lbs)
Downflow	50	UUT-3b	Hard Mount to floorstand	X	18.9	77	36	130	1,714
				Y	16.5				
				Z	>33.3				
Downflow	85	UUT-1	Hard Mount to floorstand	X	5.9	100	36	119	2,110
				Y	4.3				
				Z	17.6				
Downflow	165	UUT-2	Hard Mount to floorstand	X	4.0	144	48	142	4,248
				Y	4.1				
				Z	12.6				

* Frequencies are for units tested prior to AC156.

** All units were charged with refrigerant before AC156 testing.



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Table 2. Certified Sub-Component List

Coil			
Part #	Manufacturer	Material	Interpolated / Included With Test
323171G1	Vertiv Corporation	aluminum, copper	UUT-3b
311531G1	Vertiv Corporation	aluminum, copper	UUT-1
306600G1	Vertiv Corporation	aluminum, copper	Interpolated
304455G2	Vertiv Corporation	aluminum, copper	UUT-2

Compressor			
Part #	Manufacturer	Material	Tested / Interpolated
ZPD120KCE	Emerson Climate Technologies	aluminum, copper, carbon steel	Extrapolated
ZPD137KCE	Emerson Climate Technologies	aluminum, copper, carbon steel	UUT-1
ZPD154KCE	Emerson Climate Technologies	aluminum, copper, carbon steel	UUT-3b
ZPDT18M	Emerson Climate Technologies	aluminum, copper, carbon steel	Interpolated
ZPDT24M	Emerson Climate Technologies	aluminum, copper, carbon steel	Interpolated
ZPDT27M	Emerson Climate Technologies	aluminum, copper, carbon steel	UUT-2

Fan Motor			
Part #	Manufacturer	Material	Interpolated / Included With Test
R3G560	EBM Papst	carbon steel, copper	UUT-1
R3G630	EBM Papst	carbon steel, copper	UUT-2, UUT-3b

Expansion Valve			
Part #	Manufacturer	Material	Interpolated / Included With Test
EX6	Emerson Climate Technologies	brass, copper, carbon steel	UUT-1, UUT-3b
EX7	Emerson Climate Technologies	brass, copper, carbon steel	UUT-2

Electric Control Panel			
Part #	Manufacturer	Material	Interpolated / Included With Test
181515	Vertiv Corporation	plastic, carbon steel, copper, aluminum	UUT-1
305000	Vertiv Corporation	plastic, carbon steel, copper, aluminum	UUT-2
323250	Vertiv Corporation	plastic, carbon steel, copper, aluminum	UUT-3b

Enclosure			
Part #	Manufacturer	Material	Interpolated / Included With Test
307370	Vertiv Corporation	carbon steel	UUT-2
314420	Vertiv Corporation	carbon steel	UUT-1, UUT-3b



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Table 2. Certified Sub-Component List Con't

Reheat			
Part #	Manufacturer	Material	Interpolated / Included With Test
309711G004	Vertiv Corporation	galvanized carbon steel	UUT-1
309711G009	Vertiv Corporation	galvanized carbon steel	Extrapolated
305011G11	Vertiv Corporation	galvanized carbon steel	UUT-2
177999	Vertiv Corporation	galvanized carbon steel	UUT-3b

Plenums			
Part #	Manufacturer	Material	Interpolated / Included With Test
312792	Vertiv Corporation	carbon steel	UUT-1
196957	Vertiv Corporation	carbon steel	UUT-2
323154	Vertiv Corporation	carbon steel	UUT-3b

Floorstands			
Part #	Manufacturer	Material	Interpolated / Included With Test
325473	Vertiv Corporation	carbon steel	UUT-3b
315275	Vertiv Corporation	carbon steel	UUT-1
315906	Vertiv Corporation	carbon steel	UUT-2
307181	Vertiv Corporation	carbon steel	Extrapolated

Humidifier			
Part #	Manufacturer	Material	Interpolated / Included With Test
305012	Vertiv Corporation	carbon steel, aluminum	UUT-1 & UUT-2
177972	Vertiv Corporation	carbon steel	UUT-3b

Condensate Pump			
Part #	Manufacturer	Material	Interpolated / Included With Test
1A19271	Hartell Pumps	plastic, aluminum, carbon steel	UUT-1

