



DEPARTMENT OF HEALTH CARE ACCESS AND INFORMATION
OFFICE OF STATEWIDE HOSPITAL PLANNING AND DEVELOPMENT

APPLICATION FOR HCAI SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0204

HCAI Special Seismic Certification Preapproval (OSP)

Type: New Renewal

Manufacturer Information

Manufacturer: Multistack, LLC

Manufacturer's Technical Representative: Darrin Anderson

Mailing Address: 1065 Maple Ave, Sparta, WI 54656

Telephone: (608) 366-2400 Email: DAnderson@multistack.com

Product Information

Product Name: See attached summary table.

Product Model Number(s): MFW MagLev Flooded Chiller, Gen 1-5

Product Category: Chillers

Product Sub-Category: Chillers - Water Cooled

General Description: Water cooled mag lev flooded chillers in stacked and side-by-side configuration ranging in size from 4,500 pounds to 22,300 pounds.

Mounting Description: Flexible base mount with neoprene pads or rigidly base mounted.

Tested Seismic Enhancements: None

Applicant Information

Applicant Company Name: VMC

Contact Person: Kelly Laplace

Mailing Address: 113 Main St., Bloomingdale, NJ 07403

Telephone: (775) 358-5085 Email: kelly.laplace@thvmcgroup.com

Title: Vice President of Sales: Test and Measurement Division



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California Licensed Structural Engineer Responsible for the Engineering and Test Report(s)

Company Name: THE VMC GROUP
 Name: Kenneth Tarlow California License Number: S2851
 Mailing Address: 980 9th Street, 16th Floor, Sacramento, CA 95814
 Telephone: (832) 627-2214 Email: ken.tarlow@thevmcgroup.com

Certification Method

GR-63-Core ICC-ES AC156 IEEE 344 IEEE 693 NEBS 3
 Other (Please Specify): _____

Testing Laboratory

Company Name: U.S. ARMY ENGINEER RESEARCH AND DEVELOPMENT CENTER, CONSTRUCTION ENGINEERING RESEARCH LABORATORY (CERL)
 Contact Person: James Wilcoski
 Mailing Address: 2902 Newmark Dr., Champaign IL 61822-1076
 Telephone: (217) 373-4565 Email: james.wilcoski@usace.army.mil

Company Name: DYNAMIC CERTIFICATION LABORATORY (DCL)
 Contact Person: Josh Sailer
 Mailing Address: 1315 Greg St., Ste 109, Sparks NV 89431
 Telephone: (775) 358-5085 Email: josh@shaketest.com

Company Name: UNIVERSITY OF CALIFORNIA, BERKELEY (PEER)
 Contact Person: Amarnath Kasalanati
 Mailing Address: 325 Davis Hall, Berkeley CA 94720-1729
 Telephone: (510) 642-3437 Email: amarnath1@berkley.edu





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Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 3.60 (isolated); 1.44 (Rigid)

SDS (Design spectral response acceleration at short period, g) = 2.00

a_p (Amplification factor) = 2.5 (Isolated); 1 (Rigid)

