



OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION

**APPLICATION FOR OSHPD SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)**

OFFICE USE ONLY

APPLICATION #: OSP – 0621

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☒ New ☐ Renewal

Manufacturer Information

Manufacturer: MTU Onsite Energy

Manufacturer's Technical Representative: Ben Stratton

Mailing Address: 100 Power Drive, Mankato, MN 56001

Telephone: 507-625-7973

Email: ben.stratton@mtu-online.com

Product Information

Product Name: 210 – 400 kW Tier 3 and Tier 4 Diesel Generator Sets

Product Type: Diesel Generator Sets

Product Model Number: 6R0150 and 6R0225 Series

(List all unique product identification numbers and/or part numbers)

General Description: Diesel engine powered electrical generator sets. Seismic enhancements made to the test units required to address anomalies observed during the tests shall be incorporated into the production units.

Mounting Description: Rigid base mounting from Genset to fuel tank or ground. Externally spring isolated mounting from Genset to fuel tank or ground. Both Rigid and Isolated Mounted.

Applicant Information

Applicant Company Name: VMC Group

Contact Person: John P. Giuliano, PE

Mailing Address: 113 Main St, Bloomingdale NJ, 07403

Telephone: 973-838-1780

Email: john.giuliano@thvmcgroup.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: 3/30/2020

Title: President Company Name: VMC Group

"Access to Safe, Quality Healthcare Environments that Meet California's Diverse and Dynamic Needs"



**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION**

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

Company Name: VMC Group
Name: Mr. Ken Tarlow California License Number: SE2851
Mailing Address: 113 Main St, Bloomingdale NJ, 07403
Telephone: 973-838-1780 Email: ken.tarlow@thvmcgroup.com

Supports and Attachments Preapproval

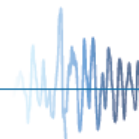
- ☐ Supports and attachments are preapproved under OPM-
(Separate application for OSHPD Preapproval of Manufacturer's Certification (OPM) of Supports and attachments is required)
☒ Supports and attachments are not preapproved

Certification Method

- ☒ Testing in accordance with: ☒ ICC-ES AC156
☐ Other (Please Specify): _____

Testing Laboratory

Company Name: Pacific Earthquake Engineering Research Center UC Berkeley (PEER)
Contact Name: Amarnath Kasalanati
Mailing Address: 1301 S. 46th Street, Building 420, Richmond, CA 94804
Telephone: 510-665-3594 Email: amarnath1@berkeley.edu





OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT FACILITIES DEVELOPMENT DIVISION

Seismic Parameters

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

Design Basis of Equipment or Components (F_p/W_p) = Rigid Spring Isolated [4.50 (z/h = 1), 1.88 (z/h = 0)]
[1.44 (z/h = 1), 1.13 (z/h = 0)]

S_{DS} (Design spectral response acceleration at short period, g) = $S_{DS} = 2.00$ (z/h = 1); $S_{DS} = 2.50$ (z/h = 0)

a_p (In-structure equipment or component amplification factor) = 2.5 (Spring Isolated); 1 (Rigid)

R_p (Equipment or component response modification factor) = 2.0 (Spring Isolated); 2.5 (Rigid)

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1 ($S_{DS} = 2.00$), 0 ($S_{DS} = 2.50$)

Equipment or Component Natural Frequencies (Hz) = See Attachments

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

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): _____

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

Signature: Timothy J. Piland Date: May 3, 2021

Print Name: Timothy J. Piland Title: SSE

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

Condition of Approval (if applicable): _____

Access to Safe, Quality Healthcare Environments that Meet California's Diverse and Dynamic Needs

