APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0621

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Rolls-Royce Solutions America Inc.

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: Emergency and Standby Power Systems

Product Type: Generators

Product Model Number: 6R0150 and 6R0225 Series

General Description: Diesel engine powered electrical generator sets

Mounting Description: Rigid base mounting or Externally spring isolated mounting, from Genset to fuel tank or ground.

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: VMC Group

Contact Person: John Giuliano

Mailing Address: 113 Main St, Bloomingdale, NJ 07403

Telephone: (973) 838-1780 Email: john.giuliano@thevmcgroup.com

Title: President

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 CALIFORNIA, BERKELEY (PEER)

Contact Person: Amarnath Kasalanati

Mailing Address: 1301 S. 46th Street, Building 420, Richmond CA 94804

Telephone: (510) 665-3594 Email: amarnath1@berkeley.edu

Seismic Parameters

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

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

a_p (Amplification factor) = 2.5 (Spring Isolated); 1 (Rigid)

R_p (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 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 05/03/2028

Date: 5/3/2022

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):

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	144.0	60.0	98.0	8,500	Isolated / Rigid	Extrapolated
mtu 6R0150 DS230	300	Tier 3 / 4	Open	144.0	60.0	98.0	8,500		Extrapolated
mtu 6R0150 DS250	300	Tier 3 / 4	Open	144.0	60.0	98.0	8,500		Extrapolated
mtu 6R0150 DS275	300	Tier 3 / 4	Open	144.0	60.0	98.0	8,500		Extrapolated
mtu 6R0150 DS300	300	Tier 3 / 4	Open	144.0	60.0	98.0	8,500		Extrapolated
mtu 6R0225 DS275	400	Tier 3 / 4	Open	155.0	88.0	98.0	11,000		Extrapolated
mtu 6R0225 DS300	400	Tier 3 / 4	Open	155.0	88.0	98.0	11,000		Extrapolated
mtu 6R0225 DS325	400	Tier 3 / 4	Open	155.0	88.0	105.0	11,000		Extrapolated
mtu 6R0225 DS350	400	Tier 3 / 4	Open	155.0	88.0	105.0	11,000		Extrapolated
mtu 6R0225 DS365	400	Tier 3 / 4	Open	155.0	88.0	105.0	11,000		Extrapolated
mtu 6R0225 DS400	400	Tier 3 / 4	Open	155.0	88.0	105.0	11,000		Extrapolated
mtu 6R0150 DS210	300	Tier 3 / 4	Enclosed	190.0	60.0	104.0	11,000		Extrapolated
mtu 6R0150 DS230	300	Tier 3 / 4	Enclosed	190.0	60.0	104.0	11,000		Extrapolated
mtu 6R0150 DS250	300	Tier 3 / 4	Enclosed	190.0	60.0	104.0	11,000		Extrapolated
mtu 6R0150 DS275	300	Tier 3 / 4	Enclosed	190.0	60.0	104.0	11,000		Extrapolated
mtu 6R0150 DS300	300	Tier 3 / 4	Enclosed	190.0	60.0	104.0	11,000		Extrapolated
mtu 6R0225 DS400	400	Tier 3 / 4	Enclosed	207.0	88.0	111.0	14,000	**Isolated** / Rigid	UUT-10B
