



DEPARTMENT OF HEALTH CARE ACCESS AND INFORMATION
OFFICE OF STATEWIDE HOSPITAL PLANNING AND DEVELOPMENT

APPLICATION FOR HCAI SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0873

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☒ New ☐ Renewal

Manufacturer Information

Manufacturer: Musashi Energy Solutions

Manufacturer's Technical Representative: Zwe Thiha

Mailing Address: 195 Brydges Drive, Battle Creek, MI 49037

Telephone: (269) 268-3020

Email: zwe.thiha@musahina.com

Product Information

Product Name: ESS400

Product Model Number(s): Reference attachment

Product Category: UPS and Batteries

Product Sub-Category: Energy Storage Systems (ESS)

General Description: Hybrid Super Capacitor-Based Energy Storage System.

Mounting Description: Base Mounted Rigid

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: Dynamic Certification Laboratories

Contact Person: Rachel Wolfe

Mailing Address: 1315 Greg Street, Sparks, NV 89431

Telephone: (775) 358-5085

Email: rachel.wolfe@shaketest.com

Title: Seismic Test Engineer



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

Company Name: THE VMC GROUP

Name: Kenneth Tarlow California License Number: S2851

Mailing Address: 980 9th Street, 16th Floor, Sacramento, CA 95814

Telephone: (832) 627-2214 Email: ken.tarlow@thevmcgroup.com

Certification Method

☐ GR-63-Core ☒ ICC-ES AC156 ☐ IEEE 344 ☐ IEEE 693 ☐ NEBS 3
☐ Other (Please Specify): _____

Testing Laboratory

Company Name: UNIVERSITY OF NEVADA, RENO (UNR)

Contact Person: Patrick LaPlace

Mailing Address: 1664 N. Virginia Street, Reno NV 89557

Telephone: (775) 784-6937 Email: plaplace@unr.edu

BY: Mohammad Karim

DATE: 11/25/2025



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Seismic Parameters

Certified Response Spectral Acceleration Factors: (F_p/W_p)

Horizontal (A Flx-H), $g =$ 3.2 (A Rig-H), $g =$ 2.15

Vertical (A Flx-V), $g =$ 1.67 (A Rig-V), $g =$ 0.67

SDS (Design spectral response acceleration at short period, g) = 2.0g at $z/h=1$; 2.5 at $z/h=0$

H_f (Force amplification height factor) = 3.5 at $z/h=1$; 1.0 at $z/h=0$

R_u (Structure ductility reduction factor) = 1.3 at $z/h=1$; 1.0 at $z/h=0$

I_p (Importance factor) = 1.5

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

HCAI Approval (For Office Use Only) - Approval Expires on 11/25/2031

Date: 11/25/2025

Name: Mohammad Karim

Title: Supervisor, Health Facilities

Condition of Approval (if applicable): _____

OSP-0873

BY: Mohammad Karim

DATE: 11/25/2025



Special Seismic Certification

Table 1 - Certified Components



DCL Project Number: 89500-2501

Manufacturer: Musashi Energy Solutions

Product Line: ESS400

Product Type: Energy Storage System

Certified Product Construction: Powder Coated Carbon Steel

Mounting: Rigid Base Mounted

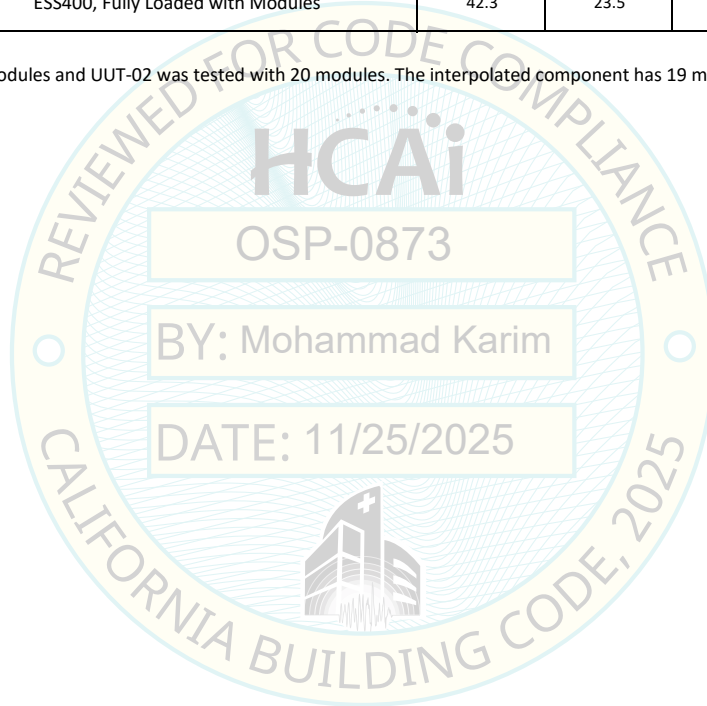
Certified Seismic Levels: Sds 2.0 g at z/h=1.0 and Sds 2.5 g at z/h=0

