APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY	
APPLICATION #:	OSP – 0270

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 43095

Telephone: (614) 841-8168 Email: Kiel.Stephens@vertivco.com

Product Information

Product Name: Liebert EconoPhase Refrigerant Economizer

Product Type: Single & Double Pump Economizers

Product Model Number: PR 050A / PR085A / PR125A
(List all unique product identification numbers and/or part numbers)

General Description: Single & Double Pump Economizer units. Modifications made to test and modifications required to address anomalies observed during test shall be incorporated into 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 43095

Telephone: (614) 841-8168 Email: Kiel.Stephens@vertivco.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: 10/09/2019

Title: Principal Engineer Company Name: Vertiv Corporation

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 Testing Laboratory, Inc.

Contact Name: Richard Siagel

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

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

Company Name: Qualtech (Curtiss-Wright)

Contact Name: Timothy Geers

Mailing Address: 4600 East Tech Drive, Cincinnati, OH 45245

Telephone: (513) 528-7900 Email: tgeers@curtisswright.com

Seismic Parameters

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

Design Basis of Equipment or Components (F_p/W_p) = 1.44

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

a_p (In-structure equipment or component amplification factor) = 1.0

R_p (Equipment or component response modification factor) = 2.5

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

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

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

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

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

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

R (Response modification coefficient) =

Ω_0 (System overstrength factor) =

C_d (Deflection amplification factor) =

I_p (Importance factor) = 1.5

Height to Center of Gravity above base =

Equipment or Component Natural Frequencies (Hz) =

Overall dimensions and weight (or range thereof) =

Tank(s) designed in accordance with ASME BPVC, 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, 2025

Signature: _____ Date: March 4, 2020

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 Product List

Model Number	Nominal Capacity (kW)	Tested/ Interpolated	Length (in)	Width (in)	Height (in)	Operating Weight (lbs)	Approved Seismic Parameters		
							S_{DS} (g)	z/h	F_p / W_p
PR050AA5S	50	extrapolated	42	36	40	300	2.00	1.0	1.44
PR050AB5S	50	extrapolated	42	36	40	300	2.00	1.0	1.44
PR050AE5S	50	extrapolated	42	36	40	300	2.00	1.0	1.44
PR050AY5S	50	extrapolated	42	36	40	300	2.00	1.0	1.44
PR050A25S	50	extrapolated	42	36	40	300	2.00	1.0	1.44
PR050AA6S	50	extrapolated	42	36	40	300	2.00	1.0	1.44
PR050AB6S	50	extrapolated	42	36	40	300	2.00	1.0	1.44
PR050AE6S	50	extrapolated	42	36	40	300	2.00	1.0	1.44
PR050AY6S	50	extrapolated	42	36	40	300	2.00	1.0	1.44
PR050A26S	50	UUT-3	42	36	40	300	2.00	1.0	1.44
PR050AA5D	100	Interpolated	42	36	40	423	2.00	1.0	1.44
PR050AB5D	100	Interpolated	42	36	40	423	2.00	1.0	1.44
PR050AE5D	100	Interpolated	42	36	40	423	2.00	1.0	1.44
PR050AY5D	100	Interpolated	42	36	40	423	2.00	1.0	1.44
PR050A25D	100	Interpolated	42	36	40	423	2.00	1.0	1.44
PR050AA6D	100	Interpolated	42	36	40	423	2.00	1.0	1.44
PR050AB6D	100	Interpolated	42	36	40	423	2.00	1.0	1.44
PR050AE6D	100	Interpolated	42	36	40	423	2.00	1.0	1.44
PR050AY6D	100	Interpolated	42	36	40	423	2.00	1.0	1.44
PR050A26D	100	Interpolated	42	36	40	423	2.00	1.0	1.44
PR085AA5S	43	Interpolated	42	36	40	314	2.00	1.0	1.44
PR085AB5S	43	Interpolated	42	36	40	314	2.00	1.0	1.44
PR085AE5S	43	Interpolated	42	36	40	314	2.00	1.0	1.44
PR085AY5S	43	Interpolated	42	36	40	314	2.00	1.0	1.44
PR085A25S	43	Interpolated	42	36	40	314	2.00	1.0	1.44
PR085AA6S	43	Interpolated	42	36	40	314	2.00	1.0	1.44
PR085AB6S	43	Interpolated	42	36	40	314	2.00	1.0	1.44
PR085AE6S	43	Interpolated	42	36	40	314	2.00	1.0	1.44
PR085AY6S	43	Interpolated	42	36	40	314	2.00	1.0	1.44
PR085A26S	43	Interpolated	42	36	40	314	2.00	1.0	1.44
PR085AA5D	85	Interpolated	42	36	40	437	2.00	1.0	1.44
PR085AB5D	85	Interpolated	42	36	40	437	2.00	1.0	1.44
PR085AE5D	85	Interpolated	42	36	40	437	2.00	1.0	1.44
PR085AY5D	85	Interpolated	42	36	40	437	2.00	1.0	1.44
PR085A25D	85	Interpolated	42	36	40	437	2.00	1.0	1.44
PR085AA6D	85	Interpolated	42	36	40	437	2.00	1.0	1.44
PR085AB6D	85	Interpolated	42	36	40	437	2.00	1.0	1.44
PR085AE6D	85	Interpolated	42	36	40	437	2.00	1.0	1.44
PR085AY6D	85	Interpolated	42	36	40	437	2.00	1.0	1.44
PR085A26D	85	Interpolated	42	36	40	437	2.00	1.0	1.44
PR125AA5S	63	Interpolated	42	36	40	314	2.00	1.0	1.44
PR125AB5S	63	Interpolated	42	36	40	314	2.00	1.0	1.44
PR125AC5S	63	UUT-2	42	36	40	314	2.50	1.0	1.80
PR125AD5S	63	Interpolated	42	36	40	314	2.00	1.0	1.44
PR125A25S	63	Interpolated	42	36	40	314	2.00	1.0	1.44
PR125AA6S	63	Interpolated	42	36	40	314	2.00	1.0	1.44
PR125AB6S	63	Interpolated	42	36	40	314	2.00	1.0	1.44
PR125AC6S	63	Interpolated	42	36	40	314	2.00	1.0	1.44
PR125AD6S	63	Interpolated	42	36	40	314	2.00	1.0	1.44
PR125A26S	63	Interpolated	42	36	40	314	2.00	1.0	1.44
PR125AA5D	125	Interpolated	42	36	40	437	2.00	1.0	1.44
PR125AB5D	125	Interpolated	42	36	40	437	2.00	1.0	1.44
PR125AC5D	125	Interpolated	42	36	40	437	2.00	1.0	1.44
PR125AD5D	125	Interpolated	42	36	40	437	2.00	1.0	1.44
PR125A25D	125	Interpolated	42	36	40	437	2.00	1.0	1.44
PR125AA6D	125	Interpolated	42	36	40	437	2.00	1.0	1.44
PR125AB6D	125	UUT-1	42	36	40	437	2.00	1.0	1.44
PR125AC6D	125	extrapolated	42	36	40	437	2.00	1.0	1.44
PR125AD6D	125	extrapolated	42	36	40	437	2.00	1.0	1.44
PR125A26D	125	extrapolated	42	36	40	437	2.00	1.0	1.44