mtu 6R0225 DS275	400	Tier 3 / 4	Enclosed	207.0	88.0	111.0	14,000	Isolated / Rigid	Interpolated
mtu 6R0225 DS300	400	Tier 3 / 4	Enclosed	207.0	88.0	111.0	14,000		Interpolated
mtu 6R0225 DS325	400	Tier 3 / 4	Enclosed	207.0	88.0	111.0	14,000		Interpolated
mtu 6R0225 DS350	400	Tier 3 / 4	Enclosed	207.0	88.0	111.0	14,000		Interpolated
mtu 6R0225 DS365	400	Tier 3 / 4	Enclosed	207.0	88.0	111.0	14,000		Interpolated
mtu 6R0225 DS400	400	Tier 3 / 4	Enclosed	207.0	88.0	111.0	14,000		Interpolated
mtu 12V1600 DS600	600	Tier 3	Enclosed	270.0	84.0	100.0	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	230.0	84.0	135.0	11,430	Isolated / **Rigid**	UUT-7
mtu 6R0150 DS300	300	Tier 3 / 4	Enclosed	280.0	60.0	140.0	12,135	**Isolated** / Rigid	UUT-11
mtu 6R0150 DS275	275	Tier 3 / 4	Enclosed	280.0	60.0	140.0	14,600	**Rigid**	UUT-9
mtu 6R0150 DS210	300	Tier 3 / 4	Open	320.0	60.0	134.0	25,000	Isolated / Rigid	Interpolated
mtu 6R0150 DS230	300	Tier 3 / 4	Open	320.0	60.0	134.0	25,000		Interpolated
mtu 6R0150 DS250	300	Tier 3 / 4	Open	320.0	60.0	134.0	25,000		Interpolated
mtu 6R0150 DS275	300	Tier 3 / 4	Open	320.0	60.0	134.0	25,000		Interpolated
mtu 6R0150 DS300	300	Tier 3 / 4	Open	320.0	60.0	134.0	25,000		Interpolated
mtu 6R0150 DS210	300	Tier 3 / 4	Enclosed	320.0	60.0	140.0	28,500		Interpolated
mtu 6R0150 DS230	300	Tier 3 / 4	Enclosed	320.0	60.0	140.0	28,500		Interpolated
mtu 6R0150 DS250	300	Tier 3 / 4	Enclosed	320.0	60.0	140.0	28,500		Interpolated
mtu 6R0150 DS275	300	Tier 3 / 4	Enclosed	320.0	60.0	140.0	28,500		Interpolated
mtu 6R0150 DS300	300	Tier 3 / 4	Enclosed	320.0	60.0	140.0	28,500		Interpolated
mtu 6R0225 DS275	400	Tier 3 / 4	Open	287.0	88.0	141.0	30,000		Interpolated
mtu 6R0225 DS300	400	Tier 3 / 4	Open	287.0	88.0	141.0	30,000		Interpolated
mtu 6R0225 DS325	400	Tier 3 / 4	Open	287.0	88.0	141.0	30,000		Interpolated
mtu 6R0225 DS350	400	Tier 3 / 4	Open	287.0	88.0	141.0	30,000		Interpolated
mtu 6R0225 DS365	400	Tier 3 / 4	Open	287.0	88.0	141.0	30,000		Interpolated
mtu 6R0225 DS400	400	Tier 3 / 4	Open	287.0	88.0	141.0	30,000		Interpolated
mtu 6R0225 DS400	400	Tier 3 / 4	Enclosed	287.0	88.0	147.0	32,500	Isolated / **Rigid**	UUT-10A
mtu 6R0225 DS275	400	Tier 3 / 4	Enclosed	287.0	88.0	147.0	36,000	Isolated / Rigid	Interpolated
mtu 6R0225 DS300	400	Tier 3 / 4	Enclosed	287.0	88.0	147.0	36,000		Interpolated
mtu 6R0225 DS325	400	Tier 3 / 4	Enclosed	287.0	88.0	147.0	36,000		Interpolated
mtu 6R0225 DS350	400	Tier 3 / 4	Enclosed	287.0	88.0	147.0	36,000		Interpolated
mtu 6R0225 DS365	400	Tier 3 / 4	Enclosed	287.0	88.0	147.0	36,000		Interpolated
mtu 6R0225 DS400	400	Tier 3 / 4	Enclosed	287.0	88.0	147.0	36,093	**Isolated** / Rigid	UUT-12
mtu 12V1600 DS600	600	Tier 3	Enclosed	330.0	84.0	135.0	44,980	**Rigid**	UUT-8A

Notes:

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

Table 2a - Certified Enclosures

Part Number	Type	Material	Notes	Max Dimensions [in]			Max Weight [lb]	Manufacturer	UUT
				Length	Width	Height			
XSG30380.00063	275-400 kW (130 mph)	Aluminum	Tier 3	155	84	93	862	Rolls-Royce Solutions America Inc.	UUT-10A, UUT-10B
XSG30380.00036	210-300 kW (130 mph)		Tier 3	144	56	85	899		Interpolated
XSG30380.00105	210-300 kW (130 mph)		Tier 4	144	56	85	948		Interpolated
XSG30380.00038	210-300 kW (190 mph)		Tier 3	144	56	85	962		Interpolated
XSG30380.00065	275-400 kW (190 mph)		Tier 3	155	84	93	981		Interpolated
XSG30380.00101	210-300 kW (190 mph)		Tier 4	144	56	85	1,012		UUT-11
XSG30380.00111	300-400 kW (130 mph)		Tier 4	155	84	93	1,048		Interpolated
XSG30380.00113	300-400 kW (190 mph)		Tier 4	155	84	93	1,048		Interpolated
XS575300.00054	450-600 kW (190 mph)		Tier 3	170	84	92	1,088		UUT-8A, UUT-8B
XS572300.00060	230-300 kW (130 mph)	Carbon Steel	Tier 3	144	56	85	1,367		UUT-7
XSG30380.00033	210-300 kW (130 mph)		Tier 3	144	56	85	1,616		Interpolated
XSG30380.00027	210-300 kW (190 mph)		Tier 3	144	56	85	1,678		UUT-9
XSG30380.00103	210-300 kW (130 mph)		Tier 4	144	56	85	1,700		Interpolated
XSG30380.00099	210-300 kW (190 mph)		Tier 4	144	56	85	1,700		Interpolated
XSG30380.00060	275-400 kW (130 mph)		Tier 3	155	84	93	1,814		Interpolated
XSG30380.00058	275-400 kW (190 mph)		Tier 3	155	84	93	1,933		Interpolated
XSG30380.00109	300-400 kW (190 mph)		Tier 4	155	84	93	2,051		Interpolated
XSG30380.00108	300-400 kW (130 mph)		Tier 4	155	84	93	2,051		UUT-12

Table 2b - Certified Enclosure Scoops

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

Table 3 - Certified Subcomponents

Component [MFR]	Part Number	Weight [lb]	Notes	UUT
UL 142 Fuel Tank (Rolls-Royce Solutions America Inc.)	XG3041200193	1,550	265 Gallon Tank	Interpolated
	XG3041200211	1,910	265 Gallon Tank	UUT-11
	XG3041200192	1,930	350 Gallon Tank	Interpolated
	XG3041200187	2,210	530 Gallon Tank	UUT-9
	XS572360.00018	2,220	525 Gallon Tank	UUT-7
	XG3041200209	2,240	540 Gallon Tank	Interpolated
	XG3041200216	2,600	550 Gallon Tank	Interpolated
	XG3041200188	2,560	530 Gallon Tank	Interpolated
	XG3041200210	2,560	540 Gallon Tank	Interpolated
	XG3041200182	2,630	700 Gallon Tank	Interpolated
	XG3041200191	2,780	650 Gallon Tank	Interpolated
	XG3041200217	3,250	550 Gallon Tank	Interpolated
	XG3041200186	3,210	650 Gallon Tank	Interpolated
	XG3041200183	3,250	700 Gallon Tank	Interpolated
	XG3041200189	3,630	1060 Gallon Tank	Interpolated
	XG3041200184	4,270	1400 Gallon Tank	Interpolated
	XG3041200190	4,950	1590 Gallon Tank	Interpolated
	XG3041200185	5,410	2100 Gallon Tank	UUT-10A
	XG3041200212	6,230	2100 Gallon Tank	UUT-12
	XS575360.00040	7,280	3000 Gallon Tank	UUT-8A
Engine (John Deere)	XSG30240.00012	2,100	6090HF484 Tier 3, 210-275 kW	UUT-9
	XSG30240.00013	2,100	6090HFG86 Tier 3, 300 kW	Interpolated
	XSG30240.00020	2,420	6090HFG06 Tier 4, 230-300 kW	UUT-11
	XSG30240.00015	3,100	6135HFG84 Tier 3, 350-400 kW	UUT-10A, UUT-10B
	XSG30240.00016	3,475	6135HFG06 Tier 4, 350-400 kW	UUT-12
Alternators (Marathon)	430 Frame	2,400	75-600kW	UUT-7, UUT-9, UUT-11
	570 Frame	5,000	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 (Rolls-Royce Solutions America Inc.)	MGC-1500 Series	2	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.	UUT-7
	MGC-2000 Series	4		UUT-9
	MGC-3000 Series	6		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
	SUA98951	15	5000 W	UUT-8A, UUT-8B
Fuel/Water Separator (Racor)	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
	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 (Rolls-Royce Solutions America Inc.)	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 / 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 (Rolls-Royce Solutions America Inc.)	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	Rolls-Royce Solutions America Inc.

Product Construction Summary

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

Options / Subcomponent Summary

Engine: Rolls-Royce Solutions America Inc.; Alternator: Marathon; Radiator: Bearward; Enclosure: Rolls-Royce Solutions America Inc.; Fuel Tank: Rolls-Royce Solutions America Inc.; Silencer: Phillips & Temro; Air Filter: Donaldson; Controller: Rolls-Royce Solutions America Inc.; 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	2.50	1.00	1.67	0.67
		2.0	1	1.5	3.20	2.40	1.33	0.53

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	Rolls-Royce Solutions America Inc.

