APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0640

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Vertiv Corporation

Manufacturer's Technical Representative: Julian Freeman

Mailing Address: 975 Pittsburgh Drive, Delaware, OH 43015

Telephone: (740) 833-8910 Email: julian.freeman@vertiv.com

Product Information

Product Name: UPS and Batteries

Product Type: UPS

Product Model Number: Varies (See attachment)

General Description: UPS Cabinets

Mounting Description: Rigid, Floor Mounted

Tested Seismic Enhancements: Seismic enhancements made to the test units and/or modifications required to address anomalies during the tests shall be incorporated into the production units.

Applicant Information

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

Contact Person: Daniel Zentner

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

Telephone: (541) 292-5839 Email: dzentner@structint.com

Title: Program Manager

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

Company Name: STRUCTURAL INTEGRITY ASSOCIATES, INC.

Name: Andrew Coughlin California License Number: S6082

Mailing Address: 5215 Hellyer Ave, Suite 101, San Jose, CA 951381025

Telephone: (415) 635-8461 Email: acoughlin@structint.com

Certification Method

☐ GR-63-Core ☒ ICC-ES AC156 ☐ IEEE 344 ☐ IEEE 693 ☐ NEBS 3

☐ Other (Please Specify):

Testing Laboratory

Company Name: ENVIRONMENTAL TESTING LABORATORIES, INC. (ETL)

Contact Person: Jeremy Lange

Mailing Address: 11034 Indian Trail, Dallas TX 75229-3513

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

Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 1.12 (SDS = 1.55, z/h = 1); 1.01 (SDS = 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 (Amplification factor) = 1.0

R_p (Response modification factor) = 2.5

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height ratio factor) = 1 and 0

Natural frequencies (Hz) = See Attachment

Overall dimensions and weight = See Attachment

HCAI Approval (For Office Use Only) - Approval Expires on 08/26/2028

Date: 8/26/2022

Name: Mohammad Karim Title: Supervisor, Health Facilities

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-R4

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 Power

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 2022 ***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	1,128.5	4 Battery Strings	2
EXS Frame 2 15-20 kVA	53S15GC2B0XXXX	29.5	17.3	63.0	734	Identical to EXS 20kVa, Software	Interp.
	53S15AG3AXXXXX	29.5	17.3	63.0	888		Interp.
	53S15GC4AXXXXX	29.5	17.3	63.0	1,042		Interp.
	53S20GC6A0000CB	29.5	17.3	63.0	767.5	2 Battery Strings	3
	53S20GCXAXXXXXX	29.5	17.3	63.0	888		Interp.
	53S20GC8A0C00CO	29.5	17.3	63.0	1,124.5	4 Battery Strings	4
EXS Fame 3 30 kVA	53S30HCERXXXXXX	23.6	33.5	63.0	1,162	1 Battery String	Interp.
	53S30HCFR000CST	23.6	33.5	63.0	1,079.5	2 Battery Strings	5
EBC Frame 3	53BP30H11L1	23.6	33.5	63.0	870	1 Battery String	7
	53BP30H12L1	23.6	33.5	63.0	1,376	2 Battery Strings	6

SPECIAL SEISMIC CERTIFICATION CERTIFIED COMPONENT MATRIX

1900510-CR-001-R4

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 Power

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 2022 ***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	67.0	63.0	1,162	1 Battery String	Extrap.
	53S30HCFR000CST	47.2	67.0	63.0	1,581	2 Battery Strings	8
EBC Frame 3	53BP30R11X1XXXX	23.6	33.5	63.0	870	1 Battery String	Extrap.
	53BP30H21L1	23.6	33.5	63.0	1,376	2 Battery Strings, 1344.5 lbs[2]	8

Notes:
1. UUT5 was ganged to an EBC Frame 3 Battert Cabinet (2 String) to create UUT8
2. EBC Frame 3 was ganged battery cabinet weighs less than identical standalone due to right panel being removed to attached the unit to a UPS.

