APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY	
APPLICATION #:	OSP – 0321 – 10

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Caterpillar Electric Power Division

Manufacturer's Technical Representative: Mr. Steve Sappington

Mailing Address: 560 Rehoboth Road Griffin GA 30224

Telephone: 770-233-5848 Email: sappisr@cat.com

Product Information

Product Name: Diesel Generator Set

Product Type: Electrical Power Generator

Product Model Number: C4.4, C6.6, C7.1, C9, C15, C18
(List all unique product identification numbers and/or part numbers)

General Description: Diesel powered electrical generators sizes D40, D50, D60, D80, D100, D125, D150, D175, D200, C9, C15 and C18

Mounting Description: Rigid base mounting, on or off fuel tanks, with or without sound enclosure, without external isolators, with internal isolators only

Applicant Information

Applicant Company Name: The VMC Group

Contact Person: Mr. John Wilson

Mailing Address: 113 Main Street Bloomingdale NJ 07403

Telephone: 973-838-1780 Email: jwilson@thevmcgroup.com

I hereby agree to reimburse the Office of Statewide Health Planning and Development review fees in accordance with the California Administrative Code, 2013.

Signature of Applicant: Date: 10/15/15

Title: CEO Company Name: The VMC Group

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

Company Name: The VMC Group

Name: Mr. Ken Tarlow California License Number: SE2851

Mailing Address: 113 Main Street Bloomingdale NJ 07403

Telephone: 973-838-1780 Email: Ken.tarlow@thevmcgroup.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 1

Company Name: Pacific Earthquake Engineering Research Center UC Berkeley (PEER)

Contact Name: Wesley Neighbor

Mailing Address: 1301 South 46th Street Building 420 CA 94804

Telephone: 510-665-3409 Email: wdn@berkeley.edu

Testing Laboratory 2

Company Name: US Army Construction Engineering Research Laboratory (CERL)

Contact Name: James Wilcoski

Mailing Address: 2902 Newmark Drive Champaign IL 61822

Telephone: 217-373-6763 Email: James.Wilcoski@usace.army.mil

Seismic Parameters

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

Design Basis of Equipment or Components (F_p/W_p) = 1.87 (C4.4 to C7.1) and 1.70 (C9 to C18)

S_{DS} (Design spectral response acceleration at short period, g) = 2.49 (C4.4 to C7.1) and 2.26 (C9 to C18)

a_p (In-structure equipment or component amplification factor) = 2.5

R_p (Equipment or component response modification factor) = 2.0

Ω_0 (System overstrength factor) = 2.5

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 0.0

Equipment or Component Natural Frequencies (Hz) = See attached

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

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, 2010: ☐ Yes ☒ No

List of Attachments Supporting Special Seismic Certification

☒ Test Report(s) ☒ Drawings ☐ Calculations ☒ Manufacturer's Catalog

☒ Other(s) (Please Specify): UUT, Certified Product and Certified Sub-Component Matrices

OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2019

Signature: _____ Date: November 9, 2015

Print Name: Timothy J. Piland Title: SSE

Special Seismic Certification Valid Up to : S_{DS} (g) = See Above z/h = 0

Condition of Approval (if applicable): _____

Table 1 - Certified Gensets On Tanks

Series	Model	Max Rating [kW]	EPA Rating	Max Package Dimensions [in]			Max Weight (2) [lbs]	z/h = 0.0 S_{DS}	z/h = 1.0 S_{DS}	Tested / Interpolated / Extrapolated
				Length	Width	Height				
C4.4 Open	D40 / D50 / D60	60	Tier 3	108	44	79	5,750	2.49	0.83	Extrapolated
C4.4 Enclosed	D40 / **D50** / D60	60	Tier 3	108	44	84	6,363	2.49	0.83	UUT-01A / 01B
C4.4 Open	D80 / D100	100	Tier 3	136	44	85	7,808	2.49	0.83	Interpolated
C4.4 Enclosed	D80 / D100	100	Tier 3	136	44	92	8,516	2.49	0.83	Interpolated
C6.6 Open	D125 / D150 / D175	175	Tier 3	198	44	95	11,856	2.49	0.83	Interpolated
C6.6 Enclosed	D125 / D150 / **D175**	175	Tier 3	198	44	96	12,752	2.49	0.83	UUT-02A / 02B
C7.1 Open	D125/D150/D175/D200	200	Tier 3	198	44	96	12,114	2.49	0.83	Extrapolated
C7.1 Enclosed	D125/D150/D175/D200	200	Tier 3	198	44	96	13,010	2.49	0.83	Extrapolated
C9 Open Wide Skid	C9	300	Tier 3	219	81	108	17,450	2.26	0.75	Interpolated
C9 Enclosed	C9	300	Tier 3	219	81	114	19,850	2.26	0.75	Interpolated
C15 Open Wide Skid	C15	450	Tier 3	244	81	119	25,773	2.26	0.75	Interpolated
C15 Enclosed	C15	450	Tier 3	251	81	127	28,504	2.26	0.75	Interpolated
C15 Open Wide Skid	C15	500	Tier 2	244	81	119	26,304	2.26	0.75	Interpolated
C15 Enclosed	C15	500	Tier 2	251	81	127	29,034	2.26	0.75	Interpolated
C18 Open Wide Skid	C18	600	Tier 2	279	81	118	29,205	2.26	0.75	Interpolated
C18 Enclosed	C18	600	Tier 2	286	81	124	32,031	2.26	0.75	UUT-03
C18 Open Wide Skid	C18 Tier 4F	500	Tier 4 Final	230	90	99	19,042	2.26	0.75	Interpolated
C18 Enclosed	C18 Tier 4F	500	Tier 4 Final	247	90	111	21,687	2.26	0.75	UUT-05

Table 2 - Certified Gensets Off Tanks

Series	Model	Max Rating [kW]	EPA Rating	Max Package Dimensions [in]			Max Weight (2) [lbs]	z/h = 0.0 S_{DS}	z/h = 1.0 S_{DS}	Tested / Interpolated / Extrapolated
				Length	Width	Height				
C4.4 Open	D40 / D50 / D60	60	Tier 3	97	44	51	3,253	2.49	0.83	Extrapolated
C4.4 Enclosed	D40 / **D50** / D60	60	Tier 3	97	44	51	3,253	2.49	0.83	UUT-01C
C4.4 Open	D80 / D100	100	Tier 3	97	44	51	3,253	2.49	0.83	Interpolated
C4.4 Enclosed	D80 / D100	100	Tier 3	114	44	59	3,961	2.49	0.83	Interpolated
C6.6 Open	D125 / D150 / D175	175	Tier 3	123	44	58	4,184	2.49	0.83	Interpolated
C6.6 Enclosed	D125 / D150 / **D175**	175	Tier 3	143	44	59	5,080	2.49	0.83	UUT-02C
C7.1 Open	D125/D150/D175/D200	200	Tier 3	123	44	58	4,442	2.49	0.83	Extrapolated
C7.1 Enclosed	D125/D150/D175/D200	200	Tier 3	143	44	59	5,338	2.49	0.83	Extrapolated
C9 Open Narrow Skid	C9	300	Tier 3	122	64	80	5,423	2.26	0.75	Interpolated
C9 Open Wide Skid	C9	300	Tier 3	150	80	80	5,961	2.26	0.75	Interpolated
C9 Enclosed	C9	300	Tier 3	178	80	87	8,364	2.26	0.75	Interpolated
C15 Open Narrow Skid	C15	450	Tier 3	138	64	84	8,253	2.26	0.75	Interpolated
C15 Open Wide Skid	C15	450	Tier 3	150	80	84	8,662	2.26	0.75	Interpolated
C15 Enclosed	C15	450	Tier 3	195	80	91	11,393	2.26	0.75	Interpolated
C15 Open Narrow Skid	C15	500	Tier 2	138	64	84	8,784	2.26	0.75	Interpolated
C15 Open Wide Skid	C15	500	Tier 2	150	80	84	9,193	2.26	0.75	Interpolated
C15 Enclosed	C15	500	Tier 2	195	80	91	11,923	2.26	0.75	Interpolated
C18 Open Narrow Skid	C18	600	Tier 2	138	64	83	9,014	2.26	0.75	UUT-04
C18 Open Wide Skid	C18	600	Tier 2	150	80	83	9,353	2.26	0.75	Extrapolated
C18 Enclosed	C18	600	Tier 2	204	80	89	12,179	2.26	0.75	Similar to UUT-03 (Note 2)
C18 Open Wide Skid	C18 Tier 4F	500	Tier 4 Final	209	90	84	11,294	2.26	0.75	Interpolated
C18 Enclosed	C18 Tier 4F	500	Tier 4 Final	227	90	96	13,720	2.26	0.75	Similar to UUT-05 (Note 2)

