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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 VC Series Video Consoles*

Reference: *Letter to Mr. Keith Carney regarding the Seismic Certification of the VC Series Video Consoles. Halcrow, Inc. Project No. DRMAP3. April 20, 2010.*

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 video console 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.

VC Series video consoles come in various configurations ranging from 24 inches to 72 inches in length. The depth and height of the consoles are constant for this series. For every 24 inches of length, there is one bay for rack mounted equipment. The 24-inch console has one, the 48-inch has two, and the 72-inch has three bays for rack mounted equipment. Consoles with lengths between these sizes do not have additional bays. Each console can also support a wide array of optional, nonstructural components such as desktops, work surfaces, video monitor stands, and wedge units. For the purposes of the seismic rating, these are considered to be included as part of the console contents capacity.

The VC Series video consoles listed in Table 1 were tested statically to verify lateral seismic adequacy. The consoles selected for testing represent the extreme configurations or worst case conditions for the entire series from a seismic perspective. Specifically, the largest (72-inch with 3 24-inch bays) and smallest (24-inch with one bay) footprint geometries were selected for testing.

The 72-inch test included the heaviest desktop with the largest number of video monitors. In addition, the largest console was tested with and without an attached Extender Bay unit. The Extender Bay is an additional rack mounted equipment bay that anchors to the console frame and to the floor. The anchorage details for all configurations and models within the console series are identical, regardless of size. Therefore, the testing results shown in Table 1 are applicable to all of the video consoles within the series and are the basis of this seismic certification.

Each video console tested was loaded with rack-mounted weights. The weights were evenly distributed within the console bay. When a console with an extender was tested, the extender bay was loaded as well. The loaded console was anchored to an inclining test frame and slowly tipped to a target angle of 56.1 degrees to simulate lateral seismic loading. At maximum inclination, the console was observed for any signs of distress or extreme deformations, and overall riser drift was measured from the top of the structural frame. The console was measured again after testing to estimate final drift. Removal of the weights out of the console bays was observed to assess the ease of their removal. The console 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 video consoles tested at maximum inclination are included in this letter.

At maximum inclination, the tested video consoles did not show any obvious signs of structural distress. No visible permanent deformations were observed after the test load was removed. This was also the case for the consoles with and without the extender. The maximum drift ratio measured for any of the tested riser bases was 0.15% (VC-2419-DT34) of the console height during the application of maximum lateral load in the front-to-back direction. After removal of the load, the corresponding maximum permanent enclosure drift was 0.03%. This final drift includes setting of the anchorage (e.g. slippage) at maximum load as well as any console deformation. As reported in Table 1, drifts at maximum loads were significantly less for the other models tested. No difficulty was encountered removing the weights from the console racks following testing.

The adequacy of the video monitor mounts were also verified in select tests. A monitor support arm was loaded with two 30 lbs weights with a center-of-gravity (c.g.) at 14 inches and 30 inches above the top console frame to represent a video monitor. This is equivalent to a moment associated with a 60 pound mass with a c.g. at 22.4 inches above the frame. It should be noted that testing with the video monitors and supporting arms was done to verify the seismic adequacy of the console framing where the mount attaches only. Seismic adequacy of the arms, monitors, and methods of attachment is beyond the scope of this study. At maximum inclination, the video monitor mounts were observed and no obvious signs of distress were noted. No difficulty was encountered removing the supporting arms from the console frame following testing.

Based on the test results, Halcrow concludes that the VC Series video consoles have sufficient seismic adequacy to support the weight capacities (self-weight, contents weight in each bay, and other accessories such as the desktop, monitors, extender, etc.) listed in Table 2 for the various building construction codes considered. 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, video consoles 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 video consoles 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 VC Series video consoles supporting appropriate rack-mounted contents and anchored in accordance with Middle Atlantic specifications. Selection and installation of console 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)

Halcrow

Table 1
SUMMARY OF VC SERIES VIDEO CONSOLE TESTING RESULTS

Riser Base	Console Height (inches)	Lateral Test Load[1] (pounds)	Enclosure Drift @ Maximum Inclination (% of Riser Height)		Enclosure Drift After Testing (% of Riser Height)	
			Front-Back[2]	Side-Side[2]	Front-Back[2]	Side-Side[2]
VC-7219-DT34 with Extender Bay	25.5	1671	< 0.01%	< 0.01%	< 0.01%	< 0.01%
VC-7219-DT34	25.5	1022	< 0.01%	< 0.01%	< 0.01%	< 0.01%
VC-2419-DT34	25.5	518	0.15%	0.09%	0.03%	0.03%

[1] Lateral test load based on console weight, weight of console contents (including monitors), any console components (desktop, extender unit, wedge unit, etc.), and test inclination. This is equivalent to building code seismic base shear.

[2] Loading direction.

Table 2
SUMMARY OF VC SERIES VIDEO CONSOLE SEISMIC CERTIFIED CONTENT CAPACITY (pounds)[1,2,3,5]

Video Console[2] (No. of Bays)	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
VC-2419-XXXX (1 bay)	337	366	324	534	577	513
VC-2419-XXXX (2 bays) [6]	415	450	400	650	710	630
VC-4819-XXXX (2 bays)	415	450	400	650	710	630
VC-4819-XXXX (3 bays) [6]	627	685	600	1,014	1,100	974
VC-7219-XXXX (3 bays)	627	685	600	1,014	1,100	974
VC-7219-XXXX (4 bays) [6]	989	1084	944	1,630	1,773	1,563

[1] Capacities provided are for VC Series video consoles anchored in accordance with Middle Atlantic recommendations, where XXXX denotes DT34 (34-in. deep desktop) or WS18 (18-in. deep work surface). Selection and installation of anchor bolts are the responsibility of the end user and are not addressed in this evaluation.

[2] Capacities provided include the self weight of the console and extender bay, if applicable, but exclude other additions like wedge units, desktops, video monitors, monitor supporting arms, etc. These additional items must be considered and deducted from the capacities provided to determine maximum capacity of each rack bay.

[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 7-05/10, 2006/09/12 IBC, 2007/10 CBC, 2006/09 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] Monitor mount capacity cannot exceed 60 pounds at each mount point with a center-of-gravity no greater than 22.4 inches above the top of the console frame.

[6] Includes Extender Bay (VC-2418X or VC-2424X, as appropriate) in self-weight.