Table 2. Certified Sub-Component List - Liebert EconoPhase

Pump			
Part Number	***Manufacturer***	***Material***	***Interpolated / Included With Test***
ELNPHPI410D012611	MTH	Stainless steel/cast iron	UUT1 & UUT2
SPCLHP310F052114	MTH	Stainless steel/cast iron	Interpolated
SPCLHP310F103014	MTH	Stainless steel/cast iron	UUT3

Disconnect			
Part Number	***Manufacturer***	***Material***	***Interpolated / Included With Test***
OT25F3	ABB	Copper, carbon steel, plastic	UUT2
OS30FAJ12	ABB	Copper, carbon steel, plastic	UUT1

VFD			
Part Number	***Manufacturer***	***Material***	***Interpolated / Included With Test***
SKCD200220	Control Techniques	Copper, carbon steel, plastic	UUT2
SKC3400220	Control Techniques	Copper, carbon steel, plastic	UUT1
M200-03200100A	Control Techniques	Copper, carbon steel, plastic	Interpolated
M200-03400056A	Control Techniques	Copper, carbon steel, plastic	UUT3

Cabinet			
Part Number	***Manufacturer***	***Material***	***Interpolated / Included With Test***
304879	Vertiv Corporation	Aluminum back, top, sides and removable covers	UUT1, 2 & 3

Transformer			
Part Number	***Manufacturer***	***Material***	***Interpolated / Included With Test***
RC2J1-H/T80/C&C/X	Rex Power Magnetics	Carbon steel, copper	UUT3
RC4J1-H/T80/C&C/X	Rex Power Magnetics	Carbon steel, copper	Interpolated
RC7J1-H/T80/C&C/X	Rex Power Magnetics	Carbon steel, copper	UUT1

UUT-1 Test Summary

Testing Lab: Clark Dynamics Testing Laboratory
Testing Report: EL:10088 tested April 9, 2012 thru April 11, 2012
Testing Unit Num: UUT-1

Model Number	*Tonnage*	Operating Weight (lbs)	*Mounting*	*Excitation Direction*		*Frequency* (Hz)*	Length (in)	Width (in)	Height (in)
PR125AB6D	125	437	Rigid Base Mount	X	Front - Back	20.8	42	36	40
				Y	Side - Side	21.8			
				Z	Vertical	21.4			

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

Attachment Method: 4-3/8" dia. grade 5 bolts on front/back of unit (8 total)

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 2016	AC 156	2.00	1.0	3.20g	2.40g	1.34g	0.54g

Figure 1.1: 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-1 Summary Tested Sub-Component