Transformer			
Part #	Manufacturer	Material	Interpolated / Included With Test
323244	Vertiv Corporation	carbon steel, copper	UUT-3b
303370	Vertiv Corporation	carbon steel, copper	UUT-2

Shake Table Test Setup

UUT Designation	UUT-1	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
Lab Report	Clark Testing 2570A Rev1					A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
Identification No.	DA085DP1AT479S	CBC 2016	ICC-ES AC 156	2.00	1.0	3.2 g	2.4 g	-	-
Attachment Method	Rigid mount, (24) 1/2"-13 bolts			2.50	0.0	-	-	1.68 g	0.68 g



Notes: The UUTs were 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 was maintained.

Shake Table Test Setup

UUT Designation	UUT-2	Seismic Parameters							
Lab Report	Clark Testing 2570A Rev1	Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
Identification No.	DA165DP1ATPROT					A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
Attachment Method	Rigid mount, (16) 1/2"-13 bolts								
		CBC 2016	ICC-ES AC 156	2.00	1.0	3.2 g	2.4 g	-	-
				2.50	0.0	-	-	1.68 g	0.68 g



Notes: The UUTs were 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 was maintained.

Shake Table Test Setup

UUT Designation	UUT-3b	Seismic Parameters							
Lab Report	Curtiss Wright Q1627.0 Rev1	Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
Identification No.	DA050DP1ADPROT3					A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
Attachment Method	Rigid mount, (12) 1/2"-13 bolts	CBC 2016	ICC-ES AC 156	2.00	1.0	3.2 g	2.4 g	-	-
				2.50	0.0	-	-	1.68 g	0.68 g



Notes: The UUTs were 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 was maintained.



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Table 1c. Tested Unit Subcomponent List

UUT #1: DA085DP1AT479S			
Sub-Component	Material	Manufacturer	Part Number
Compressor	aluminum, carbon steel, copper	Emerson Climate Technologies	ZPD137KCE
Heat Exchanger	aluminum fin, copper tube	Vertiv Corporation	311531G1
Fan	aluminum, carbon steel, copper	EBM Papst	R3G560
Humidifier	aluminum, carbon steel	Vertiv Corporation	309717
Heater	aluminum, carbon steel	Vertiv Corporation	309711
Drainage, condensate	plastic, copper, carbon steel	Hartell Pumps	1A19271
Electric Control Panel	plastic, carbon steel, copper, aluminum	Vertiv Corporation	181515
Expansion Valve	carbon steel, copper	Emerson Climate Technologies	EX6
Plenum	carbon steel	Vertiv Corporation	312792
Enclosure w/ IBC/OSHDP bracing	carbon steel	Vertiv Corporation	314420
Floorstand	tubular carbon steel	Vertiv Corporation	315275
UUT #2: DA165DP1ATPROT			
Sub-Component	Material	Manufacturer	Part Number
Compressor	aluminum, carbon steel, copper	Emerson Climate Technologies	ZPDT27M
Heat Exchanger	aluminum fin, copper tube	Vertiv Corporation	304455G2
Fan	aluminum, carbon steel, copper	EBM Papst	R3G630
Humidifier	aluminum, carbon steel	Vertiv Corporation	186783
Heater	aluminum, galvanized carbon steel	Vertiv Corporation	305011
Drainage, condensate	plastic, copper, carbon steel	Hartell Pumps	1A19271
Transformer	carbon steel, copper	Vertiv Corporation	303370
Electric Control Panel	plastic, carbon steel, copper, aluminum	Vertiv Corporation	305000
Expansion Valve	carbon steel, copper	Emerson Climate Technologies	EX7
Plenum	carbon steel	Vertiv Corporation	196957
Double skin - Enclosure w/ IBC/OSHDP bracing	carbon steel	Vertiv Corporation	307370
Floorstand	tubular carbon steel	Vertiv Corporation	307181
UUT #3b: DA050DP1ADPROT3			
Sub-Component	Material	Manufacturer	Part Number
Compressor	aluminum, carbon steel, copper	Emerson Climate Technologies	ZPD154KCE
Heat Exchanger	aluminum fin, copper tube	Vertiv Corporation	323171G1
Fan	aluminum, carbon steel, copper	EBM Papst	R3G630
Exterior Panels	16ga painted carbon steel	Vertiv Corporation	304363
Humidifier	aluminum, carbon steel	Vertiv Corporation	177972
Heater	aluminum, galvanized carbon steel	Vertiv Corporation	177999
Drainage, condensate	plastic, copper, carbon steel	Hartell Pumps	1A19271
Transformer	carbon steel, copper	Vertiv Corporation	323244
Electric Control Panel	plastic, carbon steel, copper, aluminum	Vertiv Corporation	323250
Expansion Valve	carbon steel, copper	Emerson Climate Technologies	EX6
Plenum	carbon steel	Vertiv Corporation	323154
Enclosure w/ IBC/OSHDP bracing	carbon steel	Vertiv Corporation	314420
Floorstand	tubular carbon steel	Vertiv Corporation	325473

