APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0609

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Cummins Power Generation

Manufacturer's Technical Representative: Danielle Malone

Mailing Address: 1400 73rd Ave NE, Fridley, MN 55432

Telephone: (612) 270-9214 Email: danielle.malone@cummins.com

Product Information

Product Name: Emergency and Standby Power Systems

Product Type: Generators

Product Model Number: DQDAA, B, C & DQCA, B, C & DQFAA, B, C, D, H & DSHAD

General Description: 230-1000 kW Cummins Diesel Powered Generators with or without enclosure; on and off tank.

Mounting Description: Rigid base mounted or externally isolated base mounted

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: CLARK TESTING LABORATORY, INC.

Contact Person: Devon Lohr

Mailing Address: 1801 Route 51, Jefferson Hills PA 15025

Telephone: (412) 387-1001 Email: dlohr@clarktesting.com

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: UNIVERSITY OF CALIFORNIA, BERKELEY (PEER)

Contact Person: Amarnath Kasalanati

Mailing Address: 325 Davis Hall, Berkeley CA 94720-1729

Telephone: (510) 642-6475 Email: Amarnath1@berkeley.edu

Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = See Certified Product Tables

S_{DS} (Design spectral response acceleration at short period, g) = See Certified Product Tables

a_p (Amplification factor) = Rigid: 1.0; Isolated: 2.5

R_p (Response modification factor) = Rigid: 2.5; Isolated: 2.0

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 08/10/2028

Date: 8/10/2022

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 1 - Gensets Off Tanks

Model	Rating [kW]	Configuration	Max Dimensions [in]			Max Weight[1] [lb]	z/h = 0.0 S_{DS}	z/h = 1.0 S_{DS}	F_p/W_p	Mounting	UUT
			Length	Width	Height[2]						
DSHAD	230	Open	105	40	54	4,120	2.28	2.00	1.44	Rigid	UUT-10a
							2.28	2.00	4.50	Isolated	UUT-10b
		Enclosed	143	42	78	4,466	2.28	2.00	1.44	Rigid	Interpolated
							2.28	2.00	4.50	Isolated	Interpolated
DQDAA, B, C	250, 275, 300	Open	119	50	66	5,113	2.48	2.00	1.44	Rigid	UUT-01
DQDAA, B, C	250, 275, 300	Enclosed	233	90	100	13,039	2.48	2.00	4.50	Isolated	UUT-02
DQCA, B, C	600, 750, 800	Open	173	73	81	15,247	1.94	0.65	1.46	Isolated	Interpolated
	600, 750, 800	Enclosed	315	102	119	29,291	1.94	0.65	1.46	Isolated	Interpolated
DQFAA, B, C, D, H	750, 800, 900, 1000, 1000	Open	338	97	115	18,642	1.94	0.65	1.46	Isolated	UUT-06
DQFAA, B, C, D	750, 800, 900, 1000	Enclosed	315	102	119	29,794	1.94	0.65	1.46	Isolated	UUT-07

Notes

1. Weights include genset and, as applicable, enclosure
2. Yellow highlight and underlined listings indicate tested units

Table 2 - Gensets On Tanks

Model	Rating [kW]	Configuration	Max Dimensions [in]			Max Weight[1] [lb]	z/h = 0.0 S_{DS}	z/h = 1.0 S_{DS}	F_p/W_p	Mounting	UUT
			Length	Width	Height[2]						
DSHAD	230	Open	105	40	86	7,024	2.48	2.00	1.44	Rigid	Extrapolated
		Enclosed	143	42	110	5,800	2.48	2.28	1.64	Rigid	UUT-09
		Enclosed	143	42	110	8,002	2.48	2.00	1.44	Rigid	Interpolated
DQDAA, B, C	250, 275, 300	Enclosed	222	86	104	14,250	2.48	2.00	1.44	Rigid	UUT-03
DQDAA, B, C	250, 275, 300	Open	222	90	116	20,790	2.48	2.00	4.50	Isolated	UUT-04
DQDAA, B, C	250, 275, 300	Enclosed	232	90	128	29,504	2.48	2.00	4.50	Isolated	UUT-05
DQCA, B, C	600, 750, 800	Open	315	102	131	43,156	1.94	0.65	1.46	Isolated	Interpolated
DQCA, B, C	600, 750, 800	Enclosed	338	102	142	52,082	1.94	0.65	1.46	Isolated	Interpolated
DQFAA, B, C, D, H	750, 800, 900, 1000, 1000	Open	338	102	138	45,202	1.94	0.65	1.46	Isolated	Interpolated
DQFAA, B, C, D	750, 800, 900, 1000	Enclosed	338	97	137	53,425	1.94	0.65	1.46	Isolated	UUT-08

