APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0451

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@ps.rolls-royce.com

Product Information

Product Name: Emergency and Standby Power Systems

Product Type: Generators

Product Model Number: 1600-series Diesel Powered Electrical Generator Sets

General Description: Diesel Powered Electrical Generators

Mounting Description: Rigid Base Mounted Enclosure/Genset/Tank, or Externally Isolated Enclosure/Genset

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: The VMC Group

Contact Person: John Giuliano

Mailing Address: 113 Main Street, 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: DYNAMIC CERTIFICATION LABORATORY (DCL)

Contact Person: Kelly Laplace

Mailing Address: 1315 Greg St., Ste 109, Sparks NV 89431

Telephone: (775) 358-5085 Email: Kelly@shaketest.com

Company Name: Pacific Earthquake Engineering Research Center (PEER)

Contact Person: Amarnath Kasalanati

Mailing Address: 1301 South 46th St., Bldg. 420, Richmond CA 947201729

Telephone: (510) 642-3437 Email: Amarnath1@berkeley.edu

Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 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) & 2.50 (z/h=0)

a_p (Amplification factor) = 2.5 (Isolated) & 1.0 (Rigid)

R_p (Response modification factor) = 2.0 (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 05/14/2030

Date: 5/14/2024

Name: Mohammad Karim Title: Supervisor, Health Facilities

Special Seismic Certification Valid Up to: S_{DS} (g) = 2.0 z/h = 1

Condition of Approval (if applicable):

Table 1 - Certified Components - Gensets Off Tanks

Model	Freq.	Max Rating [kW]	Config.	EPA Rating	Max Package Dimensions [in]			Max Weight[1] [lb]	Mounting Configuration	UUT
					Length	Width	Height[2]			
mtu 6R1600 DS230 ***mtu*** 6R1600 DS250 ***mtu*** 6R1600 DS275 ***mtu*** 6R1600 DS300 ***mtu*** 6R1600 DS330	60Hz	300	Open	Tier 3	144	76	73	7,500	Rigid/Isolated	Extrapolated
			Enclosed	Tier 3	190	76	100	11,000	Rigid/Isolated	Extrapolated
mtu 8V1600 DS350 ***mtu*** 8V1600 DS400 ***mtu*** 8V1600 DS440	60Hz	400	Open	Tier 3	131	73	78	9,000	Rigid/Isolated	Extrapolated
			Enclosed	Tier 3	246	84	100	13,000	Rigid/Isolated	Extrapolated
mtu 6R0225 DS400	60 Hz	400	Enclosed	Tier 3	207	88	111	13,000	Isolated	UUT-10B
mtu 10V1600 DS450 ***mtu*** 10V1600 DS500 ***mtu*** 10V1600 DS550 ***mtu*** 10V1600 DS560	60Hz	500	Open	Tier 3	139	73	80	11,000	Rigid/Isolated	Extrapolated
			Enclosed	Tier 2/3	270	84	100	14,780	Rigid/Isolated	Interpolated
mtu 12V1600 DS550 ***mtu*** 12V1600 DS600 ***mtu*** 12V1600 DS650 ***mtu*** 12V1600 DS660 ***mtu*** 12V1600 DS715 ***mtu*** 12V1600 DS730	60Hz	600	Open	Tier 3	157	73	84	12,000	Rigid/Isolated	Extrapolated
			Enclosed	Tier 2	270	84	100	14,780	Rigid/Isolated	Interpolated
mtu 12V1600 DS600	60 Hz	600	Enclosed	Tier 2	270	84	100	14,780	Isolated	UUT-8B
mtu 12V1600 DS600	60 Hz	600	Enclosed	Tier 2	273	99	113	17,000	Rigid / Isolated	Interpolated[3]

Notes:

1. Max Weights includes operating genset weight and enclosure weight (where applicable)
2. Exhaust is not included in height dimension
3. Unit is interpolated between off tank and on tank test units.

