APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0671

HCAI Special Seismic Certification Preapproval (OSP)

Type: [X] New [ ] Renewal

Manufacturer Information

Manufacturer: Cummins Power Generation

Manufacturer's Technical Representative: Danielle Malone

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

Telephone: (763) 574-3559 Email: danielle.malone@cummins.com

Product Information

Product Name: Emergency and Standby Power Systems

Product Type: Generators

Product Model Number: DQGAx, DQKAx, DQLx

General Description: Diesel Powered Generator Sets, 1250 kW – 2750 kW

Mounting Description: Rigid or Spring Isolated, Mounting from unit base to rigid structure or fuel tank

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: Main Street, Bloomingdale, NJ 07403

Telephone: (973) 381-1780 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: Josh Sailer

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

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

Company Name: UNIVERSITY OF CALIFORNIA, BERKELEY (PEER)

Contact Person: Amarnath Kasalanati

Mailing Address: 1301 S. 46th Street, Building 420, Richmond CA 94804-1729

Telephone: (510) 642-6475 Email: amarnath1@berkeley.edu

Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) =	Sds=2.1 @ z/h= 0: Rigid Fp/Wp= 0.95, Isolated Fp/Wp= 1.6; Sds=2.0 @ z/h= 1: Rigid Fp/Wp= 1.44, Isolated Fp/Wp= 4.5; Sds=0.7 @ z/h= 1: Rigid Fp/Wp= 0.5, Isolated Fp/Wp= 1.58
S_{DS} (Design spectral response acceleration at short period, g) =	2.10 @ z/h=0; 2.00 @ z/h=1 or 0.7 @ z/h=1
a_p (Amplification factor) =	Isolated: 2.5, Rigid: 1.0
R_p (Response modification factor) =	Isolated: 2.0, Rigid: 2.5
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 10/03/2028

Date: 10/3/2022

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 1 - Gensets Off Tanks

Model	Rating [kW]	Max Package Dimensions [in]			Max Weight [2] [lbs]	z/h = 0.0 S_{DS} [4]	z/h = 1.0 S_{DS} [4]	Mounting Configuration	UUT
		Length	Width	Height [1]					
DQGAA, DQGAB	1250, 1500	235.0	79.0	112.0	29,262	2.100	2.000	Rigid / Isolated	Extrapolated
DQGAE, DQGAF, DQGAS	1250, 1500, 1500	254.0	98.0	123.0	33,556	2.100	2.000	Rigid / Isolated	Extrapolated
DQKAA, DQKAB	1750, 2000	240.0	100.0	120.0	35,846	2.100	2.000	Rigid / Isolated	Extrapolated
DQKAD, DQKAE, DQKAF, DQKAM	1750, 2000, 2250, 2250	275.0	98.0	161.0	43,805	2.100	2.000	Rigid / Isolated	Interpolated
DQKAF	2250	275.0	98.0	161.0	43,805	2.100	2.100	Rigid	UUT-16
DQKAF	2250	275.0	98.0	161.0	43,805	1.940	1.940	Isolated	UUT-17
DQKAN	2500	278.0	104.0	125.0	51,366	2.100	2.000	Rigid / Isolated	Interpolated
DQLF	2750	282.0	117.0	134.0	52,985	2.000	2.000	Isolated	UUT-22
DQLC. DQLD, DQLE, DQLF, DQLH	2500, 2750, 2750	292.0	125.0	153.0	57,168	2.100	2.000	Rigid / Isolated	Interpolated
DQLF	2750	292.0	125.0	153.0	57,168	2.000	2.000	Isolated	UUT-26

