APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY	
APPLICATION #:	OSP – 0640

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☒ New ☐ Renewal

Manufacturer Information

Manufacturer: Vertiv

Manufacturer's Technical Representative: Keith Goshia

Mailing Address: 975 Pittsburgh Drive, Delaware, OH 43015

Telephone: (740) 833-8557 Email: keith.goshia@vertiv.com

Product Information

Product Name: Liebert EXS UPS

Product Type: Uninterruptible Power Supply

Product Model Number: Varies (See attachment)
(List all unique product identification numbers and/or part numbers)

General Description: UPS cabinets, seismic modifications made to address anomalies observed during tests shall be incorporated into the production units.

Mounting Description: Base mounted-rigid

Applicant Information

Applicant Company Name: TRU Compliance, by Structural Integrity Associates, Inc.

Contact Person: Galen Reid

Mailing Address: 5215 Hellyer Ave., Suite 210, San Jose, CA 95138

Telephone: 844-878-0200 Email: greid@structint.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: 12/31/19

Title: Program Manager Company Name: TRU Compliance, by Structural Integrity Associates, Inc.

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

Company Name: TRU Compliance, by Structural Integrity Associates, Inc.

Name: Andrew M. Coughlin California License Number: S6082

Mailing Address: 5215 Hellyer Ave., Suite 210, San Jose, CA 95138

Telephone: 844-878-0200 Email: acoughlin@structint.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: Environmental Testing Laboratory

Contact Name: Jeremy Lange

Mailing Address: 11034 Indian Trail, Dallas, TX 75229

Telephone: (972) 247-9657 Email: jeremy@etldallas.com

Seismic Parameters

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

Design Basis of Equipment or Components (F_p/W_p) = 1.12 (S_{DS} = 1.55, z/h = 1); 1.01 (S_{DS} = 2.25, z/h = 0)

S_{DS} (Design spectral response acceleration at short period, g) = 1.55 (z/h = 1), 2.25 (z/h = 0)

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) = 2.0

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1 (S_{DS} =1.55), 0 (S_{DS}=2.25)

Equipment or Component Natural Frequencies (Hz) = See Attachment

Overall dimensions and weight (or range thereof) = See Attachment

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): Product Matrices

OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2025

Signature: William Staehlin Date: May 13, 2021

Print Name: William Staehlin Title: Senior Structural Engineer

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

Condition of Approval (if applicable):

SPECIAL SEISMIC CERTIFICATION
CERTIFIED COMPONENT MATRIX

1900510-CR-001 R2

VERTIV.

TRU COMPLIANCE

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS

TABLE 1

Certified Product Construction Summary:
Carbon steel frame and skins

Certified Options Summary:
10, 15, 20 and 30 kVA/kW, 208/220V, Three-Phase Tower

Mounting Configuration (Standalone):
Base mounted - rigid
Note: Installed mounting configuration must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS}= ***1.55 g*** ***z/h=1.0*** S_{DS}= ***2.25 g*** ***z/h=0.0*** I_P= ***1.5***

Model Line	Model	Dimensions (in)			Weight (lb)	Notes	UUT
		Depth	Width	Height			
EXS Frame 1 10 kVA	53S10AC1AXXXXX	25.6	13.2	51.2	437	1 battery string	Extrap.
	…	…	…	…	…		Extrap.
	53S10EC2A0B0052	25.6	13.2	51.2	627.5	2 battery strings	1
EXS Frame 1S with Extended Battery 10 kVA	53S10AC3AXXXXX	25.6	22.7	51.2	893	3 battery strings	Interp.
	…	…	…	…	…		Interp.
	53S10FC4A0A0052	25.6	22.7	51.2	1128.5	4 battery strings	2
EXS Frame 2 15-20 kVA	53S15GC2B0XXXX	29.5	17.3	63	734	Identical to EXS 20kVa, software	Interp.
	53S15AG3AXXXXX	29.5	17.3	63	888		Interp.
	53S15GC4AXXXXX	29.5	17.3	63	1042		Interp.
	53S20GC6A0000CB	29.5	17.3	63	767.5	2 battery strings	3
	53S20GCXAXXXXXX	29.5	17.3	63	888		Interp.
	53S20GC8A0C00CO	29.5	17.3	63	1124.5	4 battery strings	4
EXS Fame 3 30 kVA	53S30HCERXXXXXX	23.6	33.5	63	1162	1 battery string	Interp.
	53S30HCFR000CST	23.6	33.5	63	1581	2 battery strings	5
EBC Frame 3	53BP30H11L1	23.6	33.5	63	870	1 battery string	7
	53BP30H12L1	23.6	33.5	63	1376	2 battery strings	6

SPECIAL SEISMIC CERTIFICATION CERTIFIED COMPONENT MATRIX

1900510-CR-001 R2

VERTIV.

