APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY	
APPLICATION #:	OSP-0147-10

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Johnson Controls Incorporated

Manufacturer's Technical Representative: Harold Dubensky

Mailing Address: 5757 N. Green Bay Ave., Milwaukee, WI 53201

Telephone: (717) 815-4218 Email: Harold.J.Dubensky@jci.com

Product Information

Product Name: Solution® Air Handling Units

Product Type: Air Handling Equipment

Product Model Number: See Attached OSP Product Summary
(List all unique product identification numbers and/or part numbers)

General Description: *Johnson Controls Solution® Air Handling Units comprise a custom-sized equipment product line. Units are rigid base mount air handling units with internally-isolated fan motors. Internal components include: various fan types, discharge/inlet plenums, filter mixing boxes, economizers, various filter types, cooling/heating coils, ultraviolet lighting system, variable frequency drives, and dampers. Seismic enhancement made to the test units and modifications required to address the anomalies observed during the tests shall be incorporated into the production units.*

Mounting Description: UUT1-UUT26 and UUT29-UUT30 are rigid base mounted. UUT27a and UUT27b are rigid and flexible wall-mounted

Applicant Information

Applicant Company Name: DYNAMIC CERTIFICATION LABORATORIES

Contact Person: JOSEPH L. LA BRIE, S.E., MANAGING PARTNER

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: 11/15/13

Title: MANAGING PARTNER Company Name: DYNAMIC CERTIFICATION LABORATORIES

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

Company Name: DYNAMIC CERTIFICATION LABORATORIES

Name: JOSEPH L. LA BRIE, S.E., MANAGING PARTNER California License Number: SE-3566

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

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

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 #1

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

Testing Laboratory #2

Company Name: TWIN CITY FAN COMPANIES, LTD TESTLAB

Contact Name: MATT SETTERGREN

Mailing Address: 5955 TRENTON LANE NORTH, PLYMOUTH, MN 55442

Telephone: (763) 551-7500 Email: MSETTERGREN@TCF.COM

Seismic Parameters

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

Design Basis of Equipment or Components (F_p/W_p) = 2.17 (for S_{DS} = 0.965 g); 3.26 (S_{DS} = 1.45 g)

S_{DS} (Design spectral response acceleration at short period, g) = HEPA filter frames, 0.965; All other components, 1.45

a_p (In-structure equipment or component amplification factor) = 2.5

R_p (Equipment or component response modification factor) = 2.0

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 ATTACHMENT

Overall dimensions and weight (or range thereof) = SEE ATTACHMENT

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: 12/2/13

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):

Table 1

Special Seismic Certification
Tested Units

DCL Dynamic Certification Laboratories

Manufacturer: Johnson Controls

Product Line: Solution® Air Handling Units

Certified Product Construction:

Galvanized steel cabinet construction

Certified Options: See Certified Component List

Certified Mounting Description: UUT1-UUT26 and UUT29-UUT30 are rigid base mounted. UUT27a and UU27b are rigid and flexible wall-mounted, respectively.

Model Number	Segment ID	Tag	Dimensions (inches)			Operating Weight (lb)	Highest Sds Level Passed	Unit
			Depth	Width	Height			
XTI-033X039-ASAH146A	HF-HA-EE-FR	SM1A	111	39	33	950	1.93	UUT1
XTI-033X039-NAHA146A	FS-CC-HC-RF	SM1B	105	39	33	1,100	1.93	UUT2
XTI-027X030-AAA0*A	RF-XA-FF-FM	SM2A	91	30	27	600	1.93	UUT3
XTI-027X030-AAAA0*0	DP-HM-CC-HC-IP	SM2B	99	30	27	1,100	1.93	UUT4
XTI-039X039-HAHA146A	FS	SM3A	54	39	39	760	1.93	UUT5
XTI-120X114-AAAA1*A	EE2-EE1	LG2B	102	114	120	2,110	1.93	UUT6
XTI-120X114-AAAA1*A	XA-HC-HC-FM	LG1A	81	114	120	3,840	1.45	UUT7
XTI-120X114-HATA146A	FS	LG2D	65	114	120	4,570	1.45	UUT8
XTI-120X114-AAAA1*A	HF-XA-CC-RF	LG2C	98	114	120	8,280	1.45	UUT9
XTO-120X114-NAVA146A	XA-FS	LG2A	102	114	120	5,730	1.45	UUT10
XTO-120X114-AAAA0*A	IG	LG2E	85	114	120	4,610	1.93	UUT11
XTI-120X114-AAAA0*A	AT-DI	LG2F	75	114	120	2,600	1.93	UUT12
XTI-054X084-FALA017A	FS-XA-CC-XA-MB	AHU01B3	94	84	60	3,500	2.28	UUT13
XTI-090X120-DAPA046A	2 Tiers, FS/VC-EH-XA	LG5	87	120	90	6,300	0.97	UUT14
XTI-027X030-DAGA046A	2 Tiers, FS/VC-EH-XA	SM5	62	30	27	830	2.50	UUT15
XTI-039X039-AAAA0*A	XA-IC	SM6	73	139	39	860	2.50	UUT16
XTO-045X045-AAAA0*A	IG	SM4A	60	45	45	1,510	2.50	UUT17
XTI-090X120-DAPA046A	FS	LG5 (Top)	71	120	90	3,000	1.93	UUT18
XTI-120X114-AAAA1*A	XA-IC	LG6	54	114	120	2,920	1.45	UUT19
XTI-72Hx126Wx92L	2 Tiers, IO-XA/IO-XA	LG7	92	126	72	4,590	1.45	UUT20
XTI-27Hx39Wx62L	2 Tiers, IO-XA/IO-XA	SM7	62	39	27	840	2.50	UUT21
XTI-60Hx60Wx120L	DP-FS	MFA-P1	120	60	60	2,320	1.93	UUT22
XTI-120Hx114Wx100L	DP-FS	MFA-P2	100	114	120	7,030	1.45	UUT23
XTI-72Hx126Wx96L	2 Tiers, XA-AF-MB/XA-FE	LG7B	96	126	72	5,182	1.85	UUT24
XTI-90Hx120Wx87L	VC-EH-XA	LG5-Bottom	87	120	90	2,970	1.93	UUT25
XTI-120Hx114Wx100L	DP-FS	MFA-P2 (Re-Test)	100	114	120	7,030	1.93	UUT26
AYK550	n/a	AYK550 Packaged Drive	18	33	44	260	1.93	UUT27a, UUT27b
XTI-33Hx39Wx41L	FS	UUT29	41	39	33	502	2.50	UUT29
XTO-120Hx114Wx95L	FS	UUT30	95	114	120	4,400	1.60	UUT30

