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May 3, 2011
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 DRK Series Cable Management Enclosures*

Reference: *Letter to Mr. Keith Carney regarding the Seismic Certification of DRK Series Cable Management Enclosures installed with Seismic Anchoring Kit. HPA Engineers P.C. Project No. B1376.01. May 4, 2005.*

Sent via electronic mail to kcarney@middleatlantic.com

Dear Mr. Carney:

At your request, Halcrow, Inc. (Halcrow) has reviewed the previously completed test report referenced above and have updated the capacities of the subject enclosure series in accordance with the provisions of the 2010 Edition of ASCE Standard 7 (ASCE 7-10), which is the basis for the 2009 and 2012 IBC, 2010 CBC, and the 2009 edition of NFPA 5000. These revised capacities are reported herein.

The DRK Series cable management enclosures listed in Table 1 were tested statically to verify lateral seismic adequacy. The enclosures selected for testing represent tallest model for a given footprint (defined by the width and depth of the enclosure) at 44 rack spaces and are considered 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 DRK series enclosures with equal or lesser height within the range of footprints tested.

Each enclosure tested was 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 enclosure was anchored to an appropriately sized seismic riser base that was attached to an inclining test frame. The entire assembly was slowly tipped to a target angle to simulate lateral seismic loading. At maximum inclination, the enclosure was observed for any signs of distress or extreme deformations, and overall enclosure drift was measured. The enclosure was 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 enclosure was 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. Photographs of the DRK19-44-48 enclosure while being tested are included in this letter.

At maximum inclination, the tested DRK Series enclosures did not show any signs of significant distress. No visible permanent deformations were observed for any of the tested enclosures after the test load was removed. As noted in Table 1, the maximum drift ratio measured was 1.47% of the enclosure height during the application of maximum lateral load in the side-to-side direction (DRK19-44-48). After removal of the load, the corresponding maximum permanent enclosure drift was 0.51%. No difficulty was encountered removing the rack components from any of the tested enclosures following testing. Evaluation of the operability of this equipment installed on this relay rack is beyond the scope of this test program and the responsibility of the end-user.

Based on the test results, Halcrow concludes that the DRK Series 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. The building codes selected for consideration are as follows:

- 1997 Uniform Building Code (UBC) which is the basis for the 2001 California Building Code (CBC)
- 2000 International Building Code (IBC)
- 2002 edition of ASCE Standard 7 (ASCE 7-02) which is the basis for the 2003 IBC and the 2003 edition of the National Fire Prevention Association Building Construction and Safety Code (NFPA 5000)
- 2005 edition of ASCE Standard 7 (ASCE 7-05) which is the basis for the 2006 IBC, 2007 CBC, and the 2005 edition NFPA 5000
- 2010 edition of ASCE Standard 7 (ASCE 7-10) which is the basis for the 2009 and 2012 IBC, 2010 CBC, and the 2009 edition NFPA 5000.

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 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, 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 (UBC & 2001 CBC – Zone 4, Ca=0.44; ASCE 7-02, 2000 IBC, 2000 & 2003 IBC, & 2003 NFPA 5000, SMS=2.56g; ASCE 7-05/10, 2006/09/12 IBC, 2007/10 CBC, & 2006/09 NFPA 5000, SMS=2.85g). Two categories of acceptable capacities are provided; one for "high-importance" installations and the other for standard installations. The "high-importance" category applies to installations within Essential facilities as defined in the UBC and CBC as well as for installations within Seismic Use Group III facilities as defined in the 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 DRK Series cable management enclosures when anchored as per Middle Atlantic's recommendations. 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)

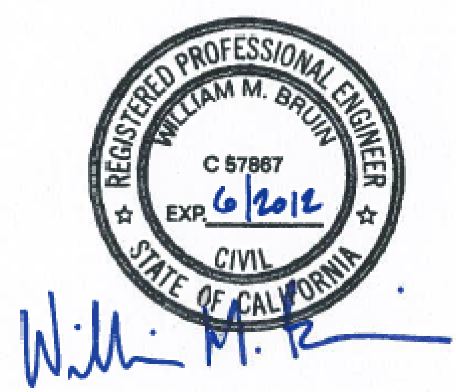

Table 1
SUMMARY OF RACK ENCLOSURE TESTING RESULTS

Enclosure[1] (Year Tested)	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	
DRK19-44-31 DRK23-44-31[3] (2005)	1,249	0.35%	0.97%	0.02%	0.13%	Yes
DRK19-44-36 (2005)	1,254	0.29%	0.91%	0.04%	0.29%	Yes
DRK19-44-42 (2005)	1,255	0.48%	1.01%	0.08%	0.36%	Yes
DRK19-44-48 (2008)	1,473	0.26%	1.47%	0.17%	0.51%	Yes

1 The tallest of the DRK Series cable management 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.

3 The primary frame and anchorage of the DRK19-44-31 and DRK23-44-31 enclosures are structurally identical.

Table 2

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

Enclosure[5]	High-Importance Installations[4]			Standard Installations		
	1997 UBC 2001 CBC	ASCE 7-02 2000 IBC 2003 IBC 2003 Ed. NFPA 5000	ASCE 7-05/10 2006/09/12 IBC 2007/10 CBC 2006/09 Ed. NFPA 5000	1997 UBC 2001 CBC	ASCE 7-02 2000 IBC 2003 IBC 2003 Ed. NFPA 5000	ASCE 7-05/10 2006/09/12 IBC 2007/10 CBC 2006/09 Ed. NFPA 5000
DRK19-XX-31	788	860	755	1,271	1,378	1,220
DRK23-XX-31	788	860	755	1,271	1,378	1,220
DRK19-XX-36	788	860	755	1,271	1,378	1,220
DRK19-XX-42	788	860	755	1,271	1,378	1,220
DRK19-XX-48	856	939	817	1,414	1,538	1,355

[1] Capacities provided are for anchored enclosures. 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 (UBC & 2001 CBC – Zone 4, Ca=0.44; ASCE 7-02, 2000 IBC, 2000 & 2003 IBC, 2003 NFPA 5000 – S_{MS}=2.56g; ASCE 7-05, 2006 IBC, 2007 CBC, 2006 NFPA 5000 – S_{MS}=2.85g) and top floor or rooftop installation. Additional capacity may be available based on site-specific evaluation.

[4] High-Importance Installations include those within UBC and CBC Essential facilities or 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 and includes enclosures with either cage nut or tapped rail assemblies.

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