



DEPARTMENT OF HEALTH CARE ACCESS AND INFORMATION
FACILITIES DEVELOPMENT DIVISION

APPLICATION FOR HCAI SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0730

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☒ New ☐ Renewal

Manufacturer Information

Manufacturer: AJ Manufacturing Co., Inc

Manufacturer's Technical Representative: Ashley Strube

Mailing Address: 8701 Elmwood Avenue, Suite 400, Kansas City, MO 64132

Telephone: (816) 507-6875

Email: ashleystрубе@ajmfg.us

Product Information

Product Name: Air Handling Units

Product Type: Fans

Product Model Number: Criti-Clean Ultra Fan Filters

General Description: Fan Filter Units. Stainless steel housing, Pre-Filter, HEPA, UPLA, PTFE, Stainless steel room side screen, LED lights, LED Battery Backup, Face Display, Continuous Filter Monitoring Pressure Transducer

Mounting Description: See Certified Product Tables, Suspended

Tested Seismic Enhancements: None

Applicant Information

Applicant Company Name: Keystone Consulting Engineers, PLLC

Contact Person: Larry Liu

Mailing Address: 2640 NW 28th Circle, Camas, WA 98607

Telephone: (360) 910-0582

Email: larryl@keystone-engineers.com

Title: Principal



**DEPARTMENT OF HEALTH CARE ACCESS AND INFORMATION
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California Licensed Structural Engineer Responsible for the Engineering and Test Report(s)

Company Name: KEYSTONE CONSULTING ENGINEERS

Name: Lei Liu California License Number: S5337

Mailing Address: 2640 NW 28th Cir, Camas, WA 98607

Telephone: (360) 910-0582 Email: Larryl@keystone-engineers.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: Kelly LaPlace

Mailing Address: 1315 Greg St., Ste 109, Sparks NV 89431

Telephone: (775) 225-2314 Email: Kelly@shaketest.com



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Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 1.875

SDS (Design spectral response acceleration at short period, g) = 2.5

a_p (Amplification factor) = 2.5

R_p (Response modification factor) = 6

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height ratio factor) = 1 and 0

Natural frequencies (Hz) = See Attachment

Overall dimensions and weight = See Attachment

HCAI Approval (For Office Use Only) - Approval Expires on 03/16/2028

Date: 3/16/2022

Name: Mohammad Karim

Title: Supervisor, Health Facilities

Special Seismic Certification Valid Up to: SDS (g) = 2.5

z/h = See Above

Condition of Approval (if applicable):

Manufacturer:	AJ Manufacturing	Table 1
Model Line:	Criti-Clean Ultra	

Certified Product Construction Summary:
Stainless steel housing; Backward curve fan wheel

Certified Options Summary:
Pre-Filter, HEPA, UPLA, PTFE, Stainless steel room side screen, LED lights, LED Battery Backup, Face Display, Continuous Filter Monitoring Pressure Transducer

Mounting Configuration:
1.) Ceiling Suspended (without spring isolators)
2.) 24" x 24" units require (2) bracing cables at each corner. All other units require minimum (1) bracing cable per UUT Summary.
3.) Hanging and bracing configurations must have equivalent strength and stiffness as those tested. See UUT summary for tested hanging and bracing configurations.

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2019	ICC-ES AC156	2.5	1.0	4.0	3.0	1.675	0.675
			0	2.5	1.0		

Model Line	Model	Cabinet Dimensions (in)			Weight (lbs)	Notes	UUT
		Length	Width	Height			
Criti-Clean Ultra	SSLFHFD-FFU-2x2	23.75	23.75	19.5	65		1A,1B,1C
	SSLFHFD-FFU-3x2	35.75	23.75	19.5	85		Interp.
	SSLFHFD-FFU-4x2	47.75	23.75	19.5	104		2
	SSLFHFD-FFU-RF-4x2	47.75	23.75	25.5	107		3A,3B

Seismic Certified Component Matrix

Manufacturer: AJ Manufacturing		Table Description: Motors						Table 2	
Model Line: Criti-Clean Ultra									
Building Code		Test Criteria	Sds	z/h	Aflx-H	Arig-H	Aflx-V	Arig-V	
CBC 2019		ICC-ES AC156	2.5	1.0	4.0	3.0	1.675	0.675	
				0	2.5	1.0			
Component Type	Manufacturer	Model	Description				Notes		UUT
Motor	Ziehl-Abegg	ZAvblue, 177224 184953 (AJ Custom)	EC Motor, 100-130V, fan wheel included				Weight = 9.9 lbs.		1A,1B,1C, 3B
		ZAvblue, 176130 185838 (AJ Custom)	EC Motor, 200-277V, fan wheel included				Weight = 9.9 lbs.		2,3A
			OSP-0730						
			BY: Mohammad Karim						
			DATE: 03/16/2022						