Table 2 - Gensets On Tanks

Model	Rating [kW]	Max Package Dimensions [in]			Max Weight [2,3] [lbs]	z/h = 0.0 S_{DS}	z/h = 1.0 S_{DS}	Mounting Configuration	UUT
		Length	Width	Height					
DQKAA, DQKAB	1750, 2000	244.0	100.0	152.0	62,592	2.100	0.700	Rigid / Isolated	Extrapolated
DQKAB	2000	244.0	100.0	152.0	62,592	1.940	0.647	Isolated	UUT-15a
DQLF	2750	308.0	122.0	159.0	66,576	2.100	0.700	Isolated	UUT-20a
DQKAD, DQKAE, DQKAF, DQKAM	1750, 2000, 2250, 2250	275.0	98.0	185.0	70,639	2.100	0.700	Rigid / Isolated	Interpolated
DQKAF	2250	275.0	98.0	185.0	70,639	2.100	0.700	Rigid	UUT-18a
DQKAF	2250	275.0	98.0	185.0	70,639	2.100	0.700	Isolated	UUT-19a
DQKAN	2500	278.0	104.0	125.0	70,760	2.100	0.700	Rigid / Isolated	Interpolated
DQLC. DQLD, DQLE, DQLF, DQLH	2500, 2750, 2750	308.0	125.0	178.0	70,760	2.100	0.700	Rigid / Isolated	Interpolated
DQLF	2750	308.0	125.0	178.0	70,760	2.100	0.700	Isolated	UUT-25a

Notes

1. Does not include height of isolator
2. Does not include weight of isolator
3. Weights include genset, tank (where applicable), and tank fuel (where applicable)
4. Some S_{DS} levels limited by radiator

Table 3 - Certified Subcomponents

Component [MFR]	Model Number	Material	Weight[1] [lbs]	UUT
Engine [Cummins]	QSK 50	Cast Iron	12,593	Interpolated
	QSK60 Trinity	Cast Iron	18,893	UUT-15a, 16, 17, 18a, 19a
	QSK78	Cast Iron	21,627	UUT-20a, 22, 25a, 26
Alternator [Cummins]	S6	Steel Laminations & Copper Windings	5,152	Extrapolated
	P7	Steel Laminations & Copper Windings	9,259	UUT-15a
	MV7	Steel Laminations & Copper Windings	8,334	Interpolated
	P80 : LV	Steel Laminations & Copper Windings	13,082	UUT-16, 17, 18a, 19a
	S9: MV	Steel Laminations & Copper Windings	17,527	Interpolated
	S9: HV	Steel Laminations & Copper Windings	17,527	Interpolated
	P80 : MV	Steel Laminations & Copper Windings	17,800	Interpolated
	P80 : HV	Steel Laminations & Copper Windings	17,800	UUT-20a, 22, 25a, 26
Controller [Cummins]	PCC3300	Printed Circuit Board	< 2	UUT-16, 17, 18a, 19a, 20a, 22, 25a, 26
	PCC 3300 Control Box	Carbon Steel	240	UUT-40a, 40b
Engine CCV Filter [Cummins]	A062Y798	Carbon Steel	32	UUT-39a, 39b
Coolant Heater [Cummins]	A041A149	Carbon Steel	92	UUT-38a, 38b

Note:

1. Listed weights are operating/wet weights

Table 4 - Certified Radiators

Component [MFR]	Description	Part/Model Number	Material	Weight[1] [lbs]	z/h = 0.0 S_{DS}	z/h = 1.0 S_{DS}	UUT
Radiator [Bearward]	Core Size 7sq.ft.	A029Y672	Copper Fins, Brass Tubes, Carbon Steel Structure	426	2.100	2.100	UUT-30
	Core Size 40 sq.ft.	A030D331	Copper Fins, Brass Tubes, Carbon Steel Structure	3,278	1.940	0.647	Interpolated
	Core Size 63 sq.ft.	A030D348	Copper Fins, Brass Tubes, Carbon Steel Structure	4,674	1.940	0.647	UUT-15a
Radiator [Modine]	Core Size 7 sq.ft.	A066Y502	Aluminum and Tubes, Carbon Steel Structure	265 [2]	2.280	2.000	UUT-01a,b
	Core Size 43 sq.ft.	A028V353	Copper Fins, Brass Tubes, Carbon Steel Structure	3,384	1.940	1.940	Interpolated
	Core Size 62 sq.ft.	0130-7741	Copper Fins, Brass Tubes, Carbon Steel Structure	5,423	1.940	1.940	Interpolated
	Core Size 104 sq.ft.	A028V349	Copper Fins, Brass Tubes, Carbon Steel Structure	5,578	1.940	1.940	UUT-17
Radiator [IEA]	Core Size 60 sq.ft.	A030D337	Copper Fins, Brass Tubes, Carbon Steel Structure	4,700	2.100	2.000	Extrapolated
	Core Size 66 sq.ft.	A047K752	Copper Fins, Brass Tubes, Carbon Steel Structure	6,494	2.100	2.000	Extrapolated
	Core Size 72 sq.ft.	A044D619	Copper Fins, Brass Tubes, Carbon Steel Structure	6,785	2.000	2.000	UUT-22
	Core Size 100 sq.ft.	A042V604	Copper Fins, Brass Tubes, Carbon Steel Structure	10,281	2.100	0.700	UUT-25a
					2.000	2.000	UUT-26