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT1 (SM1A), XTI-33Hx39Wx111L, (HF-HA-EE-FR)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: None
Curb Support: 24" H, 14 gage welded assembly, 48" max between supports across width, 48" max between vertical supports.
Dampers and Louvers: (2) control dampers with galvanized steel blade, 9.5"Hx25"W (actuated); (1) control damper aluminum, 9.5"Hx25"W (actuated)
Doors: (2) door, galvanized, no viewport, 27"Hx12"W; (2) door, galvanized, no viewport, 27"Hx18"W
Wall Location Summary
All Runs: Side and front end walls in place, open rear end

Lowest Natural Frequency (Hz)	F-B	S-S	V	
Cabinet	10.8	14.6	26.0	

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed
	Length	Width	Height		Sds (g)
Cabinet	111	39	33	950	1.93
Electrical Enclosures					
VFD without Bypass and with Fused and Non-Fused Disconnects (NEMA 1) Frame R1, Base G11, 460V, 5hp	11.7	8.3	20.5	25	1.93
JCI FEC / NCE 15x20 Panel	7.0	17.0	20.0	47	1.93
End Devices, Factory Packaged Controls					
Actuator (Mixing, Exhaust,and Return Air)	NA	NA	NA	3	1.93
Sensor, Avg, 8ft, 1k, Nickel (Averaging Temperature)	NA	NA	NA	NA	1.93
Cable, End Dev Sig, Pigtail (Fan Variable Speed Control Signal)	NA	NA	NA	NA	1.93
Cable, End Dev Sig, Pigtail (Fan Start/Stop Contact)	NA	NA	NA	NA	1.93
Cable, End Dev Sig, Pigtail (Fan Proving)	NA	NA	NA	NA	1.93
Relay, Spdt, 24vac, Coil, Ind, Led (Fan Safeties Contact)	NA	NA	NA	NA	1.93
Filter Frame: Welded Aluminum-HEPA Filters Frame with filters	16.0	39	33	48	1.93
Fan: Plenum Airfoil, Direct Drive, 122 Wheel, 56T Frame	35.0	39	33	283	1.93

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. A MicroMetl 14 gage curb was attached to the interface frame using 1/2-inch bolts at a minimum of 18 inches on center. UUT1 was attached to its MicroMetl curb using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT2 (SM1B), XTI-33Hx39Wx105L, (FS-CC-HC-RF)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: None
Curb Support: 24" H, 14 gage welded assembly, 48" max between supports across width, 48" max between vertical supports
Dampers and Louvers: None
Doors: (3) doors, galvanized, no viewport 27"Hx18'W

Wall Location Summary
Side and rear end panels, no front end panel

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	14.4	13.1	23.2		

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51

Component Summary

Item	Dimensions (in)			Weight (lb)	Passed
	Length	Width	Height		Sds (g)
Cabinet	105	39	33	1,100	1.93
Electrical Enclosures					
VFD without Bypass and with Fused and Non-Fused Disconnects (NEMA 1) Frame R1, Base G11, 460V, 5hp	11.7	8.3	20.5	25	1.93
JCI FEC / NCE 15x20 Panel	7.0	17.0	20.0	47	1.93
End Devices, Factory Packaged Controls					
Sensor, 8in. 1K RTD Temp, Nickel (Probe Temperature)	NA	NA	NA	NA	1.93
Sensor, Avg, 8ft, 1k, Nickel (Averaging Temperature)	NA	NA	NA	NA	1.93
Cable, End Dev Sig, Pigtail (Fan Variable Speed Control Signal)	NA	NA	NA	NA	1.93
Cable, End Dev Sig, Pigtail (Fan Start/Stop Contact)	NA	NA	NA	NA	1.93
Cable, End Dev Sig, Pigtail (Fan Proving)	NA	NA	NA	NA	1.93
Relay, SPDT, 24VAC, Coil, Indicator LED (Fan Safeties Contact)	NA	NA	NA	NA	1.93
High Static Pressure Switch (Manual Reset)	NA	NA	NA	NA	1.93
LTC, SPST, Fixed Reset, 20ft (Low Temperature Cutout)	NA	NA	NA	NA	1.93
Wiring only (Low Temperature - Status)	NA	NA	NA	NA	1.93
Heating Valve Wiring	NA	NA	NA	NA	1.93
Cooling Valve Wiring	NA	NA	NA	NA	1.93
Unit Light Fixture w/Gfi Receptacle & Switch to Unit Light Fixture					
Fixture, Light, 75 Watt, Vr	NA	NA	NA	NA	1.93
Switch, 15 amp, 120V; Outlet, GFI, 15 amp	NA	NA	NA	NA	1.93
Filter Frame: Aluminum Extruded - Rigid Filters Frame with filters	18	39	33	61	1.93
Coils	Depth	Length	Height		
Water Coil, 1/2" dia, 2 rows, 0.016 TW, 1 stack	7.38	27	22.5	67	1.93
Water Coil, 5/8" dia, 2 rows, 0.020 TW, 1 stack	7.38	26	24.25	76	1.93
Fan: Plenum Airfoil, Belt Drive, 122 Wheel, 184T Frame	37	39	33	297	1.93

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. A MicroMetl 14 gage curb was attached to the interface frame using 1/2-inch bolts at a minimum of 18 inches on center. UUT2 was attached to its MicroMetl curb using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT3 (SM2A), XTI-27Hx30Wx91L, (RF-XA-FF-FM)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: None
Curb Support: 24" H, 14 gage welded assembly, 48" max between supports across width, 48" max between vertical supports
Dampers and Louvers: (1) control damper galvanized steel blades 9.5Hx16W (non-actuated); (1) outside airflow measuring station w/ control damper galvanized steel blades 9.5Hx16W (non-actuated)
Doors: (1) door, galvanized, no viewport 21Hx10W; (1) door ,galvanized, no viewport 21Hx18W; (1) door, galvanized, no viewport 21Hx31W.
Wall Location Summary
Side and front end panels, no rear end panel

Lowest Natural Frequency (Hz)	F-B	S-S	V	
Cabinet	22.4	17.8	31.7	

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51

Component Summary

Item	Dimensions (in)			Weight (lb)	Passed
	Length	Width	Height		Sds (g)
Cabinet	91.0	30.0	27.0	600	1.93
Filter Frame					
Galvanized Steel Sheet Metal-Angle Filters Frame with filters	18.0	30.0	27.0	37	1.93
Galvanized Steel Sheet Metal-Flat Filters Frame with filters	10.0	30.0	27.0	17	1.93
Galvanized Steel Box - Rigid Filters Frame with filters	18.0	30.0	27.0	40	1.93

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. A MicroMetl 14 gage curb was attached to the interface frame using 1/2-inch bolts at a minimum of 18 inches on center. UUT3 was attached to its MicroMetl curb using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT4 (SM2B), XTI-27Hx30Wx99L, (DP-HM-CC-HC-IP)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: None
Curb Support: 24" H, 14 gage welded assembly, 48" max between supports across width, 48" max between vertical supports
Pipe Chase: 27"H x 39"L x 24"D
Dampers and Louvers: None
Doors: (2) door, galvanized, no viewport 21Hx12W; (1) door, galvanized, no viewport 21Hx18W; (1) door, galvanized, no viewport 24Hx26W
Wall Location Summary
Side, rear end, and front end panels