TRU COMPLIANCE

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS

TABLE 2

Certified Product Construction Summary:
Carbon steel frame and skins

Certified Options Summary:
30 kVA/kW, 208/220V, Three-Phase Tower

Mounting Configuration (Ganged [1]):
Base mounted - rigid
Note: Installed mounting configuration must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS}= ***1.55 g*** ***z/h=1.0*** S_{DS}= ***2.25 g*** ***z/h=0.0*** I_P= ***1.5***

Model Line	Model	Dimensions (in)			Weight (lb)	Notes	UUT
		Depth	Width	Height			
EXS Frame 3 30 kVA	53S30HCGRBXXXX	47.2	67	63	1162	1 battery string	Extrap.
	53S30HCFR000CST	47.2	67	63	1581	2 battery strings	8
EBC Frame 3	53BP30R11X1XXXX	23.6	33.5	63	870	1 battery string	Extrap.
	53BP30H21L1	23.6	33.5	63	1376	2 battery strings, 1344.5 lbs[2]	8

Note:
[1] UUT 5 was ganged to an EBC Frame 3 battery cabinet (2 string) to create UUT8
[2] EBC Frame 3 ganged battery cabinet weighs less than identical standalone due to right panel being removed to attached the unit to a UPS.

SPECIAL SEISMIC CERTIFICATION
CERTIFIED COMPONENT MATRIX

1900510-CR-001 R2

Manufacturer:	Vertiv Corporation
Model Line:	Liebert EXS UPS

TABLE 3

EXS Nomenclature

1-2	3	4-5	6	7	8	9	10	11	12	13-15
Product Line	System Type	Nameplate Rating	Frame Type	Input & Output Voltage	Battery String Qty & No. of Jars/String	Battery Model Code	Factory Installed Communication Cards [1,2]	Factory Installed Distribution Slot 1	Factory Installed Distribution Slot 2 [3]	Config Digits
53 = Liebert EXS	S = Single Module	10 = 10kVA/10kW 15 = 15kVA/15kW 20 = 20kVA/20kW 30 = 30kVA/30kW	A = Frame 1 335mm, 10kA B = Frame 1S 570mm, 10kA E = Frame 1 335mm, 30kA F = Frame 1S 570mm, 30kA G = Frame 2 440mm, 30kA H = Frame 3 600mm, 30kA	C = 208/120 in 208/120 out Y = 220/127 in 220/127 out	0 = None 1 = 1 String - 32 Jars 2 = 2 Strings - 32 Jars 3 = 3 Strings - 32 Jars 4 = 4 Strings - 32 Jars 6 = 2 Strings - 28 Jars 7 = 3 Strings - 28 Jars 8 = 4 Strings - 28 Jars E = 1 String - 20 Jars F = 2 Strings - 20 Jars G = 3 Strings - 20 Jars H = 4 Strings - 20 Jars	0 = No Battery A = CSB HRL1234WF2FR R = CSB HRL12150WFR	0 = IS-UNITY-LIFE / None 1 = IS-UNITY-SNMP / None 2 = IS-UNITY-DP / None 3 = IS-UNITY-LIFE / IS-RELAY 4 = IS-UNITY-LIFE / IS-485EXI 5 = IS-UNITY-SNMP / IS-RELAY 6 = IS-UNITY-SNMP / IS-485EXI 7 = IS-UNITY-DP / IS-RELAY 8 = IS-UNITY-DP / IS-485EXI A = IS-UNITY-DP / IS-UNITY-DP B = IS-UNITY-DP / IS-UNITY-SNMP C = IS-UNITY-SNMP / IS-UNITY-SNMP D = IS-485EXI / None E = IS-485EXI / IS-RELAY	These characters are shared for digits 11 & 12: 0 = None A - (2) L21-30R **[PD3-001]** B - (6) L6-30R **[PD3-002]** C - (6) L5-30R **[PD3-003]** D - (1) IEC60309 3W **[PD3-004]** E - (6) L5-20R **[PD3-005]** F - (6) L6-20R **[PD3-006]** G - (2) L15-30R **[PD3-007]** H - (1) CS8365C **[PD3-008]** J - (2) L21-20R **[PD3-009]** K - (2) L15-20R **[PD3-010]** L - (1) IEC60309 4W **[PD3-011]** 1 = (2) L6-30R, (8) 5-15/20R, **[PD2-101]** 2 = (4) L6-20R, (4) 5-15/20R, **[PD2-102]** 3 = (4) L6-30R, (4) 5-15/20R, **[PD2-103]** 4 = (2) L6-30R, (2) L6-20R, (4) 5-15/20R, **[PD2-104]** 5 = (2) L5-30R, (2) L5-20R, (4) 5-15/20R, **[PD2-105]** 6 = (4) L6-20R, (4) L5-20R, **[PD2-106]** 7 = (4) L5-20R, (4) 5-15/20R, **[PD2-107]** 8 = (2) L6-30R, (2) L6-20R, **[PD2-108]** 9 = (2) L14-30R, [PD2-109] W = (4) IEC320-C19, (4) IEC320-C13, **[PD2-200]** X = (2) IEC320-C19, (8) IEC320-C13, **[PD2-201]** Y = (12) IEC320-C13, **[PD2-202]** Z = (2) IEC320-32A, (4) IEC320-C13, **[PD2-204]**		Unique Number Automatic Assigned