Table 2 - Certified Components - Gensets On Tanks

Model	Freq.	Max Rating [kW]	Config.	EPA Rating	Max Package Dimensions [in]			Max Weight[1] [lb]	Mounting Configuration	UUT
					Length[3]	Width	Height[2]			
mtu 6R1600 DS300	60 Hz	300	Enclosed	Tier 3	230	84	135	11,430	Rigid	UUT-7
mtu 6R1600 DS230 ***mtu*** 6R1600 DS250	60 Hz	300	Open	Tier 3	230	84	108	11,430	Rigid/Isolated	Interpolated
mtu 6R1600 DS275 ***mtu*** 6R1600 DS300	60 Hz	300	Enclosed	Tier 3	230	84	135	11,430	Rigid/Isolated	Interpolated
mtu 6R1600 DS300	60 Hz	300	Enclosed	Tier 3	280	76	143	28,500	Rigid/Isolated	Interpolated
mtu 8V1600 DS350 ***mtu*** 8V1600 DS400 ***mtu*** 8V1600 DS440	60 Hz	400	Open	Tier 3	235	84	115	30,000	Rigid/Isolated	Interpolated
			Enclosed	Tier 3	286	84	135	34,000	Rigid/Isolated	Interpolated
mtu 6R0225 DS400	60 Hz	400	Enclosed	Tier 3	287	88	147	32,500	Rigid	UUT-10A
mtu 6R0225 DS400	60 Hz	400	Enclosed	Tier 4	206	84	104	36,093	Isolated	UUT-12
mtu 10V1600 DS450 ***mtu*** 10V1600 DS500 ***mtu*** 10V1600 DS550 ***mtu*** 10V1600 DS560	60 Hz	500	Open	Tier 2/3	326	84	125	41,000	Rigid/Isolated	Interpolated
			Enclosed	Tier 2/3	330	84	135	44,980	Rigid/Isolated	Interpolated
mtu 12V1600 DS550 ***mtu*** 12V1600 DS600 ***mtu*** 12V1600 DS650 ***mtu*** 12V1600 DS660 ***mtu*** 12V1600 DS715 ***mtu*** 12V1600 DS730	60 Hz	600	Open	Tier 2	326	84	125	42,000	Rigid/Isolated	Interpolated
			Enclosed	Tier 2	330	84	135	44,980	Rigid/Isolated	Interpolated
mtu 12V1600 DS600	60 Hz	600	Enclosed	Tier 2	377	99	149	44,980	Rigid / Isolated	Interpolated
mtu 12V1600 DS600	60 Hz	600	Enclosed	Tier 2	330	84	150	44,980	Isolated	UUT-8A

Notes:

1. Max Weights include operating genset weight, enclosure, empty tank, and fuel weight
2. Tank is included in height dimension. Exhaust is not included in height dimension
3. Length measurement includes tank

Table 2a - Certified Enclosures

Part Number	Type	Material	Max Dimensions [in]			Max Weight [lb]	UUT
			Length	Width	Height		
XS573300.00006	350-400 kW 130 mph	Aluminum	143	84	92	695	Interpolated
XS575300.00053	450-600 kW 130 mph		170	84	92	791	Interpolated
XS572300.00068	230-300 kW 190 mph)		144	56	85	805	Interpolated
XSG30380.00063	275-400 kW (130 mph)		155	84	93	862	UUT-10a, UUT-10b
XSG30380.00036	210-300 kW (130 mph)		144	56	85	899	Interpolated
XSG30380.00105	210-300 kW (130 mph)		144	56	85	948	Interpolated
XSG30380.00038	210-300 kW (190 mph)		144	56	85	962	Interpolated
XSG30380.00065	275-400 kW (190 mph)		155	84	93	981	Interpolated
XS573300.00007	350-400 kW 190 mph		143	84	92	995	Interpolated
XSG30380.00101	210-300 kW (190 mph)		144	56	85	1,012	Interpolated
XSG30380.00111	300-400 kW (130 mph)		155	84	93	1,048	Interpolated
XSG30380.00113	300-400 kW (190 mph)		155	84	93	1,048	Interpolated
XS575300.00054	450-600 kW (190 mph)		170	84	92	1,088	UUT-8a UUT-8b
XS572300.00065	230-300 kW (190 mph)	Carbon Steel	155	84	93	981	Interpolated
XS572300.00060	230-300 kW (130 mph)		144	56	85	1,367	UUT-7
XS573300.00001	350-400 kW 130 mph		143	84	92	1,465	Interpolated
XSG30380.00033	210-300 kW (130 mph)		144	56	85	1,616	Interpolated
XSG30380.00027	210-300 kW (190 mph)		144	56	85	1,678	Interpolated
XS575300.00047	450-600 kW 130 mph		170	84	92	1,685	Interpolated
XSG30380.00103	210-300 kW (130 mph)		144	56	85	1,700	Interpolated
XSG30380.00099	210-300 kW (190 mph)		144	56	85	1,700	Interpolated
XS573300.00002	350-400 kW 190 mph		143	84	92	1,760	Interpolated
XSG30380.00060	275-400 kW (130 mph)		155	84	93	1,814	Interpolated
XSG30380.00058	275-400 kW (190 mph)		155	84	93	1,933	Interpolated
XS575300.00055	450-600 kW 190 mph		170	84	92	1,980	Interpolated
XSG30380.00109	300-400 kW (190 mph)		155	84	93	2,051	Interpolated
XSG30380.00108	300-400 kW (130 mph)		155	84	93	2,051	UUT-12