Seismic Certified Component Matrix

Manufacturer: AJ Manufacturing		Table Description: Fan Wheels						Table 3	
Model Line: Criti-Clean Ultra									
Building Code		Test Criteria	Sds	z/h	Aflx-H	Arig-H	Aflx-V	Arig-V	
CBC 2019		ICC-ES AC156	2.5	1.0	4.0	3.0	1.675	0.675	
				0	2.5	1.0			
Component Type	Manufacturer	Model	Description				Notes		UUT
Wheel	Ziehl-Abegg	Zablue	Single inlet impeller with backwards curved blades made from high performance composite						1A,1B,1C, 2,3A,3B
			OSP-0730						
			BY: Mohammad Karim						
			DATE: 03/16/2022						

Seismic Certified Component Matrix

Manufacturer: AJ Manufacturing		Table Description: Stainless Steel Plenum						Table 4		
Model Line: Criti-Clean Ultra										
Building Code		Test Criteria	Sds	z/h	Aflx-H	Arig-H	Aflx-V	Arig-V		
CBC 2019		ICC-ES AC156	2.5	1.0	4.0	3.0	1.675	0.675		
				0	2.5	1.0				
Component Type	Manufacturer	Model	Description				Notes		UUT	
Unit Cabinet	AJ Manufacturing	SSLFHFD-FFU-2x2	20 Gauge 304 Stainless Steel (see unit submittal for details)				Weight = 12 lbs.		1A,1B,1C	
Unit Cabinet	AJ Manufacturing	SSLFHFD-FFU-3x2	20 Gauge 304 Stainless Steel (see unit submittal for details)				Weight = 17 lbs.		Interp.	
Unit Cabinet	AJ Manufacturing	SSLFHFD-FFU-4x2	20 Gauge 304 Stainless Steel (see unit submittal for details)				Weight = 22 lbs.		2	
Unit Cabinet	AJ Manufacturing	SSLFHFD-FFU-RF-4x2	20 Gauge 304 Stainless Steel (see unit submittal for details)				Weight = 16 lbs.		3A, 3B	

Seismic Certified Component Matrix

Manufacturer: AJ Manufacturing		Table Description: Filters			Table 5
Model Line: Criti-Clean Ultra & Criti-Clean					
Building Code: CBC 2019		Seismic Certification Limits:			
Component Type	Manufacturer	Model	Description	Notes	UUT
Standard HEPA Filter	Filtration Group	43892	2x2, 2" pack	Weight: 9 lbs.	Extrap.
		43946	2x3, 2" pack	Weight: 13 lbs.	Extrap.
		43257	2x4, 2" pack	Weight: 17 lbs.	Extrap.
		45759	2x2, 3" pack	Weight: 14 lbs.	1A
		45758	2x3, 3" pack	Weight: 20 lbs.	Interp.
		45390	2x4, 3" pack	Weight: 25 lbs.	Interp.
		44341	2x2, 4" pack	Weight: 18 lbs.	Interp.
		45582	2x3, 4" pack	Weight: 26 lbs.	Interp.
44342		2x4, 4" pack	Weight: 34 lbs.	Interp.	
44844		2x2, 2" pack	Weight: 9 lbs.	Interp.	
44845		2x3, 2" pack	Weight: 13 lbs.	Interp.	
44846		2x4, 2" pack	Weight: 17 lbs.	Interp.	
44370		2x2, 3" pack	Weight: 14 lbs.	Interp.	
480239		3x2, 3" pack	Weight: 20 lbs.	Interp..	
44360		2x4, 3" pack	Weight: 25 lbs.	Interp..	
45871		2x2, 4" pack	Weight: 18 lbs.	Interp..	
480240		2x3, 4" pack	Weight: 26 lbs.	Interp.	
45872		2x4, 4" pack	Weight: 34 lbs.	2	

