



**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-0150

HCAI Special Seismic Certification Preapproval (OSP)

Type: New Renewal

Manufacturer Information

Manufacturer: Multistack

Manufacturer's Technical Representative: Darrin Anderson

Mailing Address: 1065 Maple Ave, Sparta, WI 54656

Telephone: (608) 366-2411

Email: DAnderson@multistack.com

Product Information

Product Name: Chillers

Product Model Number(s): See attached

Product Category: Chillers

Product Sub-Category: Chillers - Water Cooled

General Description: Water cooled chiller modules containing condensers, evaporators, compressors, headers, controllers, line reactors, thermostatic expansion valves or electric expansion valves, actuated valves, and power control transformers.

Mounting Description: Rigid base mount or flexible base mount (neoprene pads or spring isolators)

Tested Seismic Enhancements: Seismic enhancements made to the test units and/or modifications required to address anomalies during the tests shall be incorporated into the production units.

Applicant Information

Applicant Company Name: Dynamic Certification Laboratories

Contact Person: Kelly Laplace

Mailing Address: 1315 Greg Parkway #109, Sparks, NV 89431

Telephone: (775) 358-5085

Email: Kelly@shaketest.com

Title: Business Manager





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

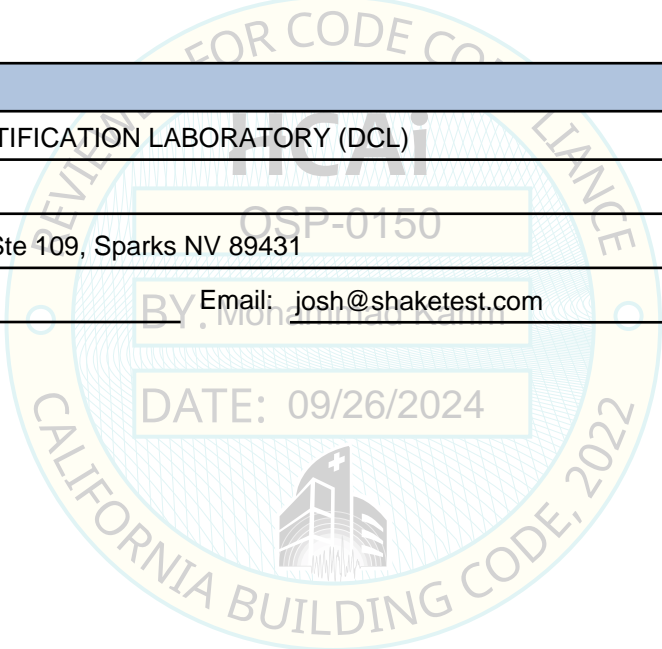
Company Name: THE VMC GROUP
Name: Kenneth Tarlow California License Number: S2851
Mailing Address: 980 9th Street, 16th Floor, Sacramento, CA 95814
Telephone: (832) 627-2214 Email: ken.tarlow@thevmcgroup.com

Certification Method

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

Testing Laboratory

Company Name: 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





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Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 1.39 (Modular – Standard, rigid) and (Centrifugal, rigid); 3.6 (Modular – Total Access, isolated w/neoprene pad); 4.5 (Modular – Total Access, isolated w/spring isolators); 0.72 (VME Modules, rigid)

SDS (Design spectral response acceleration at short period, g) = 1.93 (Water Cooled Modular Chiller – Standard) and (Water Cooled Centrifugal Chiller); 2.00 (Water Cooled Modular Chiller – Total Access); 1.00 (VME Modules, rigid)

a_p (Amplification factor) = 1.0 (rigid), 2.5 (isolated)

R_p (Response modification factor) = 2.5 (rigid or isolated w/neoprene pads), 2.0 (isolated w/spring isolators)

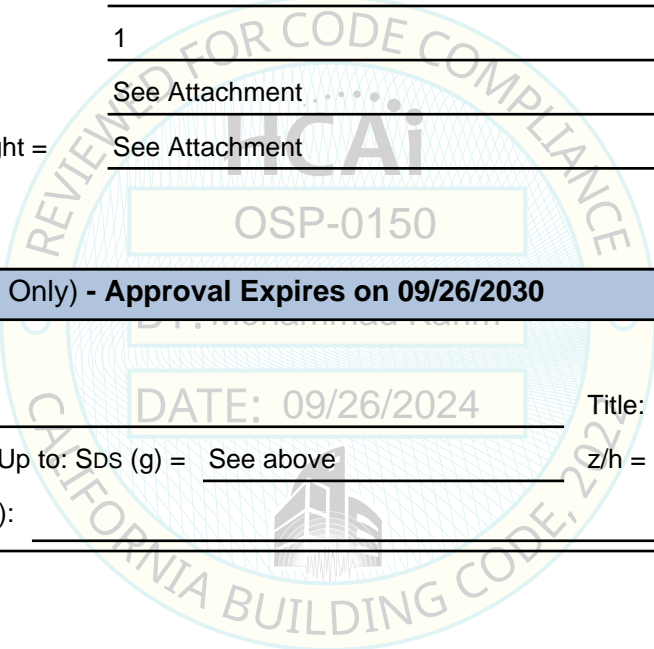
Ω_0 (System overstrength factor) = 2.0

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 09/26/2030

Date: 9/26/2024

Name: Mohammad Karim Title: Supervisor, Health Facilities

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

Condition of Approval (if applicable): _____



Special Seismic Certification
Table 1 - Certified Components - Water Cooled Modular Chiller - Standard



