Halcrow, Inc.
500 12th Street, Suite 310, Oakland, California 94607 USA
Tel +1 (510) 452-0040 Fax +1 (510) 452-0041
halcrow.com

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Project No. DRMAP3

Mr. Keith E. Carney
Vice President of Engineering & Quality Assurance
MIDDLE ATLANTIC PRODUCTS
300 Fairfield Road
Fairfield, New Jersey 07004

Subject: *Revised Seismic Certification of the BGR Series Electronics Rack Enclosures*

Sent via electronic mail to kcarney@middleatlantic.com

Dear Mr. Carney:

Based on testing conducted at the Middle Atlantic Products, Inc. (Middle Atlantic) Fairfield, New Jersey, facility between February 8 and February 10, 2011 that was observed by Halcrow, Inc. (Halcrow), the following statements can be made about the subject rack enclosures.

Each of the BGR Series electronics rack enclosures listed in Table 1 were tested statically to verify lateral seismic adequacy. The enclosures selected for testing represent the largest and smallest footprints (defined by the width and depth of the enclosure) within the BGR series. Specifically, enclosures with the largest (38-in.) and smallest (27-in.) footprint depths were selected for testing. In addition, the enclosures tested were the tallest models with 45 rack spaces and represent the worst seismic load case for a given footprint. The enclosure frame and anchorage details for each footprint within the series are identical, regardless of height. Therefore, the testing results for the tallest enclosures are applicable to all other BGR series enclosures with equal or lesser height within the range of footprints tested.

The enclosures tested were loaded with a series of rack-mounted weights that were positioned such that 50% of their total weight was placed in the bottom third of the enclosure rack, 25% in the middle third, and 25% in the top third. The loaded enclosures were anchored to an inclining test frame and slowly tipped to a target angle to simulate lateral seismic loading. At maximum inclination, the enclosures were observed for any signs of distress or extreme deformations, and overall enclosure drift was measured. The enclosures were measured again after completion of the testing to estimate final drift. Removal of the rack-mounted weights was observed to assess the ease of their removal. The enclosures were tested both in the front-to-back

and side-to-side directions. A summary of the lateral seismic test results are provided in Table 1 for the BGR enclosures tested. Photographs of the tested BGR enclosures at maximum inclination are included in this letter.

At maximum inclination, neither of the tested BGR enclosures showed any signs of significant distress. No visible permanent deformations were observed after the test load was removed from either enclosure. As noted in Table 1, the maximum drift ratio measured was 0.89% of the enclosure height during the application of maximum lateral load in the side-to-side direction. After removal of the load, the corresponding maximum permanent enclosure drift was 0.20%. No difficulty was encountered removing the rack components from any of the tested enclosures following testing. Certification of the operability of any equipment installed in this rack enclosure is beyond the scope of this test program and the responsibility of the end-user.

Based on the test results, Halcrow concludes that the BGR Series electronics rack enclosures have sufficient seismic adequacy to support the content capacities listed in Table 2 for the various building construction codes considered. These seismic capacities are appropriate for all models within the series with the same footprint as those tested, with the same or lower height, including the stand alone (SA) models. The building codes selected for consideration are as follows:

- 2005 Edition of ASCE Standard 7 (ASCE 7-05) which is the basis for the 2006 IBC, 2009 IBC, 2007 CBC, 2010 CBC, as well as the 2006 and 2009 editions of NFPA 5000

- 2010 Edition of ASCE Standard 7 (ASCE 7-10) which is the basis for the 2012 IBC

These are the primary building codes that govern construction in the most earthquake-prone regions of the country. The seismic content capacities provided in Table 2 are generic in nature and intended to cover all possible installations. These capacities are based on project locations with the highest level of seismicity and top floor or rooftop installations, where amplification of seismic shaking is greatest. As such, BGR enclosures installed at sites with less seismicity or on lower floors may have content capacities greater than those provided.

