



**THE VMC GROUP**  
The Power of Together™



## CERTIFICATE OF COMPLIANCE

### SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS



Certification No.

**VMA-44407-2 (REVISION 3)**

Expiration Date: 06/30/2016

#### Certification Parameters:

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

**IBC 2000, IBC 2003, IBC 2006, IBC 2009, IBC 2012**

The following model designations, options, and accessories are included in this certification. Reference report number **VMA-44407-2** as issued by The VMC Group for a complete list of certified models, included accessories/options, and certified installation methods.

#### ABB Standard Variable Frequency Drives

The above referenced equipment is **APPROVED** for seismic application when properly installed,<sup>3</sup> used as intended, and contains a Seismic Certification Label referencing this Certificate of Compliance<sup>4</sup>. 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  $I_p=1.5$ .

Certified Seismic Design Levels	
$S_{DS} \leq 2.00$	$S_{DS} \leq 2.00$
$z/h \leq 0.0$	$z/h \leq 1.0$
(Equipment at Grade)	(Equipment on Roof)
Soil Classes A, B, C, D, Seismic Risk Category I, II, III, IV, and Seismic Design Categories A, B, C, D, E, and F are all covered under this certification, limited by the $S_{DS}$ value stated above.	

Certified Seismic Installation Methods
Directly to rigid wall

Shake Test of Active and Energized Components, Non-Active Components, and Equipment Structure:

Qualified by successful seismic shake table testing at the nationally recognized Datasyst Engineering and Testing Services under the witness of the Certified Seismic Qualification Agency, The VMC Group. Testing was conducted in accordance with ICC-ES AC-156 to envelope the required response spectrum (RRS) of maximum horizontal flexible acceleration ( $A_{FLEX}$ ) of 3.20 g and a rigid acceleration ( $A_{RIG}$ ) of 2.40 g. This test level corresponds to an  $S_{DS} = 2.00$  with a  $z/h$  of 1.0. Functionality was verified before and after the shake test.

Basis of Design for Supports and Attachments to the Building:

For calculations and analysis of the equipment attachment to the building structure, the equivalent static force method was applied using the Seismic Design Acceleration,  $F_p/W_p$ ,<sup>5</sup> for Load Resistance Factored Design (LRFD) methods. This includes but is not limited to the unit anchoring requirements and external isolation calculations.

Seismic Design Acceleration Equation,  $F_p/W_p = 0.4 \times (S_{DS}=2.00) \times (I_p=1.5) \times (a_p/R_p=0.42) \times (1+2(z/h=1.0)) = 1.51 \text{ g}$

$a_p/R_p$  is representative of the worst-case shake tested condition, as determined from Table 13.6-1 in ASCE7-10 Chapter 13.



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#### Certified Product Table:

Product Series	Model	Output Current Rating Range	Base Drive Type Codes			U.L. Type
			Voltage	Inverter Frame Size		
ACS550	-PC, -PD	4.6A – 248A	-2	R1 - R6	1, 12	
		3.3A – 645A	-4	R1 - R8		
		2.7A – 144A	-6	R2 – R6		
ACS550	-U1, -01	4.6A – 248A	-2	R1 - R6	1, 12	
		3.3A – 645A	-4	R1 - R8		
		2.7A – 144A	-6	R2 – R6		
ACH550	-BCR, -BDR	4.6A – 248A	-2	R1 - R6	1, 12	
		3.3A – 645A	-4	R1 - R8		
		2.7A – 144A	-6	R2 – R6		
ACH550	-PCR, -PDR	4.6A – 248A	-2	R1 - R6	1, 12	
		3.3A – 645A	-4	R1 - R8		
		2.7A – 144A	-6	R2 – R6		
ACH550	-VCR, -VDR	4.6A – 75A	-2	R1 – R4	1	
		3.3A – 78A	-4	R1 – R4		
		2.7A – 62A	-6	R2 – R4		
ACH550	-UH, -01	4.6A – 248A	-2	R1 - R6	1, 12	
		3.3A – 645A	-4	R1 - R8		
		2.7A – 144A	-6	R2 – R6		
ACS550	-PC, -PD	4.6A – 75A	-2	R1 – R4	3R	
		3.3A – 78A	-4	R1 – R4		
		2.7A – 62A	-6	R1 – R4		
ACS550	-BCR, -BDR	4.6A – 75A	-2	R1 – R4	3R	
		3.3A – 78A	-4	R1 – R4		
		2.7A – 62A	-6	R1 – R4		
ACH550	-PCR, -PDR	4.6A – 75A	-2	R1 – R4	3R	
		3.3A – 78A	-4	R1 – R4		
		2.7A – 62A	-6	R1 – R4		

This certification **includes** the product as sold by the factory and only included options that are a catalogue design and factory supplied. The product shall be installed and attached to the building structure per the manufacturer supplied seismic installation instructions. This certification **excludes** all non-factory supplied accessories, including but not limited to enclosures, isolation/restraint devices, remote control panels, mounting brackets and other electrical/mechanical components.



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Revision Date: May 14, 2013  
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#### Notes and 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 units cited in this certification 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 2012	- referencing ASCE7-10 and ICC AC-156
IBC 2009	- referencing ASCE7-05 and ICC AC-156
IBC 2006	- referencing ASCE7-05 and ICC AC-156
IBC 2003	- referencing ASCE7-02 and ICC AC-156
IBC 2000	- referencing ASCE7-98 and ICC AC-156
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) are specified on the installation drawings. 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 observing the installation detailed in the seismic installation drawings and 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. When the site soil properties or final equipment installation location are not known, the soil site coefficient,  $F_A$ , defaults to the Soil Site Class D coefficient. Soil Classes A, B, C, D, Seismic Risk Category I, II, III, IV, and Seismic Design Categories A, B, C, D, E, and F are all covered under this certification, limited by the  $S_{DS}$  values on page 1, respective to the applicable building code, Importance factor, and  $z/h$  ratio.
6. 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 does not guarantee the equipment will remain compliant to UL or NEMA standards after a seismic event.

John P. Giuliano, PE  
President, The VMC Group

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