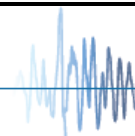


Table 1a - Gensets Off Tanks

Model	Max Rating [kW]	EPA Rating	Configuration	Max Package Dimensions [in]			Max Weight ¹ [lb]	Mounting Configuration ²	UUT
				Length	Width	Height			
MTU 6R0150 DS210	300	Tier 3 / 4	Open	144	60	98	8,500	Isolated / Rigid	Extrapolated
MTU 6R0150 DS230	300	Tier 3 / 4	Open	144	60	98	8,500		Extrapolated
MTU 6R0150 DS250	300	Tier 3 / 4	Open	144	60	98	8,500		Extrapolated
MTU 6R0150 DS275	300	Tier 3 / 4	Open	144	60	98	8,500		Extrapolated
MTU 6R0150 DS300	300	Tier 3 / 4	Open	144	60	98	8,500		Extrapolated
MTU 6R0225 DS275	400	Tier 3 / 4	Open	155	88	98	11,000		Extrapolated
MTU 6R0225 DS300	400	Tier 3 / 4	Open	155	88	98	11,000		Extrapolated
MTU 6R0225 DS325	400	Tier 3 / 4	Open	155	88	105	11,000		Extrapolated
MTU 6R0225 DS350	400	Tier 3 / 4	Open	155	88	105	11,000		Extrapolated
MTU 6R0225 DS365	400	Tier 3 / 4	Open	155	88	105	11,000		Extrapolated
MTU 6R0225 DS400	400	Tier 3 / 4	Open	155	88	105	11,000		Extrapolated
MTU 6R0150 DS210	300	Tier 3 / 4	Enclosed	190	60	104	11,000		Extrapolated
MTU 6R0150 DS230	300	Tier 3 / 4	Enclosed	190	60	104	11,000		Extrapolated
MTU 6R0150 DS250	300	Tier 3 / 4	Enclosed	190	60	104	11,000		Extrapolated
MTU 6R0150 DS275	300	Tier 3 / 4	Enclosed	190	60	104	11,000		Extrapolated
MTU 6R0150 DS300	300	Tier 3 / 4	Enclosed	190	60	104	11,000		Extrapolated
MTU 6R0225 DS400	400	Tier 3 / 4	Enclosed	207	84	111	13,000	Isolated / Rigid	UUT-10b
MTU 6R0225 DS400	400	Tier 3 / 4	Enclosed	207	88	111	14,000	Isolated / Rigid	Interpolated
MTU 6R0225 DS275	400	Tier 3 / 4	Enclosed	207	88	111	14,000		Interpolated
MTU 6R0225 DS300	400	Tier 3 / 4	Enclosed	207	88	111	14,000		Interpolated
MTU 6R0225 DS325	400	Tier 3 / 4	Enclosed	207	88	111	14,000		Interpolated
MTU 6R0225 DS350	400	Tier 3 / 4	Enclosed	207	88	111	14,000		Interpolated
MTU 6R0225 DS365	400	Tier 3 / 4	Enclosed	207	88	111	14,000		Interpolated
MTU 6R0225 DS400	400	Tier 3 / 4	Enclosed	207	88	111	14,000		Interpolated
MTU 12V1600 DS600	600	Tier 3	Enclosed	270	84	100	14,780	Isolated / Rigid	UUT-8b

Notes:

1. Weight includes enclosure where applicable
2. Bolded mounting configuration denotes tested configuration

Table 1b - Gensets On Tanks

Model	Max Rating [kW]	EPA Rating	Configuration	Max Package Dimensions [in]			Max Weight ¹ [lb]	Mounting Configuration ²	UUT
				Length	Width	Height			
MTU 6R1600 DS300	300	Tier 3	Enclosed	230	84	135	11,430	Isolated / Rigid	UUT-7
MTU 6R0150 DS300	300	Tier 4	Enclosed	190	56	97	12,135	Isolated / Rigid	UUT-11
MTU 6R0150 DS275	275	Tier 3 / 4	Enclosed	280	60	140	14,600	Rigid	UUT-9
MTU 6R0150 DS210	300	Tier 3 / 4	Open	320	60	134	25,000	Isolated / Rigid	Interpolated
MTU 6R0150 DS230	300	Tier 3 / 4	Open	320	60	134	25,000		Interpolated
MTU 6R0150 DS250	300	Tier 3 / 4	Open	320	60	134	25,000		Interpolated
MTU 6R0150 DS275	300	Tier 3 / 4	Open	320	60	134	25,000		Interpolated
MTU 6R0150 DS300	300	Tier 3 / 4	Open	320	60	134	25,000		Interpolated
MTU 6R0150 DS210	300	Tier 3 / 4	Enclosed	320	60	140	28,500		Interpolated
MTU 6R0150 DS230	300	Tier 3 / 4	Enclosed	320	60	140	28,500		Interpolated
MTU 6R0150 DS250	300	Tier 3 / 4	Enclosed	320	60	140	28,500		Interpolated
MTU 6R0150 DS275	300	Tier 3 / 4	Enclosed	320	60	140	28,500		Interpolated
MTU 6R0150 DS300	300	Tier 3 / 4	Enclosed	320	60	140	28,500		Interpolated
MTU 6R0225 DS275	400	Tier 3 / 4	Open	287	88	141	30,000		Interpolated
MTU 6R0225 DS300	400	Tier 3 / 4	Open	287	88	141	30,000		Interpolated
MTU 6R0225 DS325	400	Tier 3 / 4	Open	287	88	141	30,000		Interpolated
MTU 6R0225 DS350	400	Tier 3 / 4	Open	287	88	141	30,000		Interpolated
MTU 6R0225 DS365	400	Tier 3 / 4	Open	287	88	141	30,000		Interpolated
MTU 6R0225 DS400	400	Tier 3 / 4	Open	287	88	141	30,000		Interpolated
MTU 6R0225 DS400	400	Tier 3 / 4	Enclosed	287	88	147	32,500	Isolated / Rigid	UUT-10a
MTU 6R0225 DS275	400	Tier 3 / 4	Enclosed	287	88	147	36,000	Isolated / Rigid	Interpolated
MTU 6R0225 DS300	400	Tier 3 / 4	Enclosed	287	88	147	36,000		Interpolated
MTU 6R0225 DS325	400	Tier 3 / 4	Enclosed	287	88	147	36,000		Interpolated
MTU 6R0225 DS350	400	Tier 3 / 4	Enclosed	287	88	147	36,000		Interpolated
MTU 6R0225 DS365	400	Tier 3 / 4	Enclosed	287	88	147	36,000		Interpolated
MTU 6R0225 DS400	400	Tier 4	Enclosed	206	84	104	36,093	Isolated / Rigid	UUT-12
MTU 12V1600 DS600	600	Tier 3	Enclosed	330	84	135	44,980	Rigid	UUT-8a