DCL Project Number: 05050-2401

Manufacturer: Multistack

Product Type: Water Cooled Modular Chiller - Standard

Product Line: Water Cooled Modular Chillers

Mounting Configuration: Rigid base mounted

Certification Level: Sds = 1.93g, z/h=1.0

Cabinet Type	Old Model Number	New Model Number	Construction Material	Max. Dimensions (in)			Max. Weight (lb.)	Unit							
				Depth	Width	Height									
Water Cooled Modular Chiller - Standard	MS10X N 1	MSS010XNHXFX	Powder Coated Carbon Steel	49.1	28.0	89.0	1,150	UUT1							
		MSH010XNHXFX					1,150	Interpolated							
		MSS010ZXXXXX							49.1	28.0	89.0	1,150	Interpolated		
		MSH010ZXXXXX													
	MS15X N 1	MSS015ZXXXXX					49.1	28.0	89.0	1,200	Interpolated				
		MSH015ZXXXXX													
	MS20X N 1	MSS020ZXXXXX					49.1	28.0	89.0	1,200	Interpolated				
		MSH020ZXXXXX													
	MS30X N 1	MSS030ZXXXXX					49.1	28.0	89.0	1,625	Interpolated				
		MSH030ZXXXXX													
	MS40X N 1	MSS040ZXXXXX					49.1	28.0	89.0	2,000	Interpolated				
		MSH040ZXXXXX													
	MS50X N 1	MSS050ZXXXXX					49.1	28.0	89.0	2,000	Interpolated				
		MSH050ZXXXXX													
	MS70X N 1	MSS070ZXXXXX					49.1	28.0	89.0	2,270	Interpolated				
		MSH070ZXXXXX													
		MSS070XNCXFX									49.1	28.0	89.0	2,270	UUT2
		MSH070XNCXFX													
	MS105X N 1	MSS105ZXXXXX					102.4	50.0	78.0	5,930	Interpolated				
		MSH105ZXXXXX													
		MSS105XNHXNX									102.4	50.0	78.0	5,930	UUT3
		MSH105XNHXNX													
	MS135X N 1	MSS135ZXXXXX					102.4	50.0	78.0	6,300	Interpolated				
		MSH135ZXXXXX													
MS145X N 1	MSS145ZXXXXX	102.4	50.0	78.0	6,700	Interpolated									
	MSH145ZXXXXX														
MS160X N 1 (MS165X N 1)	MSS165ZXXXXX	102.4	50.0	78.0	6,730	Interpolated									
	MSH165ZXXXXX														
	MSS165XNHXNX					102.4	50.0	78.0	6,730	UUT4					
	MSH165XNHXNX														

Special Seismic Certification

Table 2 - Nomenclature Chart - Water Cooled Modular Chiller - Standard



DCL Project Number: 05050-2401

Manufacturer: Multistack

Product Line: Water Cooled Modular Chiller

Mounting Description: Rigid Base Mount

Sample Part Number: ABCDFGH-JK

MS S 020 X N A B - C E
A B C D F G H J K

Character	Category	Allowable Value	Description	Unit
A	Product Line	MS	Branding	UUT1, UUT2, UUT3, UUT4
B ¹	Operating Condition	S	Water cooled	UUT1, UUT2, UUT3, UUT4
		H	Heat recovery	UUT1, UUT2, UUT3, UUT4
C	Nominal Capacity	010	10 Tons of refrigeration	UUT1
		015	15 Tons refrigeration	Interpolated
		020	20 Tons refrigeration	Interpolated
		030	30 Tons refrigeration	Interpolated
		040	40 Tons refrigeration	Interpolated
		050	50 Tons refrigeration	Interpolated
		070	70 Tons refrigeration	UUT2
		105	105 Tons refrigeration	UUT3
		135	135 Tons refrigeration	Interpolated
		145	145 Tons refrigeration	Interpolated
D	Refrigerant Type	X	R410A	UUT1, UUT2, UUT3, UUT4
		Y	R454B	Extrapolated
F	AHRI Certification	N	Non-Certified	UUT1, UUT2, UUT3, UUT4
		C	Certified	Branding Change Only
G	Voltage	A	208/3/60	Extrapolated
		B	24/1/60	Extrapolated
		C	575/3/60	UUT2
		D	200/3/50	Extrapolated
		E	380/3/50	Extrapolated
		F	380/3/60	Extrapolated
		G	120/1/60	Extrapolated
		H	460/3/60	UUT1, UUT3, UUT4
		I	400/3/50	Extrapolated
		J	415/3/50	Extrapolated
		K	400/3/60	Extrapolated
		L	230/3/60	Extrapolated
		M	208/1/60	Extrapolated
		N	575/1/60	Interpolated
		O	200/1/50	Extrapolated
		P	380/1/50	Extrapolated
		Q	380/1/60	Extrapolated
		R	460/1/60	Extrapolated
S	230/1/60 - Single phase	Extrapolated		
T	400/1/50	Extrapolated		
U	415/1/50	Extrapolated		
H ¹	Compressor RLA due to Condenser Application	A	Low (below 105 LCW)	UUT1, UUT2, UUT3, UUT4
		B	Medium (between 105 & 120 LCW (below 125 SCT))	UUT1, UUT2, UUT3, UUT4
		C	High (above 120 LCW (above 125 SCT))	UUT1, UUT2, UUT3, UUT4
		D	Low / Extended	Same as tested
		E	Medium / Extended	Same as tested
		F	High / Extended	Same as tested
J	Frame Size	F	28"	UUT1, UUT2
		H	32"	Interpolated
		J	34"	Interpolated
		N	50"	UUT3, UUT4
K ²	Configuration/ Module Type	A	Standard/ Single	UUT1, UUT2, UUT3, UUT4
		B	Standard/ Multiple (busbar)	Same as tested
		C	Standard/ Multiple (wire whips)	Same as tested
		D	Standard Conduit Raceway/ Multiple (wire whips)	Same as tested

Notes:

1. Characters B and H are based on software changes only.
2. Character K configuration refers how power is distributed to and between the units, no change to units.

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Table 3 - Certified Components - Water Cooled Modular Chiller - Total Access



DCL Project Number: 05050-2401

Manufacturer: Multistack

Product Type: Water Cooled Modular Chiller - Total Access

Product Line: Water Cooled Modular Chillers

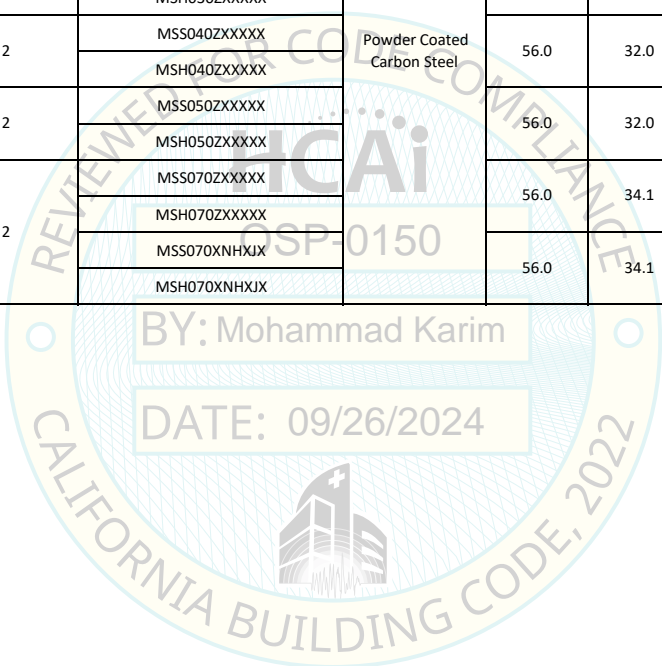
Mounting Configuration: Flexible base mounted (neoprene pads or spring isolators)