Notes

1. Weights include genset, enclosure, fuel tank, and, fuel (with the exception of UUT-09 which had no fuel)
2. Does not include isolator height
3. Yellow highlight and underlined listings indicate tested units

Table 3 - Certified Subcomponents: Engine Matrix

Manufacturer	Model	Applicable Genset Models	Material	z/h = 0.0 S_{DS}	z/h = 1.0 S_{DS}	Max. Weight [lb]	UUT
Cummins	QSL9-G2	DSHAD	Cast Iron	2.28	2.00	1,575	UUT-9, UUT-10a, UUT-10b
	QSL9-G7	DQDA, B, C	Cast Iron	2.48	2.00	1,627	UUT-01, UUT-02, UUT-03, UUT-04, UUT-05
	QSK23	DQCA, B, C	Cast Iron	1.94	0.65	6,170	Interpolated
	QST30	DQFAA, B, C, D, H	Cast Iron	1.94	0.65	6,860	UUT-06, UUT-07, UUT-08

Note: Listed engine models are not interchangeable

Table 4 - Certified Subcomponents: Alternator Matrix

Manufacturer	Model	Applicable Genset Models	Material	z/h = 0.0 S_{DS}	z/h = 1.0 S_{DS}	Max. Weight [lb]	UUT
Cummins	UC27J	DSHAD	Steel Laminations & Copper Windings	2.28	2.00	1,587	Extrapolated
	UC27K	DSHAD	Steel Laminations & Copper Windings	2.28	2.00	1,587	UUT-9, UUT-10a, UUT-10b
	HC4	DQDA, B, C	Steel Laminations & Copper Windings	2.48	2.00	2,582	UUT-01, UUT-02, UUT-03, UUT-04, UUT-05
	S6	DQCA, B, C, DQFAA, B, C, D	Steel Laminations & Copper Windings	1.94	0.65	5,128	Interpolated
	HC6	DQCA, B, C, DQFAA, B, C, D, H	Steel Laminations & Copper Windings	1.94	0.65	5,602	UUT-06, UUT-08
	P7	DQFAA, B, C, D, H	Steel Laminations & Copper Windings	1.94	0.65	6,654	UUT-07

Note: S6, HC6 and P7 alternator models cannot be replaced with HC4

Table 5 - Certified Subcomponents: Radiator Matrix

Manufacturer	Core Size [ft]	Applicable Genset Models	Material		z/h = 0.0 S_{DS}	z/h = 1.0 S_{DS}	Max. Weight[1] [lb]	UUT
			Core (fin + tube)	Supporting Structure				
Enterex	7	DSHAD	Auminum + Aluminum	Carbon Steel	2.28	2.00	37	UUT-9, UUT-10a, UUT-10b
Modine	7	DSHAD	Auminum + Aluminum	Carbon Steel	2.28	2.00	265	UUT-11a, UUT-11b
AKG	10	DQDA, B, C	Auminum + Aluminum	Carbon Steel	2.48	2.00	464	UUT-03
	26	DQCA, B, C	Auminum + Aluminum	Carbon Steel	1.94	0.65	1,303	Interpolated
	34	DQFAA, B, C, D, H	Auminum + Aluminum	Carbon Steel	1.94	0.65	1,614	UUT-06, UUT-08

Note: For UUT-11, the tested UUT weight was 350 pounds and included the skid

Table 6 - Certified Subcomponents: Controller Matrix

Manufacturer	Model	Applicable Genset Models	Material	z/h = 0.0 S_{DS}	z/h = 1.0 S_{DS}	Max. Weight [lb]	UUT
Cummins	PCC2100	DQDA, B, C	Carbon Steel and Plastic	2.48	2.00	10	UUT-01, UUT-02, UUT-03, UUT-04, UUT-05
	PCC2300	DSHAD	Carbon Steel and Plastic	2.28	2.00	108	UUT-10a, UUT-10b
	PC 2.3	DQCA, B, C	Carbon Steel and Plastic	1.94	0.65	90	Interpolated
	PC 3.3	DQCA, B, C, DQFAA, B, C, D, H	Carbon Steel and Plastic	1.94	0.65	90	UUT-06, UUT-08