SPECIAL SEISMIC CERTIFICATION NOMENCLATURE MATRIX

1900510-CR-001-R4

TRU COMPLIANCE

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS

TABLE 3

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

Notes:

1. Communication card code 3 is standard for the Liebert EXS 10 kVA model
2. Communication card codes A, B, and C are only available in Liebert EXS Frames 2 & 3 (15-30 kVA)
3. Distribution Slot #2 is only available on the Liebert EXS Frames 2 & 3 (15-30 kVA)

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

1900510-CR-001-R4

TRU COMPLIANCE

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS

Table Description: Subcomponents

TABLE 4

Building Code: CBC 2022

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	2.60	6.00	3.70	6.00	Lead Acid		1, 2, 3, 4, 5
	HRL12150W-FR	7.70	5.12	6.80	26.50	Lead Acid		6, 7, 8
Battery (Data Safe)	12HX150	7.68	5.12	6.46	22.50	Lead Acid		8
Bypass /Maintenance Isolation Breaker (ABB)	S203-C40	2.10	2.70	3.50	0.80	Plastic		1, 2, 3
Maintenance Bypass Breaker (ABB)	S203-C50	2.10	2.70	3.50	0.80	Plastic		1, 2, 3
Rectifier Input Breaker (ABB)	S204-C40	2.80	2.70	3.50	1.10	Plastic		1, 2, 3
Breaker (NADER)	NDM1-125C80/3	2.80	2.70	3.50	1.20	Plastic		4, 5
	NDM1-125C125/3	2.80	2.70	3.50	1.20	Plastic		8
Breaker (Siemens)	3VA5217-5EC31-0AA0	4.20	4.10	7.30	4.50	Plastic		6, 7, 8
Communication Cards (Liebert)	IS-UNITY-LIFE		3.00	1.50	0.44	Carbon Steel and Plastic		1, 2
	IS-UNITY-SNMP		3.00	1.50	0.44			3
	IS-UNITY-DP		3.00	1.50	0.44			4
	IS-RELAY		3.00	1.50	0.44			5, 6
	IS-485EXI		3.00	1.50	0.44			5, 6

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

1900510-CR-001-R4

Manufacturer: Vertiv Corporation
Model Line: Liebert EXS UPS

Table Description: Power Output Distribution (PODS)

TABLE 5

Building Code: CBC 2022

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

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		(6) L6-30R	1
	PD3-003		7.4	5.7	6.6		(6) L5-30R	4
	PD3-004		7.4	5.7	4.4		(1) IEC60309 - 60A (4W+G)	Interp.
	PD3-005		7.4	5.7	6.6		(6) L5-20R	Interp.
	PD3-006		7.4	5.7	6.6		(6) L6-20R	Interp.
	PD3-007		7.4	5.7	4.4		(2) L15-30R	Interp.
	PD3-008		7.4	5.7	4.4		(1) CS8364C- 60A	Interp.
	PD3-009		7.4	5.7	4.4		(2) L21-20R	Interp.
	PD3-010		7.4	5.7	4.4		(2) L15-20R	Interp.
	PD3-011		7.4	5.7	4.4		(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-R4

Manufacturer: Vertiv Corporation

Model Line: Liebert EXS UPS

UUT	Unit Description	Report Number	Testing Lab	Year Tested	ISO 17025 Accredited?	S_{DS}	z/h	I_P
1	EXS Frame 1 (10kVA)	15392, Rev.3	Environmental Testing Lab (ETL)	2019	Yes	1.55 2.25	1.0 0.0	1.5
2	EXS Frame 1S (10kVA w/ Battery)	15392, Rev.3	Environmental Testing Lab (ETL)	2019	Yes	1.55 2.25	1.0 0.0	1.5
3	EXS Frame 2 (20kVA)	15392, Rev.3	Environmental Testing Lab (ETL)	2019	Yes	1.55 2.25	1.0 0.0	1.5
4	EXS Frame 2 (20kVA)	15392, Rev.3	Environmental Testing Lab (ETL)	2019	Yes	1.55 2.25	1.0 0.0	1.5
5	EXS Frame 3 - 30 kVA (2 String)	15392, Rev.3	Environmental Testing Lab (ETL)	2019	Yes	1.55 2.25	1.0 0.0	1.5
6	EBC Frame 3 (2 String)	15392, Rev.3	Environmental Testing Lab (ETL)	2019	Yes	1.55 2.25	1.0 0.0	1.5
7	EBC Frame 3 (1 String)	15392, Rev.3	Environmental Testing Lab (ETL)	2019	Yes	1.55 2.25	1.0 0.0	1.5
8	EBC Frame 3 - EXS Frame 3 (Ganged- 4 String)	15392, Rev.3	Environmental Testing Lab (ETL)	2019	Yes	1.55 2.25	1.0 0.0	1.5