Notes:

1. Weight includes enclosure where applicable
2. Bolded mounting configuration denotes tested configuration

Table 2a - Certified Enclosures

MTU Part Number	Type	Material	Notes	Dimensional Data				Manufacturer	UUT
				Max Length [in]	Max Width [in]	Max Height [in]	Max Weight [lb]		
XSG30380.00063	275-400 kW (130 mph)	Aluminum	Tier 3	155	84	93	862	MTU	UUT-10a, UUT-10b
XSG30380.00036	210-300 kW (130 mph)		Tier 3	144	56	85	899	MTU	Interpolated
XSG30380.00105	210-300 kW (130 mph)		Tier 4	144	56	85	948	MTU	Interpolated
XSG30380.00038	210-300 kW (190 mph)		Tier 3	144	56	85	962	MTU	Interpolated
XSG30380.00065	275-400 kW (190 mph)		Tier 3	155	84	93	981	MTU	Interpolated
XSG30380.00101	210-300 kW (190 mph)		Tier 4	144	56	85	1,012	MTU	UUT-11
XSG30380.00111	300-400 kW (130 mph)		Tier 4	155	84	93	1,048	MTU	Interpolated
XSG30380.00113	300-400 kW (190 mph)		Tier 4	155	84	93	1,048	MTU	Interpolated
XS575300.00054	450-600 kW (190 mph)	Carbon Steel	Tier 3	170	84	92	1,088	MTU	UUT-8a, UUT-8b
XSG30380.00060	230-300 kW (130 mph)		Tier 3	144	56	85	1,367	MTU	UUT-7
XSG30380.00033	210-300 kW (130 mph)		Tier 3	144	56	85	1,616	MTU	Interpolated
XSG30380.00027	210-300 kW (190 mph)		Tier 3	144	56	85	1,678	MTU	UUT-9
XSG30380.00103	210-300 kW (130 mph)		Tier 4	144	56	85	1,700	MTU	Interpolated
XSG30380.00099	210-300 kW (190 mph)		Tier 4	144	56	85	1,700	MTU	Interpolated
XSG30380.00060	275-400 kW (130 mph)		Tier 3	155	84	93	1,814	MTU	Interpolated
XSG30380.00058	275-400 kW (190 mph)		Tier 3	155	84	93	1,933	MTU	Interpolated
XSG30380.00109	300-400 kW (190 mph)		Tier 4	155	84	93	2,051	MTU	Interpolated
XSG30380.00108	300-400 kW (130 mph)		Tier 4	155	84	93	2,051	MTU	UUT-12

Table 2b - Certified Enclosure Scoops

MTU Part Number	Type	Material	Notes	Dimensional Data				Manufacturer	UUT
				Max Length [in]	Max Width [in]	Max Height [in]	Max Weight [lb]		
XSG30380.00051	210-300 kW	Aluminum	Tier 3	46	56	85	177	MTU	UUT-11
XS575300.00057	350-600 kW	Aluminum	Tier 3	52	84	92	262	MTU	UUT-8a, UUT-8b
XSG30380.00078	350-400 kW	Aluminum	Tier 3	52	84	93	263	MTU	UUT-10a, UUT-10b
XSG30380.00028	210-300 kW	Carbon Steel	Tier 3	46	56	85	434	MTU	UUT-9
XS572300.00062	230-300 kW	Carbon Steel	Tier 3	46	56	85	435	MTU	UUT-7
XSG30380.00059	350-400 kW	Carbon Steel	Tier 3	52	84	93	644	MTU	UUT-12