Notes

1) Weights include genset, enclosure (where applicable), tank (where applicable), and tank fuel (where applicable)
2) The only difference is the lack of fuel tank

Table 3 - Certified Enclosures

Series	Model	Type	CAT Part No	Manufacturer	UUT / Int / Ext
C4.4	D40 / **D50** / D60	WP Standard	3816168	Caterpillar	Extrapolated
		WP With Window	3943713	Caterpillar	Extrapolated
		SA1 Standard	3943714	Caterpillar	Extrapolated
		SA1 With Window	3943715	Caterpillar	Extrapolated
		SA2 Standard	3943716	Caterpillar	Extrapolated
		SA2 With Window	3943717	Caterpillar	UUT-01A / 01B / 01C
C4.4	D80 / D100	WP Standard	3818667	Caterpillar	Interpolated
		WP With Window	3943721	Caterpillar	Interpolated
		SA1 Standard	3943722	Caterpillar	Interpolated
		SA1 With Window	3943723	Caterpillar	Interpolated
		SA2 Standard	3943724	Caterpillar	Interpolated
		SA2 With Window	3943725	Caterpillar	Interpolated
C6.6 / C7.1	D125 / D150 / **D175** / D200	WP Standard (D200)	3784033	Caterpillar	Interpolated
		WP With Window (D200)	3943733	Caterpillar	Interpolated
		WP Standard (D125-D175)	3943734	Caterpillar	Interpolated
		WP With Window (D125-D175)	3943735	Caterpillar	Interpolated
		SA1 Standard (D125 - D200)	3943736	Caterpillar	Interpolated
		SA1 With Window (D125 - D200)	3943737	Caterpillar	Interpolated
		SA2 Standard (D125 - D200)	3943738	Caterpillar	UUT 02A / 02B / 02C
		SA2 With Window (D125 - D200)	3943739	Caterpillar	Interpolated
C9	C9	WP Standard	449-0700	Caterpillar	Interpolated
		SA1 Standard	453-2197	Caterpillar	Interpolated
		SA1 With Window	453-2198	Caterpillar	Interpolated
		SA2 Standard	449-0534	Caterpillar	Interpolated
		SA2 With Window	449-0724	Caterpillar	Interpolated
C15	C15	SA Standard	393-2460	Caterpillar	Interpolated
		SA With Window	422-6087	Caterpillar	Interpolated
C18	C18	SA Standard	393-2442	Caterpillar	Interpolated
		SA With Window	422-6089	Caterpillar	UUT-03
	C18 Tier 4F	SA Standard	461-6316	Caterpillar	UUT-05

Notes
3) All enclosures are carbon steel
4) WP = Weatherproof Enclosure
5) SA = Sound Attenuated
6) SA1 = Sound Attenuated Level 1
7) SA2 = Sound Attenuated Level 2

Table 4 - Certified Subcomponents

Component (MFR)	CAT Part Number	Notes	Tested / Interpolated / Extrapolated
UL-142 Tanks (Caterpillar)	3877613	156 Gallons	Extrapolated
	449-0567	200 Gallons	Extrapolated
	3928555	228 Gallons	Extrapolated
	3877612	285 Gallons	UUT-01A / 01B
	419-6625	321 Gallons	Interpolated
	419-6626	370 Gallons	Interpolated
	3823984	376 Gallons	Interpolated
	4669202	408 Gallons	Interpolated
	3928565	412 Gallons	Interpolated
	449-0565	660 Gallons	Interpolated
	461-6197	660 Gallons	UUT-05
	3928524	725 Gallons	UUT-02A / 02B
	466-9205	784 Gallons	Interpolated
	419-6632	1,000 Gallons	Interpolated
	463-3100	1,100 Gallons	Interpolated
	422-6066	1,855 Gallons	Interpolated
	419-6634	2,160 Gallons	UUT-03
Engine (Perkins / Caterpillar)	3837265	D40	Extrapolated
	3837266	D50	Extrapolated
	3837267	D60	UUT-01A / 01B / 01C
	3837268	D80	Interpolated
	3837269	D100	Interpolated
	2910361	D125	Interpolated
	4696214	D125	Interpolated
	2910362	D150	Interpolated
	4696211	D150	Interpolated
	3903314	D175	UUT-02A / 02B / 02C
	4694413	D175	Interpolated
	4567961	D200	Interpolated
	452-9865	C9	Interpolated
	423-0922	C15	Interpolated
	420-6876	C15	Interpolated
	420-6877	C18	UUT-03 / 04
	419-0904	C18 Tier 4F	UUT-05
Alternators (Leroy Somer)	1500 Frame		Extrapolated
	2000 Frame		UUT-01A / 01B / 01C
	3000 Frame		Interpolated
	3100 Frame		Interpolated
	5000 Frame		UUT-02A / 02B / 02C
	6100 Frame		UUT-05
	7000 Frame		UUT-03 / 04