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	23.3	15.8	32.3		

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	99.0	30.0	27.0	1,100.0	1.93
Electrical Enclosures					
UV light control panel, UV Lights < 8 Amps	7.0	8.0	18.0	29.0	1.93
Humidifier Grid	15.0	30.0	27.0	35.0	1.93
UV Light					
UV Light Ballast Length(Qty): 21(1)	10.0	30.0	27.0	36.0	1.93
Magnetic Proximity Sensors 1 for each door	NA	NA	NA	NA	1.93
Coils	Depth	Length	Height		
DX Coil, 1/2" dia, 4 rows, ,0.016 TW, 1 stack	7.38	18.0	17.5	44.0	1.93
Steam Coil, 1" dia, 1 rows,0.035 TW, 1 stack	5.0	17.0	18.0	41.0	1.93

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. A MicroMetl 14 gage curb was attached to the interface frame using 1/2-inch bolts at a minimum of 18 inches on center. UUT4 was attached to its MicroMetl curb using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center. The unit was tested full of operating fluid.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT5 (SM3A), XTI-39Hx39Wx54L , (FS)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: None
Curb Support: 24" H, 14 gage welded assembly, 48" max between supports across width, 48" max between vertical supports
Dampers and Louvers: None
Doors: (1) door, galvanized, with viewport 33Hx18W

Wall Location Summary
Side and rear end panels, no front end panel

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	15.1	12.4	28.1		

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	54.0	39.0	39.0	760.0	1.93
Electrical Enclosures					
Motor Starter (NEMA 3R) Frame R1, Base G20, 460v, 5hp	10.0	10.0	17.0	22.0	1.93
JCI FEC / NCE 15x20 Panel	7.0	17.0	20.0	47.0	1.93
Transformer, 460/120 Volt, 2kva W/Gfi Receptacle & Switch	7.5	11.5	18.5	65.0	1.93
End Devices, Factory Packaged Controls					
Sensor, 8in. 1K RTD Temp, Nickel (Probe Temperature)	NA	NA	NA	NA	1.93
Cable, End Dev Sig, Pigtail (Fan Start/Stop Contact)	NA	NA	NA	NA	1.93
Cable, End Dev Sig, Pigtail (Fan Proving)	NA	NA	NA	NA	1.93
Relay, SPDT, 24VAC, Coil, Indicator LED (Fan Safeties Contact)	NA	NA	NA	NA	1.93
Unit Light Fixture w/Gfi Receptacle & Switch to Unit Light Fixture					
Fixture, Light, 75 Watt, Vr	NA	NA	NA	NA	1.93
Switch, 15 amp, 120V	NA	NA	NA	NA	1.93
Outlet, GFI, 15 amp	NA	NA	NA	NA	1.93
Fan: DWDI Airfoil, Belt Drive, 122 Wheel, 184T Frame	48.0	39.0	39.0	345.0	1.93

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.

Mounting: A MicroMetl 14 gage curb was attached directly to the shake table using M12 threaded rod at a minimum of 18 inches on center. UUT5 was attached to its MicroMetl curb using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT6 (LG2B), XTI-120Hx114Wx102L, (EE2-EE1)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: 6" galvanized 10 gage steel
Curb Support: 24" H, 14 gage welded assembly, 48" max between supports across width, 48" max between vertical supports
Dampers and Louvers: (1) control damper galvanized steel blade 44Hx96W (actuated), (2) control damper galvanized steel blade 38.25Hx82W (actuated)
Doors: (2) doors, galvanized, no viewport 114Hx24W

Wall Location Summary
Side and front end panels, no rear end panel

Lowest Natural Frequency (Hz)	F-B	S-S	V	
Cabinet	4.8	4.8	12.7	

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed
	Length	Width	Height		Sds (g)
Cabinet	102.0	114.0	120.0	2,110	1.93
Electrical Enclosures					
JCI FEC / NCE 15x20 Panel	7.0	17.0	20.0	47	1.93
End Devices, Factory Packaged Controls					
Actuator (Mixing, Exhaust,and Return Air)	NA	NA	NA	6	1.93
Sensor, Avg, 17ft, 1k, Nickel (Averaging Temperature)	NA	NA	NA	NA	

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. A MicroMetl 14 gage curb was attached to the interface frame using 1/2-inch bolts at a minimum of 18 inches on center. UUT6 was attached to its MicroMetl curb using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Additional "Seismic Kit" Utilized for Pre-Approval:
Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT7 (LG1A), XTI-120Hx114Wx81L, (XA-HC-HC-FM)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: 6" galvanized 10 gage steel
Curb Support: 24" H, 14 gage welded assembly, 48" max between supports across width, 48" max between vertical supports
Dampers and Louvers: (1) control damper galvanized steel blades 44Hx96W (actuated); (1) outside airflow measuring station w/ control damper galvanized steel blades 44Hx96W
Doors: (1) door, galvanized, with viewport 114Hx40W
Wall Location Summary
Side and front end panels, no rear end panel

Lowest Natural Frequency (Hz)	F-B	S-S	V	
Cabinet	3.0	2.9	12.2	

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.45	2.32	1.74	0.97	0.39

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	81.0	114.0	120.0	3,840	1.45
End Devices, Factory Packaged Controls					
Actuator (Outside and Return Air)	NA	NA	NA	6	1.45
Switch, Diff, Press, 2CND, L-Bracket (Dirty Filter Alarm)	NA	NA	NA	NA	1.45
Coils	Depth	Length	Height		
Steam Coil, 1" dia, 1 rows,0.035 TW, 2 stack	5.0	101.0	108.0	706	1.45
Water Coil, 1/2" dia, 2 rows, 0.016 TW, 3 stack	7.38	102.0	107.5	793	1.45
Filter Frame: Galvanized Steel Sheet Metal-Angle Filters Frame with filters	20.0	114.0	120.0	395	1.45

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. A MicroMetl 14 gage curb was attached to the interface frame using 1/2-inch bolts at a minimum of 18 inches on center. UUT7 was attached to its MicroMetl curb using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Additional "Seismic Kit" Utilized for Pre-Approval:
Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT8 (LG2D), XTI-120Hx114Wx65L, (FS)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: 6" galvanized 10 gage steel
Curb Support: 24" H, 14 gage welded assembly, 48" max between supports across width, 48" max between vertical supports
Dampers and Louvers: None
Doors: (1) door, galvanized, no viewport 114Hx24W