Table 3 - Certified Subcomponents

Component [MFR]	Part Number	Weight [lb]	Notes	UUT
UL 142 Fuel Tank (MTU)	XG3041200193	1550	265 Gallon Tank	Interpolated
	XG3041200211	1910	265 Gallon Tank	UUT-11
	XG3041200192	1930	350 Gallon Tank	Interpolated
	XG3041200187	2210	530 Gallon Tank	UUT-9
	XS572360.00018	2220	525 Gallon Tank	UUT-7
	XG3041200209	2240	540 Gallon Tank	Interpolated
	XG3041200216	2600	550 Gallon Tank	Interpolated
	XG3041200188	2560	530 Gallon Tank	Interpolated
	XG3041200210	2560	540 Gallon Tank	Interpolated
	XG3041200182	2630	700 Gallon Tank	Interpolated
	XG3041200191	2780	650 Gallon Tank	Interpolated
	XG3041200217	3250	550 Gallon Tank	Interpolated
	XG3041200186	3210	650 Gallon Tank	Interpolated
	XG3041200183	3250	700 Gallon Tank	Interpolated
	XG3041200189	3630	1060 Gallon Tank	Interpolated
	XG3041200184	4270	1400 Gallon Tank	Interpolated
	XG3041200190	4950	1590 Gallon Tank	Interpolated
	XG3041200185	5410	2100 Gallon Tank	UUT-10a
	XG3041200212	6230	2100 Gallon Tank	UUT-12
	XS575360.00040	7280	3000 Gallon Tank	UUT-8a
Engine (John Deere)	XSG30240.00012	2100	6090HF484 Tier 3, 210-275 kW	UUT-9
	XSG30240.00013	2100	6090HFG86 Tier 3, 300 kW	Interpolated
	XSG30240.00020	2420	6090HFG06 Tier 4, 230-300 kW	UUT-11
	XSG30240.00015	3100	6135HFG84 Tier 3, 350-400 kW	UUT-10a, UUT-10b
	XSG30240.00016	3475	6135HFG06 Tier 4, 350-400 kW	UUT-12
Alternators (Marathon)	430 Frame	2400	75-600kW	UUT-7, UUT-9, UUT-11
	570 Frame	5000	300-600kW	UUT-8a, UUT-8b, UUT-10a, UUT-10b, UUT-12
Radiator (AKG)	XSG30200.00008	490	210-300 kW Tier 3	UUT-9
	XSG30200.00012	728	210-300 kW Tier 4	UUT-11
	XSG30200.00010	810	275-400 kW Tier 3	UUT-10a, UUT-10b
	XSG30200.00011	852	300-400 kW Tier 4	UUT-12
Air Filters (Donaldson)	SUA86885	5	230-600 kW	UUT-7, UUT-9, UUT-11
	XG3012100019	7	350-400 kW	Interpolated
	SUA90069	8	650-3250 kW	UUT-20a, UUT-20b
Air Filters (Vortox)	SUA96271	31	230-600 kW	UUT-8a, UUT-8b, UUT-10a, UUT-10b
	XG3012100036	51	300-400 kW	UUT-12
Controller (MTU) 05/03/2021	MGC-1500 Series	1.9	Each controller is a depopulated version of the higher number. 2000 and 3000 series boxes are the same. 1500 series box is smaller. All boxes are carbon steel. OSP-0621	UUT-7
	MGC-2000 Series	4.4		UUT-9
	MGC-3000 Series	5.7		UUT-8a, UUT-8b, UUT-10a, UUT-10b, UUT-11, UUT-12

Table 3 - Certified Subcomponents (Continued)