Certification Level: Sds = 2.0g, z/h=1.0

Cabinet Type	Old Model Number	New Model Number	Construction Material	Max. Dimensions (in)			Max. Weight (lb.)	Unit
				Depth	Width	Height		
Water Cooled Modular Chiller - Total Access	MS20X N 2	MSS020XNAXHX	Powder Coated Carbon Steel	56.0	32.0	64.0	1,300	UUT8
		MSH020XNAXHX						
		MSS020ZXXXXX						
		MSH020ZXXXXX						
	MS30X N 2	MSS030ZXXXXX		56.0	32.0	64.0	1,740	Interpolated
		MSH030ZXXXXX						
	MS40X N 2	MSS040ZXXXXX		56.0	32.0	66.0	2,100	Interpolated
		MSH040ZXXXXX						
	MS50X N 2	MSS050ZXXXXX		56.0	32.0	66.0	2,100	Interpolated
		MSH050ZXXXXX						
	MS70X N 2	MSS070ZXXXXX		56.0	34.1	66.0	2,750	Interpolated
		MSH070ZXXXXX						
MSS070XNHXJX		UUT9						
MSH070XNHXJX								

BY: Mohammad Karim

DATE: 09/26/2024



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Table 4 - Nomenclature Chart - Water Cooled Modular Chiller -

Total Access

DCL Project Number: 05050-2401



Manufacturer: Multistack

Product Line: Water Cooled Modular Chiller

Mounting Description: Flexible Base Mount

Sample Part Number: ASCDFGB-JK

MS S 020 X N A B - C E
A S C D F G B J K

Character	Category	Allowable Value	Description	Unit
A	Product Line	MS	Branding	UUT8, UUT9
S ¹	Operating Condition	S	Water cooled	UUT8, UUT9
		H	Heat recovery	UUT8, UUT9
		020	20 Tons refrigeration	UUT8
C	Nominal Capacity	030	30 Tons refrigeration	Interpolated
		040	40 Tons refrigeration	Interpolated
		050	50 Tons refrigeration	Interpolated
		070	70 Tons refrigeration	UUT9
D	Refrigerant Type	X	R410A	UUT8, UUT9
		K	R454B	Extrapolated
F	AHRI Certification	N	Non-Certified	UUT8, UUT9
		C	Certified	Branding Change Only
G	Voltage	A	208/3/60	UUT8
		B	24/1/60	Extrapolated
		C	575/3/60	Extrapolated
		D	200/3/50	Extrapolated
		E	380/3/50	Interpolated
		F	380/3/60	Interpolated
		G	120/1/60	Extrapolated
		H	460/3/60	UUT9
		I	400/3/50	Interpolated
		J	415/3/50	Interpolated
		K	400/3/60	Interpolated
		L	230/3/60	Interpolated
		M	208/1/60	Extrapolated
		N	575/1/60	Extrapolated
		O	200/1/50	Extrapolated
		P	380/1/50	Interpolated
		Q	380/1/60	Interpolated
		R	460/1/60	Interpolated
S	230/1/60 - Single phase	Interpolated		
T	400/1/50	Interpolated		
U	415/1/50	Interpolated		
B ¹	Compressor RLA due to Condenser Application	A	Low (below 105 LCW)	UUT8, UUT9
		B	Medium (between 105 & 120 LCW (below 125 SCT))	UUT8, UUT9
		C	High (above 120 LCW (above 125 SCT))	UUT8, UUT9
		D	Low / Extended	Same as tested
		E	Medium / Extended	Same as tested
		F	High / Extended	Same as tested
J	Frame Size	H	32"	UUT8
		J	34"	UUT9
K ²	Configuration/ Module Type	E	Total Access/ Single	UUT8, UUT9
		F	Total Access/ Multiple (busbar)	Extrapolated
		G	Total Access/ Multiple (wire whips)	Extrapolated
		H	Total Access Conduit Raceway/ Multiple (wire whips)	Extrapolated

Notes:

- Character S and B are based on software changes only.
- Character K configuration refers how power is distributed to and between the units, no change to units.

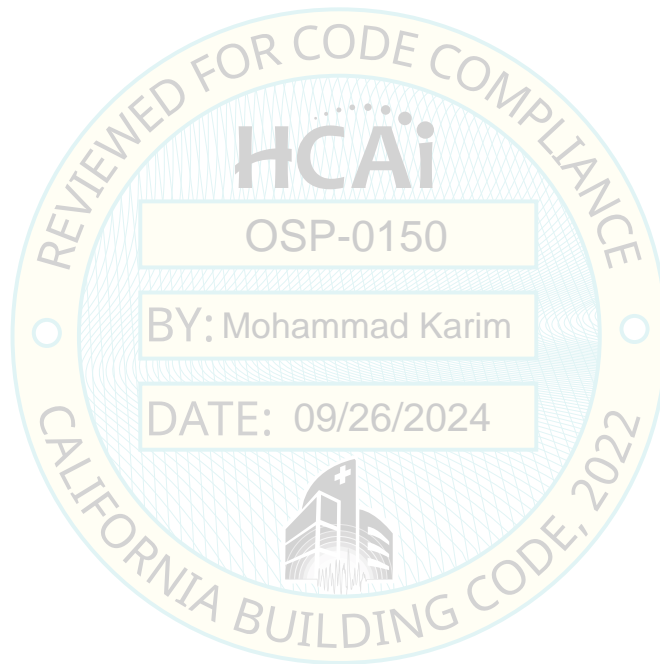
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Table 5 - Certified Components - Water Cooled Centrifugal Chiller and VME Modules



DCL Project Number: 05050-2401

Manufacturer: Multistack
 Product Type: Water Cooled Centrifugal Chiller
 Product Line: Water Cooled Modular Chillers
 Mounting Configuration: Rigid base mounted
 Certification Level: Sds = 1.93g, z/h=1.0

Cabinet Type	Model Number	Construction Material	Max. Dimensions (in)			Max. Weight (lb.)	Unit
			Depth	Width	Height		
Water Cooled Centrifugal Chiller	MS80T	Powder-coated carbon steel	66.0	35.0	60.5	2,520	UUT5



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Table 6 - Certified Components - VME Modules