Notes:

1. Rolls-Royce Solutions America Inc. is the manufacturer of all enclosures

Table 2b - Certified Enclosure Scoops

Part Number	Type	Material	Max Dimensions [in]			Max Weight [lb]	UUT
			Length	Width	Height		
XSG30380.00051	210-300 kW	Aluminum	46	56	85	177	Extrapolated
XS575300.00057	350-600 kW		52	84	92	262	UUT-8a UUT-8b
XSG30380.00078	350-400 kW		52	84	93	263	UUT-10a, UUT-10b
XS572300.00061	230-300 kW		46	56	85	435	Extrapolated
XSG30380.00028	210-300 kW	Carbon Steel	46	56	85	434	Extrapolated
XS572300.00062	230-300 kW		46	56	85	435	UUT-7
XSG30380.00059	350-400 kW		52	84	93	644	UUT-12
XS575300.00049	350-600 kW		52	84	92	645	Extrapolated

Notes:

1. Rolls-Royce Solutions America Inc. is the manufacturer of all enclosure scoops

Table 3 - Certified Subcomponents

Component [MFR]	Part Number	Notes	Material	Weight [lb]	UUT
Engine [Rolls-Royce Solutions America Inc.]	SUA100171	200-300 kW	Carbon Steel, Cast Iron, Aluminum, Plastic, Brass, Stainless Steel	2,620	UUT-7
	SUA96384	325-400 kW		3,400	Interpolated
	SUA100149	400-500 kW		3,860	Interpolated
	SUA100139	500-600 kW		4,300	UUT-8A, UUT-8B
Engine [John Deere]	XSG30240.00015	350-400 kW	Carbon Steel, Cast Iron, Aluminum, Plastic, Brass, Stainless Steel	3,100	UUT-10A, UUT-10B
	XSG30240.00016			3,475	UUT-12
Alternators [Marathon]	430 Frame	75-600 kW	Carbon Steel, Cast Iron, Aluminum, Copper	2,400	UUT-7
	570 Frame	300-600 kW		5,000	UUT-8A, UUT-8B, UUT-10A, UUT-10B, UUT-12
Radiators [Bearward]	SUA91969	230-300 kW	Carbon Steel, Aluminum, Copper	500	UUT-7
	SUA98975	350-400 kW		540	Interpolated
	SUA98809	450-500 kW		835	Interpolated
	SUA98581	550-600 kW		875	UUT-8A, UUT-8B
Radiators [AKG]	XSG30200.00010	275-400 kW	Carbon Steel, Aluminum, Copper	810	UUT-10A, UUT-10B
	XSG30200.00011	300-400 kW		852	UUT-12
Controller [Rolls-Royce Solutions America Inc.]	MGC-1500 Series	Each controller is a depopulated version of the controller with a higher number. The boxes of the 2000 and 3000 series are the same. The 1500 series box is smaller. All boxes are carbon steel.	Carbon Steel, Aluminum, Copper, Plastic	2	UUT-7
	MGC-2000 Series			5	Interpolated
	MGC-3000 Series			6	UUT-8A, UUT-8B, UUT-12
Jacket Water Heaters [Kim Hotstart]	SUA90334	2500 W	Carbon Steel, Cast Iron, Stainless Steel, Brass, Copper, Plastic	5	UUT-7
	CL/WL 4000 W	4000 W		10	UUT-12
	SUA98951	5000 W		15	UUT-8A, UUT-8B
Breakers [Square-D]	H Frame	150 Amp Max Rating	Carbon Steel, Aluminum, Copper, Plastic	4.8	Extrapolated
	J Frame	250 Amp Max Rating		5.3	UUT-7
	L Frame	600 Amp Max Rating		14	UUT-7
	M Frame	800 Amp Max Rating		29	Interpolated
	P Frame	1200 Amp Max Rating		32	UUT-8A, UUT-8B
	MTZ Frame	6000 Amp Max Rating		363	Interpolated
	NW Frame	4000 Amp Max Rating		363	UUT-10A, UUT-10B, UUT-12
Fuel Water Separator [Racor]	SUA100604	Switchable/Dual	Carbon/Stainless Steel, Cast Iron, Brass, Copper, Plastic, Glass	17	UUT-12
	1000FV10	Single Filter; 180 GPH		11	UUT-13A, UUT-13B
	751000FV10	Double Filter; 360 GPH		24	Interpolated
	791000FV10	Triple Filter; 540 GPH		36	UUT-13A, UUT-13B
Fuel Monitor System [FSI]	CMS-2M-MTU	iFuel monitor and flow meter assembly	Carbon/Stainless Steel, Cast Iron, Brass, Copper, Plastic, Glass	250	UUT-13A, UUT-13B