Product Construction Summary

Carbon Steel Skid, Aluminum Enclosure, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Engine: Rolls-Royce Solutions America Inc.; Alternator: Marathon; Radiator: Bearward; Enclosure: Rolls-Royce Solutions America Inc.; Fuel Tank: Rolls-Royce Solutions America Inc.; Silencer: Phillips & Temro; Air Filter: Vortox; Controller: Rolls-Royce Solutions America Inc.; 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	2.50	1.00	1.67	0.67
		2.0	1	1.5	3.20	2.40	1.33	0.53

Test Mounting Details

Genset mounted to (10) VMC MSSH-3C external spring isolators. 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	Rolls-Royce Solutions America Inc.

Product Construction Summary

Carbon Steel Skid, Aluminum Enclosure

Options / Subcomponent Summary

Engine: Rolls-Royce Solutions America Inc.; Alternator: Marathon; Radiator: Bearward; Enclosure: Rolls-Royce Solutions America Inc.; Silencer: Phillips & Temro; Air Filter: Vortox; Controller: Rolls-Royce Solutions America Inc.; 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	2.50	1.00	1.67	0.67
		2.0	1	1.5	3.20	2.40	1.33	0.53

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	Rolls-Royce Solutions America Inc.

Product Construction Summary

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

Options / Subcomponent Summary

Enclosure: Rolls-Royce Solutions America Inc.; Carbon Steel Silencer: Miratech; Fuel Tank: Rolls-Royce Solutions America Inc.; Engine: John Deere; Alternator: Marathon; Radiator: AKG; Air Filter: Donaldson; Controller: Rolls-Royce Solutions America Inc.; 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	2.50	1.00	1.67	0.67
		2.0	1	1.5	3.20	2.40	1.33	0.53

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	Rolls-Royce Solutions America Inc.

Product Construction Summary

Carbon Steel Skid, Aluminum Enclosure, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Enclosure: Rolls-Royce Solutions America Inc.; Carbon Steel Silencer: Miratech; Fuel Tank: Rolls-Royce Solutions America Inc.; Engine: John Deere; Alternator: Marathon; Radiator: AKG; Air Filter: Vortox; Controller: Rolls-Royce Solutions America Inc.; 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	2.50	1.00	1.67	0.67
		2.0	1	1.5	3.20	2.40	1.33	0.53

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 enhacements 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, 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 galvinzed 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	Rolls-Royce Solutions America Inc.

Product Construction Summary

Carbon Steel Skid, Aluminum Enclosure

Options / Subcomponent Summary

Enclosure: Rolls-Royce Solutions America Inc.; Carbon Steel Silencer: Miratech; Engine: John Deere; Alternator: Marathon; Radiator: AKG; Air Filter: Vortox; Controller: Rolls-Royce Solutions America Inc.; 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	2.50	1.00	1.67	0.67
		2.0	1	1.5	3.20	2.40	1.33	0.53

Test Mounting Details

Genset mounted to (8) VMC M2SS-1E external spring isolators. Isolators mounted shake table interface fixture with (32) 5/8" grade 8 bolts. Seismic enhacements 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 galvinzed 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	Rolls-Royce Solutions America Inc.

Product Construction Summary

Carbon Steel Skid, Aluminum Enclosure, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Enclosure: Rolls-Royce Solutions America Inc.; Fuel Tank: Rolls-Royce Solutions America Inc.; Engine: John Deere; Alternator: Marathon; Radiator: AKG; Air Filter: Donaldson; Controller: Rolls-Royce Solutions America Inc.; Jacket Water Heater: Kim Hotstart; Breaker: Square-D; Battery: Exide; Battery Charger: SENS; Lighting Kit: Rolls-Royce Solutions America Inc.; Space Heater: King Electric;Motorized Intake Louver: Vent Products:Fuel Water Separator: Racor; Aftertreament: 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	2.50	1.00	1.67	0.67
		2.0	1	1.5	3.20	2.40	1.33	0.53

Test Mounting Details

Genset mounted to fuel tank with (8) VMC M2SSH-1E Isolators. 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	Rolls-Royce Solutions America Inc.