DCL Project Number: 05050-2401

Manufacturer: Multistack

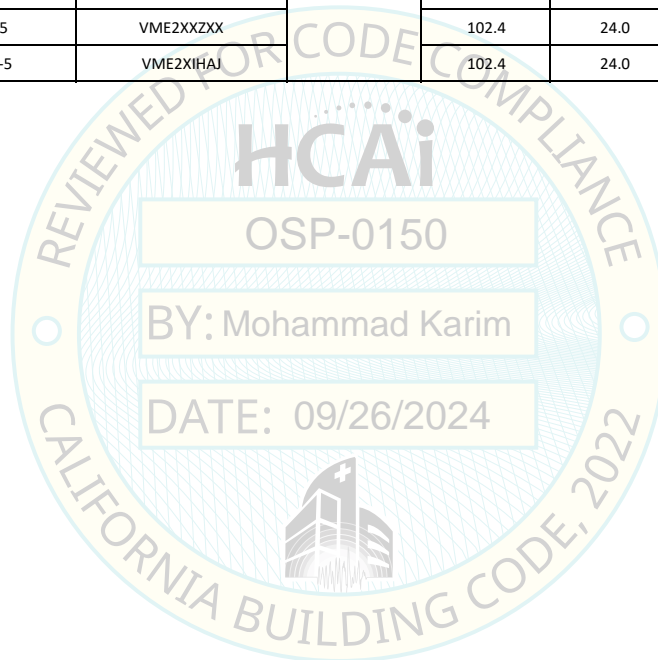
Product Type: VME Modules

Product Line: Water Cooled Modular Chillers

Mounting Configuration: Rigid base mounted

Certification Level: Sds = 1.0g, z/h=1.0

Cabinet Type	Old Model Number	New Model Number	Construction Material	Max. Dimensions (in)			Max. Weight (lb.)	Unit
				Depth	Width	Height		
VME Modules	VME1H4-5	VME1XHAA	Powder-coated carbon steel	76.6	14.0	64.0	310	UUT6
	VME2H4-5	VME2XXZXX		76.6	14.0	64.0	370	Interpolated
	VME1H6-5	VME1XXZXX		76.6	14.0	64.0	460	Interpolated
	VME2H6-2	VME2XXZXX		56.0	14.0	64.0	700	Interpolated
	VME2H6-5	VME2XXZXX		76.6	14.0	64.0	720	Interpolated
	VME1H8-5	VME1XXZXX		76.6	18.0	64.0	920	Interpolated
	VME2H8-5	VME2XXZXX		102.4	24.0	80.0	1,850	Interpolated
	VME2H10-5	VME2XHAA		102.4	24.0	80.0	2,120	UUT7



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Table 7 - Nomenclature Chart - VME (Virtual Movable Endcap)



DCL Project No.: 05050-2401

Manufacturer: Multistack

Product Line: VME (Virtual Movable Endcap)

Mounting Description: Rigid Base Mount

Sample Part Number: ACBFVHK

VME 1 H A I H A
A C B F V H K

Character	Category	Allowable Value	Description	Unit
A	Product Line	VME	Branding	UUT-06 and UUT-07
C	Version	1	Reversing Valves	UUT-06
		2	Non-Reversing Valves	UUT-07
B ¹	Air/Water Cooled	A	Water Cooled - Dual - 10 - 70	UUT6 and UUT7
		B	Water Cooled - Dual 85	UUT6 and UUT7
		C	Water Cooled - Quad	UUT6 and UUT7
		D	Water Cooled - Screw 90	UUT6 and UUT7
		E	Water Cooled -Screw - 125-145	UUT6 and UUT7
		F	Air Cooled	UUT6 and UUT7
F	Frame Configuration	C	Total Access	Extrapolated
		I	Both Extended Headers	UUT6 and UUT7
V ²	Voltage	A	208/3/60	Extrapolated
		B	24/1/60	Extrapolated
		C	575/3/60	Extrapolated
		D	200/3/50	Extrapolated
		E	380/3/50	Extrapolated
		F	380/3/60	Extrapolated
		G	120/1/60	Extrapolated
		H	460/3/60	UUT6 and UUT7
		I	400/3/50	Extrapolated
		J	415/3/50	Extrapolated
		K	400/60/3	Extrapolated
		L	230/3/60	Extrapolated
		M	208/1/60	Extrapolated
		N	575/1/60	Extrapolated
		O	200/1/50	Extrapolated
		P	3801/50	Extrapolated
		Q	380/1/60	Extrapolated
R	460/1/60	Extrapolated		
S	220/230/1/60	Extrapolated		
T	400/1/50	Extrapolated		
U	415/1/50	Extrapolated		

Continued on next page

Special Seismic Certification

Table 7 - Nomenclature Chart - VME (Virtual Movable Endcap) Continued



DCL Project No.: 05050-2401

Manufacturer: Multistack

Product Line: VME (Virtual Movable Endcap)

Mounting Description: Rigid Base Mount

Sample Part Number: ACBFVHK

VME 1 H A I H A
A C B F V H K

Character	Category	Allowable Value	Description	Unit
H	Cabinetry/ Fasteners/ Coating Material	A	Galvanneal/Standard/Power Coating	UUT6 and UUT7
		B	Galvanneal/Standard/PSX 700	Same as tested
		C	Standard/Special Paint	Same as tested
		D	Galvanneal/Standard/None	Same as tested
		E	Galvanneal/Stainless/Power Coating	Same as tested
		F	Galvanneal/Stainless/PSX 700	Same as tested
		G	Standard with SS Hardware/Special Paint	Same as tested
		H	Galvanneal/Stainless/None	Same as tested
		I	304 Stainless/Stainless/Power Coating	Interpolated
		J	304 Stainless/Stainless/PSX 700	Interpolated
		K	Stainless 304 with SS Hardware/Special Paint	Interpolated
		L	304 Stainless/Stainless/None	Interpolated
		M	316 Stainless/Stainless/Power Coating	Interpolated
		N	316 Stainless/Stainless/PSX 700	Interpolated
		O	Stainless 316 with SS Hardware/Special Paint	Interpolated
		P	316 Stainless/Stainless/None	Interpolated
K	Size/ Inlet Material/ Outlet Material	A	4"/Carbon Steel/Carbon Steel	UUT6
		B	4"/304 SS/Carbon Steel	Interpolated
		C	4"/304 SS/304	Interpolated
		D	6"/Carbon Steel/Carbon Steel	Interpolated
		E	6"/304 SS/Carbon Steel	Interpolated
		F	6"/304 SS/304 SS	Interpolated
		G	8"/Carbon Steel steel/Carbon Steel	Interpolated
		H	8"/304 SS/Carbon Steel	Interpolated
		I	8"/304 SS/304 SS	Interpolated
		J	10"/Carbon Steel steel/Carbon Steel	UUT7
		K	10"/304 SS/Carbon Steel	Extrapolated
		L	10"/304 SS/304 SS	Extrapolated
		M	12"/Carbon Steel/Carbon Steel	Extrapolated
		N	12"/304 SS/Carbon Steel	Extrapolated
		O	12"/304 SS/304 SS	Extrapolated
		P	Other/Carbon Steel/Carbon Steel	Extrapolated
		Q	Other/304 SS/Carbon Steel	Extrapolated
R	Other/304/304	Extrapolated		