tes:

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

1900510-CR-001 R2

VERTIV.

TRU COMPLIANCE

Manufacturer:	Vertiv Corporation	***Table Description:*** Subcomponents	**TABLE 4**
Model Line:	Liebert EXS UPS		

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS} = 1.55 g z/h = 1.0; S_{DS} = 2.25 g z/h = 0.0 I_P = 1.5

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT
		Depth	Width	Height				
Battery (CBS)	HRL123W-F2FR	2.6	6	3.7	6	Lead Acid		1,2,3,4,5
	HRL12150W-FR	7.7	5.12	6.8	26.5	Lead Acid		6,7,8
Battery (Data Safe)	12HX150	7.68	5.12	6.46	22.5	Lead Acid		8
Bypass /Maintenance Isolation Breaker (ABB)	S203-C40	2.1	2.7	3.5	0.8	Plastic		1,2,3
Maintenance Bypass Breaker (ABB)	S203-C50	2.1	2.7	3.5	0.8	Plastic		1,2,3
2925.5	S204-C40	2.8	2.7	3.5	1.1	Plastic		1,2,3
Breaker (NADER)	NDM1-125C80/3	2.8	2.7	3.5	1.2	Plastic		4,5
	NDM1-125C125/3	2.8	2.7	3.5	1.2	Plastic		8
Breaker (Siemens)	3VA5217-5EC31-0AA0	4.2	4.1	7.3	4.5	Plastic		6,7,8
Communication Cards (Liebert)	IS-UNITY-LIFE		3	1.5	0.44	Carbon steel and plastic		1,2
	IS-UNITY-SNMP		3	1.5	0.44			3
	IS-UNITY-DP		3	1.5	0.44			4
	IS-RELAY		3	1.5	0.44			5,6
	IS-485EXI		3	1.5	0.44			5,6

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

1900510-CR-001 R2

VERTIV.