Note:

1) Listed weights are operating/wet weights

2) Tested UUT weight of 350 lbs included the skid

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-01a

Test Report: 18187-2201

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

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 (Radiator weight: 265 lbs.)

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 2022	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-1b

Test Report: 18187-2201

Model Line	Model Number	Manufacturer
DSHAD	A066Y502 (Cummins Installation Part Number: 0179-4219-03)	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 (Radiator weight: 265 lbs.)

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 2022	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.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-15a

PEER-STI/2010-05; UUT w/ tank

Model Line	Model Number	Manufacturer
Diesel Gensets	DQKAB	Cummins

Product Construction Summary

Carbon Steel Skid, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Engine: Cummins ; Alternator: Cummins ; Radiator: Bearward ; Controller: Cummins ; Fuel Tank: IBI

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
62592	244	100	152	7.0	2.8	4.1

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	1.94	0	1.5	1.94	0.78	1.30	0.52

Test Mounting Details

Genset mounted to fuel tank using (12) VMC M2SSH-1E external spring isolators. Fuel tank rigidly mounted to shake table interface fixture.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-16

PEI-PEER-CUM-125

Model Line	Model Number	Manufacturer
Diesel Gensets	DQKAF	Cummins

Product Construction Summary

Cabon Steel Skid

Options / Subcomponent Summary

Engine: Cummins ; Alternator: Cummins ; Radiator: Modine ; Controller: Cummins

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
43805	275	98	161	3.5	4.4	8.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2022	ICC-ES AC156	2.1	1	1.5	3.36	2.52	1.41	0.57

Test Mounting Details

UUT rigidly mounted to shake table interface fixture with (12) 3/4" 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-17

PEI-PEER-CUM-125

Model Line	Model Number	Manufacturer
Diesel Gensets	DQKAF	Cummins

Product Construction Summary

Cabon Steel Skid

Options / Subcomponent Summary

Engine: Cummins ; Alternator: Cummins ; Radiator: Modine ; Controller: Cummins

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
43805	275	98	161	1.7	2.8	5.5

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	1.94	1	1.5	3.10	2.33	1.3	0.52

Test Mounting Details

UUT mounted to shake table interface fixture using (16) CalDyn RJJEQ-D-5880 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-18a

PEI-PEER-CUM-125

Model Line	Model Number	Manufacturer
Diesel Gensets	DQKAF	Cummins

Product Construction Summary

Cabon Steel Skid, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Engine: Cummins ; Alternator: Cummins ; Radiator: Modine ; Controller: Cummins ; Fuel Tank: IBI

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
70639	275	98	185	1.7	2.8	4.4

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 2022	ICC-ES AC156	2.1	0	1.5	2.1	0.84	1.41	0.57

Test Mounting Details

Genset rigidly mounted to fuel tank using (12) 3/4" ASTM 325 bolts. Fuel tank rigidly mounted to shake table interface fixture using (32) 3/4" diameter A325 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-19a

PEI-PEER-CUM-125

Model Line	Model Number	Manufacturer
Diesel Gensets	DQKAF	Cummins

Product Construction Summary

Cabon Steel Skid, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Engine: Cummins ; Alternator: Cummins ; Radiator: Modine ; Controller: Cummins ; Fuel Tank: IBI

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
71239	275	98	191	3.5	4.9	8.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2022	ICC-ES AC156	2.1	0	1.5	2.1	0.84	1.41	0.57

Test Mounting Details

Genset mounted to fuel tank using (12) VMC M2SSH-1E external spring isolators. Fuel tank rigidly mounted to shake table interface fixture using (32) 3/4" diameter A325 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-20a

