CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Certification No.

VMA-50957-01C (Revision 20)

Expiration Date: 6/30/2029

Certification Parameters:

The nonstructural products (mechanical and/or electrical components) listed on this certificate are CERTIFIED[1] FOR SEISMIC APPLICATIONS in accordance with the following building code[2] releases.

IBC 2021, 2018, 2015, 2012; EC8 2004

The following model designations, options, and accessories are included in this certification. Reference report number VMA-50957-01 as issued by The VMC Group for a complete list of certified models, included accessories/options, and certified installation methods.

Cummins Power Generation, Inc.; Diesel Gensets

DSHAD, DQDAx, DFEx, DQCx, DQFx, CxD6E(B), C1000D6ED, CxD5E(B); 230kW - 1000kW

The above referenced equipment is **APPROVED** for seismic application when properly installed[3], used as intended, and contains a Seismic Certification Label referencing this Certificate of Compliance[4]. As limited by the tabulated values, below grade, grade, and roof-level installations, installations in essential facilities, for life safety applications, and/or of equipment containing hazardous contents are permitted and included in this certification with an Equipment Importance Factor assigned as I_p=1.5. The equipment is qualified by successful seismic shake table testing at the nationally recognized University of California Berkeley Pacific Earthquake Engineering Research Center, University of Nevada at Reno, and Dynamic Certification Laboratories under the review of the ISO Accredited Product Certification Agency, the VMC Group.

Certified Seismic Design Levels[8]			
Certified **IBC**	**Importance $I_p \leq 1.5$** Soil Classes A-E Risk Categories I-IV Design Categories A-F	z/h ≤ 1.0 $S_{DS} \leq 2.000$ g	z/h = 0.0 $S_{DS} \leq 2.480$ g
Certified **EC8**[10]	**Importance $Y_a \leq 1.5$** Soil Classes A-E, Type I-II	$a_g \leq 0.165$ g	$a_g \leq 0.374$ g

The qualified seismic design level stated is the highest for all series this certificate covers. For more information, see the certified product tables on page 2.

Certified Seismic Installation Methods[9]	
External Isolation Mounting From Unit Base To Fuel Tank	External Isolation Mounting From Unit Base To Rigid Structure
Rigid Mounting From Unit Base To Rigid Structure	Rigid Mounting From Unit Base To Fuel Tank

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Certified Product Table:

Series	Model (x-value in Series)	Max Rating [kW]	Length [in]	Width [in]	Height [in]	Max Weight [lb]	S_{DS} z/ h=0	S_{DS} z/ h=1	Mounting	Configuration
DSHAx	D	230	143	42	78	4,466	2.28	2.00	Rigid/ Isolated	Off Tank
DQDAx	A, B, C	300	246	90	106	13,039	2.48			
DFEx	J, K	500	152	60	77	10,125	1.94	1.94		
Open DQCx	A, B, C	800	173	73	81	15,247			Isolated	
Enclosed DQCx			315	102	119	29,291		0.65		
Open DQFx	A, B, C, D, H	1000	338	97	115	18,535		1.94		
Enclosed DQFx			315	102	119	29,794		0.65		
CxD6E, C1000D6ED	600, 750, 800, 900		363	87	113	20,388	1.94	0.65	Rigid	
DSHAx	D	230	143	42	110	8,002	2.28	2.00	Rigid/ Isolated	On Tank
DQDAx	A, B, C	300	232	90	128	29,504	2.48			
DFEx	J, K	500	366	86		39,245	1.94	0.65		
DQCx	A, B, C	800	338	102	142	52,082			Isolated	
DQFx	A, B, C, D, H	1000			138	53,425				
CxD6E, C1000D6ED	600, 750, 800, 900		376	87	140	37,176	1.94	0.65	Rigid	
CxD5E	1000, 1100		253	92	111	22,241				On Integral Tank
CxD5EB	825, 900					23,046				
CxD6EB	750, 800, 900, 1000									

Group	Type	S_{DS} z/h=0	S_{DS} z/h=1	A_{Flex-H}	A_{Rig-H}	A_{Flex-V}	A_{Rig-V}	Rigid F_p/W_p	Isolated F_p/W_p
Seismic	AC156	2.48	2.00	3.2	2.4	1.66	0.67	1.44	4.5

Listed seismic design levels are the highest for all series this certificate covers.
Refer to manufacturer for details on reduced levels for select models.

This certification includes the open generator set and the enclosed generator set when installed with or without the sub-base tank. The generator set and included options shall be a catalogue design and factory supplied. The generator set and applicable options shall be installed and attached to the building structure per the manufacturer supplied seismic installation instructions. This certification excludes After Treatment Units (ATUs), all non-factory supplied accessories, including but not limited to mufflers, isolation/restraint devices, remote control panels, remote radiators, pumps and other electrical/mechanical components.