Table 3 - Certified Subcomponents, Continued

Component [MFR]	Part Number	Notes	Material	Weight [lb]	UUT
Space Heater [King Electric]	XSG3006100004	Space Heater	Carbon Steel, Aluminum, Copper, Plastic	12	UUT-12
Air Filters [Donaldson]	SUA86885	230-600 kW	Carbon Steel, Plastic, Paper	5	UUT-7
Air Filters [Vortox]	SUA96271	230-600 kW	Carbon Steel, Plastic, Paper	31	UUT-8A, UUT-8B
	XG3012100036	300-400 kW		51	UUT-12
Battery [Exide]	SUA120299	12 V	Carbon Steel, Aluminum, Copper, Plastic	56	UUT-7, UUT-8A, UUT-8B, UUT-12
Battery Charger [SENS]	XG3042500014	15 A	Carbon Steel, Cast Iron, Aluminum, Copper, Plastic	6	UUT-12
	SUA89983	10 A		22	UUT-7
	SUA87576	20 A		42	UUT-8A, UUT-8B
Battery Warming Plate [Zero Start]	SUA33218	200 W	Plastic, Copper, Aluminum	1	UUT-12
Lighting Kit [Rolls-Royce Solutions America Inc.]	XSG30300.02442	Lighting Kit (AC / DC)	Carbon Steel, Aluminum, Copper, Plastic, Glass	18	UUT-12
	XS572500.00268			20	UUT-7
	XS575340.00209 / XS575340.00226			32	UUT-8A, UUT-8B
Carbon Steel Silencer [Phillips & Temro]	SUA101916	5" Space Saver 18" Dia.	Carbon Steel	71	UUT-7
	SUA99120 / SUA99121	4" Space Saver 18" Dia.		64	Interpolated
	SUA97987 / SUA97988	5" Space Saver 18" Dia.		64	UUT-8A, UUT-8B
Motorized Intake Louver [Vent Products]	XSG3062300147	210-400 kW	Carbon Steel, Aluminum	105	UUT-12
Gravity Exhaust Louver [Rolls-Royce Solutions America Inc.]	XSG3062300263	275-400 kW	Carbon Steel, Aluminum	30	UUT-12
Fuel Tank [Rolls-Royce Solutions America Inc.]	XS572360.00017	265 Gallon Tank	Carbon Steel	1,630	Extrapolated
	XS573360.00002	340 Gallon Tank		2,000	Extrapolated
	XS575360.00034	500 Gallon Tank		2,510	Extrapolated
	XS572360.00018	525 Gallon Tank		2,220	UUT-7
	XS573360.00003	675 Gallon Tank		2,650	Interpolated
	XS575360.00035	1000 Gallon Tank		3,330	Interpolated
	XS572360.00019	1050 Gallon Tank		3,630	Interpolated
	XS573360.00004	1350 Gallon Tank		4,210	Interpolated
	XS572360.00020	1575 Gallon Tank		4,950	Interpolated
	XS575360.00036	2000 Gallon Tank		5,350	Interpolated
	XS573360.00005	2020 Gallon Tank		5,210	Interpolated
	XSG3041200153-4	2100 Gallon Tank		5,410	UUT-10A
	XSG3041200212	2100 Gallon Tank		6,230	UUT-12
	XS575360.00040	3000 Gallon Tank		7,280	UUT-8A