Seismic Certified Component Matrix

Manufacturer: AJ Manufacturing		Table Description: Filters						Table 5		
Model Line: Criti-Clean Ultra										
Building Code		Test Criteria	Sds	z/h	Aflx-H	Arig-H	Aflx-V	Arig-V		
CBC 2019		ICC-ES AC156	2.5	1.0	4.0	3.0	1.675	0.675		
				0	2.5	1.0				
Component Type	Manufacturer	Model		Description			Notes		UUT	
Standard HEPA Filter	Camfil	P5-19.50-19.50-T-41-VU-1D-11-0		2x2, 2" pack			Weight: 9 lbs.		Extrap.	
		P5-19.50-31.50-T-41-VU-1D-11-0		2x3, 2" pack			Weight: 13 lbs.		Extrap.	
		P5-19.50-43.50-T-41-VU-1D-11-0		2x4, 2" pack			Weight: 17 lbs.		Extrap.	
		Q5-19.50-19.50-9-11-VU-1D-31-0		2x2, 3" pack			Weight: 14 lbs.		1B	
		Q5-19.50-31.50-9-11-VU-1D-31-0		2x3, 3" pack			Weight: 20 lbs.		Interp.	
		Q5-19.50-43.50-9-11-VU-1D-31-0		2x4, 3" pack			Weight: 25 lbs.		Interp.	
		P5-19.50-19.50-B-39-VU-1D-61-0		2x2, 4" pack			Weight: 18 lbs.		Interp.	
		P5-19.50-31.50-B-39-VU-1D-61-0		2x3, 4" pack			Weight: 26 lbs.		Interp.	
		P5-19.50-43.50-B-39-VU-1D-61-0		2x4, 4" pack			Weight: 34 lbs.		Interp.	
Standard ULPA Filter		P7-19.50-19.50-T-41-VU-1D-11-0		2x2, 2" pack			Weight: 9 lbs.		Interp.	
		P7-19.50-31.50-T-41-VU-1D-11-0		2x3, 2" pack			Weight: 13 lbs.		Interp.	
		P7-19.50-43.50-T-41-VU-1D-11-0		2x4, 2" pack			Weight: 17 lbs.		Interp.	
		P7-19.50-19.50-9-11-VU-1D-31-0		2x2, 3" pack			Weight: 14 lbs.		Interp.	
		P7-19.50-31.50-9-11-VU-1D-31-0		2x3, 3" pack			Weight: 20 lbs.		Interp.	
		P7-19.50-43.50-9-11-VU-1D-31-0		2x4, 3" pack			Weight: 25 lbs.		Interp.	
		P7-19.50-43.50-B-39-VU-1D-61-0		2x2, 4" pack			Weight: 18 lbs.		Interp.	
		P7-19.50-31.50-B-39-VU-1D-61-0		2x3, 4" pack			Weight: 26 lbs.		Interp.	
		P7-19.50-19.50-B-39-VU-1D-61-0		2x4, 4" pack			Weight: 34 lbs.		3A	
PTFE HEPA Filter		S2-19.50-19.50-1-41-VU-1D-11-0		2x2, 2" pack			Weight: 9 lbs.		Extrap.	
		S2-19.50-31.50-1-41-VU-1D-11-0		2x3, 2" pack			Weight: 13 lbs.		Extrap.	
		S2-19.50-43.50-1-41-VU-1D-11-0		2x4, 2" pack			Weight: 17 lbs.		Extrap.	

Seismic Certified Component Matrix

Manufacturer: AJ Manufacturing		Table Description: Filters			Table 3
Model Line: Criti-Clean Ultra & Criti-Clean					
Building Code: CBC 2019		Seismic Certification Limits:			
Component Type	Manufacturer	Model	Description	Notes	UUT
Standard HEPA Filter	AAF	E-007-2-19-06-SU-52-00-19J19J	2x2, 2" pack	Weight: 9 lbs.	Extrap.
		E-007-2-19-06-SU-52-00-19J31J	2x3, 2" pack	Weight: 13 lbs.	Extrap.
		E-007-2-19-06-SU-52-00-19J43J	2x4, 2" pack	Weight: 17 lbs.	Extrap.
		E-007-3-19-06-SU-52-00-19J19J	2x2, 3" pack	Weight: 14 lbs.	1C
		E-007-3-19-06-SU-52-00-19J31J	2x3, 3" pack	Weight: 20 lbs.	Interp.
		E-007-3-19-06-SU-52-00-19J43J	2x4, 3" pack	Weight: 25 lbs.	Interp.
		E-007-4-19-06-SU-52-00-19J19J	2x2, 4" pack	Weight: 18 lbs.	Interp.
		E-007-4-19-06-SU-52-00-19J31J	2x3, 4" pack	Weight: 26 lbs.	Interp.
		E-007-4-19-06-SU-52-00-19J43J	2x4, 4" pack	Weight: 34 lbs.	Interp.
Standard ULPA Filter		E-009-2-19-06-SU-52-00-19J19J	2x2, 2" pack	Weight: 9 lbs.	Interp.
		E-009-2-19-06-SU-52-00-19J31J	2x3, 2" pack	Weight: 13 lbs.	Interp.
		E-009-2-19-06-SU-52-00-19J43J	2x4, 2" pack	Weight: 17 lbs.	Interp.
		E-009-3-19-06-SU-52-00-19J19J	2x2, 3" pack	Weight: 14 lbs.	Interp.
		E-009-3-19-06-SU-52-00-19J31J	2x3, 3" pack	Weight: 20 lbs.	Interp.
		E-009-3-19-06-SU-52-00-19J43J	2x4, 3" pack	Weight: 25 lbs.	Interp.
		E-009-4-19-06-SU-52-00-19J19J	2x2, 4" pack	Weight: 18 lbs.	Interp.
		E-009-4-19-06-SU-52-00-19J31J	2x3, 4" pack	Weight: 26 lbs.	Interp.
		E-009-4-19-06-SU-52-00-19J43J	2x4, 4" pack	Weight: 34 lbs.	3B
eFRM HEPA Filter		E19E19EC85K2F1DA0C	2x2, 2" pack	Weight: 9 lbs.	Extrap.
		E19E31EC85K2F1DA0C	2x3, 2" pack	Weight: 13 lbs.	Extrap.
		E19E43EC85K2F1DA0C	2x4, 2" pack	Weight: 17 lbs.	Extrap.
PTFE HEPA Filter		29F85H2F1T0AC	2x2, 2" pack	Weight: 9 lbs.	Extrap.
		29F85H2F1T0AC	2x3, 2" pack	Weight: 13 lbs.	Extrap.
		29F85H2F1T0AC	2x4, 2" pack	Weight: 17 lbs.	Extrap.

