



**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION**

**APPLICATION FOR OSHPD SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)**

OFFICE USE ONLY

APPLICATION #: **OSP – 0150 – 10**

OSHPD Special Seismic Certification Preapproval (OSP)

Type: New Renewal

Manufacturer Information

Manufacturer: Multistack

Manufacturer's Technical Representative: Rachel Bible

Mailing Address: 1065 Maple Avenue, Sparta, WI 54656

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

Product Information

Product Name: Water Cooled Chiller Modules

Product Type: Chillers

Product Model Number: See Attachments

(List all unique product identification numbers and/or part numbers)

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. Seismic enhancements made to the test units and modifications required to address anomalies observed during the tests shall be incorporated into the production units.

Mounting Description: Rigid base mount

Applicant Information

Applicant Company Name: DYNAMIC CERTIFICATION LABORATORIES

Contact Person: JOSEPH L. LABRIE, S.E., PRESIDENT / CEO

Mailing Address: 1315 GREG STREET, SUITE 109, SPARKS, NV 89431

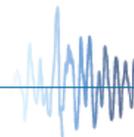
Telephone: (775) 358-5085 Email: LABRIE@MAKEITRIGHT.NET

I hereby agree to reimburse the Office of Statewide Health Planning and Development review fees in accordance with the California Administrative Code, 2013.

Signature of Applicant:  Date: 6/10/13

Title: PRESIDENT / CEO Company Name: DYNAMIC CERTIFICATION LABORATORIES

"Access to Safe, Quality Healthcare Environments that Meet California's Diverse and Dvnamic Needs"





**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION**

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

Company Name: DYNAMIC CERTIFICATION LABORATORIES

Name: DR. AHMAD ITANI, S.E. California License Number: SE-5220

Mailing Address: 1315 GREG STREET, SUITE 109, SPARKS, NV 89431

Telephone: (775) 358-5085 Email: ITANI@SHAKETEST.COM

Supports and Attachments Preapproval

- Supports and attachments are preapproved under OPM- _____
(Separate application for OSHPD Preapproval of Manufacturer's Certification (OPM) of Supports and attachments is required)
- Supports and attachments are not preapproved

Certification Method

- Testing in accordance with: ICC-ES AC156
- Other (Please Specify): _____

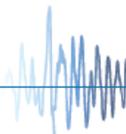
Testing Laboratory

Company Name: DYNAMIC CERTIFICATION LABORATORIES

Contact Name: AUSTIN BROWN, P.E., LABORATORY MANAGER

Mailing Address: 1315 GREG STREET, SUITE 109, SPARKS, NV 89431

Telephone: (775) 358-5085 Email: AUSTIN@SHAKETEST.COM





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Seismic Parameters

Design in accordance with ASCE 7-10 Chapter 13: Yes No

Design Basis of Equipment or Components (F_p/W_p) = 1.39 (S_{DS} 1.93); 0.72 (S_{DS} 1.00)

S_{DS} (Design spectral response acceleration at short period, g) = 1.93 (MS modules); 1.00 (VME modules)

a_p (In-structure equipment or component amplification factor) = 1.0

R_p (Equipment or component response modification factor) = 2.5

Ω_0 (System overstrength factor) = 2.5

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1.0

Equipment or Component Natural Frequencies (Hz) = See attachments

Overall dimensions and weight (or range thereof) = See attachments

Equipment or Components @ grade designed in accordance with ASCE 7-10 Chapter 15: Yes No

Design Basis of Equipment or Components (V/W) = _____

S_{DS} (Design spectral response acceleration at short period, g) = _____

S_{D1} (Design spectral response acceleration at 1 second period, g) = _____

R (Response modification coefficient) = _____

Ω_0 (System overstrength factor) = _____

C_d (Deflection amplification factor) = _____

I_p (Importance factor) = 1.5

Height to Center of Gravity above base = _____

Equipment or Component Natural Frequencies (Hz) = _____

Overall dimensions and weight (or range thereof) = _____

Tank(s) designed in accordance with ASME BPVC, 2010: Yes No

List of Attachments Supporting Special Seismic Certification

Test Report(s) Drawings Calculations Manufacturer's Catalog

Other(s) (Please Specify): _____

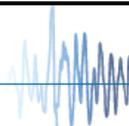
OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2019

Signature:  Date: 7/12/13

Print Name: M. R. karim Title: SHFR

Special Seismic Certification Valid Up to : S_{DS} (g) = See Above z/h = 1.0

Condition of Approval (if applicable): _____



Special Seismic Certification Certified Units



Manufacturer: Multistack

Product Line: Water Cooled Chiller Modules

Tested Product Construction: Powder-coated carbon steel

Tested Options and Components: 460V-575V, condensers, evaporators, compressors, headers, controllers, line reactor, actuated valves and transformers