Notes

8) Perkins is a brand of Caterpillar

Table 4 - Certified Subcomponents (Continued)

Component (MFR)	CAT Part Number	Notes	Tested / Interpolated / Extrapolated
Radiators (Denso-Marston)	3174133	D40 / **D50** / D60	UUT-01A / 01B / 01C
	2994051	D80 / D100	Interpolated
	2758174	D125 / D150	Interpolated
	3304835	**D175** / D200	UUT-02A / 02B / 02C
	384-2246	C9	Interpolated
	354-6434	C15	Interpolated
	366-0080	C18	UUT-03 / 04
Radiators (Bearward)	336-8518	C18 Tier 4F	UUT-05
16 Gauge Steel Control Panel / Box (Caterpillar)	N/A	**C4.4** / **C6.6** / 7.1	UUT-01A / 01B / 01C / 02A / 02B / 02C
	374-5749	C9 / C 15 / **C18**	UUT-03 / 04
	461-6309	C18 Tier 4F	UUT-05
Controller (Caterpillar)	3518767	Controller - EMCP 4.2 (AVR Compatible)	Extrapolated
	4311966	Controller - EMCP 4.2 (AVR Compatible)	UUT-01A / 01B / 01C / 02A / 02B / 02C
	442-7222	Controller - EMCP 4.2 (IVR Compatible)	UUT-03
	390-1195	Controller - EMCP 4.3	UUT-04
	356-0121	Controller - EMCP 4.4	Extrapolated
Voltage Regulators (Leroy-Somer)	R220 (AVR)	Control Panel-Mounted	Extrapolated
	R250 (AVR)	Control Panel-Mounted	UUT-01A / 01B / 01C
	R251 (AVR)	Control Panel-Mounted	Extrapolated
	R438 (AVR)	Control Panel-Mounted	Extrapolated
	R250 (AVR)	Alternator-Mounted	UUT-02A / 02B / 02C
	R450 (AVR)	Alternator-Mounted	UUT-04
	EM10 (IVR)	Alternator-Mounted	UUT-03
14-Gauge Carbon Steel Main Breaker Box (Caterpillar)	449-0638		UUT-03
	390-4858		UUT-04
16 Gauge Carbon Steel Auxiliary Breaker Box (Caterpillar)	449-0619		UUT-03
Molded Case Breakers (ABB)	T Series		UUT-01A / 01B / 01C / 02A / 02B / 02C
Molded Case Breakers (Square D)	R Frame		UUT-03 / 04

Notes

9) The only difference between controller part number 4311966 and 3518767 is software and an additional signal output port

10) The only difference between voltage regulator R250 and R251 is software

11) All skids are carbon steel

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-01A

VMA-48473-01

Model Line	Model Number	Manufacturer
Electrical Genset	C4.4 D50	Caterpillar Inc

Product Construction Summary

Diesel powered electrical generator set 50 kW, SA2 Carbon Steel Enclosure and 285 gal Carbon Steel Fuel Tank

Options / Subcomponent Summary

Enclosure: Caterpillar, UL-142 Tanks: Caterpillar, Engine: Perkins/Caterpillar, Alternator: Leroy Somer, Radiator: Denso-Marston, 16 Gauge Steel Control Panel / Box: Caterpillar, Contoller: Caterpillar, Voltage Regulators: Leroy-Somer, Molded Case Breakers: ABB

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
4,260	108	41	80	3.9	5.4	10.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2013	ICC-ES AC156	2.49	0.0	1.5	2.49	1.00	1.66	0.66

Test Mounting Details

UUT skids bolted to UUT fuel tanks using (12) 5/8-in. Grade 8 bolts
UUT fuel tanks bolted to fixture beams using (12) 5/8-in. Grade 8 bolts
Fixture beams bolted to Beta fixture plates using (8) 3/4-in. Grade 8 bolts

All units were filled with contents and maintained structural integrity

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-01B

VMA-48473-01

Model Line	Model Number	Manufacturer
Electrical Genset	C4.4 D50	Caterpillar Inc

Product Construction Summary

Diesel powered electrical generator set 50 kW, SA2 Carbon Steel Enclosure and 285 gal Carbon Steel Fuel Tank