Special Seismic Certification
Table 8 - Certified Subcomponents - Water Cooled Modular Chiller
- Standard



DCL Project Number: 05050-2401

Certification Level: Sds = 1.93g, z/h=1.0

Model Number	Manufacturer	Description	Material	Weight (lb)	Unit		
Condensers							
DB300x38	SWEP	Brazed Plate Heat Exchanger	Stainless Steel	48	Extrapolated		
DB200x94				103	UUT1		
DB200x134				138	Interpolated		
DP700x266				396	UUT3		
DP700x326				477	Interpolated		
DP700x362				535	UUT4		
Evaporators							
DP300x34	SWEP	Brazed Plate Heat Exchanger	Stainless Steel	46	Extrapolated		
DP200x62				77	UUT1		
DP200x94				107	Interpolated		
DP700x214				326	UUT3		
DP700x266				396	Interpolated		
DP700x280				414	Interpolated		
DP700x362				535	UUT4		
Compressors¹							
ZP61K5E	Emerson Climate Technologies/ Copeland	6 HP	Carbon Steel	77	UUT1		
ZR67KCE				88	Interpolated		
ZP104KCE				106	Interpolated		
ZR108KCE				9 HP	132	Interpolated	
ZP103KCE					134	Interpolated	
YA104K1E				113	Interpolated		
ZP122KCE				10 HP	108	Interpolated	
ZP120KCE					135	Interpolated	
ZR125KCE				135	Interpolated		
YA122K1E				15 HP	113	Interpolated	
ZP182KCE					146	Interpolated	
ZR190KCE				25 HP	146	Interpolated	
YA182K1E					148	Interpolated	
ZP296KCE				32 HP	293	Interpolated	
ZP296KWE					296	Interpolated	
ZP295KCE					353	Interpolated	
ZR300KCE					406	Interpolated	
YA275K1E					202	Interpolated	
ZR380KCE					390	Interpolated	
ZP385KCE					390	UUT2	
ZP385KWE					400	Interpolated	
YA360K1E					390	Interpolated	
YA1360K1E					390	Interpolated	
ZPT592					50 HP	631	Interpolated
ZPT590KCE						752	UUT3
ZRT600KCE				864		Interpolated	
YAT550K1E				449		Interpolated	
ZPT770KCE				64 HP	826	Interpolated	
ZRT760KCE					826	Interpolated	
YAT720K1E					825	Interpolated	
ZPU870KCE					878	Interpolated	
YAT920K1E				80 HP	883	Interpolated	
ZPT970KCE	932	UUT4					

Notes:

1. Compressors whose part numbers begin with ZP contain R-410A refrigerant, those beginning with ZR contain R-134a or R-407c refrigerant, and part numbers begin with YA contain R-454B. Except for liquid type, the listed compressors for each module are identical.

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Table 8 - Certified Subcomponents - Water Cooled Modular Chiller - Standard (Continued)



DCL Project Number: 05050-2401

Certification Level: SDS = 1.93g, z/h=1.0

Model Number	Manufacturer	Description	Material	Weight (lb)	Unit		
Heaters							
1000-3926	USEMCO	6 inches	Carbon Steel	47	UUT1		
1000-3927				47	UUT1		
1000-3978				47	Interpolated		
1000-3979				47	Interpolated		
1000-2315-41A				50	UUT2		
1000-2311-41B				52	UUT2		
1000-4484				55	Interpolated		
1000-4485				55	Interpolated		
1000-6447				10 inches	175	Interpolated	
1000-6448					175	Interpolated	
1000-5332				12 inches	230	UUT3, UUT4	
1000-5333					230	UUT3, UUT4	
1000-2315-41ASS				6 inches	Stainless Steel	50	UUT2
1000-2311-41BSS						52	UUT2
1000-6447SS		175	Interpolated				
1000-6448SS		175	Interpolated				
1000-5332-SS		230	UUT3, UUT4				
1000-5333-SS		230	UUT3, UUT4				
Controllers							
cPCO	Carel	Controllers	Plastic, Electronics	2	Same as Tested		
pCO5				2	UUT3, UUT4		
Expansion Valves							
ERZE-4	Sporlan	4 Ton Valve	Brass, Carbon Steel	1	UUT1		
ERZE-6		6 Ton Valve		1	Interpolated		
ERZE-8		8 Ton Valve		1	Interpolated		
ERZE-12.5		12.5 Ton Valve		1	Interpolated		
BBIZE-15		15 Ton Valve		2	Interpolated		
OZE-20		20 Ton Valve		2	Interpolated		
OZE-25		25 Ton Valve		2	Interpolated		
OZE-35		35 Ton Valve		2	UUT2		
OZE-50		50 Ton Valve		4	Extrapolated ¹		
OZE-60		60 Ton Valve		4	Extrapolated ¹		
SER-C	Sporlan	2-10 Ton Valve	Carbon Steel, Brass, Copper	1	Extrapolated		
SER-D		8-15 Ton Valve		1	Extrapolated		
SERI-G		15-20 Ton Valve		1	Extrapolated		
SERI-J		20-30 Ton Valve		1	Extrapolated		
SERI-K		85 Ton Valve		1	UUT3, UUT4		

Notes:

1. Extrapolated valves are identical in construction and similar in weight (within 2 lb) to the OZE-20 to 35 ton valves.

Special Seismic Certification

Table 9 - Certified Subcomponents - Water Cooled Modular Chiller -

Total Access



DCL Project Number: 05050-2401

Certification Level: Sds = 2.00g, z/h=1.0

Model Number	Manufacturer	Description	Material	Weight (lb)	Unit			
Condensers								
DB300x78	SWEP	Brazen Plate Heat Exchanger	Stainless Steel	78	UUT8			
DB300x106				98	Interpolated			
DB400x118				195	Interpolated			
DBD400Hx182				306	UUT9			
Evaporators								
DP300x58	SWEP	Brazen Plate Heat Exchanger	Stainless Steel	64	UUT8			
DP300x82				83	Interpolated			
DP400x98				172	Interpolated			
DP400x130				218	UUT9			
Compressors¹								
ZP122KCE	Emerson Climate Technologies/ Copeland	10 HP	Carbon Steel	108	UUT8			
ZP182KCE		15 HP		146	Interpolated			
ZR190KCE				146	Interpolated			
ZP296KCE		25 HP		293	Interpolated			
ZP296KWE				296	Interpolated			
ZP295KCE				353	Interpolated			
ZR300KCE		32 HP		390	Interpolated			
ZR380KCE				390	Interpolated			
ZP385KCE				390	Interpolated			
ZP385KWE		400		UUT9				
Headers								
1000-7319	USEMCO	6 inch	Carbon Steel	52	UUT8			
1000-7320				54	UUT8			
1000-5505				60	UUT9			
1000-5506				60	UUT9			
1000-3978-SS				47	Extrapolated			
1000-3979-SS				47	Extrapolated			
1000-7319-SS			Stainless Steel	52	UUT8			
1000-7320-SS				54	UUT8			
1000-4484-SS				55	Extrapolated			
1000-4485-SS				55	Extrapolated			
1000-5505-SS				60	UUT9			
1000-5506-SS				60	UUT9			
Controller								
pCO3				Carel	Controller	Plastic, Electronics	1.5	UUT8, UUT9
Actuated Valve								
GRB24-MFT	Belimo	2-3 inch Valve	Carbon Steel	16	UUT8/UUT9			

Notes:

1. Compressors whose part numbers begin with ZP contain R-410A refrigerant and those beginning with ZR contain R-134a or R-407c refrigerant. The heavier refrigerant was tested. Except for liquid type, the listed compressors for each module are identical.

Special Seismic Certification

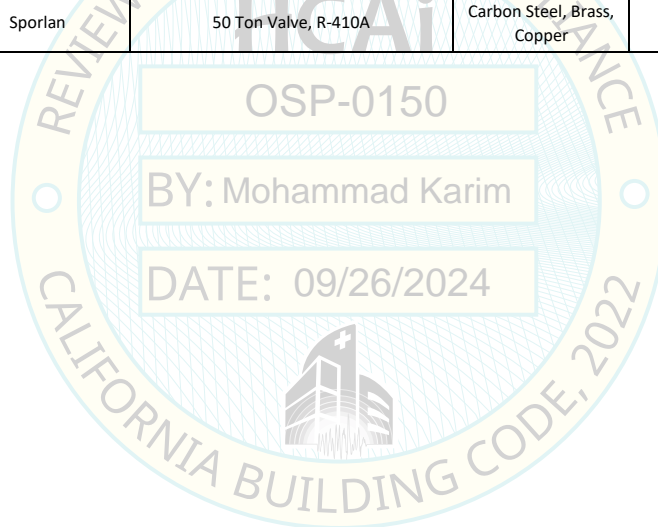
Table 10 - Certified Subcomponents - Water Cooled Centrifugal Chiller



DCL Project Number: 05050-2401

Certification Level: SDS = 1.93g, z/h=1.0

Model Number	Manufacturer	Description	Material	Weight (lb)	Unit
Evaporator					
S400Tx220	SWEP	Brazed Plate Heat Exchanger	Stainless Steel	384	UUT5
Condenser					
B400Tx240	SWEP	Brazed Plate Heat Exchanger	Stainless Steel	383	UUT5
Compressor					
TT350-G61HL	Danfoss Turbocor	300 to 400 kW Nominal Capacity	Carbon Steel	265	UUT5
Headers					
C1000-2087-41	USEMCO	8"	Carbon Steel	80	UUT5
1000-2752-41B				80	UUT5
2088-41SS			Stainless Steel	80	UUT5
1000-2756-41ASS				80	UUT5
Controller					
pCO1	Carel	Controllers	Plastic, Electronics	1	UUT5
Line Reactor					
KDRG3H	TCI	Line Reactor	Iron, Copper	55	UUT5
Electric Expansion Valve					
SEI-50	Sporlan	50 Ton Valve, R-410A	Carbon Steel, Brass, Copper	1	UUT5



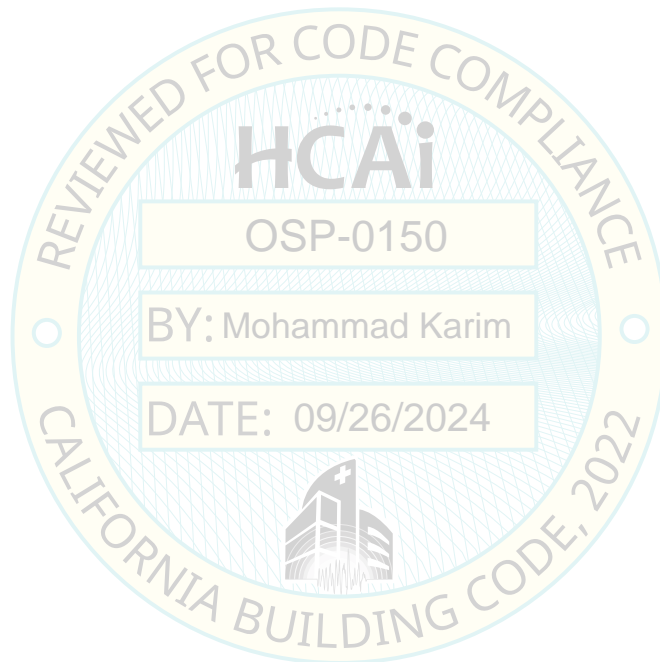
Special Seismic Certification
Table 11 - Certified Subcomponents - VME Modules



DCL Project Number: 05050-2401

Certification Level: Sds = 1.00g, z/h=1.0

Model Number	Manufacturer	Description	Material	Weight (lb)	Unit
Actuated Valves					
SY1-24	Belimo	2"-3" Valve	Carbon Steel	16	Extrapolated
SY2-24		4" Valve		47	UUT6
SY3-24		6" Valve		56	Interpolated
SY4-24		8" Valve		64	Interpolated
SY5-24		10" Valve		81	UUT7
Power Control Transformers					
B250-0086-1	Micron	Multitap 250 VA Transformer	Iron, Copper	10	UUT6
B500-2266-GAF		Multitap 500 VA Transformer		21	UUT7