Seismic Certified Component Matrix

[illegible]

UUT1A



Unit Under Test (UUT) Summary Sheet

Manufacturer: AJ Manufacturing

Product Line: Air Handling Units

Model Number: SSLFHFD-FFU-2x2

Product Construction Summary:

Stainless steel cabinet construction.

Options / Component Summary:

100-130V motor, Filtration Group 3" HEPA, Continuous filter monitoring, Tunable White LED Lights

Note: The UUT was operational before and after the shake test. The structural integrity of the component attachment system and the force resisting system was maintained.

UUT Properties

Operating Weight (lb)	Cabinet Dimensions (in)			Lowest Natural Frequency		
	Length	Width	Height	X (Longitudinal)	Y (Lateral)	Z (Vertical)
65	23.75	23.75	19.5	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2019	ICC-ES AC156	2.5	1.0	4.0	3.0	1.675	0.675
			0	2.5	1.0		

Unit Mounting Description:

Unit was ceiling mounted to the test fixture using (4) 3/8" rod with 1 5/8" channel strut rod stiffeners, (8) SB-125-01, (8) 3/8" grade 5 nuts, (8) 3/8" medium split washers, (8) SAE flat washers, and (8) 3/16" galvanized wire rope. (2) galvanized wire ropes at each corner.

DATE: 03/16/2022



UUT1B



Unit Under Test (UUT) Summary Sheet

Manufacturer: AJ Manufacturing

Product Line: Air Handling Units

Model Number: SSLFHFD-FFU-2x2

Product Construction Summary:

Stainless steel cabinet construction.

Options / Component Summary:

100-130V motor, Camfil 3" HEPA, Continuous filter monitoring, Tunable White LED Lights

Note: The UUT was operational before and after the shake test. The structural integrity of the component attachment system and the force resisting system was maintained.

UUT Properties

Operating Weight (lb)	Cabinet Dimensions (in)			Lowest Natural Frequency		
	Length	Width	Height	X (Longitudinal)	Y (Lateral)	Z (Vertical)
66	23.75	23.75	19.5	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2019	ICC-ES AC156	2.5	1.0	4.0	3.0	1.675	0.675
			0	2.5	1.0		

Unit Mounting Description:

Unit was ceiling mounted to the test fixture using (4) 3/8" rod with 1 5/8" channel strut rod stiffeners, (8) SB-125-01, (8) 3/8" grade 5 nuts, (8) 3/8" medium split washers, (8) SAE flat washers, and (8) 3/16" galvanized wire rope. (2) galvanized wire ropes at each corner.

DATE: 03/16/2022



UUT1C



Unit Under Test (UUT) Summary Sheet

Manufacturer: AJ Manufacturing

Product Line: Air Handling Units

Model Number: SSLFHFD-FFU-2x2

Product Construction Summary:

Stainless steel cabinet construction.

Options / Component Summary:

100-130V motor, AAF 3" HEPA, Continuous filter monitoring, Tunable White LED Lights

Note: The UUT was operational before and after the shake test. The structural integrity of the component attachment system and the force resisting system was maintained.