R_p (Response modification factor) = 2.5

Ω_0 (System overstrength factor) = 2.5

I_p (Importance factor) = 1.5

z/h (Height ratio factor) = 1

Natural frequencies (Hz) = See attachment

Overall dimensions and weight = See attachment

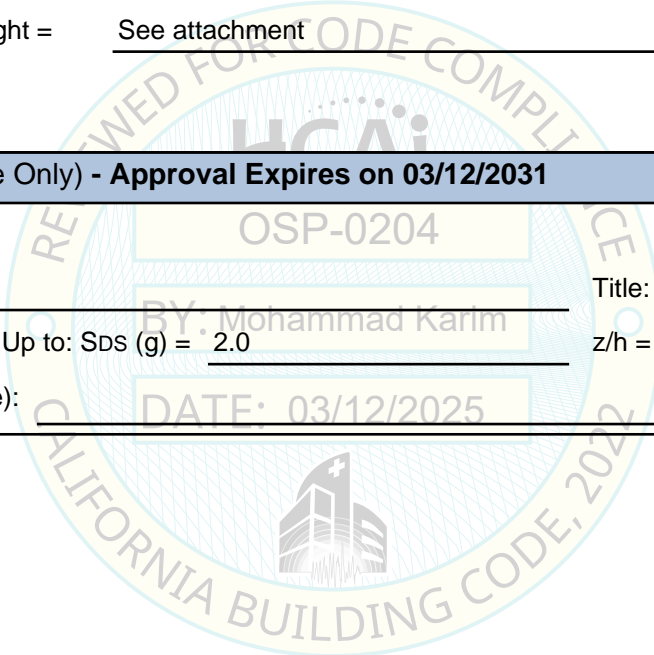
HCAI Approval (For Office Use Only) - Approval Expires on 03/12/2031

Date: 3/12/2025

Name: Mohammad Karim Title: Supervisor, Health Facilities

Special Seismic Certification Valid Up to: SDS (g) = 2.0 z/h = 1

Condition of Approval (if applicable): DATE: 03/12/2025



Special Seismic Certification
Table 1 - Certified Components



DCL Project Number: 09698-2401

Manufacturer: Multistack

Product Line: MFW MagLev Flooded Chiller, Gen 1-5

Product Construction Summary: Painted shell (carbon steel) and tube (copper) heat exchanger.

Mounting: Isolated Base Mounted with Neoprene Pads or Rigid Base Mounted

Certified Seismic Levels: Sds 2.00g z/h=1.0

Old Model Number	New Model Number	Dimensions [in.]			Weight [lb.]	Certified Installation	Unit*
		Depth	Width	Height			
N/A	MFW0095	139	33	64	4,500	Rigid and Isolated Base Mounted	Extrapolated
N/A	MFW0102	139	33	64	4,500		Extrapolated
MS0122FC1	MFW0122	139	33	64	4,500		Extrapolated
MS0132FC1	MFW0132	139	33	64	4,670		UUT-6
N/A	MFW0135	139	35	77	6,270		Interpolated
MS0152FC1	MFW0152	139	35	77	6,270		Interpolated
MS0162FC1	MFW0162	139	35	77	6,990		Interpolated
N/A	MFW0125	139	35	77	6,990		Interpolated
N/A	MFW0115	139	35	77	6,990		Interpolated
MS0192FC1	MFW0192	141	36	77	7,150		Interpolated
MS0202FC1	MFW0202	141	36	77	7,860		Interpolated
N/A	MFW0212	141	36	77	7,860		Interpolated
N/A	MFW0175	142	35	77	8,670		Interpolated
N/A	MFW0185	142	35	77	8,670		Interpolated
N/A	MFW0205	142	35	77	8,670		Interpolated
N/A	MFW0235	142	35	77	8,670		Interpolated
MS0242FC1	MFW0242	142	35	77	8,670		Interpolated
N/A	MFW0252	142	35	77	8,670		Interpolated
N/A	MFW0265	142	35	77	8,670		Interpolated
N/A	MFW0285	143	37	77	9,840		Interpolated
MS0292FC1	MFW0292	143	37	77	9,840		Interpolated
N/A	MFW0305	143	37	77	9,840		Interpolated
MS0332FC1	MFW0332	143	37	77	9,960		Interpolated
MS0392FC1	MFW0392	143	40	81	11,350		Interpolated
N/A	MFW0295	168	40	89	13,050		Interpolated
N/A	MFW0402	168	40	89	13,050		Interpolated
MS0412FC1	MFW0412	168	40	89	13,050		Interpolated
N/A	MFW0415	172	48	94	15,350		Interpolated
N/A	MFW0425	172	48	94	15,350		Interpolated
MS0482FC1	MFW0482	172	48	94	15,350		UUT-5
MS0542FC1	MFW0542	171	82	82	17,660	Interpolated	
MS0602FC1	MFW0602	171	86	86	19,560	Interpolated	
MS0612FC1	MFW0612	171	86	86	20,100	Interpolated	
MS0622FC1	MFW0622	171	86	86	20,160	Interpolated	
MS0702FC1	MFW0702	147	90	86	21,150	Interpolated	
MS0703FC1	MFW0703	149	90	90	20,800	Interpolated	
MS0803FC1	MFW0803	149	101	96	22,300	UUT-7	

* The type of refrigerant does not affect the physical build of the unit.