Wall Location Summary
Side and rear end panels, no front end panel

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	3.7	4.7	14.5		

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.45	2.32	1.74	0.97	0.39

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed
	Length	Width	Height		Sds (g)
Cabinet	65.0	114.0	120.0	4,570	1.45
Electrical Enclosures	Depth	Width	Height		
Motor Starter (NEMA 3R) Frame R4, Base G23, 460v, 75hp	12.0	26.0	27.0	88	1.45
JCI FEC / NCE 20x25 Panel	7.0	20.0	26.0	59	1.45
Transformer, 460/120 Volt, 2kva W/Gfi Receptacle & Switch	7.5	11.5	18.5	65	1.45
End Devices, Factory Packaged Controls					
Sensor, 8in. 1K RTD Temp, Nickel (Probe Temperature)	NA	NA	NA	NA	1.45
Cable, End Dev Sig, Pigtail (Fan Start/Stop Contact)	NA	NA	NA	NA	1.45
Cable, End Dev Sig, Pigtail (Fan Proving)	NA	NA	NA	NA	1.45
Relay, SPDT, 24VAC, Coil, Indicator LED (Fan Safeties Contact)	NA	NA	NA	NA	1.45
Unit Light Fixture w/Gfi Receptacle & Switch to Unit Light Fixture					
Fixture, Light, 75 Watt, Vr	NA	NA	NA	NA	1.45
Switch, 15 amp, 120V	NA	NA	NA	NA	1.45
Outlet, GFI, 15 amp	NA	NA	NA	NA	1.45
Fan: DWDI Airfoil, Belt Drive, 330 Wheel, 365T Frame	59.0	114.0	120.0	2,900	1.45

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. A MicroMetl 14 gage curb was attached to the interface frame using 1/2-inch bolts at a minimum of 18 inches on center. UUT8 was attached to its MicroMetl curb using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Additional "Seismic Kit" Utilized for Pre-Approval:
Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT9 (LG2C), XTI-120Hx114Wx98L, (HF-XA-CC-RF)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: 6" galvanized 10 gage steel
Curb Support: 24" H, 14 gage welded assembly, 48" max between supports across width, 48" max between vertical supports
Dampers and Louvers: None
Doors: (1) door, galvanized, no viewport 114Hx12W; (2) doors, galvanized, no viewport 114Hx18W

Wall Location Summary
Side panels, no front and rear end panels

Lowest Natural Frequency (Hz)	F-B	S-S	V	
Cabinet	2.0	2.3	7.4	

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.45	2.32	1.74	0.97	0.39
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0 (HEPA filters)	0.965	1.54	1.16	0.64	0.26

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	98.0	114.0	120.0	8,280	1.45
Electrical Enclosures	Depth	Width	Height		
UV light control panel, UV Lights < 8 Amps	7.0	8.0	18.0	29	1.45
End Devices, Factory Packaged Controls					
Switch, Diff, Press, 2CND, L-Bracket (Dirty Filter Alarm)	NA	NA	NA	NA	1.45
Filter Frame	Length	Width	Height		
Aluminum Extruded - Rigid Filters Frame with filters	18.0	114.0	120.0	667	1.45
Welded Aluminum-HEPA Filters Frame with filters	16.0	114.0	120.0	764	0.965
UV Light: UV Light Ballast Length(Qty): 18(3), 24(6), 36(3)	10.0	114.0	120.0	138	1.45
Magnetic Proximity Sensors 1 for each door	NA	NA	NA	NA	1.45
Coils	Depth	Length	Height		
Water Coil, 5/8" dia, 12 rows, 0.049 TW, 3 stack	17.63	101.0	105.75	5,687	1.45

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. A MicroMetl 14 gage curb was attached to the interface frame using 1/2-inch bolts at a minimum of 18 inches on center. UUT9 was attached to its MicroMetl curb using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Additional "Seismic Kit" Utilized for Pre-Approval:
1) Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors.
2) Added 5/16-inch bolts with rivet nuts at 12-inch spacing with 1/4-inch drill screws halfway between along the right and top bulkhead-to-cabinet connections.
3) Added 12 gage top bulkhead to down-side of the coil.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT10 (LG2A), XTO-120Hx114Wx105L, (HM - FS)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: 6" galvanized 10 gage steel
Curb Support: 24" H, 14 gage welded assembly, 48" max between supports across width, 48" max between vertical supports
Dampers and Louvers: None
Doors: (1) door, multi latch, galvanized, out swing, no veiwport 114Hx24W
Wall Location Summary
Side and front end panels, no rear end panel

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	2.5	2.3	12.7		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.45	2.32	1.74	0.97	0.39

Component Summary

Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	105.0	114.0	120.0	5,730.0	1.45
Electrical Enclosures	Depth	Width	Height		
VFD with and without Bypass Fused and Non-Fused Disconnect (NEMA3R Self Ventilated) Frame R6, 460V, 100hp	22.9	32.2	44.0	409	1.45
JCI FEC / NCE 20x25 Panel	7.0	20.0	26.0	59	1.45
End Devices, Factory Packaged Controls					
Sensor, 8in. 1K RTD Temp, Nickel (Probe Temperature)	NA	NA	NA	NA	1.45
Cable, End Dev Sig, Pigtail (Fan Variable Speed Control Signal)	NA	NA	NA	NA	1.45
Cable, End Dev Sig, Pigtail (Fan Start/Stop Contact)	NA	NA	NA	NA	1.45
Cable, End Dev Sig, Pigtail (Fan Proving)	NA	NA	NA	NA	1.45
Relay, SPDT, 24VAC, Coil, Indicator LED (Fan Safeties Contact)	NA	NA	NA	NA	1.45
High Static Pressure Switch (Manual Reset)	NA	NA	NA	NA	1.45
Humidifier Grid Assembly	Length	Width	Height		
Humidifier Grid	15.0	114.0	120.0	363	1.45
Fan Skid Assembly: Plenum Airfoil, Belt Drive, 490 Wheel, 404T Frame	78.0	114.0	120.0	3,926	1.45

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. A MicroMetl 14 gage curb was attached to the interface frame using 1/2-inch bolts at a minimum of 18 inches on center. UUT10 was attached to its MicroMetl curb using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Additional "Seismic Kit" Utilized for Pre-Approval:
1) Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors.
2) Replaced existing screws connecting fan skid to floor of unit with 5/16-inch bolts with rivet nuts (4 at each of 4 connection locations).
3) Humidifier support screws pulled out during shipping, so the top support bracket was revised for each vertical support to add structural supports at end of the skid next to the humidifier.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT11 (LG2E), XTI-120Hx114Wx85L, (IG)					
Cabinet Construction Summary					
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner					
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner					
Base Rails: 6" galvanized 10 gage steel					
Curb Support: 14" H, 14 Gage Welded Assembly, 48" Max between supports across width, 48" Max between vertical supports.					
Pipe Chase: 120"H x 71"L x 48"D					
Dampers and Louvers: Control Damper Galvanized Steel Blades 15.25Hx93W (With Manual Locking Quadrant)					
Doors: (1) Door, Galvanized, no Viewport 117Hx48W					
Wall Location Summary					
Side Panels, No Front and Rear End Panels					
Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	4.5	4.1	14.8		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51
Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	85.0	114.0	120.0	4,610	1.93
Burner	Depth	Width	Height		
Burner Control Module, 10:1 Full Modulation	8.50	34.50	16.00	NA	1.93
Indirect Fired Gas Heater	Length	Width	Height		
Heater, Indirect Gas, 2,000,000 BTUs	64.13	100.00	50.00	3,075	1.93
Gas Burner Piping, Underwriters Laboratories	NA	NA	NA	NA	1.93
Exhaust Flue		Diameter	Height		
Flue Pipe System, Double Wall, Air Insulated, SST, Direct Drive Inducer Fan		12.0	111.0	NA	1.93