Special Seismic Certification
Table 12 - Tested Units



DCL Project Number: 05050-2401

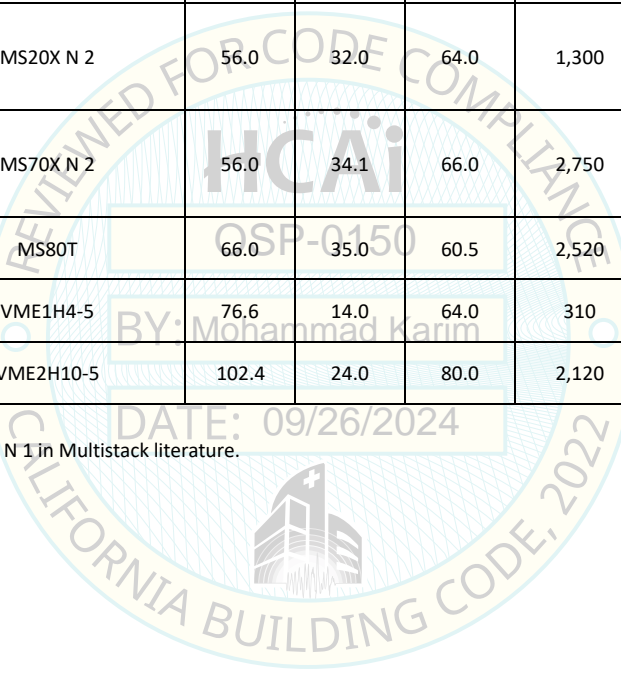
Manufacturer: Multistack

Product Line: Water Cooled Modular Chillers

Cabinet Type	Model Numbers	Dimensions (in)			Weight (lb.)	Mounting Configuration	Sds (g) z/h=1	Unit
		Depth	Width	Height				
Water Cooled Modular Chiller - Standard	MS10X N 1	49.1	28.0	89.0	1,150	Rigid Base Mounted	1.93	UUT1
Water Cooled Modular Chiller - Standard	MS70X N 1	49.1	28.0	89.0	2,270		1.93	UUT2
Water Cooled Modular Chiller - Standard	MS105X N 1	102.4	50.0	78.0	5,930		1.93	UUT3
Water Cooled Modular Chiller - Standard	MS160X N 1 (MS165X N 1) ¹	102.4	50.0	78.0	6,730		1.93	UUT4
Water Cooled Modular Chiller - Total Access	MS20X N 2	56.0	32.0	64.0	1,300	Flexible Base Mounted (neoprene pads)	2.00	UUT8
Water Cooled Modular Chiller - Total Access	MS70X N 2	56.0	34.1	66.0	2,750	Flexible Base Mounted (spring isolators)	2.00	UUT9
Water Cooled Centrifugal Chiller	MS80T	66.0	35.0	60.5	2,520	Rigid Base Mounted	1.93	UUT5
VME Modules	VME1H4-5	76.6	14.0	64.0	310		1.00	UUT6
VME Modules	VME2H10-5	102.4	24.0	80.0	2,120		1.00	UUT7

Notes:

1. The MS160X N 1 is called the MS165X N 1 in Multistack literature.



UNIT UNDER TEST (UUT) Summary Sheet



UUT1

DCL Test Report Number: 91410-1001

Manufacturer: Multistack

Product Line: Water Cooled Modular Chillers

Old Model Number: MS10X N 1

New Model Number: MSS010XNHXFX / MSH010XNHXFX

Mounting: Rigid Base Mount

Product Construction Summary: Powder Coated Carbon Steel Frame

Options / Component Summary:

460V, R-410A refrigerant, condenser, evaporator, compressor, headers, controller and expansion valves

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

UUT Properties

Operating Weight (lb)	Dimensions (inches)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,150	49.1	28.0	89.0	11.0	13.3	>33.3

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	1.93	1.0	1.5	3.09	3.32	1.29	0.51

Unit Mounting Description:

The unit was mounted to the DCL shake table interface plate with (6) 1/2" diameter A307 bolts, (3) bolts on each long side of the unit spaced approximately 22 1/2" on center.



Overall view of UUT1

UNIT UNDER TEST (UUT) Summary Sheet



UUT2

DCL Test Report Number: 91410-1001

Manufacturer: Multistack

Product Line: Water Cooled Modular Chillers

Old Model Number: MS70X N 1

New Model Number: MSS070XNCXFX / MSH070XNCXFX

Mounting: Rigid Base Mount

Product Construction Summary: Powder Coated Carbon Steel Frame

Options / Component Summary:

575V, R-410a refrigerant, condenser, evaporator, compressor, headers, controller and expansion valves

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural

UUT Properties

Operating Weight (lb)	Dimensions (inches)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
2,270	49.1	28.0	89.0	4.3	11.0	>33.3

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	1.93	1.0	1.5	3.09	2.32	1.29	0.51

Unit Mounting Description:

The unit was mounted to the DCL shake table interface plate with (6) 1/2" diameter A307 bolts, (3) bolts on each long side of the unit spaced approximately 22 1/2" on center.



Overall view of UUT2

UNIT UNDER TEST (UUT) Summary Sheet



UUT3

DCL Test Report Number: 91410-1001

Manufacturer: Multistack

Product Line: Water Cooled Modular Chillers

Old Model Number: MS105X N 1

New Model Number: MSS105XNHXNX / MSH105XNHXNX

Mounting: Rigid Base Mount

Product Construction Summary: Powder Coated Carbon Steel Frame

Options / Component Summary:

460V, R-410a refrigerant, condenser, evaporator, compressor, headers, controller and expansion valves

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

UUT Properties

Operating Weight (lb)	Dimensions (inches)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
5,930	102.4	50.0	78.0	4.5	6.6	19.0

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 2019	ICC-ES AC156	1.93	1.0	1.5	3.09	2.32	1.29	0.51

Unit Mounting Description:

The unit was mounted to the DCL shake table interface frame with (6) 3/4" diameter A307 bolts, (3) bolts on each long side of the unit spaced approximately 47" on center.



Overall view of UUT-03

UNIT UNDER TEST (UUT) Summary Sheet



UUT4

DCL Test Report Number: 91410-1001

Manufacturer: Multistack

Product Line: Water Cooled Modular Chillers

Old Model Number: MS160X N 1

New Model Number: MSS165XNHXNX / MSH165XNHXNX

Mounting: Rigid Base Mount

Product Construction Summary: Powder Coated Carbon Steel Frame

Options / Component Summary:

460V, R-410A refrigerant, condenser, evaporator, compressor, headers, controller and expansion valves

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural

UUT Properties

Operating Weight (lb)	Dimensions (inches)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
6,730	102.4	50.0	78.0	5.2	7.2	20.4

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	1.93	1.0	1.5	3.09	2.32	1.29	0.51

Unit Mounting Description:

The unit was mounted to the DCL shake table interface frame with (6) 3/4" diameter A307 bolts, (3) bolts on each long side of the unit spaced approximately 47" on center.