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-7

Test Report: PEER STI 2015-17

Model Line	Model Number	Manufacturer
1600	mtu 6R1600 DS300	Rolls-Royce Solutions America Inc.

Product Construction Summary

Carbon Steel Skid, Carbon Steel Enclosure, Carbon Steel Tank

Options / Subcomponent Summary

Engine: Rolls-Royce Solutions America Inc. ; Alternator: Marathon ; Radiator: Bearward ; Enclosure and Enclosure Scoop: 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	230.0	84.0	135.0	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 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.50	0.0	1.5	-	-	1.67	0.67

Test Mounting Details

UUT-7 was rigidly mounted to the fuel tank using (12) 5/8" diameter Grade 8 bolts. The tank was rigidly connected to the shake table 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-8A

Test Report: PEER STI 2015-17

Model Line	Model Number	Manufacturer
1600	mtu 12V1600 DS600	Rolls-Royce Solutions America Inc.

Product Construction Summary

Carbon Steel Skid, Carbon Steel Enclosure, Carbon Steel Tank

Options / Subcomponent Summary

Engine: Rolls-Royce Solutions America Inc. ; Alternator: Marathon ; Radiator: Bearward ; Enclosure and Enclosure Scoop: 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	330.0	84.0	150.0	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 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.50	0.0	1.5	-	-	1.67	0.67

Test Mounting Details

Genset was isolated from fuel tank using (10) VMC Group MSSH-3C spring isolators. Spring isolators were attached to the fuel tank using (40) 5/8" Grade 8 bolts. Fuel tank was connected to the 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-8B

Test Report: PEER STI 2015-17

Model Line	Model Number	Manufacturer
1600	mtu 12V1600 DS600	Rolls-Royce Solutions America Inc.

Product Construction Summary

Carbon Steel Skid, Carbon Steel Enclosure

Options / Subcomponent Summary

Engine: Rolls-Royce Solutions America Inc. ; Alternator: Marathon ; Radiator: Bearward ; Enclosure and Enclosure Scoop: 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	270.0	84.0	100.0	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 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.50	0.0	1.5	-	-	1.67	0.67

Test Mounting Details

UUT-8B was isolated using (10) VMC Group MSS-3E spring isolators. The isolators were connected to the equipment using (1) 7/8 Grade 8 bolt each, and were connected to the shake table using (4) 3/4" diameter Grade 8 bolts per isolator.
DCRs: Additional support to the middle of the bottom panel is required.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-10A

Test Report: DCL 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 and Enclosure Scoop: 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
32,500	287.0	88.0	147.0	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 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.50	0.0	1.5	-	-	1.67	0.67

Test Mounting Details

UUT-10A was rigidly mounted to the fuel tank using (8) 5/8" diameter Grade 8 bolts. The tank was rigidly connected to the shake table using (12) 5/8" Grade 8 bolts.
DCRs: (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

Test Report: DCL 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 and Enclosure Scoop: 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	207.0	88.0	111.0	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 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.50	0.0	1.5	-	-	1.67	0.67

Test Mounting Details

UUT-10B was isolated using (8) VMC Group M2SS-1E-2400N spring isolators. The isolators were connected to the equipment using (1) 5/8 Grade 8 bolt each, and were connected to the shake table using (4) 5/8" diameter Grade 8 bolts per isolator.
DCRs: (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-12

Test Report: DCL 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 and Enclosure Scoop: 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	206.0	84.0	104.0	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 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.50	0.0	1.5	-	-	1.67	0.67

Test Mounting Details

UUT-12 was isolated using (8) VMC Group M2SSH-1E-2400N spring isolators. The isolators were connected to the equipment using (1) 5/8" Grade 8 bolt each, and were connected to the tank using (4) 5/8" diameter Grade 8 bolts per isolator. The tank was rigidly connected to the shake table 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-13A