Component [MFR]	Part Number	Weight [lb]	Notes	UUT
Jacket Water Heaters (Kim Hotstart)	SUA90334	5	2500 W	UUT-7
	CB/WL 2500 W	7	208V	UUT-9
			240V	Interpolated
			480V	UUT-11
	CL/WL 4000 W	10	208V	UUT-12
			240V	Interpolated
			480V	UUT-10a, UUT-10b
Fuel/Water Separator (Racor)	SUA98951	15	5000 W	UUT-8a, UUT-8b
	SUA100603	5	Single	UUT-9, UUT-11
	SUA100604	17	Switchable/Dual	UUT-10a, UUT-10b, UUT-12
Breakers (Square-D)	H Frame	4.8	150 Amp Max Rating	UUT-9, UUT-11
	J Frame	5.3	250 Amp Max Rating	UUT-7, UUT-11
	L Frame	14	600 Amp Max Rating	UUT-7, UUT-9
	M Frame	29	800 Amp Max Rating	Interpolated
	P Frame	32	1200 Amp Max Rating	UUT-7, UUT-8a, UUT-8b, UUT-9, UUT-11
	R Frame	52	3000 Amp Max Rating	Interpolated
	MTZ Frame	363	6000 Amp Max Rating	Interpolated
	NW Frame	363	4000 Amp Max Rating	UUT-10a, UUT-10b, UUT-12
Battery (Exide)	SUA120299	56	12V	UUT-7, UUT-8a, UUT-8b, UUT-9, UUT-10a, UUT-10b, UUT-11, UUT-12
Battery Warming Plate (Zero Start)	SUA33218	1	200 W	UUT-9, UUT-12
Battery Charger (SENS)	XG3042500009	6	10 A	UUT-9
	X54942500005	6	10 A	UUT-11
	XG3042500010	6	15 A	UUT-10a, UUT-10b
	XG3042500014	6	15 A	UUT-12
Lighting Kit (MTU)	XSG30300.02441	18	210-300 T3 Lighting Kit	UUT-9, UUT-11
	XSG30300.02442	18	275-400 T3 Lighting Kit	UUT-10a, UUT-10b, UUT-12
Carbon Steel Silencer (Miratech)	XG3041700064	59	5.75" inlet, 12" Dia.	UUT-09, UUT-10a, UUT-10b
	XG3041700070	104	5.75" inlet, 12" Dia.	UUT-09, UUT-10a, UUT-10b
Aftertreatment (John Deere)	DEF tank	20	230-400 kW Tier 4	UUT-11, UUT-12
	DOC	106	5" inlet, 13" Dia.	UUT-11, UUT-12, UUT-13, UUT-14
	SCR	126	5" inlet, 15" Dia.	UUT-11, UUT-12, UUT-13, UUT-14
Space Heater (King Electric)	XG3006100004	12	Space Heater	UUT-09, UUT-10a, UUT-10b, UUT-11, UUT-12
Motorized Intake Louver (Vent Products)	XG3062300147	105	210-400 kW T3	UUT-09, UUT-10a, UUT-10b, UUT-11, UUT-12
Gravity Exhaust Louver (MTU)	XG3062300148	19	210-300 kW T3	UUT-09
	XG3062300391	19	210-300 kW T4	UUT-11
	XG3062300263	30	275-400 kW T3 / T4	UUT-10a, UUT-10b, UUT-12



UNIT UNDER TEST (UUT) Summary Sheet

UUT-07

PEER STI 2015-17

Model Line	Model Number	Manufacturer
1600 Model	MTU 6R1600 DS300	MTU America, Inc.

Product Construction Summary

Carbon Steel Skid, Carbon Steel Enclosure, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Engine: MTU; Alternator: Marathon; Radiator: Bearward; Enclosure: MTU; Fuel Tank: MTU; Silencer: Phillips & Temro; Air Filter: Donaldson; Controller: MTU; Jacket Water Heater: Kim-Hotstart; Breakers: Square-D; Battery: Exide; Battery Charger: SENS

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
11,430	230	84	135	5.1	4.9	13.0

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 2019	ICC-ES AC156	2.5	0	1.5	-	-	1.67	0.67
		2.0	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset mounted to fuel tank using (12) 5/8" grade 8 Bolts. Fuel tank mounted to shake table interface fixture using (12) 5/8" grade 8 Bolts.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.



UNIT UNDER TEST (UUT) Summary Sheet

UUT-08a

PEER STI 2015-17

Model Line	Model Number	Manufacturer
1600 Model	MTU 12V1600 DS600	MTU America, Inc.

Product Construction Summary

Carbon Steel Skid, Aluminum Enclosure, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Engine: MTU; Alternator: Marathon; Radiator: Bearward; Enclosure: MTU; Fuel Tank: MTU; Silencer: Phillips & Temro; Air Filter: Vortex; Controller: MTU; Jacket Water Heater: Kim-Hotstart; Breakers: Square-D; Battery: Exide; Battery Charger: SENS

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
44,980	330	84	150	3.3	3.7	5.1

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 2019	ICC-ES AC156	2.5	0	1.5	-	-	1.67	0.67
		2.0	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset mounted to (10) VMC MSSH-3C external spring isolators using (1) 5/8" Grade 8 bolt each. Isolators mounted to fuel tank using (40) 5/8" grade 8 bolts. Fuel tank mounted to shake table interface fixture using (20) 5/8" grade 8 Bolts.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.



UNIT UNDER TEST (UUT) Summary Sheet

UUT-08b

PEER STI 2015-17

Model Line	Model Number	Manufacturer
1600 Model	MTU 12V1600 DS600	MTU America, Inc.