TRU COMPLIANCE

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS

Table Description: PODS

TABLE 5

Building Code: ***CBC 2019***

Seismic Certification Limits: S_{DS} = 1.55 g z/h = 1.0; S_{DS} = 2.25 g z/h = 0.0; I_P = 1.5

Model Line (Manufacturer)	Model[1]	Dimension (in)			Weight (lb)	Material	Notes	UUT
		Depth	Width	Height				
Power Output Distribution (Vertiv Co.)	PD3-001		7.4	5.7	4.4	Carbon steel and plastic	(2) L21-30R	2
	PD3-002		7.4	5.7	6.6	Carbon steel and plastic	(6) L6-30R	1
	PD3-003		7.4	5.7	6.6	Carbon steel and plastic	(6) L5-30R	4
	PD3-004		7.4	5.7	4.4	Carbon steel and plastic	(1) IEC60309 - 60A (4W+G)	Interp.
	PD3-005		7.4	5.7	6.6	Carbon steel and plastic	(6) L5-20R	Interp.
	PD3-006		7.4	5.7	6.6	Carbon steel and plastic	(6) L6-20R	Interp.
	PD3-007		7.4	5.7	4.4	Carbon steel and plastic	(2) L15-30R	Interp.
	PD3-008		7.4	5.7	4.4	Carbon steel and plastic	(1) CS8364C- 60A	Interp.
	PD3-009		7.4	5.7	4.4	Carbon steel and plastic	(2) L21-20R	Interp.
	PD3-010		7.4	5.7	4.4	Carbon steel and plastic	(2) L15-20R	Interp.
	PD3-011		7.4	5.7	4.4	Carbon steel and plastic	(1) IEC60309 - 60A (3W+G)	Interp.

Notes:
[1] All PODS are of similar construction, output receptacle vary.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1900510-CR-001 R2

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS

UUT	Unit Description	Report Number	Testing Laboratory	S_{DS}	z/h	I_P
1	EXS Frame 1 10 kVA Standalone	15392 Rev.3 and Addendum "15392 Rev.3 Addendum 1"	ETL- Dallas	1.55 2.25	1 0	1.5
2	EXS Frame 1S 10 kVA Standalone	15392 Rev.3 and Addendum "15392 Rev.3 Addendum 1"	ETL-Dallas	1.55 2.25	1 0	1.5
3	EXS Frame 2 20 kVA Standalone 2 String	15392 Rev.3 and Addendum "15392 Rev.3 Addendum 1"	ETL-Dallas	1.55 2.25	1 0	1.5
4	EXS Frame 2 20 kVA Standalone 4 String	15392 Rev.3 and Addendum "15392 Rev.3 Addendum 1"	ETL-Dallas	1.55 2.25	1 0	1.5
5	EXS Frame 3 30 kVA Standalone 2 String	15392 Rev.3 and Addendum "15392 Rev.3 Addendum 1"	ETL-Dallas	1.55 2.25	1 0	1.5
6	EBC Frame 3 Standalone 4 String	15392 Rev.3 and Addendum "15392 Rev.3 Addendum 1"	ETL-Dallas	1.55 2.25	1 0	1.5
7	EBC Frame 3 Standalone 2 String	15392 Rev.3 and Addendum "15392 Rev.3 Addendum 1"	ETL-Dallas	1.55 2.25	1 0	1.5
8	EBC Frame 3 - EXS Frame 3 Ganged 4 String	15392 Rev.3 and Addendum "15392 Rev.3 Addendum 1"	ETL-Dallas	1.55 2.25	1 0	1.5

Notes:

UNIT UNDER TEST (UUT) SUMMARY SHEET

1900510-CR-001 R2

UUT 1

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS
Model Number: 53S10EC2A0B0052 ***Serial Number:*** M19GBE0002

Product Construction Summary:
Carbon steel frame and skin

Options/Subcomponent Summary:
Battery - CBS (PN: HRL123W-F2Fr, Bypass/Maintenance Isolator Breaker - ABB: S203-C40, Maintenance Bypass Breaker -ABB: S203-C50, Rectifier Input Breaker-ABB: S204-C40, Communication Card-Vertiv: IS-UNITY-LIFE, Power Output Distribution-Vertiv: PD3-002

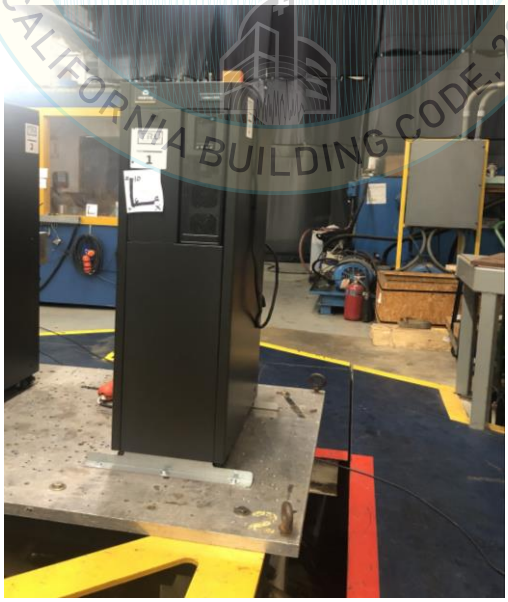
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
627.5	25.6	13.2	51.2	13.84	10.59	22.50