Test Report: DCL 20479-2201; UUT-1A

Model Line	Model Number	Manufacturer
Fuel Water Separators/Filters and Fuel Monitor	Fuel Water Separators/Filters and Fuel Monitor	Racor and ESI

Product Construction Summary

Carbon Steel, Cast Iron, Stainless Steel, Brass, Copper, Plastic, Glass

Options / Subcomponent Summary

Fuel Filters: Racor; Fuel Monitor System: ESI

UUT Properties

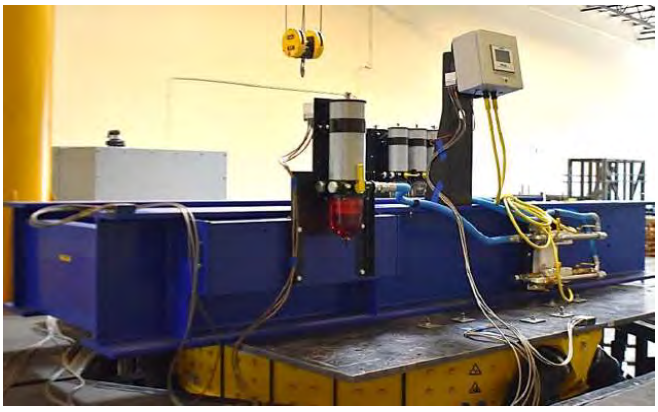
Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
2,990	133.0	77.0	49.5	>33.3	9.5	20.5

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 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.50	0.0	1.5	-	-	1.68	0.68

Test Mounting Details

The mock skid was rigidly mounted to the shake table using (4) 5/8" diameter Grade 8 bolts. The Triple Fuel Filter was mounted to the skid with (8) M12 Grade 8.8 bolts. The Single Fuel Filter was mounted to the skid with (6) M10 Grade 8.8 bolts. The Fuel Monitor System was mounted to the skid with (4) M12 Grade 8.8 bolts; the flow meter assembly was mounted to the skids with (3) M16 Grade 8.8 bolts.



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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-13B

Test Report: DCL 20479-2201; UUT-1B

Model Line	Model Number	Manufacturer
Fuel Water Separators/Filters and Fuel Monitor	Fuel Water Separators/Filters and Fuel Monitor	Racor and ESI

Product Construction Summary

Carbon Steel, Cast Iron, Stainless Steel, Brass, Copper, Plastic, Glass

Options / Subcomponent Summary

Fuel Filters: Racor; Fuel Monitor System: ESI

UUT Properties

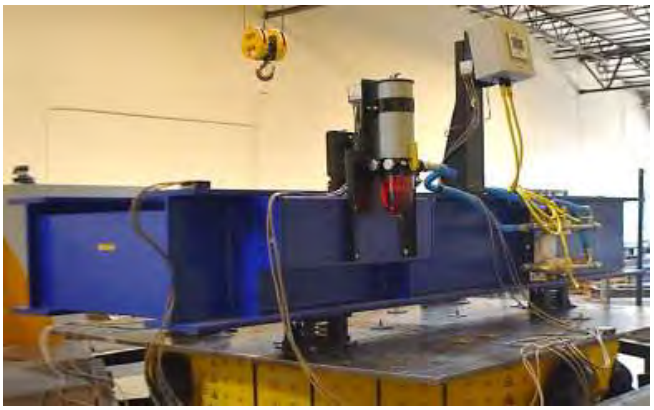
Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
2,990	133.0	77.0	49.5	3.5	4.5	6.0

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 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.50	0.0	1.5	-	-	1.68	0.68

Test Mounting Details

The mock skid was isolated using (4) VMC Group MSSH spring isolators. The isolators were connected to the equipment using (1) 5/8" Grade 8 bolt each, and were connected to the shake table using (4) 5/8" diameter Grade 8 bolts per isolator. The Triple Fuel Filter was mounted to the skid with (8) M12 Grade 8.8 bolts. The Single Fuel Filter was mounted to the skid with (6) M10 Grade 8.8 bolts. The Fuel Monitor System was mounted to the skid with (4) M12 Grade 8.8 bolts; the flow meter assembly was mounted to the skids with (3) M16 Grade 8.8 bolts.



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