**Special Seismic Certification
Nomenclature Chart**



DCL Project Number: 09698-2401

Manufacturer: Multistack

Product Line: MFW MagLev Flooded Chiller, Gen 1-5

Mounting: Rigid and Isolated Base Mounted with Neoprene Pads or Rigid Base Mounted

Sample Part Number: MFW0102

MFW 010 2
1 2 3

Character	Category	Allowable Value	Description	Certified Installation	Unit
1 ¹	Product Line	MS	Branding	N/A	UUT-5, UUT-6, UUT-7
		MSF	Branding		Same as tested
		MFW	Branding		Same as tested
2	Nominal Capacity	009	90 Tons of refrigeration	Rigid and Isolated Base Mounted	Extrapolated
		010	100 Tons of refrigeration		Extrapolated
		011	110 Tons of refrigeration		Extrapolated
		012	120 Tons of refrigeration		Extrapolated
		013	130 Tons of refrigeration		UUT-6
		015	150 Tons of refrigeration		Interpolated
		016	160 Tons of refrigeration		Interpolated
		017	170 Tons of refrigeration		Interpolated
		018	180 Tons of refrigeration		Interpolated
		019	190 Tons of refrigeration		Interpolated
		020	200 Tons of refrigeration		Interpolated
		021	210 Tons of refrigeration		Interpolated
		023	230 Tons of refrigeration		Interpolated
		024	240 Tons of refrigeration		Interpolated
		025	250 Tons of refrigeration		Interpolated
		026	260 Tons of refrigeration		Interpolated
		028	280 Tons of refrigeration		Interpolated
		029	290 Tons of refrigeration		Interpolated
		030	300 Tons of refrigeration		Interpolated
		033	330 Tons of refrigeration		Interpolated
		039	390 Tons of refrigeration		Interpolated
		040	400 Tons of refrigeration		Interpolated
		041	410 Tons of refrigeration		Interpolated
042	420 Tons of refrigeration	Interpolated			
048	480 Tons of refrigeration	UUT-5			
054	540 Tons of refrigeration	Interpolated			
060	600 Tons of refrigeration	Interpolated			
061	610 Tons of refrigeration	Interpolated			
062	620 Tons of refrigeration	Interpolated			
070	700 Tons of refrigeration	Interpolated			
080	800 Tons of refrigeration	UUT-7			
3 ²	Controls Generation	1	Generation 1	N/A	Same as tested
		2	Generation 2		UUT5, UUT6
		3	Generation 3		UUT-7
		4	Generation 4		Same as tested
		5	Generation 5		Same as tested

1. Character 1 differences are in name only, build is identical.
2. Character 3 based on controls/software changes only, physical build is identical.