DSE Model Number Nomenclature

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
D	A	1	2	5	D	A	1	A	T	H	A	0	8	1	1	D	0	0	S	P	1	2	3	S

Model number = first 10 digits plus last 4 digits of configuration number

Digit 1, 2	Product Family
DA	Liebert DSE

Digit 3, 4, 5	Cooling Capacity, kW
	Nominal Sensible Capacity, kW

Digit 6	Air Discharge
D	Downflow

Digit 7	System Type
A	Air Cooled
P	Air-Cooled, EconoPhase ready

Digit 8	Airflow (fan type)
1	EC plug fans

Digit 9	Power Supply
A	460V / 3ph / 60Hz
B	575V / 3ph / 60Hz
C	208V / 3ph / 60Hz
D	230V / 3ph / 60Hz
2	380-415V / 3ph / 60Hz

Digit 10	Cooling System
T	Tandem w/ Digital, R-410A

Digit 11	Humidification
0	No humidifier
H	Infrared Humidifier

Digit 12	Display
A	Small Display
D	Large Display
F	Small Display w/ Supply Air Sensor
E	Large Display w/ Supply Air Sensor

Digit 13	Reheat
0	No reheat
1	Electric reheat, 15, 20, 25, 30kW

Digit 14	Air filter
8	MERV 8, 4"
9	MERV 11, 4"
A	MERV 13, 4"
6	MERV 11, 2" + MERV8 pre-filter, 2"
C	MERV 13, 2" + MERV8 pre-filter 2"

Digit 15 Coil options	
1	Non-Coated coil, indoor unit
2	Coated coil, indoor unit

Digit 16	Enclosure options
1	Color standard
2	Color optional
6	Color standard w/double skin panels
9	Color optional w/double skin panels
3	Color standard & IBC/OSHDPD bracing
4	Color optional & IBC/OSHDPD bracing
8	Color standard, IBC/OSHDPD, double-skin panels
A	Color optional, IBC/OSHDPD, double-skin panels

Digit 17	High Voltage Options
0	No disconnect
D	Non-locking disconnect
L	Locking disconnect
3	No disconnect with condensate pump
4	Non-locking disconnect with condensate pump
5	Locking disconnect with condensate pump

Digit 18	Option Packages
0	None
1	Option pkg #1 - low voltage terminal package
H	Reheat & Humidifier Lockout
R	Remote Humidity contact
C	Option pkg #1, plus reheat/humidifier lockout
D	Option pkg #1, plus remote humidifier contact
E	Option pkg #1, plus reheat/humidifier lockout, plus remote contact
F	Remote Humidity contact plus R&H Lockout

Digit 19	Monitoring cards
0	None
1	IS-WEBL Card
3	IS-485L Card
F	IS-IPBML Card
C	IS-485EXI Card
5	IS-WEBL & IS-485L Cards
H	IS-WEBL & IS-IPBML Cards
D	IS-WEBL & IS-485EXI Cards
J	IS-485L & IS-IPBML Cards
E	IS-485L & IS-485EXI Cards
K	IS-IPBML & IS-485EXI Cards

Digit 20	Sensors
0	None
S	Smoke Sensor
H	High Temp Sensor
F	Smoke and High Temp Sensor
C	Compressor Overload Sensors
A	Compressor, High Temp
D	Compressor, Smoke Sensor
K	Compressor, High Temp, Smoke sensor

Digit 21	Packaging
P	Domestic

Digit 22-24	Configuration code
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Digit 25	Configuration code
A	1
S	SFA