Overall view of UUT4

UNIT UNDER TEST (UUT) Summary Sheet



UUT8

DCL Test Report Number: 10201-1601

Manufacturer: Multistack

Product Line: Water Cooled Modular Chillers

Old Model Number: MS20X N 2

New Model Number: MSS020XNAXHX / MSH020XNAXHX

Mounting: Flexible Base Mount (with neoprene pads)

Product Construction Summary: Powder Coated Carbon Steel Frame

Options / Component Summary:

460V, condenser, evaporator, 10 HP compressor, 6" headers, pC03 controller, 2-3" actuated valve

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

UUT Properties

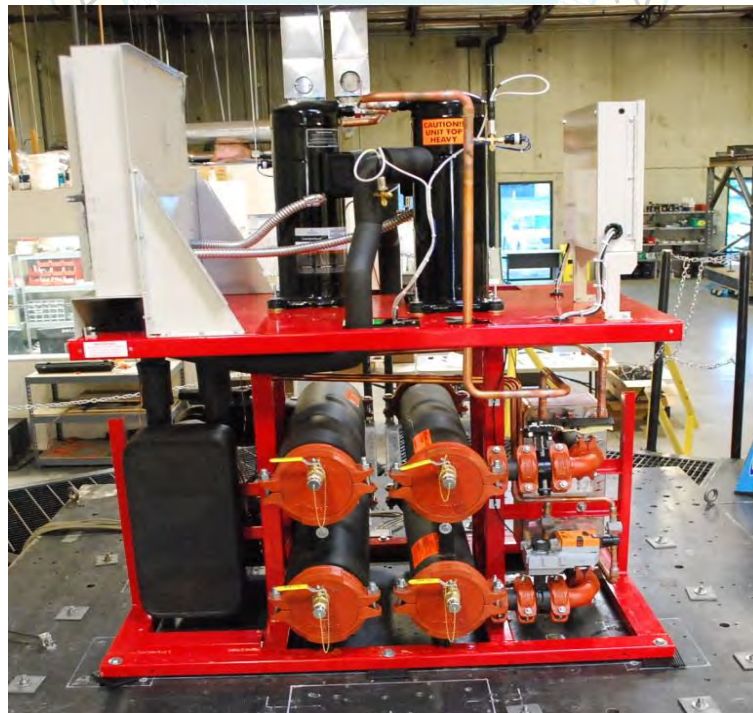
Operating Weight (lb)	Dimensions (inches)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,300	56.0	32.0	64.0	6.0	6.0	23.0

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	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

The unit was flexibly base mounted with (6) 3/8" thick, 4"x4" rubber pads (Bramec model 6434) and (6) 1/2" diameter Grade 5 bolts, (3) bolts on each long side of the unit spaced approximately 26" on center.



Overall view of UUT8

UNIT UNDER TEST (UUT) Summary Sheet



UUT9

DCL Test Report Number: 10201-1601

Manufacturer: Multistack

Product Line: Water Cooled Modular Chillers

Old Model Number: MS70X N 2

New Model Number: MSS070XNHXJX / MSH070XNHXJX

Mounting: Flexible Base Mount (with spring isolators)

Product Construction Summary: Powder Coated Carbon Steel Frame

Options / Component Summary:

460V, condenser, evaporator, 32 HP compressor, 6" headers, pC03 controller, 2-3" actuated valve

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

UUT Properties

Operating Weight (lb)	Dimensions (inches)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
2,750	56.0	34.0	66.0	4.0	3.0	12.0

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	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

The unit arrived at DCL pre-mounted to a steel lifting frame with four 1/2" diameter Grade 5 bolts. The lifting frame was attached to four isolators (VMC model MSH-1E-825N) with one 5/8" diameter Grade 5 bolt per isolator. Each isolator was attached to the shake table interface plate with four 1/2" diameter Grade 5 bolts.



Overall view of UUT9

UNIT UNDER TEST (UUT) Summary Sheet



UUT5

DCL Test Report Number: 91410-1001

Manufacturer: Multistack

Product Line: Water Cooled Modular Chillers

Model Number: MS80T

Mounting: Rigid Base Mount

Product Construction Summary: Powder Coated Carbon Steel Frame

Options / Component Summary:

460V, R-410A refrigerant, condenser, evaporator, compressor, headers, controller and expansion valves

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

UUT Properties

Operating Weight (lb)	Dimensions (inches)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
2,520	66.0	35.0	60.5	6.9	20.7	>33.3

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	1.93	1.0	1.5	3.09	2.32	1.29	0.51

Unit Mounting Description:

The unit was mounted to the DCL shake table interface plate with six 5/8" diameter A307 bolts, (3) bolts on each long side of the unit spaced approximately 30" on center.



Overall view of UUT5

UNIT UNDER TEST (UUT) Summary Sheet



UUT6

DCL Test Report Number: 91001-1201b

Manufacturer: Multistack

Product Line: Water Cooled Modular Chillers

Model Number: VME1H4-5

Mounting: Rigid Base Mount

Product Construction Summary: Powder Coated Carbon Steel Frame

Options / Component Summary:

460V, VME 1 with two 4-inch diameter valves, 250VA transformer and controller

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

UUT Properties

Operating Weight (lb)	Dimensions (inches)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
310	76.6	14.0	64.0	5.8	5.5	13.3

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	1.00	1.0	1.5	1.60	1.20	0.67	0.27

Unit Mounting Description:

The unit was mounted to the DCL shake table interface plate with (6) 3/8" diameter Grade 5 bolts, (3) bolts on each long side of the unit spaced approximately 20" on center.



Overall view of UUT6

UNIT UNDER TEST (UUT) Summary Sheet

UUT7

DCL Test Report Number: 91001-1201b

Manufacturer: Multistack

Product Line: Water Cooled Modular Chillers

Model Number: VME2H10-5

Mounting: Rigid Base Mount

Product Construction Summary: Powder Coated Carbon Steel Frame

Options / Component Summary:

460V, VME 2 with four 10-inch diameter valves, 500VA transformer and controller

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

Operating Weight (lb)	Dimensions (inches)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
2,120	102.4	24.0	80.0	5.3	3.0	28.0

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	1.00	1.0	1.5	1.60	1.20	0.67	0.27

Unit Mounting Description:

The unit was mounted to the DCL shake table interface frame with (4) 1/2" diameter Grade 5 bolts, (2) bolts on each long side of the unit spaced approximately 93" on center.



Overall view of UUT7