PEI-PEER-CUM-129

Model Line	Model Number	Manufacturer
Diesel Gensets	DQLF	Cummins

Product Construction Summary

Cabon Steel Skid, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Engine: Cummins ; Alternator: Cummins ; Radiator: IEA ; Controller: Cummins ; Fuel Tank: GPC

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
66576	308	122	159	2.2	2.5	3.9

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	2.1	0	1.5	2.1	0.84	1.41	0.57

Test Mounting Details

Genset mounted to fuel tank using (14) CalDyn RJRD-5880 external spring isolators. Fuel tank rigidly mounted to shake table interface fixture using 7/8" Grade 8 hardware.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-22

PEI-PEER-CUM-129

Model Line	Model Number	Manufacturer
Diesel Gensets	DQLF	Cummins

Product Construction Summary

Cabon Steel Skid

Options / Subcomponent Summary

Engine: Cummins ; Alternator: Cummins ; Radiator: IEA ; Controller: Cummins

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
52985	282	117	134	2.5	3.5	3.5

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	2.0	1	1.5	3.2	2.4	1.34	0.54

Test Mounting Details

UUT mounted to shake table interface fixture using (18) CalDyn RJRD-5880 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-26

PEI-PEER-CUM-129

Model Line	Model Number	Manufacturer
Diesel Gensets	DQLF	Cummins

Product Construction Summary

Cabon Steel Skid

Options / Subcomponent Summary

Engine: Cummins ; Alternator: Cummins ; Radiator: IEA ; Controller: Cummins
Seismic enhancements made to UUT: Increased bolt size of the radiator to genset connection.

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
57168	292	125	153	2.5	2.8	5.5

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	2.0	1	1.5	3.2	2.4	1.34	0.54

Test Mounting Details

UUT mounted to shake table interface fixture using (18) CalDyn RJRD-5880 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-25a

PEI-PEER-CUM-129

Model Line	Model Number	Manufacturer
Diesel Gensets	DQLF	Cummins

Product Construction Summary

Cabon Steel Skid, Carbon Steel Fuel Tank

Options / Subcomponent Summary

Engine: Cummins ; Alternator: Cummins ; Radiator: IEA ; Controller: Cummins ; Fuel Tank: GPC

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
70760	308	125	178	2.2	2.5	2.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2022	ICC-ES AC156	2.1	0	1.5	2.1	0.84	1.41	0.57

Test Mounting Details

Genset mounted to fuel tank using (14) VMC M2SSH-1E external spring isolators. Fuel tank rigidly mounted to shake table interface fixture using 7/8" Grade 8 hardware.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-30

PEI-PEER-CUM-130

Model Line	Model Number	Manufacturer
Diesel Gensets	DQDAC	Cummins

Product Construction Summary

Cabon Steel Skid

Options / Subcomponent Summary

Engine: Cummins ; Alternator: Cummins ; Radiator: Bearward ; Controller: Cummins

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
5113	119	50	66	<1	<1	24.9

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	2.1	1	1.5	3.36	2.52	1.41	0.57

Test Mounting Details

Genset mounted to interface fixture using (4) 3/4" 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-38a

DCL 31260-2001

Model Line	Model Number	Manufacturer
Coolant Heater Subcomponent	A041A149	Cummins

Product Construction Summary

Carbon Steel Mounting Brackets
Note: Component is surface mounted on the equipment or directly to skid frame.