Note: PC 2.3 and PC 3.3 models cannot be replaced with PCC2100

Table 7 - Certified Subcomponents: Enclosure Matrix

Manufacturer	Model Name	Applicable Genset Models	Type	Material	z/h = 0.0 S_{DS}	z/h = 1.0 S_{DS}	Max. Weight [lb]	UUT
Cummins	F216-2	DSHAD	Weather Enclosure	Aluminum	2.28	2.00	328	Interpolated
	F182-2		Weather Enclosure		2.28	2.00	450	Interpolated
	F172-2		Sound level 1 enclosure		2.28	2	950	UUT-09
	F217-2		Sound level 2 enclosure		2.28	2.00	978	Interpolated
	F173-2		Sound level 2 enclosure		2.28	2.00	978	Interpolated
	Thor-I	DQDA, B, C	Weather Enclosure, Sound Level 1, Sound Level 2	Carbon Steel	2.48	2.00	4,398	UUT-02, UUT-03, UUT-05
	Thor-II	DQCA, B, C, DQFAA, B, C, D		Carbon Steel	1.94	0.65	11,440	UUT-07, UUT-08

Note: Thor-I and Thor-II enclosures are not interchangeable

Table 8 - Certified Subcomponents: Fuel Tank

Manufacturer	Capacity [gals]	Applicable Genset Models	Material	z/h = 0.0 S_{DS}	z/h = 1.0 S_{DS}	Max. Weight [lb]	UUT
Tramont	270 - 1,470	DQDA, B, C	Carbon Steel	2.48	2.00	14,697	UUT-04, UUT-05
Hennig	270	DQDA, B, C	Carbon Steel	2.48	2.00	3,988	UUT-03
United Alloy Inc.	200 - 2,400	DQCA, B, C, DQFAA, B, C, D	Carbon Steel	1.94	0.65	24,072	UUT-08

Note: Listed tanks are not interchangeable

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-01

PEI-PEER-CUM-130; UUT-30

Model Line	Model Number	Manufacturer
DQDA	DQDAC	Cummins

Product Construction Summary

Structural Carbon Steel Skid

Options / Subcomponent Summary

Cummins Engine; Cummins Alternator; Cummins Controller; Bearward Radiator

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
5,113	119	50	66	3.49	6.22	11.09

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	2.48	0	1.5	-	-	1.66	0.67
		2.00	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset secured to the fixture using (4) 3/4" dia ASTM 325 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-02

PEI-PEER-CUM-130; UUT-32

Model Line	Model Number	Manufacturer
DQDA	DQDAC	Cummins

Product Construction Summary

Structural Carbon Steel Skid

Options / Subcomponent Summary

Cummins Engine; Cummins Alternator; Cummins Controller; Bearward Radiator; Cummins Enclosure

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
13,039	233	90	100	5.54	4.40	6.98

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	2.48	0	1.5	-	-	1.66	0.67
		2.00	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset secured to enclosure base via (4) EBCO 4990-60 duro elastomer isolators. Enclosure base secured to the fixture using (4) 3/4" dia ASTM 325 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-03

VMA-45782-01E; UUT-1

Model Line	Model Number	Manufacturer
DQDA	DQDAC-QSL9-G7	Cummins

Product Construction Summary

Structural Carbon Steel Skid and Carbon Steel Sheet Metal Enclosure

Options / Subcomponent Summary

Cummins Engine; Cummins Alternator; Cummins Controller; AKG Radiator; Cummins Enclosure; Hennig Fuel Tank

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
14,250	222	86	104	5.5	4.3	9.3

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 2019	ICC-ES AC156	2.50	0	1.5	-	-	1.67	0.67
		2.00	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset secured to fuel tank using (4) 3/4" dia. SAE Grade 5 bolts. Fuel tank secured to the fixture using (12) 1" dia. SAE 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-04

PEI-PEER-CUM-130; UUT-31

Model Line	Model Number	Manufacturer
DQDA	DQDAC	Cummins

Product Construction Summary

Structural Carbon Steel Skid

Options / Subcomponent Summary

Cummins Engine; Cummins Alternator; Cummins Controller; Bearward Radiator; Tramont Fuel Tank

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
20,790	222	90	116	3.11	4.40	7.84

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	2.48	0	1.5	-	-	1.66	0.67
		2.00	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset secured to a sub-base tank via (4) EBCO 4990-60 duro elastomer isolators. Sub-base tank secured to fixture using (10) 5/8" dia. ASTM 325 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-05

PEI-PEER-CUM-130; UUT-33

Model Line	Model Number	Manufacturer
DQDA	DQDAC	Cummins

Product Construction Summary

Structural Carbon Steel Skid

Options / Subcomponent Summary

Cummins Engine; Cummins Alternator; Cummins Controller; Bearward Radiator; Cummins Enclosure; Tramont Fuel Tank