Factors for Force Amplification and Structure Ductility Reduction: $H_f = 3.5$ at z/h=1.0; 1.0 at z/h=0 and $R_{\mu} = 1.3$ at z/h=1.0; 1.0 at z/h=0

Model Number	Description ¹	Max. Dimensions [in.]			Max. Weight [lb.]	Unit
		Depth	Width	Height		
ESS400-18	ESS400, Partially Loaded with Modules	42.3	23.5	78.3	1350	UUT-01
ESS400-19	ESS400, Partially Loaded with Modules	42.3	23.5	78.3	1396	Interpolated
ESS400-20	ESS400, Fully Loaded with Modules	42.3	23.5	78.3	1440	UUT-02

Note:

1. UUT-01 was tested with 18 modules and UUT-02 was tested with 20 modules. The interpolated component has 19 modules.



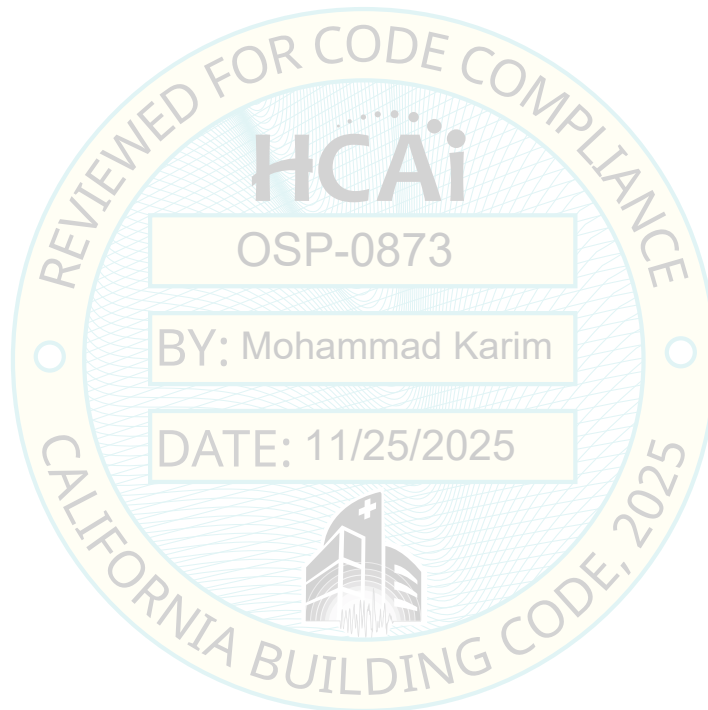
Special Seismic Certification
Table 2 - Certified Subcomponents



DCL Project Number: 89500-2501

Product Line: ESS400

Subcomponent Type	Model Number	Manufacturer	Description	Material	Weight [lb]	Unit
Enclosure	SR42UBZ4	Tripp-Lite	Restriction of Hazardous Substances; EIA/ECA-310-E Compliant	Powder Coated Carbon Steel	353	UUT-01, UUT-02
Energy Storage Modules	L12-0001M-A-00	Musashi	Hybrid-Supercapacitor Module for ESS400	Chromate Conversion Coated Aluminum Sheet Metal	44	UUT-01, UUT-02
EMS Shelf	L22-0001M	Musashi	Energy Management System for ESS400	Galvanized Steel, Zinc Plated Steel	89	UUT-01, UUT-02
MidPack Fuse	L00-0001M	Musashi	High-Voltage Fuse for Safety and Circuit Protection	Nickel Plated Aluminum	4	UUT-01, UUT-02



Special Seismic Certification
Table 3 - Tested Units



DCL Project Number: 89500-2501

Manufacturer: Musashi Energy Solutions

Product Line: ESS400

Product Type: Energy Storage System

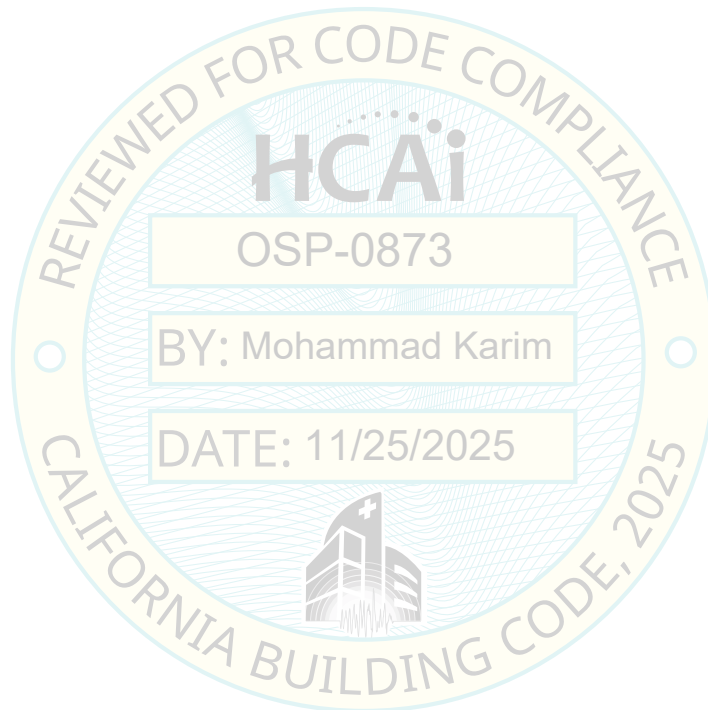
Certified Product Construction: Powder Coated Carbon Steel