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2018)	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT base mounted rigid to shake table with mounting brackets at the front and rear base of unit. Each mounting bracket (Vertiv PN: 660267P1) was attached to the unit with (4) 3/8" Grade 5 bolts and to the shake table with (3) 3/8" Grade 5 bolts. All bolts used lock washers and flat washers.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1900510-CR-001 R2

UUT 2

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS
Model Number: 53S10FC4A0A0052 ***Serial Number:*** M19GBE0003

Product Construction Summary:
Carbon steel frame and skin, sidecar battery

Options/Subcomponent Summary:
Battery - CBS (PN: HRL123W-F2Fr, Bypass/Maintenance Isolator Breaker - ABB: S203-C40, Maintenance Bypass Breaker -ABB: S203-C50, Rectifier Input Breaker-ABB: S204-C40, Communication Card-Vertiv: IS-UNITY-LIFE, Power Output Distribution-Vertiv: PD3-001

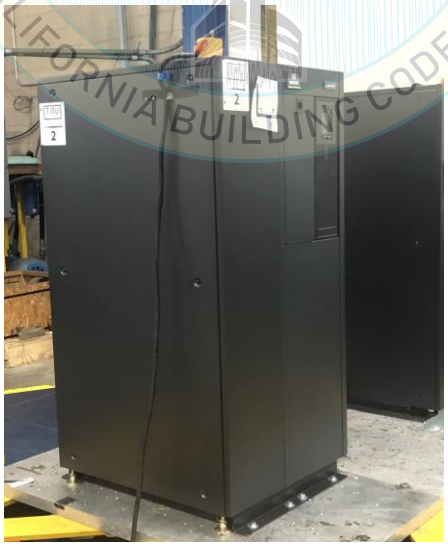
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1128.5	25.6	22.7	51.2	8.62	11.01	28.40

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2018)	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT base mounted rigid to shake table with mounting brackets at the front and rear base of unit. Each mounting bracket (Vertiv PN: 660130P1 & 660130P2) attached to the shake table with (4) 3/8" Grade 5 bolts and to the unit with (4) 3/8" Grade 5 bolts. All bolts used lock washers and flat washers.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1900510-CR-001 R2

UUT 3

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS
Model Number: 53S20GC6A0000CB ***Serial Number:*** M19GB00002

Product Construction Summary:
Carbon steel frame and skins, 2 battery string

Options/Subcomponent Summary:
Battery - CBS (PN: HRL123W-F2Fr, Bypass/Maintenance Isolator Breaker - ABB: S203-C40, Maintenance Bypass Breaker -ABB: S203-C50, Rectifier Input Breaker-ABB: S204-C40, Communication Card-Vertiv: IS-UNITY-SNMP

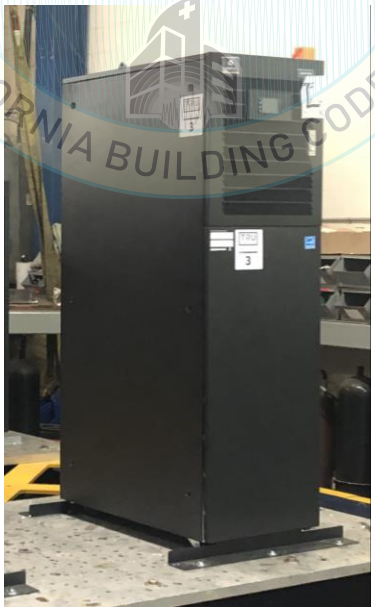
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
767.5	29.5	17.3	63	11.52	5.92	>33.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2018)	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT base mounted rigid to shake table with mounting brackets at the front and rear base of unit. Each mounting bracket (Vertiv PN: 660224P1) was attached to the unit with (4) 3/8" Grade 5 bolts and to the shake table with (4) 3/8" Grade 5 bolts. All bolts used lock washers and flat washers.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1900510-CR-001 R2