Options / Subcomponent Summary

Coolant Heater A041A149: Cummins ; Brackets A055J936 / A055X195: Cummins

UUT Properties

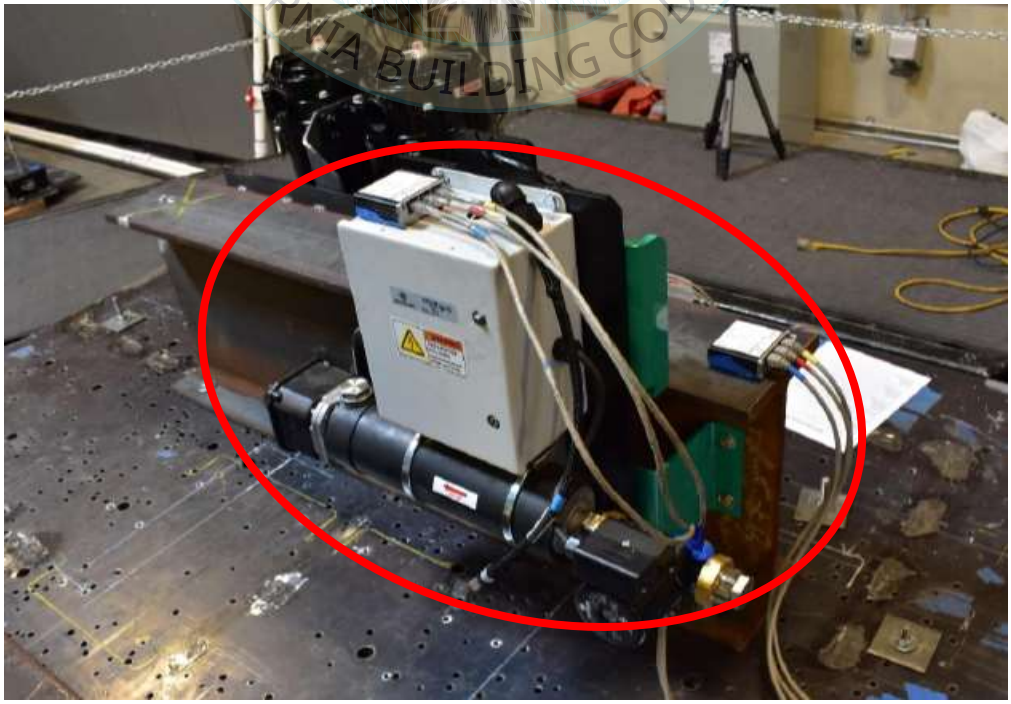
Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
92	14	30	21	15.0	15.0	15.0

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	2.1	1	1.5	3.36	2.52	1.41	0.57

Test Mounting Details

UUT mounted to the interface I beam with (7) 3/8” grade 5 bolts, washers and nuts. Interface I beam rigidly mounted to shake table interface plate. Shake table interface plate rigidly mounted to shake table.



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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-38b

DCL 31260-2001

Model Line	Model Number	Manufacturer
Coolant Heater Subcomponent	A041A149	Cummins

Product Construction Summary

Carbon Steel Mounting Brackets
Note: Component is surface mounted on the equipment or directly to skid frame.

Options / Subcomponent Summary

Coolant Heater A041A149: Cummins ; Brackets A055J936 / A055X195: Cummins

UUT Properties

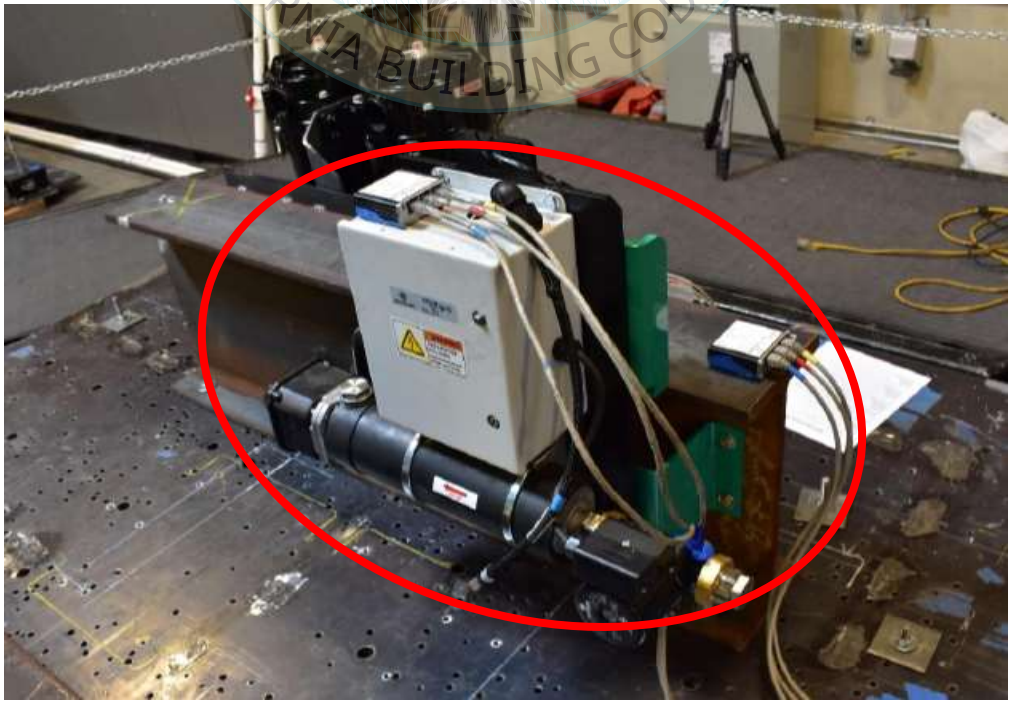
Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
92	14	30	21	9.0	7.5	12.5