Notes:

UNIT UNDER TEST (UUT) SUMMARY SHEET

1900510-CR-001-R4

UUT 1

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

Product Construction Summary:
Carbon Steel Frame and Skin, 2 Battery Strings

Options/Subcomponent Summary:
Battery: CBS (HRL123W-F2FR), **Bypass/Maintenance Isolation Breaker:** ABB (S203-C40), **Maintenance Bypass Breaker:** ABB (S203-C50), **Rectifier Input Breaker:** ABB (S204-C40), **Communication Cards:** Liebert (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 2022	ICC-ES AC156	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:

UUT1 was base mounted - rigid to the shake table with mounting brackets at the front and rear base of the unit. Each mounting bracket (Vertiv-PN: 610267P1) was attached to the unit with two (2) 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-R4

UUT 2

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

Product Construction Summary:
Carbon Steel Frame and Skin, 4 Battery Strings

Options/Subcomponent Summary:
Battery: CBS (HRL123W-F2FR), **Bypass/Maintenance Isolation Breaker:** ABB (S203-C40), **Maintenance Bypass Breaker:** ABB (S203-C50), **Rectifier Input Breaker:** ABB (S204-C40), **Communication Cards:** Liebert (IS-UNITY-LIFE), **Power Output Distribution:** Vertiv (PD3-001)

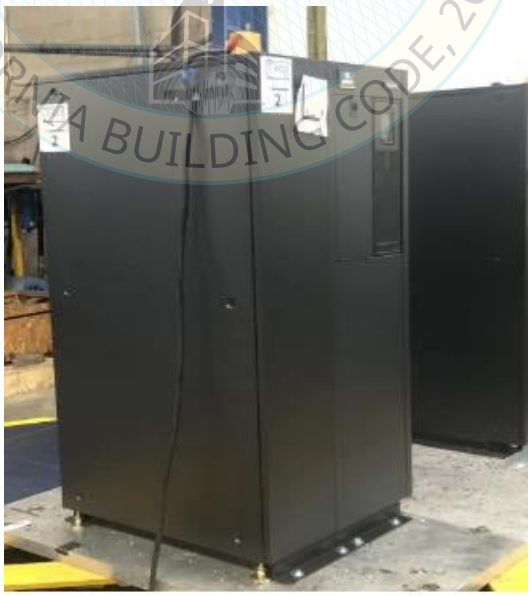
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,128.5	25.6	22.7	51.2	8.62	11.02	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 2022	ICC-ES AC156	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT2 was base mounted - rigid to the shake table with mounting brackets at the front and rear base of the unit. Each mounting bracket (Vertiv-PN: 660130P1 & 660130P2, QTY 1 each) was attached to the unit with four (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-R4

UUT 3

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

Product Construction Summary:
Carbon Steel Frame and Skin, 2 Battery Strings

Options/Subcomponent Summary:
Battery: CBS (HRL123W-F2FR), **Bypass/Maintenance Isolation Breaker:** ABB (S203-C40), **Maintenance Bypass Breaker:** ABB (S203-C50), **Rectifier Input Breaker:** ABB (S204-C40), **Communication Cards:** Liebert (IS-UNITY-SNMP)

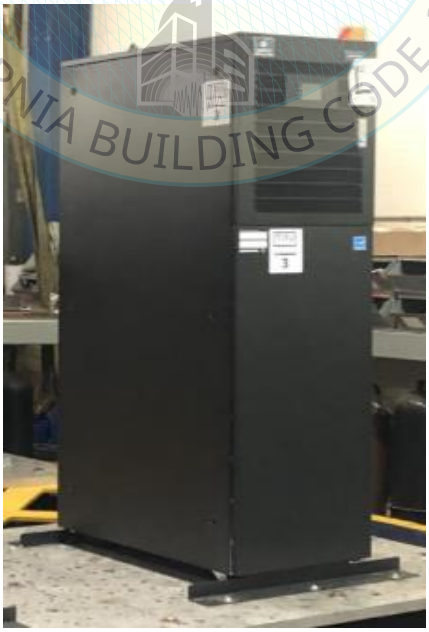
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
767.5	29.5	17.3	63.0	11.52	5.92	>33.33