UUT Properties

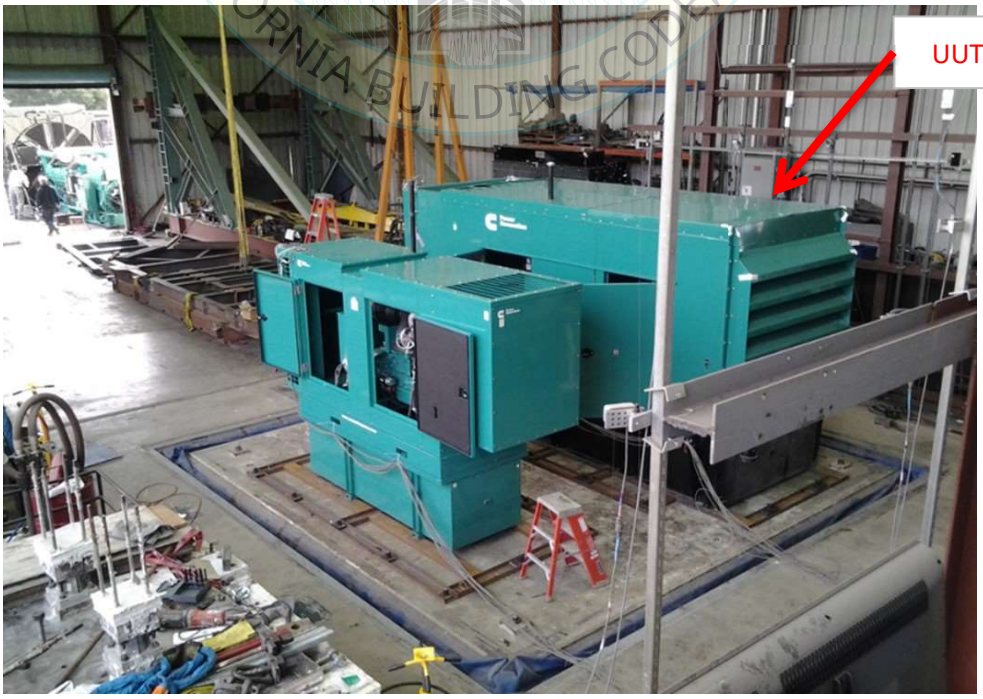
Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
29,504	232	90	128	3.11	4.40	6.98

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	2.48	0	1.5	-	-	1.66	0.67
		2.00	1	1.5	3.20	2.40	-	-

Test Mounting Details

Genset secured to a sub-base tank via (4) EBCO 4990-60 duro elastomer isolators. Sub-base tank secured to fixture using (10) 5/8" dia. ASTM 325 bolts.



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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-06

VMA-49943; UUT-34B

Model Line	Model Number	Manufacturer
DQFA	DQFAD	Cummins

Product Construction Summary

Structural Carbon Steel Skid.

Options / Subcomponent Summary

Cummins Engine; Cummins Alternator; Cummins Controller; AKG Radiator.

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
18,642	338	97	115	1.6	2.9	4.5

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	1.94	0	1.5	1.94	0.78	1.3	0.52

Test Mounting Details

Genset secured to skid via (10) VMC M2SSH-1E-3400N spring isolators. Genset skid secured to fixture using (18) 3/4" dia. SAE 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-07

PEI-PEER-CUM-123; UUT-13

Model Line	Model Number	Manufacturer
DQFA	DQFAD	Cummins

Product Construction Summary

Structural Carbon Steel Skid and Carbon Steel Sheet Metal Enclosure

Options / Subcomponent Summary

Cummins Engine; Cummins Alternator; Cummins Controller; Bearward Radiator; Cummins Thor-II Enclosure.

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
29,794	315	102	119	5.54	8.8	13.97

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	1.94	0	1.5	1.94	0.78	1.3	0.52

Test Mounting Details

Genset attached to enclosure base via (10) VMC M2SSH-1E-3400N spring isolators. Enclosure base secured to fixture using (12) 3/4" dia SAE 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-08

VMA-49943; UUT-34A

Model Line	Model Number	Manufacturer
DQFA	DQFAD	Cummins

Product Construction Summary

Structural Carbon Steel Skid.

Options / Subcomponent Summary

Cummins Engine; Cummins Alternator; Cummins Controller; AKG Radiator; Cummins Enclosure; UAI Fuel Tank.