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. A MicroMetl 14 gage curb was attached to the interface frame using 1/2-inch bolts at a minimum of 18 inches on center. UUT11 was attached to its MicroMetl curb using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Johnson Controls

Solution Air Handling Units
Unit Under Test (UUT) Summary

DCL Dynamic Certification Laboratories

UUT12 (LG8), XTI-120Hx114Wx75L, (AT-DI)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: 6" galvanized 10 gage steel
Curb Support: Mounted directly to shake table structural tubing test fixture
Dampers and Louvers: None
Doors: None

Wall Location Summary
Side panels, no front and rear end panels

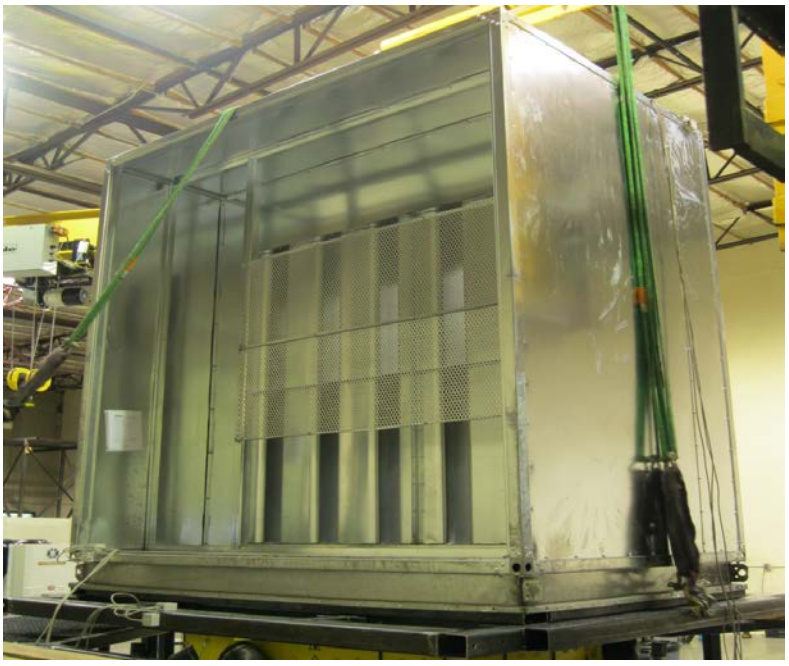
Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	6.9	4.3	24.6		

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51

Component Summary

Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	75.0	114.0	120.0	2,170	1.93
Diffuser	Length	Width	Height		
Perforated Plate Diffuser for Fan: DWDI Airfoil, Belt Drive, 330 Wheel	27.0	114.0	120.0	68	1.93
Attenuator	Length	Width	Height		
Galvanized, Standard Packing Material	36.0	104.0	110.0	1,127	1.93

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.



Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT8 was attached directly to the structural steel tube interface frame using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Additional "Seismic Kit" Utilized for Pre-Approval:
Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT13 (AHU01B3), XTI-54Hx84Wx94L, (FS-XA-CC-XA-MB)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: 6" galvanized 10 gage steel
Curb Support: 20" H, structural steel welded isolated curb, 45" max between supports across width
Dampers and Louvers: Control damper galvanized steel blades 21Hx66W (actuated)
Doors: (2) Door, galvanized, no viewport 48Hx18W
Wall Location Summary
All Runs: Side , front end, and rear end walls in place

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	7.6	11.3	19.7		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	2.28	3.65	2.74	1.52	0.61
Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed
	Length	Width	Height		Sds (g)
Cabinet	94	84	60	3,500	2.28
Electrical Enclosures	Depth	Width	Height		
VFD without Bypass and with Fused and Non-Fused Disconnects (NEMA 1) Frame R1, Base G11, 460V, 5hp	11.7	8.3	20.5	70	2.28
JCI FEC / NCE 15x20 Panel	7.0	17.0	20.0	47	2.28
JCI Terminal Strip Panel	7.0	8.0	18.0	25	2.28
JCI FEC / NCE 24x37 Panel	7.0	24.0	37.0	109	2.28
VFD with Bypass and with Fused and Non-Fused Disconnects (NEMA 1) Frame R1, Base B1, 460V, 1-1.5hp	16.0	16.0	23.0	150	2.28
VFD with and without Bypass Fused and Non-Fused Disconnect (NEMA3R Self Ventilated) Frame R4, 460V, 50hp	18.9	28.2	40.0	241	2.28
Motor Starter (NEMA 3R) Frame R4, Base G23, 460v, 100HP	12.0	26.0	27.0	88	2.28
Factory Terminated Wiring Enclosure, 2 Circuit, Nema 3R, 400A,	12.0	22.0	36.0	158	2.28
UV light control panel, UV Lights < 8 Amps	7.0	8.0	18.0	29	2.28
Transformer, 460/120 Volt, 2kva W/Gfi Receptacle & Switch	7.5	11.5	18.5	65	2.28
End Devices, Factory Packaged Controls					
Actuator (Outside Air)	NA	NA	NA	3	2.28
Sensor, Avg, 8ft, 1k, Nickel (Averaging Temperature)	NA	NA	NA	NA	2.28
Cable, End Dev Sig, Pigtail (Fan Variable Speed Control Signal)	NA	NA	NA	NA	2.28
Cable, End Dev Sig, Pigtail (Fan Start/Stop Contact)	NA	NA	NA	NA	2.28
Cable, End Dev Sig, Pigtail (Fan Proving)	NA	NA	NA	NA	2.28
Relay, Spdt, 24vac, Coil, Ind, Led (Fan Safeties Contact)	NA	NA	NA	NA	2.28
LTC, SPST, Fixed Reset, 20ft (Low Temperature Cutout)	NA	NA	NA	NA	2.28
Wiring only (Low Temperature - Status)	NA	NA	NA	NA	2.28
Cooling Valve Wiring	NA	NA	NA	NA	2.28
Sensor, 8in. 1K RTD Temp, Nickel (Probe Temperature)	NA	NA	NA	NA	2.28
High Static Pressure Switch (Manual Reset)	NA	NA	NA	NA	2.28
Wring only (High Pressure - Status)	NA	NA	NA	NA	2.28
Low Static Pressure Switch (Manual Reset)	NA	NA	NA	NA	2.28
Wring only (Low Temperature - Status)	NA	NA	NA	NA	2.28