UUT 4

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS
Model Number: 53S20GC8A0C00CO ***Serial Number:*** M19GB00003

Product Construction Summary:
Carbon steel and skin - 4 battery string

Options/Subcomponent Summary:
Battery - CBS (PN: HRL123W-F2Fr, Breaker-Nader: NDM1-125C80/3 Communication Card-Vertiv: IS-UNITY-DP, Power Output Distribution-Vertiv: PD3-003

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1124.5	29.5	17.3	63	9.06	3.79	19.96

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2018)	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:

UUT base mounted rigid to shake table with mounting brackets at the front and rear base of unit. Each mounting bracket (Vertiv PN: 660224P1) was attached to the unit with (4) 3/8" Grade 5 bolts and to the shake table with (4) 3/8" Grade 5 bolts. All bolts used lock washers and flat washers.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1900510-CR-001 R2

UUT 5

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS
Model Number: 53S30HCFR000CST ***Serial Number:*** M19GBE008

Product Construction Summary:
Carbon steel frame and skin

Options/Subcomponent Summary:
Battery - CBS (PN: HRL123W-F2Fr, Breaker-Nader: NDM1-125C80/3, Communication Card-Vertiv: IS-Relay, Communication Card-Vertiv: IS-485EXI, Output Distribution-Vertiv: PD2-102

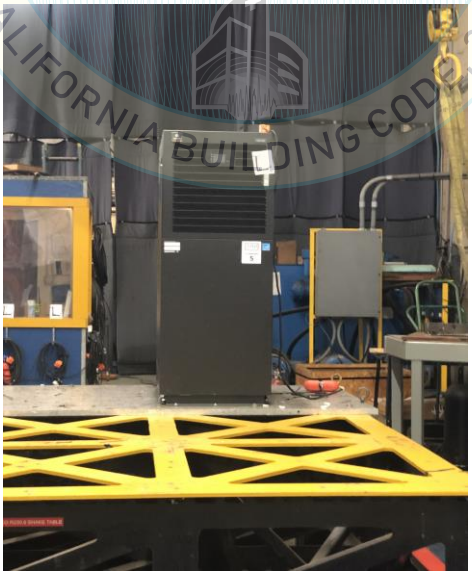
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1581	23.6	33.5	63	12.01	5.51	17.24

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2018)	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT base mounted rigid to shake table with mounting brackets at the front and rear base of unit. Each mounting bracket (Vertiv PN: 660224P1) was attached to the unit with (4) 3/8" Grade 5 bolts and to the shake table with (4) 3/8" Grade 5 bolts. All bolts used lock washers and flat washers.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1900510-CR-001 R2

VERTIV.

TRU COMPLIANCE

UUT 6

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS
Model Number: 53BP30H12L1 ***Serial Number:*** N/A

Product Construction Summary:
Carbon steel frame and skin, 2 Battery Strings

Options/Subcomponent Summary:
Battery - CBS: HRL12150W-FR, Battery-Data Safe: 12HX150, Breaker - Siemens: 3VA5217-5EC31-0AA0

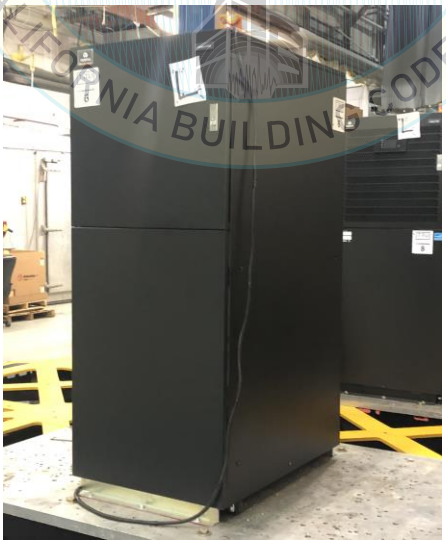
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1376	23.6	33.5	63	11.21	6.44	22.20

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2018)	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT base mounted rigid to shake table with mounting brackets at the front and rear base of unit. Each mounting bracket (Vertiv PN: 660224P1) was attached to the unit with (4) 3/8" Grade 5 bolts and to the shake table with (4) 3/8" Grade 5 bolts. All bolts used lock washers and flat washers.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1900510-CR-001 R2

VERTIV.