Special Seismic Certification
Table 2 - Certified Subcomponents



DCL Project Number: 09698-2401

Product Line: MFW MagLev Flooded Chiller, Gen 1-5

Subcomponent Type [Manufacturer]	Part Number	Dimensions	Material	Certified Installation	Weight [lb.]	Unit
Compressors* [Danfoss Turbocor]	TTS-300	31.0" x 20.4" x 19.2"	Iron, Aluminum, Copper, Plastic	Rigid and Isolated Base Mounted	265	UUT-6
	TGS-230	31.0" x 20.4" x 19.2"			265	Interpolated
	TTS-350	31.0" x 20.4" x 19.2"			290	Interpolated
	TGS-310	31.0" x 20.4" x 19.2"			290	Interpolated
	TTS-400	31.0" x 20.4" x 19.2"			290	UUT-5
	TGS-390	31.0" x 20.4" x 19.2"			290	Interpolated
	TTS-450	31.0" x 20.4" x 19.2"			290	Interpolated
	TGS-380	31.0" x 20.4" x 19.2"			290	Interpolated
	TTS-500	31.0" x 20.4" x 19.2"			318	UUT-5
	TGS-490	31.0" x 20.4" x 19.2"			318	Interpolated
	TTS-700	31.0" x 20.4" x 19.2"			318	UUT-7
	TGS-520	31.0" x 20.4" x 19.2"			318	Interpolated
	VTX-1600	44.5" x 26.9" x 29.5"			977	Interpolated
	VTT-1200	44.5" x 26.9" x 29.5"			977	UUT-7
Condensers [Standard Refrigeration]	HSE1210	12" dia x 10' tube	Iron, Copper	Rigid and Isolated Base Mounted	1300	Extrapolated
	HSE1410	14" dia x 10' tube			1620	UUT-6
	HSE1610	16" dia x 10' tube			1910	Interpolated
	HSE1810	18" dia x 10' tube			2320	Interpolated
	HSE2010	20" dia x 10' tube			2570	Interpolated
	HSE2212	22" dia x 12' tube			3100	Interpolated
	HSE2412	24" dia x 12' tube			4620	UUT-5
	HSE2612	26" dia x 12' tube			5950	Interpolated
	HSE2812	28" dia x 12' tube			6510	Interpolated
	HSE3010	30" dia x 10' tube			6800	Interpolated
	HSE3012	30" dia x 12' tube			7520	Interpolated
	HSE3210	32" dia x 10' tube			7550	UUT-7
Evaporators [Standard Refrigeration]	FEV1410	14" dia x 10' tube	Iron, Copper	Rigid and Isolated Base Mounted	1190	Extrapolated
	FEV1610	16" dia x 10' tube			1490	UUT-6
	FEV1810	18" dia x 10' tube			1810	Interpolated
	FEV2010	20" dia x 10' tube			2100	Interpolated
	FEV2212	22" dia x 12' tube			2970	Interpolated
	FEV2412	24" dia x 12' tube			3790	Interpolated
	FEV2612	26" dia x 12' tube			4120	UUT-5
	FEV2812	28" dia x 12' tube			7050	Interpolated
	FEV3012	30" dia x 12' tube			8070	Interpolated
	FEV3210	32" dia x 10' tube			8230	UUT-7
Condenser/Evaporator Expansion Valves [Carel]	E7V	16.4" x 5.3" x 16.8"	Copper, Iron, Brass, Stainless Steel, Nylon	Rigid and Isolated Base Mounted	9	UUT-6
Expansion Valves [Sporlan]	Y12-31	11.0" x 5.5" x 2.5"	Copper, Iron, Brass, Stainless Steel, Nylon	Rigid and Isolated Base Mounted	15	UUT-5
	SEHI-T	14.4" x 6.5" x 3.5"			20	UUT-7

* TTS uses R134a and R513a refrigerants, TGS uses R1234ze and R515b refrigerants, VTT uses R134a and R513a refrigerants and VTX uses R134a, R513a, R515b, or R1234ze refrigerants.