Options / Subcomponent Summary

Enclosure: Caterpillar, UL-142 Tanks: Caterpillar, Engine: Perkins/Caterpillar, Alternator: Leroy Somer, Radiator: Denso-Marston, 16 Gauge Steel Control Panel / Box: Caterpillar, Contoller: Caterpillar, Voltage Regulators: Leroy-Somer, Molded Case Breakers: ABB

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
6,310	108	41	80	4.6	5.6	11.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2013	ICC-ES AC156	2.49	0.0	1.5	2.49	1.00	1.66	0.66

Test Mounting Details

UUT skids bolted to UUT fuel tanks using (12) 5/8-in. Grade 8 bolts
UUT fuel tanks bolted to fixture beams using (12) 5/8-in. Grade 8 bolts
Fixture beams bolted to Beta fixture plates using (8) 3/4-in. Grade 8 bolts

All units were filled with contents and maintained structural integrity

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-01C

VMA-48473-01

Model Line	Model Number	Manufacturer
Electrical Genset	C4.4 D50	Caterpillar Inc

Product Construction Summary

Diesel powered electrical generator set 50 kW and SA2 Carbon Steel Enclosure

Options / Subcomponent Summary

Enclosure: Caterpillar, UL-142 Tanks: Caterpillar, Engine: Perkins/Caterpillar, Alternator: Leroy Somer, Radiator: Denso-Marston, 16 Gauge Steel Control Panel / Box: Caterpillar, Contoller: Caterpillar, Voltage Regulators: Leroy-Somer, Molded Case Breakers: ABB

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
3,020	102	41	96	5.3	6.8	11.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2013	ICC-ES AC156	2.49	0.0	1.5	2.49	1.00	1.66	0.66

Test Mounting Details

UUT bolted to fixture beams using (12) 5/8-in. Grade 8 bolts
Fixture beams bolted to Beta fixture plates using (8) 3/4-in. Grade 8 bolts

All units were filled with contents and maintained structural integrity

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-02A

VMA-48473-01

Model Line	Model Number	Manufacturer
Electrical Genset	C6.6 D175	Caterpillar Inc

Product Construction Summary

Diesel powered electrical generator set 175 kW, SA2 Carbon Steel Enclosure and 725 gal Carbon Steel Fuel Tank

Options / Subcomponent Summary

Enclosure: Caterpillar, UL-142 Tanks: Caterpillar, Engine: Perkins/Caterpillar, Alternator: Leroy Somer, Radiator: Denso-Marston, 16 Gauge Steel Control Panel / Box: Caterpillar, Contoller: Caterpillar, Voltage Regulators: Leroy-Somer, Molded Case Breakers: ABB

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
7,610	199	44	96	3.4	5.6	8.6

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2013	ICC-ES AC156	2.49	0.0	1.5	2.49	1.00	1.66	0.66

Test Mounting Details

UUT skids bolted to UUT fuel tanks using (12) 5/8-in. Grade 8 bolts
UUT fuel tanks bolted to fixture beams using (16) 5/8-in. Grade 8 bolts
Fixture beams bolted to Beta fixture plates using (8) 3/4-in. Grade 8 bolts

All units were filled with contents and maintained structural integrity

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-02B

VMA-48473-01

Model Line	Model Number	Manufacturer
Electrical Genset	C6.6 D175	Caterpillar Inc

Product Construction Summary

Diesel powered electrical generator set 175 kW, SA2 Carbon Steel Enclosure and 725 gal Carbon Steel Fuel Tank

Options / Subcomponent Summary

Enclosure: Caterpillar, UL-142 Tanks: Caterpillar, Engine: Perkins/Caterpillar, Alternator: Leroy Somer, Radiator: Denso-Marston, 16 Gauge Steel Control Panel / Box: Caterpillar, Contoller: Caterpillar, Voltage Regulators: Leroy-Somer, Molded Case Breakers: ABB

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
12,830	199	44	96	3.7	6.1	8.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2013	ICC-ES AC156	2.49	0.0	1.5	2.49	1.00	1.66	0.66

Test Mounting Details

UUT skids bolted to UUT fuel tanks using (12) 5/8-in. Grade 8 bolts
UUT fuel tanks bolted to fixture beams using (16) 5/8-in. Grade 8 bolts
Fixture beams bolted to Beta fixture plates using (8) 3/4-in. Grade 8 bolts