Mounting: Rigid Base Mounted

Certified Seismic Levels: Sds 2.0 g at z/h=1.0 and Sds 2.5 g at z/h=0

Factors for Force Amplification and Structure Ductility Reduction: $H_f = 3.5$ at z/h=1.0; 1.0 at z/h=0 and $R_{\mu} = 1.3$ at z/h=1.0; 1.0 at z/h=0

Model Number	Description	Max. Dimensions [in.]			Weight [lb.]	Unit
		Depth	Width	Height		
ESS400-18	ESS400, Partially Loaded with Modules	42.3	23.5	78.3	1350	UUT-01
ESS400-20	ESS400, Fully Loaded with Modules	42.3	23.5	78.3	1440	UUT-02



UNIT UNDER TEST (UUT) Summary Sheet



UUT-01

DCL Repot Number: 89500-2501, Testing preformed at University of Nevada, Reno

Test Dates: 10/2/2025 - 10/3/2025

Manufacturer: Musashi Energy Solutions

Product Line: ESS400

Product Type: Energy Storage System

Model Number: ESS400-18

Product Construction Summary: Powder Coated Carbon Steel

Options / Component Summary:

SR42UBZ4 Tripp-Lite powder coated carbon steel enclosure. Eighteen L12-0001M-A-00 Musashi chromate conversion coated aluminum sheet metal energy storage modules. L22-0001M Musashi galvanized steel, zinc plated steel EMS shelf. L00-0001M Musashi nickel plated aluminum MidPack Fuse.

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component attachment system and force-resisting systems was maintained before and after the AC 156 test.

UUT Properties

Operating Weight (lb)	Dimensions (inches)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,350	42.3	23.5	78.3	4.75	4.50	>33.33

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	H _f	R _μ	I _p	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2025	ICC-ES	2.0	1.0	3.5	1.3	1.5	3.20	2.15	N/A	N/A
	AC156-24	2.5	0.0	1.0	1.0		N/A	N/A	1.67	0.67

Unit Mounting Description: UUT-01 was rigidly base mounted to the shake table interface plate using (8) 3/8" Grade 5 bolts, 1.6" x 1.6" x 0.3" carbon steel plate washers and (2) manufacturer-provided plates. The manufacturer provided plates were 0.3" thick, 23.3" long and 1.8" wide. The 3/8" bolts were spaced 20.7" apart in the side-side direction measured on-center and 4", 33.3" and 4" apart in front-back direction measured on-center.

Design changes: (2) M6 cage nuts, Class 12.9 bolts and washers were installed on each of the four side panels. The bolts were spaced 21.5" in the front-back direction measured on-center.



Overall view of UUT-01



Interior view of UUT-01

UNIT UNDER TEST (UUT) Summary Sheet



UUT-02

DCL Report Number: 89500-2501, Testing performed at University of Nevada, Reno

Test Dates: 10/2/2025 - 10/3/2025

Manufacturer: Musashi Energy Solutions

Product Line: ESS400

Product Type: Energy Storage System

Model Number: ESS400-20

Product Construction Summary: Powder Coated Carbon Steel

Options / Component Summary:

SR42UBZ4 Tripp-Lite powder coated carbon steel enclosure. Twenty L12-0001M-A-00 Musashi chromate conversion coated aluminum sheet metal energy storage modules. L22-0001M Musashi galvanized steel, zinc plated steel EMS shelf. L00-0001M Musashi nickel plated aluminum MidPack Fuse.

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component attachment system and force-resisting systems was maintained before and after the AC 156 test.

UUT Properties

Operating Weight (lb)	Dimensions (inches)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,440	42.3	23.5	78.3	7.25	5.75	>33.33

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	H _r	R _μ	I _p	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2025	ICC-ES	2.0	1.0	3.5	1.3	1.5	3.20	2.15	N/A	N/A
	AC156-24	2.5	0.0	1.0	1.0		N/A	N/A	1.67	0.67

Unit Mounting Description: UUT-02 was rigidly base mounted to the shake table interface plate using (8) 3/8" Grade 5 bolts, 1.6" x 1.6" x 0.3" carbon steel plate washers and (2) manufacturer-provided plates. The manufacturer provided plates were 0.3" thick, 23.3" long and 1.8" wide. The 3/8" bolts were spaced 20.7" apart in the side-side direction measured on-center and 4", 33.3" and 4" apart in front-back direction measured on-center.

Design changes implemented: (2) M6 cage nuts, Class 12.9 bolts and washers were installed on each of the four side panels. The bolts were spaced 21.5" in the front-back direction measured on-center.



Overall view of UUT-02



Interior view of UUT-02