TRU COMPLIANCE

Manufacturer:	Vertiv Corporation	**UUT 7**
Model Line:	Liebert EXS UPS	
Model Number:	53BP30H11L1	***Serial Number:*** N/A

Product Construction Summary:

Carbon steel frame and skin, 1 Battery String

Options/Subcomponent Summary:

Battery - CBS: HRL12150W-FR, Breaker - Siemens: 3VA5217-5EC31-0AA0

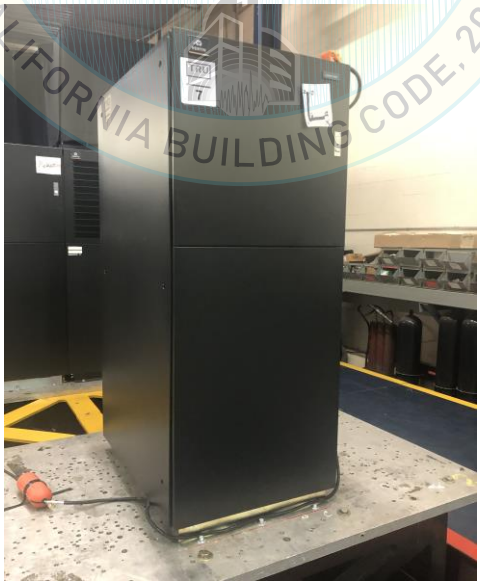
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
870	23.6	33.5	63	15.61	7.27	22.33

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2018)	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT base mounted rigid to shake table with mounting brackets at the front and rear base of unit. Each mounting bracket (Vertiv PN: 660224P1) was attached to the unit with (4) 3/8" Grade 5 bolts and to the shake table with (4) 3/8" Grade 5 bolts. All bolts used lock washers and flat washers.

Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.

Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1900510-CR-001 R2

VERTIV.

TRU COMPLIANCE

UUT 8

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS
Model Number: 53BP30H21L1 & 53S30HCER000CST ***Serial Number:*** M19GBE0007 & M19GBE0008

Product Construction Summary:
Carbon steel frame and skin. Units ganged together and 4 Battery Strings.

Options/Subcomponent Summary:
Battery - CBS: HRL12150W-FR, Battery-Data Safe: 12HX150, Breaker - Siemens: 3VA5217-5EC31-0AA0, Breaker-Nader: NDM1-125C80/3, Communication Card-Vertiv: IS-Relay, Communication Card-Vertiv: IS-485EXI, Output Distribution-Vertiv: PD2-102

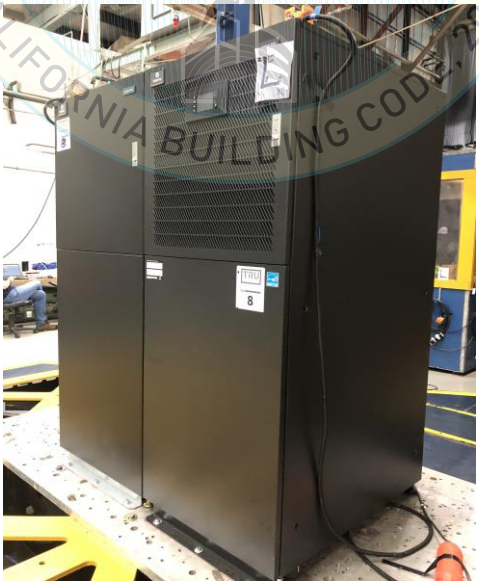
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
2925.5	23.6	67	63	7.56	4.13	17.48

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2018)	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT ganged together with two M10 bolts at the front and back junction of the cabinets. UUT base mounted - rigid to table with four (4) brackets provided by manufacturer (Vertiv PN: 660224P1). Each mounting bracket was attached to the unit with (4) 3/8" Grade 5 bolts and to the shake table with (4) 3/8" Grade 5 bolts. All bolts used lock washers and flat washers.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.