Tested Mounting Description: Rigid base mount

Model	Frame / Enclosure			Approximate Operating Weight (lbs)	Sds (g), z/h=1	Unit
	Length(in.)	Width (in.)	Height (in.)			
MS10X	49 1/8	28	89	1,150	1.93	UUT1
MS15X	49 1/8	28	89	1,200		Interpolated
MS20X	49 1/8	28	89	1,200		Interpolated
MS30X	49 1/8	28	89	1,625		Interpolated
MS50X	49 1/8	28	89	2,000		Interpolated
MS70X	49 1/8	28	89	2,270		UUT2
MS105X	102 3/8	50	78	5,930		UUT3
MS135X	102 3/8	50	78	6,300		Interpolated
MS145X	102 3/8	50	78	6,700		Interpolated
MS160X (MS165X) ¹	102 3/8	50	78	6,730		UUT4
MS80T	66	35	60 1/2	2,520		UUT5
VME1H4	76 5/8	14	64	310	1.00	UUT6
VME1H6	76 5/8	14	64	460		Interpolated
VME1H8	76 5/8	18	64	920		Interpolated
VME2H4	76 5/8	14	64	330 - 370		Interpolated
VME2H6	76 5/8	14	64	660 - 720		Interpolated
VME2H8	102 3/8	24	80	1,500 - 1,850		Interpolated
VME2H10	102 3/8	24	80	1,920 - 2,120 ²		UUT7

Notes:

1. The MS160X is now called the MS165X in Multistack literature.
2. Weight of the VME2 modules varies, depending on the number of valves (2 or 4). Weight of UUT7 as tested was 2,120 lb.

Special Seismic Certification Certified Components



Manufacturer: Multistack

Product Line: Water Cooled Chiller Modules

Model Number	Manufacturer	Description	Unit		
Condenser					
DB200x94	SWEP	Brazed Plate Heat Exchanger	UUT1		
DB200x134			Interpolated		
DB300x38			Interpolated		
DB300x78			Interpolated		
DB300x106			Interpolated		
DB400x118			Interpolated		
DBD400Hx182			UUT2		
DP700x266			UUT3		
DP700x326			Interpolated		
DP700x362			UUT4		
B400Tx240			UUT5		
Evaporator					
DP200x62			SWEP	Brazed Plate Heat Exchanger	UUT1
DP200x94	Interpolated				
DP300x34	Interpolated				
DP300x58	Interpolated				
DP300x82	Interpolated				
DP400x98	Interpolated				
DP400x130	UUT2				
DP700x214	UUT3				
DP700x266	Interpolated				
DP400x280	Interpolated				
DP700x362	UUT4				
S400Tx220	UUT5				

Special Seismic Certification Certified Components



Manufacturer: Multistack

Product Line: Water Cooled Chiller Modules

Model Number	Manufacturer	Description	Unit
Compressors			
ZP61K5E / ZR67KCE	Emerson Climate Technologies/Copeland	6 HP	UUT1
ZP103KCE / ZR108KCE		9 HP	Interpolated
ZP120KCE / ZR125KCE		10 HP	Interpolated
ZP122KCE		10 HP	Interpolated
ZP182KCE / ZR190KCE		15 HP	Interpolated
ZP295KCE / ZR300KCE		25 HP	Interpolated
ZP296KCE		25 HP	Interpolated
ZP385KCE / ZR380KCE		32 HP	UUT2
ZPT590KCE / ZRT600KCE		50 HP	UUT3
ZPT592		50 HP	Interpolated
ZPT770KCE / ZRT760KCE		64 HP	Interpolated
ZPU870KCE		70 HP	Interpolated
ZPT970KCE		80 HP	UUT4
TT350-G61HL		Danfoss Turbocor	300 to 400 kW nominal capacity

Note: 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.

Headers			
1000-3926	USEMCO	6" Carbon Steel	UUT1
1000-3927			UUT1
1000-3978			Interpolated
1000-3979			Interpolated
1000-2315-41A			UUT2
1000-2311-41B			UUT2
1000-3978-SS		6" Stainless Steel	Interpolated
1000-3979-SS			Interpolated
1000-2311-41BSS			UUT2
1000-2315-41ASS			UUT2
C1000-2087-41		8" Carbon Steel	UUT5
1000-2752-41B			UUT5
2088-41SS			UUT5
1000-2756-41ASS		8" Stainless Steel	UUT5
1000-5332			UUT3, UUT4
1000-5333		10" Carbon Steel	UUT3, UUT4
1000-6447			Interpolated
1000-6448			Interpolated
1000-5332-SS			UUT3, UUT4
1000-5333-SS		10" Stainless Steel	UUT3, UUT4
1000-6447SS	Interpolated		
1000-6448SS	Interpolated		

Note: Interpolated valves for each size are identical in mass, dimension, construction and manufacturer to the tested valves.