UUT13 (AHU01B3), XTI-54Hx84Wx94L, (FS-XA-CC-XA-MB)

Component Summary (Continued)

Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Unit Light Fixture w/Gfi Receptacle & Switch to Unit Light Fixture					
Fixture, Light, 75 Watt, Vr	NA	NA	NA	NA	2.28
Switch, 15 amp, 120V	NA	NA	NA	NA	2.28
Outlet, GFI, 15 amp	NA	NA	NA	NA	2.28
UV Light	Length	Width	Height		
UV Light Ballast Length(Qty): 36(2)	10.0	84.0	54.0	61	2.28
Magnetic Proximity Sensors 1 for each door	NA	NA	NA	NA	2.28
Coils	Depth	Length	Height		
DX Coil, 1/2" dia, 4 rows, 0.016 TW, 1 stack	7.38	72	45	300	2.28
Fan	Length	Width	Height		
DWDI Airfoil, Belt Drive, 20-20 Wheel, 254T Frame	43.0	84.0	54.0	665	2.28

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.

Mounting: The test item was mounted to a VMC-supplied VMC Seismic/Wind Restraint Roof Curb, Drawing #VMA-45860A Rev. A. The test item was welded to the curb with a 4-inch weld above each spring. The curb was clamped to the seismic table surface.

Johnson Controls

Solution Air Handling Units
Unit Under Test (UUT) Summary

DCL Dynamic Certification Laboratories

UUT14 (LG5), XTI-90Hx120Wx71L/87L, (FS)/(VC-EH-XA)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: 6" galvanized 10 gage steel
Curb Support: Mounted directly to shaker table structural tubing test fixture.
Dampers and Louvers: None
Doors: (2) Door, Galvanized, No Viewport 84Hx18W, (1) Door, Galvanized, No Viewport 84x24W
Wall Location Summary
VC-EH-XA (Bottom Skid): Side and Rear End Panels, No Front End Panel, No Top Panel on VC segment FS (Top Skid): Side, Rear End, and Front End Panels, No Bottom panel

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	2.3	2.5	13.5		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	0.965	1.54	1.16	0.64	0.26

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet Bottom	87	120	90	6,300	0.965
Cabinet Top	71	120	90		
Electrical Enclosures	Depth	Width	Height		
Motor Starter (NEMA 3R) Frame R2, Base G21, 460v, 30hp	12.0	24.0	25.0	56	0.965
Factory Terminated Wiring Enclosure, 2 Circuit, Nema 3R, 200A,	10.25	19.18	27.0	105	0.965
Unit Disconnect Enclosure,Non-Fused, Nema 1, 100A	5.0	8.0	10.0	9	0.965
Electric Heater	Depth	Length	Height		
Electric heat open element, 75 kW 460/3/60, w/Protective Screen	8.0	101.25	81.0	2,150	0.965
Electric Heat Control Enclosure, 2 stage, Magnetic Disconnecting Contactors, Airflow Switch and Fan Interlock, 24 Volts Control Voltage	10.0	18.0	81.0		
Coils: Water Coil, 1/2" dia, 6 rows, 0.016 TW, 2 stack	10	108	80	1,135	0.965
Fan	Length	Width	Height		
DWDI FC, Belt Drive, 40-40 Wheel, 286T Frame	65.0	120.0	90.0	2,039	0.965

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.

Mounting: The top half of the unit was attached to the bottom half at seven (7) locations with two (2) 3/8-inch diameter Grade 5 bolts per location (fourteen bolts total). A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT14 was attached directly to the structural steel tube interface frame using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center. The unit was tested full of operating fluid.

Additional "Seismic Kit" Utilized for Pre-Approval:
Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT15 (SM5), XTI-27Hx30Wx40L/62L, (FS)/(VC-EH-XA)

Cabinet Construction Summary
Side and Top Panel Construction: 2" galvanized steel foam filled panels with 20 gage outer and 20 gage liner
Bottom Panel Construction: 2" galvanized steel foam filled panels with 24 gage outer and 20 gage liner
Base Rails: None
Curb Support: Mounted directly to shaker table structural tubing test fixture.
Dampers and Louvers: None
Doors: (1) Door, Galvanized, No Viewport 21Hx18W, (1) Door, Galvanized, No Viewport 21x27W

Wall Location Summary
VC-EH-XA (Bottom Skid): Side and Rear End Panels, No Front End Panel, No Top Panel on VC segment FS (Top Skid): Side, Rear End, and Front End Panels, No Bottom panel

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	22.3	11.0	>33.0		

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	2.50	4.00	3.00	1.67	0.67

Component Summary					
Item	Dimensions (in)			Weight	Passed
	Length	Width	Height	(lb)	Sds (g)
Cabinet Bottom	62	30	27	830	2.50
Cabinet Top	40	30	27		
Electrical Enclosures	Depth	Width	Height		
Motor Starter (NEMA 3R) Frame R1, Base G20, 460v, 3hp	10.00	10.00	17.00	22	2.50
Factory Terminated Wiring Enclosure, 2 Circuit, Nema 3R, 80A,	8.25	8.00	17.00	25	2.50
Unit Disconnect Enclosure,Non-Fused, Nema 1, 30A	5.00	6.00	8.00	9	2.50
Electric Heater	Depth	Length	Height		
Electric heat open element, 15 kW 460/3/60, w/ Protective Screen	8.0	15.25	18.00	55	2.50
Electric Heat Control Enclosure, 2 stage, Magnetic Disconnecting Contactors, Airflow Switch and Fan Interlock, 24 Volts Control Voltage	6.0	27.0	18.0		
Coils: Water Coil, 1/2" dia, 2 rows, 0.016 TW, 1 stack	7.38	17.5	18	39	2.50
Fan	Length	Width	Height		
DWDI FC, Belt Drive, 7-7 Wheel, 182T Frame	34.0	30.0	27.0	127	2.50

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT15 was attached directly to the structural steel tube interface frame using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT16 (SM6), XTI-39Hx139Wx73L, (XA-IC)

Cabinet Construction Summary
Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.
Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.
Base Rails: 6" Galvanized 10 ga Steel
Curb Support: Mounted directly to shaker table structural tubing test fixture.
Dampers and Louvers: None
Doors: (1) Door, Galvanized, No Viewport 33Hx24W
Wall Location Summary
Side Panels, No Front and Rear End Panels

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	23.5	13.8	26.8		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	2.50	4.00	3.00	1.67	0.67
Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	73.0	39.0	39.0	860	2.50
End Devices, Factory Packaged Controls					
Actuator (Damper Bypass Air - Proportional Control)	NA	NA	NA	6.4	2.50
Coils	Depth	Length	Height		
Coil, Integral Face & Bypass,B18, IFB Steam, 4 row, 0.035 TW, 2 sections	38.50	26.50	29.13	240	2.50