IBC CERTIFIED VMC GROUP

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Cross-Code Compliance:

EC8 Approved Equivalent a_g							
Earthquake Type	Install Height	f_1/f_a					
		0.01	0.10	0.50	1.0	2.0	100.0
Type 2 Only	z/h = 0.0	0.701	0.614	0.374	0.284	0.711	0.711
Type 1 Only		0.615	0.615	0.481	0.366	0.615	0.615
Type 1 and Type 2			0.614	0.374	0.284		
Type 2 Only	z/h = 1.0	0.281	0.253	0.165	0.129	0.284	0.711
Type 1 Only		0.361	0.325	0.213	0.166	0.366	0.615
Type 1 and Type 2		0.281	0.253	0.165	0.129	0.284	

* The type of earthquake to use per country/region is listed in the national annex
* The f_1/f_a is fundamental frequency of the building divided by that of the component
* The column for f_1/f_a=1.0 can be used as the most conservative approved ground motion
* Listed values are based on the maximum Sds levels the certification covers. Refer to manufacturer for details on reduced levels for select models.

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Notes & Comments:

1. All equipment listed herein successfully passed the seismic acceptance criteria for shake testing non-structural components and systems as set forth in the ICC AC-156. The Test Response Spectrum (TRS) enveloped the Required Response Spectrum (RRS) for all units tested. The tested units were representative sample(s) of a contingent of models and all remained captive and structurally sound after the seismic shake simulation. The units also remained functionally operational after the simulation testing as functional testing was completed by the equipment manufacturer before and after the seismic simulations. Although a seismic qualified unit inherently contains some wind resisting capacity, that capacity is undetermined and is excluded from this certification. Snow/Ice loads have been neglected and thus limit the unit to be installed both indoors (covered by an independent protective structure) and out of doors (exposed to accumulating snow/ice) for ground snow loads no greater than 30 psf for all applications.

2. The following building codes are addressed under this certification:
   IBC 2021 referencing ASCE7-16 and ICC-ES AC-156
   IBC 2018 referencing ASCE7-16 and ICC-ES AC-156
   IBC 2015 referencing ASCE7-10 and ICC-ES AC-156
   IBC 2012 referencing ASCE7-10 and ICC-ES AC-156
   EC8 2004 full reference Eurocode EN-1998 2004

3. Refer to the manufacturer supplied installation drawings for anchor requirements and mounting considerations for seismic applications. Required anchor locations, size, style, and load capacities (tension and shear) may be specified on the installation drawings or specified by a 3rd party. Mounting requirement details such as anchor brand, type, embedment depth, edge spacing, anchor-to-anchor spacing, concrete strength, special inspection, wall design, and attachment to non-building structures must be outlined and approved by the Engineer of Record for the project or building. Structural walls, structural floors, and housekeeping pads must also be seismically designed and approved by the project or building Structural Engineer of Record to withstand the seismic anchor loads as defined on the installation drawings. The installing contractor is responsible for ensuring the proper installation of all anchors and mounting hardware.

4. For this certificate and certification to remain valid, this certificate must correspond to the "Seismic Certification Label" found affixed to the unit by the factory. The label ensures the manufacturer built the unit in conformance to the IBC seismic design criteria set forth by the Certified Seismic Qualification Agency, the VMC Group, and meets the seismic design levels claimed by this certificate.

5. Mechanical, Electrical, and Plumbing connections to the equipment must be flexibly attached as to not transfer load through the connection. The structural integrity of any conduit, cable trays, piping, ductwork and/or flexible connections is the responsibility of others. This certification makes no statements of compliance in regards to NEMA, IP, UL, CSA, or other relevant standards after a seismic event. For compliance to other relevant standards, please contact the manufacturer.

6. This certificate applies to units manufactured at:
   Cummins Power Generation, Inc., 1400 73rd Ave NE, Minneapolis, MN 55432
   Plot No. B3-1, SEZ unit, Village Surwadi Nandal, Tal.Phaltan, Dist. Satara-415522, Maharasta, India

7. This certification follows the VMC Group's ISO-17065 Scheme.

8. The qualified seismic design level stated is the highest for all series this certificate covers. For more information, see the certified product tables on page 2.

9. The certified seismic installation methods stated are a summary for all product lines this certificate covers. For individual certified seismic installation methods, see the certified product tables.

10. The Eurocode 8 maximum ground motion for equipment installed at grade or roof listed assumes that the fundamental frequency of the component is exactly twice that of the building (approximately 5 times more stiff compared to the building). If the frequency of the building or equipment is not known for a particular project, the cross-code table for EC8 may be used after the certified product table for the value of f_1/f_a=1.0 as it represents the worst case amplification (and thus approves the lowest most conservative maximum ground motion).

John P. Giuliano, PE
President, VMC Group

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