Product Construction Summary

Carbon Steel Skid, Aluminum Enclosure

Options / Subcomponent Summary

Engine: MTU; Alternator: Marathon; Radiator: Bearward; Enclosure: MTU; Silencer: Phillips & Temro; Air Filter: Vortex; Controller: MTU; Jacket Water Heater: Kim-Hotstart; Breakers: Square-D; Battery: Exide; Battery Charger: SENS

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
14,780	270	84	100	2.9	3.7	4.9

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 2019	ICC-ES AC156	2.5	0	1.5	-	-	1.67	0.67
		2.0	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset mounted to (10) VMC MSS-3E external spring isolators. Isolators mounted to shake table interface fixture using (40) 5/8" grade 8 bolts.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.



UNIT UNDER TEST (UUT) Summary Sheet

UUT-09

30889-1801b

Model Line	Model Number	Manufacturer
6R0150	MTU 6R0150 DS275 Tier 3	MTU America, Inc.

Product Construction Summary

Carbon Steel Skid, Carbon Steel Enclosure, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Enclosure: MTU; Carbon Steel Silencer: Miratech; Fuel Tank: MTU; Engine: John Deere; Alternator: Marathon; Radiator: AKG; Air Filter: Donaldson; Controller: MTU; Jacket Water Heater: Kim Hotstart; Breaker: Square-D; Battery: Exide; Battery Charger: SENS

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
14,600	280	60	140	6.5	7.0	20.0

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 2019	ICC-ES AC156	2.5	0	1.5	-	-	1.67	0.67
		2.0	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset mounted to fuel tank with (8) 5/8" diameter grade 8 bolts. Fuel tank mounted to shake table interface fixture with (8) 5/8" diameter grade 8 bolts.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.



UNIT UNDER TEST (UUT) Summary Sheet

UUT-10a

30889-1801b

Model Line	Model Number	Manufacturer
6R0225	MTU 6R0225 DS400 Tier 3	MTU America, Inc.

Product Construction Summary

Carbon Steel Skid, Aluminum Enclosure, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Enclosure: MTU; Carbon Steel Silencer: Miratech; Fuel Tank: MTU; Engine: John Deere; Alternator: Marathon; Radiator: AKG; Air Filter: Vortex; Controller: MTU; Jacket Water Heater: Kim Hotstart; Breaker: Square-D; Battery: Exide; Battery Charger: SENS

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
32,500	287	88	147	5.0	4.5	9.5

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 2019	ICC-ES AC156	2.5	0	1.5	-	-	1.67	0.67
		2.0	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset mounted to fuel tank with (8) 5/8" diameter grade 8 bolts. Fuel tank mounted to shake table interface fixture with (12) 5/8" diameter grade 8 bolts. Seismic enhancements made during testing include, (6) additional 5/16" diameter Grade 8 bolts for attachment of breaker box to junction box, 1"x1"x1/8" angle steel welded to full width of the top and bottom back corners of the breaker box, an added pin in the breaker box door hinge to prevent vertical displacement, addition of 2" galvanized washers to the attachment between the junction box and alternator, (4) additional 3" welds at the widths of the radiator feet that mount to the skid, replacement of the (2) radiator lateral braces with 1-3/4"x1-3/4"x1/8" carbon steel tube mounted with 1/2" diameter Grade 5 bolt at each end, the attachment piece connecting the tank vent pipe lateral brace to the tank flange is required to have the mounting bolt fully threaded into the attachment piece instead of tack welded, and a 1/2" diameter galvanized steel tube must be added to shroud the enclosure door latch.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.



UNIT UNDER TEST (UUT) Summary Sheet

UUT-10b

30889-1801b

Model Line	Model Number	Manufacturer
6R0225	MTU 6R0225 DS400 Tier 3	MTU America, Inc.

Product Construction Summary

Carbon Steel Skid, Aluminum Enclosure

Options / Subcomponent Summary

Enclosure: MTU; Carbon Steel Silencer: Miratech; Engine: John Deere; Alternator: Marathon; Radiator: AKG; Air Filter: Vortex; Controller: MTU; Jacket Water Heater: Kim Hotstart; Breaker: Square-D; Battery: Exide; Battery Charger: SENS

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
13,000	207	84	111	3.0	4.0	5.0

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 2019	ICC-ES AC156	2.5	0	1.5	-	-	1.67	0.67
		2.0	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset mounted to (8) VMC M2SS-1E-2400N external spring isolators using (1) 5/8" Grade 8 bolt each. Isolators mounted shake table interface fixture with (32) 5/8" grade 8 bolts. Seismic enhancements made during testing include, (6) additional 1/4" diameter Grade 8 bolts for attachment of breaker box to junction box, 1"x1"x1/8" angle steel welded to full width of the top and bottom back corners of the breaker box, an added pin in the breaker box door hinge to prevent vertical displacement, addition of 2" galvanized washers to the attachment between the junction box and alternator, (4) additional 3" welds at the widths of the radiator feet that mount to the skid, replacement of the (2) radiator lateral braces with 1-3/4"x1-3/4"x1/8" carbon steel tube mounted with 1/2" diameter Grade 5 bolt at each end, and a 1/2" diameter galvanized steel tube must be added to shroud the enclosure door latch.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.