Note: The UUT was operational before and after shaking and was full of operating content during the tests. For shake table test, the unit's steam coils were pressurized with air to simulate operating conditions. Pressure was monitored before and after the shake test to determine that the coils were operational.The structural integrity of the component attachment system and force-resisting systems was maintained.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT16 was attached directly to the structural steel tube interface frame using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Johnson Controls

Solution Air Handling Units
Unit Under Test (UUT) Summary

DCL Dynamic Certification Laboratories

UUT17 (SM4A), XTI-45Hx45Wx60L, (IG)

Cabinet Construction Summary
Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.
Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.
Base Rails: 6" Galvanized 10 ga Steel
Curb Support: Mounted directly to shaker table structural tubing test fixture.
Pipe Chase: 45"H x 46"L x 36"D
Dampers and Louvers: None
Doors: (1) Door, Galvanized, no Viewport 42Hx36W
Wall Location Summary
Side Panels, No Front and Rear End Panels

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	20.8	13.0	>33.0		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	2.50	4.00	3.00	1.67	0.67
Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	60.0	45.0	45.0	1,510	2.50
Burner	Depth	Width	Height		
Burner Control Module, 10:1 Full Modulation	8.50	24.00	15.50	NA	2.50
Indirect Fired Gas Heater	Length	Width	Height		
Heater, Indirect Gas, 150,000 BTUs	42.0	40.13	30.0	580	2.50
Gas Burner Piping, ANSI	NA	NA	NA	NA	2.50
Exhaust Flue		Diameter	Height		
Flue Pipe System, Double Wall, Air Insulated, SST, Direct Drive Inducer Fan		12.0	111.0	NA	2.50

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT17 was attached directly to the structural steel tube interface frame using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT18 (LG5-top), XTI-90Hx120Wx71L (FS)

Cabinet Construction Summary
Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.
Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.
Base Rails: None
Curb Support: Mounted directly to shaker table structural tubing test fixture.
Dampers and Louvers: None
Doors: (1) Door, Galvanized, No Viewport 84x24W
Wall Location Summary
Side, Rear End, and Front End Panels, No Bottom panel

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	4.5	6.5	17.0		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51
Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	71	120	90	3,000	1.93
Electrical Enclosures	Depth	Width	Height		
Motor Starter (NEMA 3R) Frame R2, Base G21, 460v, 30hp	12.0	24.0	25.0	56	1.93
Factory Terminated Wiring Enclosure, 2 Circuit, Nema 3R, 200A,	10.25	19.18	27.0	105	1.93
Fan	Length	Width	Height		
DWDI FC, Belt Drive, 40-40 Wheel, 286T Frame	65.0	120.0	90.0	2,039	1.93

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.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT18 was attached directly to the structural steel tube interface frame at four locations with the manufacturer-provided brackets, using two (2) 3/8-inch diameter Grade 5 bolts per bracket (total of eight (8) bolts).

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT19 (LG6), XTI-120Hx114Wx54L, (XA-IC)

Cabinet Construction Summary
Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.
Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.
Base Rails: 6" Galvanized 10 ga Steel
Curb Support: Mounted directly to shaker table structural tubing test fixture.
Dampers and Louvers: None
Doors: (1) Door, Galvanized, No Viewport 78Hx18W
Wall Location Summary
Side Panels, No Front and Rear End Panels

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	3.5	3.3	17.0		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.45	2.32	1.74	0.97	0.39
Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	54.0	114.0	120.0	3,656	1.45
End Devices, Factory Packaged Controls					
Actuator (Damper Bypass Air - Proportional Control)	NA	NA	NA	6.4	1.45
Coils	Depth	Length	Height		
Coil, Integral Face & Bypass,VE9TX, VIFB Steam 3 row, 0.035 TW, 1 section	22.00	100.50	98.00	1,669	1.45
DWDI FC, Belt Drive, 40-40 Wheel, 286T Frame	65.0	120.0	90.0	2,039	1.93

Note: The UUT was operational before and after shaking and was full of operating content during the tests. For shake table test, the unit's steam coils were pressurized with air to simulate operating conditions. Pressure was monitored before and after the shake test to determine that the coils were operational.The structural integrity of the component attachment system and force-resisting systems was maintained.

Mounting: A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT19 was attached directly to the structural steel tube interface frame using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Additional "Seismic Kit" Utilized for Pre-Approval:
Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors.

Johnson Controls

Solution Air Handling Units
Unit Under Test (UUT) Summary

DCL Dynamic Certification Laboratories

UUT20 (LG7), XTI-72Hx126Wx92L, (2) Tiers, (IO)(HW1)(XA)\(IO)(HW2)(XA)

Cabinet Construction Summary
Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.
Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.
Base Rails: 6" Galvanized 10 ga Steel
Curb Support: Mounted directly to shaker table structural tubing test fixture.
Dampers and Louvers: (1) Control Damper Galvanized Steel Blade 21Hx112W (actuated)
Doors: (2) Door, Galvanized, No Viewport 66Hx26W

Wall Location Summary
(IO)(HW1)(XA) (Bottom Skid): Side Panels, No Front and Rear End Panels (IO)(HW2)(XA) (Top Skid): Side Panels, No Front and Rear End Panels

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	4.0	2.8	14.5		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.45	2.32	1.74	0.97	0.39

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed
	Length	Width	Height		Sds (g)
Cabinet Bottom	92.0	126.0	72.0	4,590	1.45
Cabinet Top	92.0	126.0	72.0		
Electrical Enclosures					
VFD without Bypass and with Trailing Fuse Disconnect (NEMA 1) Frame R0, 380-480V,1.9fla, 50/60 Hz,3PH	6.3	5.3	17.0	15	1.45
JCI FEC / NCE 16.5x20 Panel	6.5	16.5	20.0	50	1.45
End Devices, Factory Packaged Controls					
Actuator (Mixing, Ehaust,and Return Air)	NA	NA	NA	3	1.45
Sensor, Avg, 8ft, 1k, Nickel (Averaging Temperature)	NA	NA	NA	NA	1.45
Cable, End Dev Sig, Pigtail (Fan Variable Speed Control Signal)	NA	NA	NA	NA	1.45
Cable, End Dev Sig, Pigtail (Fan Start/Stop Contact)	NA	NA	NA	NA	1.45
Cable, End Dev Sig, Pigtail (Fan Proving)	NA	NA	NA	NA	1.45
Heat Wheel and Motor					
Heat Wheel: Wheel,Heat,110290C-T,M10, Double Wall, LT, Ch/Matrix ERC, 3" Cass	3.0	110.00		1,100	1.45
Motor: 460-3-60, 1.70 FLA, 865 RPM	NA	NA	NA		1.45

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.