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 2022	ICC-ES AC156	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT3 was base mounted - rigid to the shake table with mounting brackets at the front and rear base of the unit. Each mounting bracket (Vertiv-PN: 610224P1) was attached to the unit with four (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-R4

UUT 4

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

Product Construction Summary:
Carbon Steel Frame and Skin, 4 Battery Strings

Options/Subcomponent Summary:
Battery: CBS (HRL123W-F2FR), **Breaker:** Nader (NDM1-125C80/3), **Communication Cards:** Liebert (IS-UNITY-DP), **Power Output Distribution:** Vertiv (PD3-003)

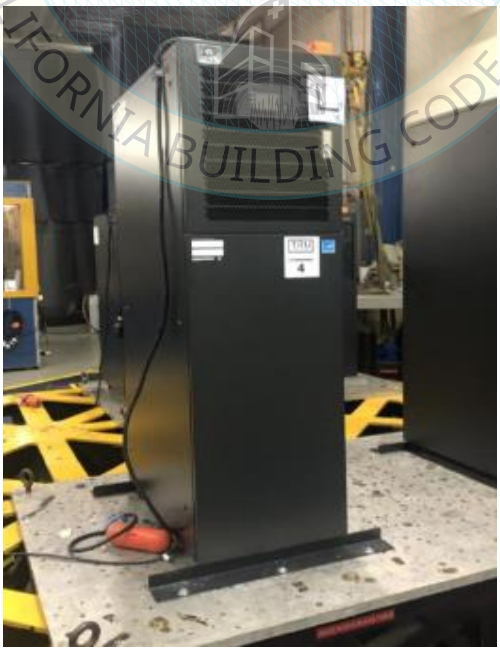
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,124.5	29.5	17.3	63.0	9.06	3.79	19.97

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 2022	ICC-ES AC156	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT4 was base mounted - rigid to the shake table with mounting brackets at the front and rear base of the unit. Each mounting bracket (Vertiv-PN: 610224P1) was attached to the unit with four (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-R4

UUT 5

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

Product Construction Summary:
Carbon Steel Frame and Skin, 2 Battery Strings

Options/Subcomponent Summary:
Battery: CBS (HRL123W-F2FR), **Breaker:** Nader (NDM1-125C80/3), **Communication Cards:** Liebert (IS-RELAY, IS-485EXI)

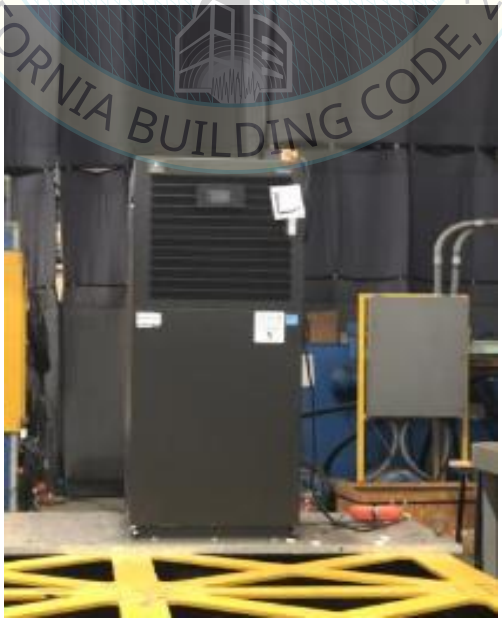
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,079.5	23.6	33.5	63.0	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 2022	ICC-ES AC156	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT5 was base mounted - rigid to the shake table with mounting brackets at the front and rear base of the unit. Each mounting bracket (Vertiv-PN: 660124P1) was attached to the unit with four (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-R4

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), **Breaker:** Siemens (3VA5217-5EC31-0AA0), **Communication Cards:** Liebert (IS-RELAY, IS-485EXI)