All units were filled with contents and maintained structural integrity

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-02C

VMA-48473-01

Model Line	Model Number	Manufacturer
Electrical Genset	C6.6 D175	Caterpillar Inc

Product Construction Summary

Diesel powered electrical generator set 175 kW and SA2 Carbon Steel Enclosure

Options / Subcomponent Summary

Enclosure: Caterpillar, UL-142 Tanks: Caterpillar, Engine: Perkins/Caterpillar, Alternator: Leroy Somer, Radiator: Denso-Marston, 16 Gauge Steel Control Panel / Box: Caterpillar, Contoller: Caterpillar, Voltage Regulators: Leroy-Somer, Molded Case Breakers: ABB

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
5,090	144	44	60	4.3	6.8	9.4

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2013	ICC-ES AC156	2.49	0.0	1.5	2.49	1.00	1.66	0.66

Test Mounting Details

UUT bolted to fixture beams using (12) 5/8-in. Grade 8 bolts
Fixture beams bolted to Beta fixture plates using (8) 3/4-in. Grade 8 bolts

All units were filled with contents and maintained structural integrity

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-03

VMA-48473-01

Model Line	Model Number	Manufacturer
Electrical Genset	C18	Caterpillar Inc

Product Construction Summary

Diesel powered electrical generator set 600 kW, SA Carbon Steel Enclosure and 48 hr 2160 gal Carbon Steel Fuel Tank

Options / Subcomponent Summary

Enclosure: Caterpillar, UL-142 Tanks: Caterpillar, Engine: Perkins/Caterpillar, Alternator: Leroy Somer, Radiator: Denso-Marston, 16 Gauge Steel Control Panel / Box: Caterpillar, Contoller: Caterpillar, Voltage Regulators: Leroy-Somer, 14-Gauge Carbon Steel Main Breaker Box: Caterpillar, 16 Gauge Carbon Steel Auxiliary Breaker Box: Caterpillar, Molded Case Breakers: Square D

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
32000	279	81	124	6.2	4.8	10.5

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2013	ICC-ES AC156	2.26	0	1.5	2.26	0.9	1.51	0.6

Test Mounting Details

UUT bottom bolted to the W10x33 Beams top flange using (18) M16 ISO 10.9 Grade Bolts with Nuts
W10x33 Beams bottom flange bolted to W18x76 top flange using (30) M20 ISO 10.9 Grade Bolts with Nuts

All units were filled with contents and maintained structural integrity

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-04

VMA-48473-01

Model Line	Model Number	Manufacturer
Electrical Genset	C18	Caterpillar Inc

Product Construction Summary

Diesel powered electrical generator set 600 kW

Options / Subcomponent Summary

Enclosure: Caterpillar, UL-142 Tanks: Caterpillar, Engine: Perkins/Caterpillar, Alternator: Leroy Somer, Radiator: Denso-Marston, 16 Gauge Steel Control Panel / Box: Caterpillar, Contoller: Caterpillar, Voltage Regulators: Leroy-Somer, 14-Gauge Carbon Steel Main Breaker Box: Caterpillar, Molded Case Breakers: Square D

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
8,800	132	44	83	4.4	5.9	11.2

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2013	ICC-ES AC156	2.20	0.0	1.5	2.20	0.88	1.47	0.59

Test Mounting Details

UUT bolted to adapter frame using (6) 3/4" in. Grade 8 bolts
Adapter frame bolted to Kappa fixture plates using (6) Grade 8 bolts

All units were filled with contents and maintained structural integrity

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-05

VMA-48473-01

Model Line	Model Number	Manufacturer
Electrical Genset	C18 T4 Final	Caterpillar Inc

Product Construction Summary

Diesel powered electrical generator set 500 kW

Options / Subcomponent Summary

Enclosure: Caterpillar, UL-142 Tanks: Caterpillar, Engine: Perkins/Caterpillar, Alternator: Leroy Somer, Radiator: Bearward, 16 Gauge Steel Control Panel / Box: Caterpillar

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
21,687	247	90	111	3.9	4.9	7.2

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2013	ICC-ES AC156	2.26	0.0	1.5	2.26	0.90	1.51	0.61

Test Mounting Details

UUT bolted to Fuel Tank using (12) 5/8 in. Grade 8 bolts
Fuel Tank bolted to Kappa fixture plates using (12) 5/8 in. Grade 8 bolts

All units were filled with contents and maintained structural integrity