Product Construction Summary

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

Options / Subcomponent Summary

Enclosure: Rolls-Royce Solutions America Inc.; Fuel Tank: Rolls-Royce Solutions America Inc.; Engine: John Deere; Alternator: Marathon; Radiator: AKG; Air Filter: Vortox; Controller: Rolls-Royce Solutions America Inc.; Jacket Water Heater: Kim Hotstart; Breaker: Square-D; Battery: Exide; Battery Charger: SENS; Battery Warming Plate: Zero Start; Lighting Kit: Rolls-Royce Solutions America Inc.; Space Heater: King Electric; Motorized Intake Louver: Vent Products; Fuel Water Separator: Racor; Aftertreament: 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	2.50	1.00	1.67	0.67
		2.0	1	1.5	3.20	2.40	1.33	0.53

Test Mounting Details

Genset mounted to fuel tank with (8) VMC M2SSH-1E external spring isolators. 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	Rolls-Royce Solutions 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	2.50	1.00	1.67	0.67
		2.0	1	1.5	3.20	2.40	1.33	0.53

Test Mounting Details

UUT 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-14

31218-2001

Model Line	Model Number	Manufacturer
6R0225	OPU 6135 Tier 4	Rolls-Royce Solutions 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	2.50	1.00	1.67	0.67
		2.0	1	1.5	3.20	2.40	1.33	0.53

Test Mounting Details

UUT mounted to shake table interface fixture with (4) VMC MSS-1E external spring isolators.

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	Rolls-Royce Solutions America Inc.

Product Construction Summary

Carbon Steel Skid

Options / Subcomponent Summary

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

UUT Properties

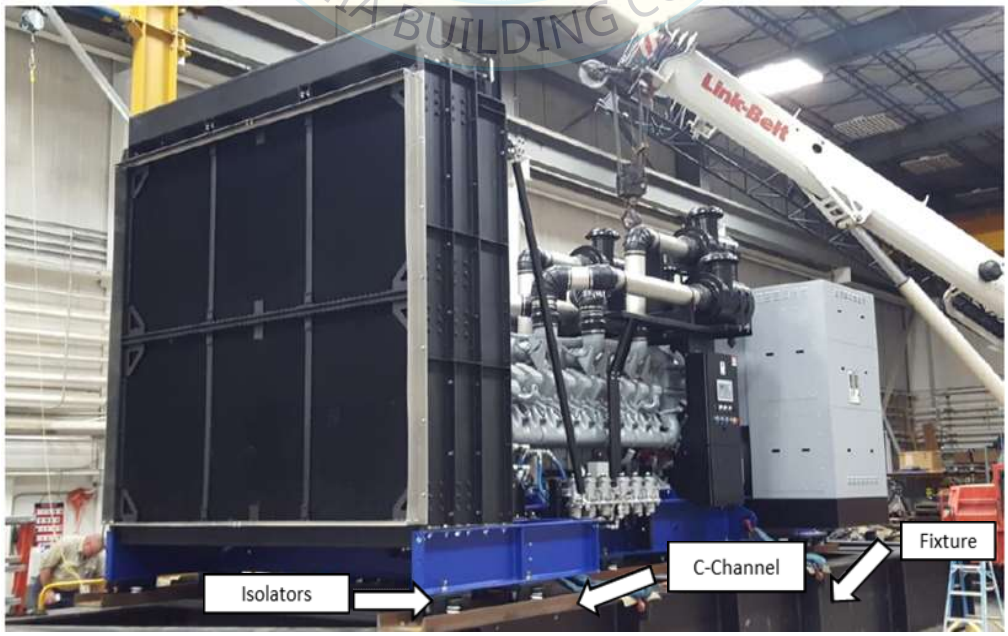
Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
69,400	132	320	150	5.5	4	9.5

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	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-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	Rolls-Royce Solutions America Inc.

Product Construction Summary

Carbon Steel Skid

Options / Subcomponent Summary

Engine: Rolls-Royce Solutions America Inc.; Alternator: Leroy Somer; Radiator: Diesel Radiator; Autotensioner: Rolls-Royce Solutions America Inc.; Controller: Rolls-Royce Solutions America Inc.; Air Filters: Donaldson; Battery: NAPA; Battery Charger: SENS; Best Battery Selector: SENS; Battery Heater: Zero Start; Fuel Filters: Separ; Breakers: Square-D; Oil Tank: Rolls-Royce Solutions America Inc.; 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}	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-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.