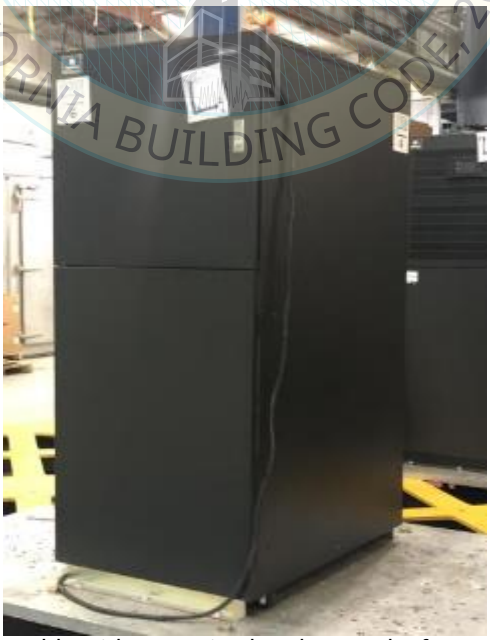
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,376	23.6	33.5	63.0	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 2022	ICC-ES AC156	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT6 was base mounted - rigid to the shake table with mounting brackets at the front and rear base of the unit. Each mounting bracket (Vertiv-PN: 609885P1) was attached to the unit with four (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-R4

UUT 7

Manufacturer: Vertiv Corporation
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)

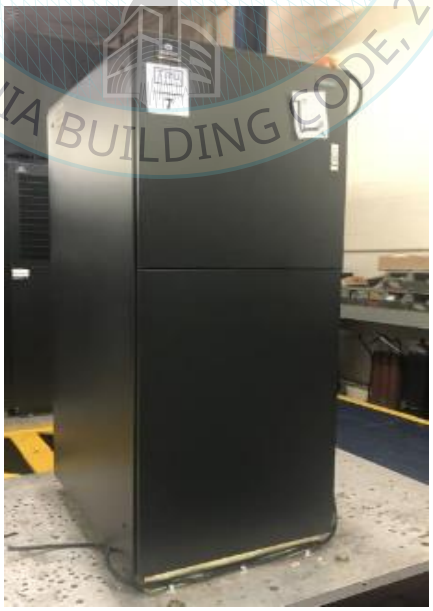
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
870	23.6	33.5	63.0	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 2022	ICC-ES AC156	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



UUT7 was base mounted - rigid to the shake table with mounting brackets at the front and rear base of the unit. Each mounting bracket (Vertiv-PN: 609885P1) was attached to the unit with four (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-R4

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) & Data Safe (12HX150), **Breaker:** Nader (NDM1-125C125/3) & Siemens (3VA5217-5EC31-0AA0)

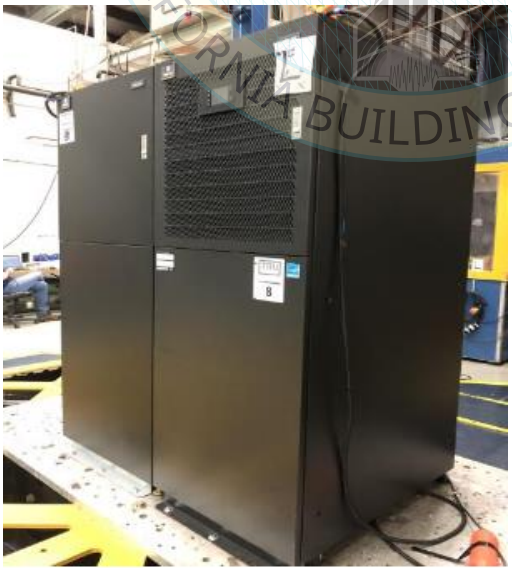
UUT Properties

Weight[1] (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
2,957	23.6	67.0	63.0	7.22	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 2022	ICC-ES AC156	1.55	1.0	1.5	2.48	1.86	1.50	0.60
		2.25	0.0					

Test Mounting Details:



[1]Weight listed is the total for ganged EXS and EBC. Individual details are as follows:

EXS Frame 3: 1,581 lbs.
EBC Frame 3: 1,376 lbs.

UUT8 ganged together with two (2) M10 bolts at the front and back junction of the cabinents. UUT8 was base mounted - rigid to the table with four (4) brackets provided by manufacturer (Vertiv-PN:660124P1 & 609885P1, QTY 2 each). Each mounting bracket was attached to the unit with four (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.