UNIT UNDER TEST (UUT) Summary Sheet

UUT-11

31218-2001

Model Line	Model Number	Manufacturer
6R0150	MTU 6R0150 DS300 Tier 4	MTU America, Inc.

Product Construction Summary

Carbon Steel Skid, Aluminum Enclosure, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Enclosure: MTU; Fuel Tank: MTU; Engine: John Deere; Alternator: Marathon; Radiator: AKG; Air Filter: Donaldson; Controller: MTU; Jacket Water Heater: Kim Hotstart; Breaker: Square-D; Battery: Exide; Battery Charger: SENS; Lighting Kit: MTU; Space Heater: King Electric; Motorized Intake Louver: Vent Products; Fuel Water Separator: Racor; Aftertreatment: John Deere

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
12,135	190	56	97	4.5	3.5	7.5

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 2019	ICC-ES AC156	2.5	0	1.5	-	-	1.67	0.67
		2.0	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset mounted to fuel tank with (8) VMC M2SSH-1E-2000 Isolators using (1) 3/4" Grade 8 bolt each. Fuel tank mounted to shake table interface fixture with (8) 5/8" diameter grade 8 bolts.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.



UNIT UNDER TEST (UUT) Summary Sheet

UUT-12

31218-2001

Model Line	Model Number	Manufacturer
6R0225	MTU 6R0225 DS400 Tier 4	MTU America, Inc.

Product Construction Summary

Carbon Steel Skid, Carbon Steel Enclosure, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Enclosure: MTU; Fuel Tank: MTU; Engine: John Deere; Alternator: Marathon; Radiator: AKG; Air Filter: Vortex; Controller: MTU; Jacket Water Heater: Kim Hotstart; Breaker: Square-D; Battery: Exide; Battery Charger: SENS; Battery Warming Plate: Zero Start; Lighting Kit: MTU; Space Heater: King Electric; Motorized Intake Louver: Vent Products; Fuel Water Separator: Racor; Aftertreatment: John Deere

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
36,093	206	84	104	3.5	3.5	6.5

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 2019	ICC-ES AC156	2.5	0	1.5	-	-	1.67	0.67
		2.0	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset mounted to fuel tank with (8) VMC M2SSH-1E-2400N external spring isolators using (1) 3/4" Grade 8 bolt each. Fuel tank mounted to shake table interface fixture with (12) 5/8" diameter grade 8 bolts.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.



UNIT UNDER TEST (UUT) Summary Sheet

UUT-13

31218-2001

Model Line	Model Number	Manufacturer
6R0150	OPU 6090 Tier 4	MTU America, Inc.

Product Construction Summary

Carbon Steel Skid

Options / Subcomponent Summary

Aftertreatment: John Deere

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
1,653	144	60	100	8.5	5.5	11.0

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 2019	ICC-ES AC156	2.5	0	1.5	-	-	1.67	0.67
		2.0	1	1.5	3.20	2.40	-	-

Test Mounting Details

UUT mounted to shake table interface fixture with (8) 5/8" diameter grade 8 bolts, (8) 5/8"-11 Grade 8 nuts, and (16) 316SS flat washers.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.



UNIT UNDER TEST (UUT) Summary Sheet

UUT-14

31218-2001

Model Line	Model Number	Manufacturer
6R0225	OPU 6135 Tier 4	MTU America, Inc.

Product Construction Summary

Carbon Steel Skid

Options / Subcomponent Summary

Aftertreatment: John Deere

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
1,862	137	80	103	3.0	4.0	9.0

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 2019	ICC-ES AC156	2.5	0	1.5	-	-	1.67	0.67
		2.0	1	1.5	3.20	2.40	-	-

Test Mounting Details

UUT mounted to shake table interface fixture with (4) VMC MSS-1E-1000 external spring isolators using (1) 5/8" Grade 5 bolt each. The isolators were connected to the fixture using (4) 3/4" 5/8" Grade 8 bolts, (4) 5/8" grade 8 nuts, and (8) 316SS flat washers per isolator.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.



UNIT UNDER TEST (UUT) Summary Sheet

UUT 20A

30837-1801

Model Line	Model Number	Manufacturer
4000	MTU 20V4000 DS3250	MTU America, Inc.