Special Seismic Certification Certified Components



Manufacturer: Multistack

Product Line: Water Cooled Chiller Modules

Model Number	Manufacturer	Description	Unit
Controllers			
pCO1	Carel	Controllers	UUT5
pCO3			UUT1, UUT2, UUT6, UUT7
pCO5			UUT3, UUT4
Line Reactor			
KDRG3H	TCI	Line Reactor	UUT5
Thermostatic Expansion Valves			
ERZE-4	Sporlan	4 Ton Valve, R-410A	UUT1
ERZE-6		6 Ton Valve, R-410A	Interpolated
ERZE-8		8 Ton Valve, R-410A	Interpolated
ERZE-12.5		12.5 Ton Valve, R-410A	Interpolated
BBIZE-15		15 Ton Valve, 410A	Interpolated
OZE-20		20 Ton Valve, R-410A	Interpolated
OZE-25		25 Ton Valve, R-410A	Interpolated
OZE-35		35 Ton Valve, R-410A	UUT2
OZE-50		50 Ton Valve, R-410A	Extrapolated*
OZE-60		60 Ton Valve, R-410A	Extrapolated*
*Extrapolated units are identical in construction and similar in weight (within 2 lb) to the OZE-20 to 35 ton valves.			
Electric Expansion Valves			
SEI-50	Sporlan	50 Ton Valve, R-410A	UUT5
SER-K		85 Ton Valve, R-410A	UUT3, UUT4
Actuated Valves			
SY1-24	Belimo	2"-3" Valve	Extrapolated
SY2-24		4" Valve	UUT6
SY3-24		6" Valve	Interpolated
SY4-24		8" Valve	
SY5-24		10" Valve	UUT7
Power Control Transformers			
B250-0086-1	Micron	Multitap 250 VA Transformer	UUT6
B500-2266-GAF		Multitap 500 VA Transformer	UUT7

UUT1

UNIT UNDER TEST (UUT) Summary Sheet



Manufacturer: Multistack

Product Line: Water Cooled Chiller Modules

Model Number: MS10X

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, during and after shaking. 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 1/8	28	89	11.0	13.3	>33.3

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Ip	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2013	2012 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 1/2-inch diameter A307 bolts. The shake table interface plate was mounted to the shake table using M12 threaded rod at approximately 8-inches on-center.

UUT2

UNIT UNDER TEST (UUT) Summary Sheet



Manufacturer: Multistack

Product Line: Water Cooled Chiller Modules

Model Number: MS70X

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, during and after shaking. 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
2,270	49 1/8	28	89	4.3	11.0	>33.3

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Ip	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2013	2012 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 1/2-inch diameter A307 bolts. The shake table interface plate was mounted to the shake table using M12 threaded rod at approximately 8-inches on-center.

UUT3

UNIT UNDER TEST (UUT) Summary Sheet



Manufacturer: Multistack

Product Line: Water Cooled Chiller Modules

Model Number: MS105X

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, during and after shaking. 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 3/8	50	78	4.5	6.6	19.0

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Ip	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2013	2012 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 six 3/4-inch diameter A307 bolts. The shake table interface frame was mounted to the shake table using M12 threaded rod at approximately 8-inches on-center.

UUT4

UNIT UNDER TEST (UUT) Summary Sheet



Manufacturer: Multistack

Product Line: Water Cooled Chiller Modules

Model Number: MS160X (MS165X)

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, during and after shaking. 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
6,730	102 3/8	50	78	5.2	7.2	20.4

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Ip	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2013	2012 ICC-ES AC156	1.93	1.0	1.5	3.09	2.32	1.29	0.51

Unit Mounting Description (side panels removed in photograph):



The unit was mounted to the DCL shake table interface frame with six 3/4-inch diameter A307 bolts. The shake table interface frame was mounted to the shake table using M12 threaded rod at approximately 8-inches on-center.

UUT5

UNIT UNDER TEST (UUT) Summary Sheet



Manufacturer: Multistack

Product Line: Water Cooled Chiller Modules

Model Number: MS80T

Product Construction Summary:

Powder-coated carbon steel frame

Options / Component Summary:

460V, R-134a refrigerant, condenser, evaporator, compressor, headers, controller, expansion valves and line reactor

Note: The UUT was operational before, during and after shaking. 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	35	60 1/2	6.9	20.7	>33.3

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Ip	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2013	2012 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-inch diameter A307 bolts. The shake table interface plate was mounted to the shake table using M12 threaded rod at approximately 8-inches on-center.

UUT6

UNIT UNDER TEST (UUT) Summary Sheet



Manufacturer: Multistack

Product Line: Water Cooled Chiller Modules

Model Number: VME1H4

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, during and after shaking. 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 5/8	14	64	5.8	5.5	13.3

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Ip	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2013	2012 ICC-ES AC156	2.5	1.0	1.5	4.00	3.00	1.67	0.67

Unit Mounting Description:



The unit was mounted to the DCL shake table interface plate with six 3/8-inch diameter Grade 5 bolts. The shake table interface plate was mounted to the shake table using M12 threaded rod at approximately 8-inches on-center.

UUT7

UNIT UNDER TEST (UUT) Summary Sheet



Manufacturer: Multistack

Product Line: Water Cooled Chiller Modules

Model Number: VME2H10

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, during and after shaking. 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
2,120	102 3/8	24	80	5.3	3.0	28.0

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Ip	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2013	2012 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 four 1/2-inch diameter Grade 5 bolts. The shake table interface frame was mounted to the shake table using M12 threaded rod at approximately 8-inches on-center.