Special Seismic Certification
Table 3 - Certified Subcomponents



DCL Project Number: 09698-2401

Product Line: MFW MagLev Flooded Chiller, Gen 1-5

Subcomponent Type [Manufacturer]	Part Number	Dimensions	Material	Certified Installation	Weight [lb.]	Unit	
Economizer [SWEP]	V200THx40	9.6" x 20.6" x 4.0"	Stainless Steel	Rigid and Isolated Base Mounted	58	UUT-6	
	V200THx60	9.6" x 20.6" x 5.8"			76	Interpolated	
	V200THx80	9.6" x 20.6" x 7.6"			95	Interpolated	
	FS250x120	8.0" x 24.4" x 9.6"			111	UUT-7	
	V200THx130	9.6" x 20.6" x 12.1"			141	Interpolated	
	S400x120	12.0" x 27.3" x 11.5"			219	Interpolated	
	S400THx120	12.0" x 27.3" x 11.5"			219	UUT-5	
Economizer Expansion Valves [Sporlan]	SERI-G	7.3" x 4.6" x 1.9"	Copper, Iron, Brass, Stainless Steel, Nylon	Rigid and Isolated Base Mounted	5	UUT-6	
	SERI-K	7.9" x 4.9" x 1.9"			7	UUT-5	
	SERI-J	7.5" x 4.8" x 1.9"			6	UUT-7	
Subcomponent Type [Manufacturer]	Part Number	Description	Material	Quantity in Each Subassembly	Certified Installation	Weight of Each Component in Subassembly (Combined Weight) [lb.]	Unit
Flexsys Control System [Multistack]	FLEXSYS	Control Panels as Subassembly	Iron, Copper, Aluminum, Plastic	4	Rigid and Isolated Base Mounted	60, 80, 80, 90 (310)	Extrapolated
	FLEXSYS			3		90, 130,100 (320)	Extrapolated
	FLEXSYS			4		130, 90,130,100 (450)	UUT-6
	FLEXSYS			5		130, 130, 90, 130, 100 (580)	UUT-5
	FLEXSYS			6		130(4), 90, 400 (1010)	Interpolated
	FLEXSYS			4		400, 275, 110, 275 (1060)	Interpolated
	FLEXSYS			5		450, 275, 110, 275, 130 (1240)	UUT-7

Special Seismic Certification
Table 4 - Tested Units



DCL Project Number: 09698-2401

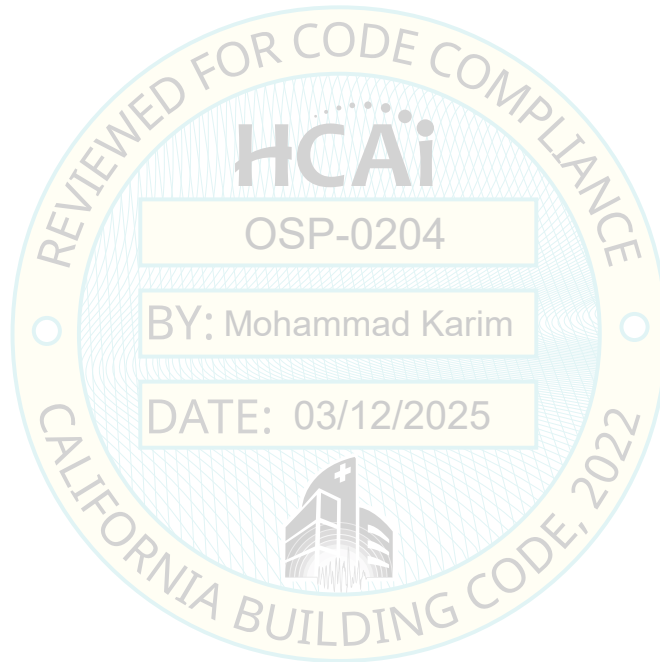
Manufacturer: Multistack

Product Line: MFW MagLev Flooded Chiller, Gen 1-5

Mounting: Isolated Base Mounted with Neoprene Pads or Rigid Base Mounted

Certified Seismic Levels: Sds 2.00g z/h=1.0

Old Model Number	New Model Number	Report Number / Name	Dimensions [in.]			Weight [lb.]	Mounting	Unit
			Depth	Width	Height			
MS0482FC1	MFW0482	60413-1301_Test Report	172	48	94	15,350	Isolated Base	UUT-5
MS0132FC1	MFW0132	60413-1301_Test Report	139	33	64	4,670	Isolated Base	UUT-6
MS0803FC1	MFW0803	Water Cooled Flooded OSP Test Report_R1	149	101	96	22,300	Rigid Base	UUT-7



UNIT UNDER TEST (UUT) Summary Sheet



UUT-5

DCL Test Report Number: 60413-1301

Manufacturer: Multistack, LLC

Product Line: MFW Mag Lev Flooded Chiller Line, Gen 1-5

Model Number (Old / Current): MS0482FC1 / MFW0482

Mounting: Isolated base mounted

Product Construction Summary: Painted carbon steel shell and copper tube heat exchanger.