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
53,425	338	97	137	1.8	3.1	4.7

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	1.94	0	1.5	1.94	0.78	1.3	0.52

Test Mounting Details

Genset secured to enclosure base via (10) VMC M2SSH-1E-3400N spring isolators. Sub-base tank secured to fixture using (18) 3/4" dia SAE 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

Test Report: EL:8385

Model Line	Model Number	Manufacturer
DSHAD	DSHAD	Cummins Power Generation

Product Construction Summary

Structural Carbon Steel Skid

Options / Subcomponent Summary

Cummins Engine; Cummins Alternator; Cummins Controller; Enterex Radiator; Cummins Enclosure; United Alloy Fuel Tank

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
5,800	143.0	42.0	110.0	7.8	4.9	11.7

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	2.28	0.0	1.5	-	-	1.52	0.61
		2.00	1.0	1.5	3.20	2.40	-	-

Test Mounting Details

UUT was rigidly mounted to the fuel tank using (4) 3/4" diameter Grade 5 bolts. The tank was rigidly connected to the shake table using (2) 3/4" Grade 5 bolts and (2) 3/4" Grade 9 strain bolts.

All units maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-10a

Test Report: 13602-2001; UUT-41a

Model Line	Model Number	Manufacturer
DSHAD	DSHAD (Test Report Model Number: QSL9G2)	Cummins Power Generation

Product Construction Summary

Structural Carbon Steel Skid

Options / Subcomponent Summary

Cummins Engine; Cummins Alternator; Cummins Controller; Enterex Radiator

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
4,120	105.0	40.0	54.0	4.5	8.5	14.5

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	2.28	0.0	1.5	-	-	1.52	0.61
		2.00	1.0	1.5	3.20	2.40	-	-

Test Mounting Details

UUT was rigidly mounted to the shake table using (4) 3/4" diameter Grade 5 bolts.
DCRs: Junction box changed from slots to holes in connection to alternator. VMC TTBX rubber isolators used for mounting of engine and alternator.

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: 13602-2001; UUT-41b

Model Line	Model Number	Manufacturer
DSHAD	DSHAD (Test Report Model Number: QSL9G2)	Cummins Power Generation

Product Construction Summary

Structural Carbon Steel Skid

Options / Subcomponent Summary

Cummins Engine; Cummins Alternator; Cummins Controller; Enterex Radiator

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
4,120	105.0	40.0	54.0	2.5	3.5	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 2019	ICC-ES AC156	2.28	0.0	1.5	-	-	1.52	0.61
		2.00	1.0	1.5	3.20	2.40	-	-

Test Mounting Details

UUT was isolated using (4) VMC MSSH-1E spring isolators. The isolators were connected to the equipment using (1) 3/4 Grade 5 bolt each, and were connected to the shake table using (4) 1/2" diameter Grade 5 bolts per isolator.
DCRs: Junction box changed from slots to holes in connection to alternator. VMC TTBX rubber isolators used for mounting of engine and alternator.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-11a

Test Report: 18187-2201; UUT-01a

Model Line	Model Number	Manufacturer
DSHAD	A066Y502 (Cummisn Installation Part Number: 0179-4219-03)	Skid Assembly: Cummins Radiator: Modine Radiator

Product Construction Summary

Structural Carbon Steel Skid. (Note: when installed with full generator set, all connections to the generator set are flexible)

Options / Subcomponent Summary

Radiator: Modine

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
350	77.0	40.2	53.0	19.6	19.6	>33.3

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 2019	ICC-ES AC156	2.28	0.0	1.5	-	-	1.52	0.61
		2.00	1.0	1.5	3.20	2.40	-	-

Test Mounting Details

UUT was rigidly mounted to the shake table using (4) 5/8" diameter Grade 5 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-11b

Test Report: 18187-2201; UUT-01b

Model Line	Model Number	Manufacturer
DSHAD	A066Y502 (Cummisn Installation Part Number: 0179-4219-03)	Skid Assembly: Cummins Radiator: Modine Radiator

Product Construction Summary

Structural Carbon Steel Skid. (Note: when installed with full generator set, all connections to the generator set are flexible)

Options / Subcomponent Summary

Radiator: Modine

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
350	77.0	40.2	53.0	5.2	7.6	7.4

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 2019	ICC-ES AC156	2.28	0.0	1.5	-	-	1.52	0.61
		2.00	1.0	1.5	3.20	2.40	-	-

Test Mounting Details

UUT was isolated using (4) VMC MSSH-1E spring isolators. The isolators were connected to the equipment using (1) 3/4 Grade 5 bolt each, and were connected to the shake table using (4) 1/2" diameter Grade 5 bolts per isolator.

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