Sub-Component	*Part Number*	*Manufacturer*	*Material*
Cabinet	304879	Vertiv Corporation	Aluminum
Pump	ELNPHPI410D012611	MTH	Stainless steel/cast iron
Disconnect	OS30FAJ12	ABB	Copper, carbon steel, plastic
VFD	SKC3400220	Control Techniques	Copper, carbon steel, plastic
Transformer	RC7J1-H/T80/C&C/X	Rex Power Magnetics	Carbon steel, copper

UUT-2 Test Summary

Testing Lab: Clark Dynamics Testing Laboratory
Testing Report: EL:10088 tested April 9, 2012 thru April 11, 2012
Testing Unit Num: UUT-2

Model Number	*Tonnage*	Operating Weight (lbs)	*Mounting*	*Excitation Direction*		*Frequency* (Hz)*	Length (in)	Width (in)	Height (in)
PR125AC5S	63	314	Rigid Base Mount	X	Front - Back	21.8	42	36	40
				Y	Side - Side	25.8			
				Z	Vertical	20.9			

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

Attachment Method: 4-3/8" dia. grade 5 bolts on front/back of unit (8 total)

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 2016	AC 156	2.50	1.0	4.00g	3.00g	1.68g	0.68g

Figure 2.1: 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 Summary Tested Sub-Component

Sub-Component	*Part Number*	*Manufacturer*	*Material*
Cabinet	304879	Vertiv Corporation	Aluminum
Pump	ELNPHPI410D012611	MTH	Stainless steel/cast iron
Disconnect	OT25F3	ABB	Copper, carbon steel, plastic
VFD	SKCD200220	Control Techniques	Copper, carbon steel, plastic

UUT-3 Test Summary

Testing Lab: Curtiss-Wright
Testing Report: Q1627.0 tested April 11, 2016
Testing Unit Num: UUT

Model Number	*Tonnage*	Operating Weight (lbs)	*Mounting*	*Excitation Direction*		*Frequency* (Hz)*	Length (in)	Width (in)	Height (in)
PR050A26S	50	300	Rigid Base Mount	X	Front - Back	18.9	42	36	40
				Y	Side - Side	16.5			
				Z	Vertical	>33.3			

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

Attachment Method	4-3/8" dia. grade A307 bolts on front/back of unit (8 total)

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 2016	AC 156	2.00 2.50	1.00 0.00	3.20g	2.40g	1.68g	0.68g

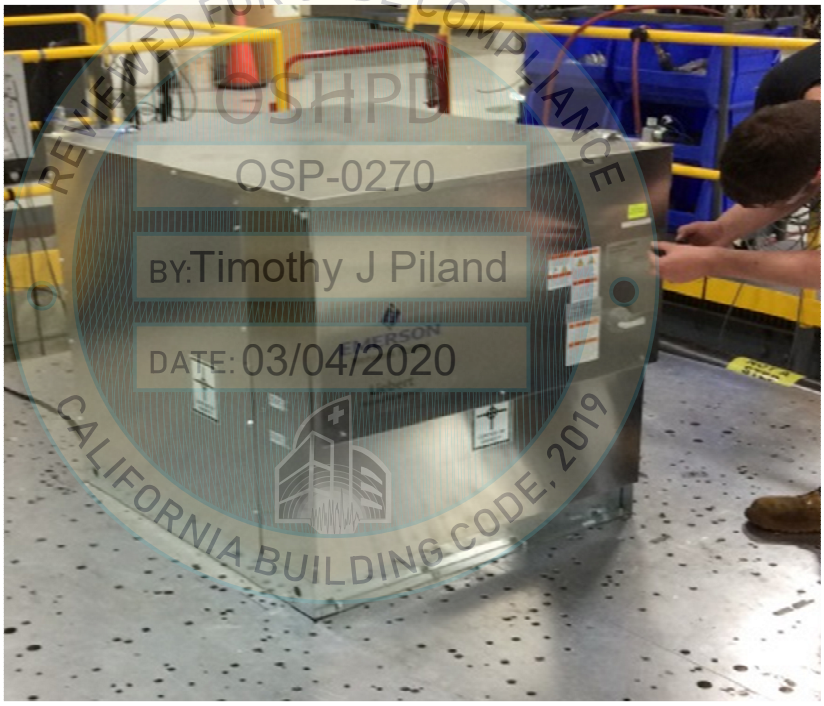

Figure 3.1: Unit on the shake table

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-3 Summary Tested Sub-Component

Sub-Component	*Part Number*	*Manufacturer*	*Material*
Cabinet	304879	Vertiv Corporation	Aluminum
Pump	SPCLHP310F103014	MTH	Stainless steel/cast iron
Disconnect	OS30FAJ12	ABB	Copper, carbon steel, plastic
VFD	M200-03400056A	Control Techniques	Copper, carbon steel, plastic
Transformer	RC2J1-H/T80/C&C/X	Rex Power Magnetics	Carbon steel, copper

Model Number Nomenclature

1.0 Model Number Nomenclature and Specifications

Example: PR125AA6DD-*