Options / Component Summary:

Compressor: (1) Danfoss TT-500, (1) Danfoss TT-400, Condenser: (1) Standard Refrigeration HSE2412, Evaporator: (1) Standard Refrigeration FEV2612, Expansion Valves: (4) Sporlan Y12-31, Econimizer: (1) SWEP S400THx120, Econimizer Expansion Valves: (1) Sporlan SERI-K Flexsys Control System: (5) Multistack Flexsys

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Tested unit	Operating Weight (lb)	Dimensions (in)			Lowest Natural Frequency (Hz)		
		Depth	Width	Height	Front-Back	Side-Side	Vertical
UUT-5	15,350	171.7	48.0	94.4	6.5	5.5	18.3

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.0	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

UUT-5 was attached to shake table interface plate with 3/8" thick neoprene pads and four (4) 3/4" diameter Grade 5 steel bolts per support frame (8 bolts total) to the test fixture.



Overall view of UUT-5

UNIT UNDER TEST (UUT) Summary Sheet



UUT-6

DCL Test Report Number: 060413-1301

Manufacturer: Multistack, LLC

Product Line: MFW Mag Lev Flooded Chiller Line, Gen 1-5

Model Number (Old / Current): MS0132FC1 / MFW0132

Mounting: Isolated base mounted

Product Construction Summary: Painted carbon steel shell and copper tube heat exchanger.

Options / Component Summary:

Compressor: (2) Danfoss TT-300, Condenser: (1) Standard Refrigeration HSE1410 , Evaporator: (1) Standard Refrigeration FEV1610, Condenser/Evaporator Expansion Valves: (2) Carel E7V, Econimizer: (1) SWEP V200THx40, Econimizer Expansion Valves: (1) Sporlan SERI-G, Flexsys Control System: (4) Multistack Flexsys

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Tested unit	Operating Weight (lb)	Dimensions (in)			Lowest Natural Frequency (Hz)		
		Depth	Width	Height	Front-Back	Side-Side	Vertical
UUT-6	4,670	139.1	32.5	63.8	8.5	7.3	14.5

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.0	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

UUT-6 was attached to shake table interface plate with 3/8" thick neoprene pads and four (4) 3/4" diameter Grade 5 steel bolts per support frame (8 bolts total) to the test fixture.



Overall view of UUT-6

UNIT UNDER TEST (UUT) Summary Sheet



UUT-7

Test Report Name: Water Cooled Flooded OSP Test Report_R1

Manufacturer: Multistack, LLC

Product Line: MFW Mag Lev Flooded Chiller Line, Gen 1-5

Model Number (Old / Current): MS0803FC1 / MFW0803

Mounting: Rigid base mounted

Product Construction Summary: Painted carbon steel shell and copper tube heat exchanger.

Options / Component Summary:

Compressor: (1) Danfoss TT-700, (2) Danfoss VTT-1200, Condenser: (1) Standard Refrigeration HSE3210, Evaporator: (1) Standard Refrigeration FEV3210, Expansion Valves: (2) Sporlan SEHI-T, Economizer: (2) SWEP FS250-120, Economizer Expansion Valves: (2) Sporlan SERI-J, Flexsys Control System: (5) Multistack Flexsys

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Tested unit	Operating Weight (lb)	Dimensions (in)			Lowest Natural Frequency (Hz)		
		Depth	Width	Height	Front-Back	Side-Side	Vertical
UUT-7	22,300	149.0	101.0	96.0	13.0	11.8	11.2

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.0	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

UUT-7 was attached to the shake table interface plate with (16) ¾" diameter bolts to the test fixture.



Overall view of UUT-7