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	2.1	1	1.5	3.36	2.52	1.41	0.57

Test Mounting Details

UUT mounted to the interface I beam with (7) 3/8” grade 5 bolts, washers and nuts. Interface I beam rigidly mounted to shake table interface plate. Shake table interface plate mounted to shake table using VMC isolators.



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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-39a

DCL 31260-2001

Model Line	Model Number	Manufacturer
CCV Filter Subcomponent	A045A444	Cummins

Product Construction Summary

Carbon Steel Mounting Bracket
Note: Component is surface mounted on the equipment or directly to skid frame.

Options / Subcomponent Summary

CCV Filter A045A444: Cummins

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
32	12	19	23	23.0	11.5	11.5

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	2.1	1	1.5	3.36	2.52	1.41	0.57

Test Mounting Details

UUT mounted to the interface I beam with (2) M20 class 8.8 bolts, washers and nuts. Interface I beam rigidly mounted to shake table interface plate. Shake table interface plate rigidly mounted to shake table.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-39b

DCL 31260-2001

Model Line	Model Number	Manufacturer
CCV Filter Subcomponent	A045A444	Cummins

Product Construction Summary

Carbon Steel Mounting Bracket
Note: Component is surface mounted on the equipment or directly to skid frame.

Options / Subcomponent Summary

CCV Filter A045A444: Cummins

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
32	12	19	23	9.0	7.5	12.5

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	2.1	1	1.5	3.36	2.52	1.41	0.57

Test Mounting Details

UUT mounted to the interface I beam with (2) M20 class 8.8 bolts, washers and nuts. Interface I beam rigidly mounted to shake table interface plate. Shake table interface plate mounted to shake table using VMC isolators.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-40a

DCL 31260-2001

Model Line	Model Number	Manufacturer
Delta 2 Control Box Subcomponent	AU60U263	Cummins

Product Construction Summary

Carbon Steel Enclosure and Mounting Brackets
Note: Component is surface mounted on the equipment or directly to skid frame.

Options / Subcomponent Summary

Delta 2 Control Box AU60U263: Cummins ; Spacer Bracket A063E104: Cummins

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
240	17	37	65	6.0	12.0	>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 2022	ICC-ES AC156	2.1	1	1.5	3.36	2.52	1.41	0.57

Test Mounting Details

UUT mounted to the interface channel with with (4) 3/8" grade 5 bolts, washers and nuts. Interface channel rigidly mounted to shake table interface plate. Shake table interface plate rigidly mounted to shake table.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-40b

DCL 31260-2001

Model Line	Model Number	Manufacturer
Delta 2 Control Box Subcomponent	AU60U263	Cummins

Product Construction Summary

Carbon Steel Enclosure and Mounting Brackets
Note: Component is surface mounted on the equipment or directly to skid frame.

Options / Subcomponent Summary

Delta 2 Control Box AU60U263: Cummins ; Spacer Bracket A063E104: Cummins

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
240	17	37	65	5.0	7.5	22.0

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	2.1	1	1.5	3.36	2.52	1.41	0.57

Test Mounting Details

UUT mounted to the interface channel with with (4) 3/8" grade 5 bolts, washers and nuts. Interface channel rigidly mounted to shake table interface plate. Shake table interface plate mounted to shake table using VMC isolators.

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