UUT Properties

Operating Weight (lb)	Cabinet Dimensions (in)			Lowest Natural Frequency		
	Length	Width	Height	X (Longitudinal)	Y (Lateral)	Z (Vertical)
65	23.75	23.75	19.5	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2019	ICC-ES AC156	2.5	1.0	4.0	3.0	1.675	0.675
			0	2.5	1.0		

Unit Mounting Description:

Unit was ceiling mounted to the test fixture using (4) 3/8" rod with 1 5/8" channel strut rod stiffeners, (8) SB-125-01, (8) 3/8" grade 5 nuts, (8) 3/8" medium split washers, (8) SAE flat washers, and (8) 3/16" galvanized wire rope. (2) galvanized wire ropes at each corner.



UUT2



Unit Under Test (UUT) Summary Sheet

Manufacturer: AJ Manufacturing

Product Line: Air Handling Units

Model Number: SSLFHFD-FFU-4x2

Product Construction Summary:

Stainless steel cabinet construction.

Options / Component Summary:

100-130V motor, Filtration Group 4" HEPA, Continuous filter monitoring, Tunable White LED Lights

Note: The UUT was operational before and after the shake test. The structural integrity of the component attachment system and the force resisting system was maintained.

UUT Properties

Operating Weight (lb)	Cabinet Dimensions (in)			Lowest Natural Frequency		
	Length	Width	Height	X (Longitudinal)	Y (Lateral)	Z (Vertical)
104	47.75	23.75	19.5	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2019	ICC-ES AC156	2.5	1.0	4.0	3.0	1.675	0.675
			0	2.5	1.0		

Unit Mounting Description:

Unit was ceiling mounted to the test fixture using (4) 3/8" rod with 1 5/8" channel strut rod stiffeners, (4) SB-125-01, (8) 3/8" grade 5 nuts, (8) 3/8" medium split washers, (8) SAE flat washers, and (4) 3/16" galvanized wire rope. (1) galvanized wire ropes at approximately 45° to each corner in a coplaner view.



UUT3A



Unit Under Test (UUT) Summary Sheet

Manufacturer: AJ Manufacturing

Product Line: Air Handling Units

Model Number: SSLFHFD-FFU-RF-4x2

Product Construction Summary:

Stainless steel cabinet construction.

Options / Component Summary:

100-130V motor, Camfil 4" HEPA, Continuous filter monitoring, Tunable White LED Lights

Note: The UUT was operational before and after the shake test. The structural integrity of the component attachment system and the force resisting system was maintained.

UUT Properties

Operating Weight (lb)	Cabinet Dimensions (in)			Lowest Natural Frequency		
	Length	Width	Height	X (Longitudinal)	Y (Lateral)	Z (Vertical)
107	47.75	23.75	25.5	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2019	ICC-ES AC156	2.5	1.0	4.0	3.0	1.675	0.675
			0	2.5	1.0		

Unit Mounting Description:

Unit was ceiling mounted to the test fixture using (4) 3/8" rod with 1 5/8" channel strut rod stiffeners, (4) SB-125-01, (8) 3/8" grade 5 nuts, (8) 3/8" medium split washers, (8) SAE flat washers, and (4) 3/16" galvanized wire rope. (1) galvanized wire ropes at approximately 45° to each corner in a coplaner view.



UUT3B



Unit Under Test (UUT) Summary Sheet

Manufacturer: AJ Manufacturing

Product Line: Air Handling Units

Model Number: SSLFHFD-FFU-RF-4x2

Product Construction Summary:

Stainless steel cabinet construction.

Options / Component Summary:

100-130V motor, AAF 4" HEPA, Continuous filter monitoring, Tunable White LED Lights

Note: The UUT was operational before and after the shake test. The structural integrity of the component attachment system and the force resisting system was maintained.

UUT Properties

Operating Weight (lb)	Cabinet Dimensions (in)			Lowest Natural Frequency		
	Length	Width	Height	X (Longitudinal)	Y (Lateral)	Z (Vertical)
107	47.75	23.75	25.5	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds	z/h	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2019	ICC-ES AC156	2.5	1.0	4.0	3.0	1.675	0.675
			0	2.5	1.0		

Unit Mounting Description:

Unit was ceiling mounted to the test fixture using (4) 3/8" rod with 1 5/8" channel strut rod stiffeners, (4) SB-125-01, (8) 3/8" grade 5 nuts, (8) 3/8" medium split washers, (8) SAE flat washers, and (4) 3/16" galvanized wire rope. (1) galvanized wire ropes at approximately 45° to each corner in a coplaner view.