Product Construction Summary

Carbon Steel Skid

Options / Subcomponent Summary

Engine: MTU; Alternator: Leroy Somer; Radiator: Diesel Radiator; Autotensioner: MTU; Controller: MTU; Air Filters: Donaldson; Battery: NAPA; Battery Charger: SENS; Best Battery Selector: SENS; Battery Heater: Zero Start; Fuel Filters: Separ; Breakers: Eaton; Oil Tank: MTU; Fuel Lift Pump: Oberdorfer; Battery Disconnect: Blue Sea; Battery Disconnect: Blue Sea; Jacket Water Heaters: Kim Hotstart

UUT Properties

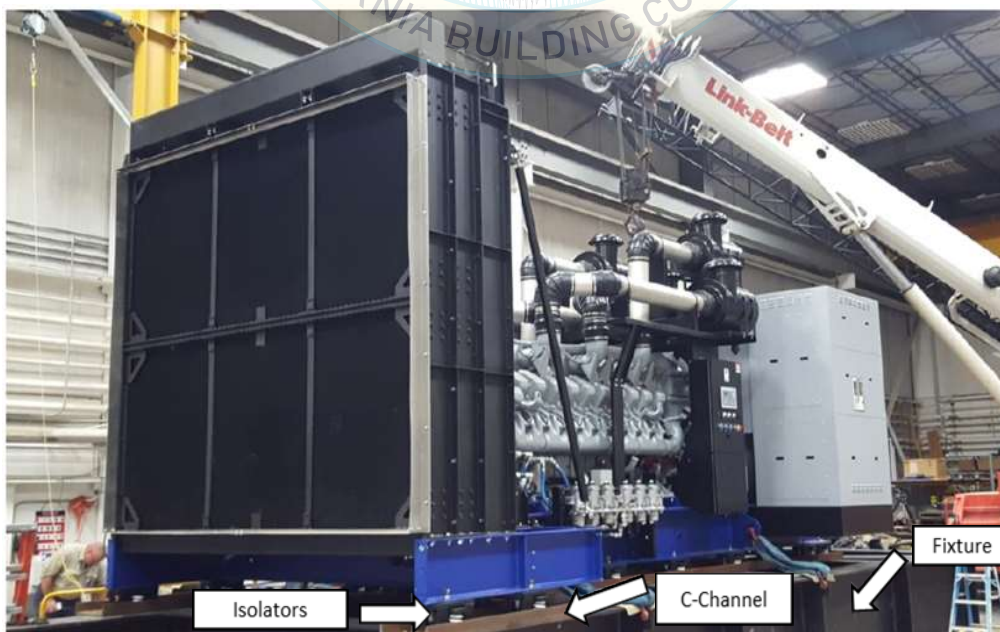
Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
69,400	132	320	150	5.5	4	9.5

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	2.50	0.00	1.50	-	-	1.67	0.67
CBC 2019	ICC-ES AC156	2.00	1.00	1.50	3.20	2.40	-	-

Test Mounting Details

UUT-20A was externally isolated using (18) VMC M2SSHX-1E-6200N spring isolators. Isolators were attached to the generator skid using (18) 3/4" grade 8 bolts. Isolators were welded to an adaptor and the adaptor was bolted to the fixture using (32) 3/4" grade 8 bolts.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.



UNIT UNDER TEST (UUT) Summary Sheet

UUT 20B

30837-1801

Model Line	Model Number	Manufacturer
4000	MTU 20V4000 DS3250	MTU America, Inc.

Product Construction Summary

Carbon Steel Skid

Options / Subcomponent Summary

Engine: MTU; Alternator: Leroy Somer; Radiator: Diesel Radiator; Autotensioner: MTU; Controller: MTU; Air Filters: Donaldson; Battery: NAPA; Battery Charger: SENS; Best Battery Selector: SENS; Battery Heater: Zero Start; Fuel Filters: Separ; Breakers: Square-D; Oil Tank: MTU; Fuel Lift Pump: Oberdorfer; Battery Disconnect: Blue Sea; Battery Disconnect: Blue Sea; Jacket Water Heaters: Kim Hotstart

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
68,900	132	320	150	5.5	4	9.5

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	2.50	0.00	1.50	-	-	1.67	0.67
CBC 2019	ICC-ES AC156	2.00	1.00	1.50	3.20	2.40	-	-

Test Mounting Details

UUT-20B was rigidly attached to (18) locked out (springs and dampers removed) VMC M2SSHX-1E-6200N spring isolators. Isolators were attached to the generator skid using (18) 3/4" grade 8 bolts. Isolators were welded to an adaptor and the adaptor was bolted to the fixture using (32) 3/4" grade 8 bolts.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.