Table 2 provides a listing of acceptable capacities for enclosures installed at locations with the highest seismicity (ASCE 7-05, ASCE 7-10, 2006 IBC, 2009 IBC, 2012 IBC, 2007 CBC, 2010 CBC, and 2006 & 2009 Editions of NFPA 5000, SMS=2.85g). Two categories of acceptable capacities are provided; one for standard installations and the other for "high-importance" installations (Seismic Use Group III facilities as defined in the CBC, IBC, ASCE 7, and NFPA 5000). These installations are generally for facilities where reasonable operation of the facility and/or certain equipment items following an earthquake is desired. The design for these "high-

importance" installations use an importance factor (Ip) of 1.5. The other category shown in Table 2 is for standard or for all other installations where the building codes generally assign an importance factor of one.

Please note that the observations and conclusions noted herein are applicable only to the BGR Series electronics rack enclosures when anchored using the appropriate Middle Atlantic seismic anchorage kit. Selection and installation of rack enclosure anchor bolts are the responsibility of the end user and are not addressed in this evaluation. Any changes to the enclosure design, fabrication, materials, and anchorage may invalidate these observations and conclusions.

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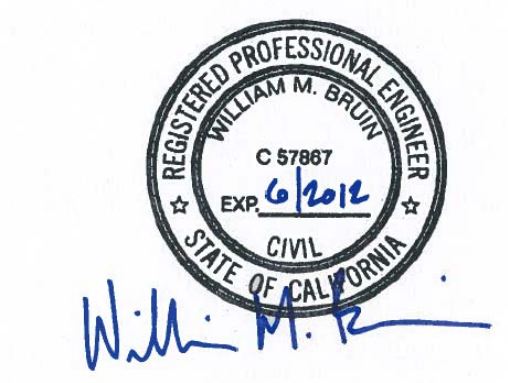
If you have any questions or comments, please feel free to contact me with any questions or concerns that may arise.

Very truly yours,
Halcrow, Inc.



William M. Bruin, P.E.
Principal Engineer

California Civil C57867 (expires June 30, 2012)

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Table 1
SUMMARY OF RACK ENCLOSURE TESTING RESULTS

Enclosure[1]	Lateral Test Load[2] (pounds)	Enclosure Drift @ Maximum Inclination (% of Enclosure Height)		Enclosure Drift After Testing (% of Enclosure Height)		Were Weights Easily Removed following Testing?
		Front-Back	Side-Side	Front-Back	Side-Side	
BGR-4527	1,741	0.80%	0.89%	0.35%	0.20%	Yes
BGR-4538	1,842	0.83%	0.88%	0.38%	0.13%	Yes

[1] The tallest of the BGR enclosures represented the worst seismic load case for a given footprint (defined by the width and depth of the enclosure).

[2] Lateral test load based on enclosure weight, weight of contents, and test inclination. This is equivalent to code seismic base shear.

Table 2
SEISMIC CERTIFIED CONTENT CAPACITY (pounds)[1,2,3]

Enclosure[5]	High-Importance Installations[4]		Standard Installations	
	ASCE 7-05 2006 IBC 2009 IBC 2007 CBC 2010 CBC 2006 & 2009 Ed. NFPA 5000	ASCE 7-10 2012 IBC	ASCE 7-05 2006 IBC 2009 IBC 2007 CBC 2010 CBC 2006 & 2009 Ed. NFPA 5000	ASCE 7-10 2012 IBC
BGR-XX27	1,175	1,175	1,811	1,811
BGR-XXSA-27	1,158	1,158	1,794	1,794
BGR-XX32	1,175	1,175	1,811	1,811
BGR-XXSA-32	1,156	1,156	1,792	1,792
BGR-XX38	1,227	1,227	1,901	1,901

[1] Capacities provided are for BGR series enclosures anchored with the Middle Atlantic BGR-Z4 or BGR-ISO-ANCH-Z4 seismic anchorage kits. Selection and installation of enclosure rack anchor bolts are the responsibility of the end user and are not addressed in this evaluation.

[2] Capacities provided are applicable when 50% of the enclosure contents are positioned in the bottom third of rack, 25% in the middle third, and 25% in the top third.

[3] Capacities provided are based on worst case seismicity for the building codes noted (S_{MS} = 2.85 g; top floor or rooftop installation). Additional capacity may be available based on a site-specific evaluation.

[4] High-Importance Installations include CBC, IBC, ASCE 7, and NFPA 5000 Seismic Use Group III facilities. For all codes, the Importance factor (Ip) is 1.5.

[5] Capacities provided are for all enclosure heights for the models listed.