Mounting to Shake Table:
A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT20 was attached directly to the structural steel tube interface frame using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Additional "Seismic Kit" Utilized for Pre-Approval:
Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT21 (SM7), XTI-27Hx39Wx62L, (2) Tiers, (IO)(HW1)(XA)\(IO)(HW2)(XA)

Cabinet Construction Summary
Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.
Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.
Base Rails: None
Curb Support: Mounted directly to shaker table structural tubing test fixture.
Dampers and Louvers: (1) Control Damper Galvanized Steel Blade 6Hx25W (actuated)
Doors: (2) Door, Galvanized, No Viewport 21Hx15W

Wall Location Summary
(IO)(HW1)(XA) (Bottom Skid): Side Panels, No Front and Rear End Panels
(IO)(HW2)(XA) (Top Skid): Side Panels, No Front and Rear End Panels

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	22.0	14.0	>33.3		

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	2.50	4.00	3.00	1.67	0.67

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed
	Length	Width	Height		Sds (g)
Cabinet Bottom	62.0	39.0	27.0	840	2.50
Cabinet Top	62.0	39.0	27.0		
End Devices, Factory Packaged Controls					
Actuator (Mixing, Ehaust,and Return Air)	NA	NA	NA	3	2.50
Heat Wheel and Motor					
Heat Wheel: Wheel,Heat,2510C-T,M01, Double Wall, Lt, Ch/Matrix Erc, 3" Cass	3.0	25.00		30	2.50
Motor: 120-1-60, 0.70 FLA, 0 HP, 1050 RPM	NA	NA	NA		2.50

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.

Mounting to Shake Table:
A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT21 was attached directly to the structural steel tube interface frame using No. 14, 1-1/2-inch sheet metal screws, spaced approximately 7.5-inches on center.

Additional "Seismic Kit" Utilized for Pre-Approval:
Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT22 (MFA-P1), XTI-60Hx60Wx120L, (DP-FS)					
Cabinet Construction Summary					
Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.					
Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.					
Base Rails: 6" Gavanized 10 ga Steel					
Curb Support: Mounted directly to shaker table structural tubing test fixture.					
Dampers and Louvers: (4) Backdraft Damper With Counterbalance, 17.00hx17.00w, Airfoil extruded aluminum blades					
Doors: (1) Door,Multi Latch,Galvanized,Out Swing, with Veiwport 54Hx24W					
Wall Location Summary					
Side Panels, No Front and Rear End Panels					
Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	11.5	8.8	19.8		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51
Component Summary					
Item	Dimensions (in)			Weight	Passed
	Length	Width	Height	(lb)	Sds (g)
Cabinet	120.0	60.0	60.0	2,320	1.93
Electrical Enclosures					
VFD without Bypass and with Fused and Non-Fused Disconnects (NEMA 1) Frame R2, Base G12, 460V, 15hp	12.2	8.3	24.8	33	1.93
Enclosure, MMP, 6 circuit, 16x28, 150 amp, with (9) Manual Motor Protector, Range 4.00 - 6.30 amps	6.5	16.5	28.0	60	1.93
Fan	Length	Width	Height		
(4) Plenum Airfoil, Direct Drive, 122 Wheel, 284T Frame	40.5	114.0	120.0	234	1.93

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.

Mounting to Shake Table:
A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT22 was attached directly to the structural steel tube interface frame with sixteen 1/2-inch diameter Grade 5 bolts.

Additional "Seismic Kit" Utilized for Pre-Approval:
Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors.

Johnson Controls

Solution Air Handling Units
Unit Under Test (UUT) Summary

DCL Dynamic Certification Laboratories

UUT23 (MFA-P2), XTI-120Hx114Wx100L, (DP-FS)

Cabinet Construction Summary
Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.
Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.
Base Rails: 6" Gavanized 10 ga Steel
Curb Support: Mounted directly to shaker table structural tubing test fixture.
Dampers and Louvers: (4) Backdraft Damper With Counterbalance, 40.00hx40.00w, Airfoil extruded aluminum blades
Doors: (1) Door,Multi Latch,Galvanized,Out Swing, with Veiwport 78Hx24W
Wall Location Summary
Side Panels, No Front and Rear End Panels

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	3.5	4.0	9.3		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.45	2.32	1.74	0.97	0.39

Component Summary

Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	100.0	114.0	120.0	7,030	1.45
Electrical Enclosures					
VFD without Bypass and with Fused and Non-Fused Disconnects (NEMA 1)	16.9	16.0	48.0	172	1.45
Enclosure, MMP, 3 circuit, 16x20, 40 - 50 amp range, with (3) Manual Motor Protector, Range 40.0 - 50.0 amps	6.5	16.5	20.0	50	1.45
Enclosure, MMP, 6 circuit, 16x20, 150 amp, with (6) Manual Motor Protector, Range 25.0 - 32.0 amps	6.5	16.5	20.0	50	1.45
Fan	Length	Width	Height		
(4) Plenum Airfoil, Direct Drive, 270 Wheel, 284T Frame	40.5	114.0	120.0	1,227	1.45

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.

Mounting to Shake Table:
A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT23 was attached directly to the structural steel tube interface frame with twenty-eight 1/2-inch diameter Grade 5 bolts.

Additional "Seismic Kit" Utilized for Pre-Approval:
Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors. At each of the four corners, a 1/4"x6" fillet weld was added connecting the base rail to the raceway.

UUT24 (LG7B), XTI-72Hx126Wx96L, (2) Tiers, (XA-AF-MB)\(XA-FE)

Cabinet Construction Summary

Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.

Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.

Base Rails: 6" Gavanized 10 ga Steel

Curb Support: Mounted directly to shaker table structural tubing test fixture.

Dampers and Louvers: (1) Control Damper Galvanized Steel Blade 26.75Hx108W

Doors: (2) Door,Multi Latch,Galvanized,Out Swing, No Veiwport 66Hx24W; (1) Door,Multi Latch,Galvanized,Out Swing, No Veiwport 66Hx17W

Wall Location Summary

(XA)(AF)(MB) (Bottom Skid): Side and Front Panels, No Rear End Panels
(XA)(FE) (Top Skid): Side and Front Panels, No Rear End Panels

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	2.5	2.8	15.8		

Seismic Test Parameters

Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.85	2.96	2.22	1.23	0.49

Component Summary

Item	Dimensions (in)			Weight (lb)	Passed
	Length	Width	Height		Sds (g)
Cabinet Bottom	96.0	126.0	72.0	5,182	1.85
Cabinet Top	96.0	126.0	72.0		
Electrical Enclosures					
Motor Starter (NEMA 3R) Frame R2, Base G21, 460v, 30hp	12.0	24.0	25.0	56	1.85
Filter Frame					
Galvanized Steel Sheet Metal-Angle Filters Frame with filters	17.0	126.0	72.0	490	1.85
Fan					
DWDI AF, Belt Drive, 32-32 Wheel, 286T Frame	54.0	126.0	72.0	2,509	1.85

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.

Mounting to Shake Table:
A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT24 was attached directly to the structural steel tube interface frame with twenty 1/2-inch diameter Grade 5 bolts.

Additional "Seismic Kit" Utilized for Pre-Approval:
Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors. At each of the four corners, a 1/4"x6" fillet weld was added connecting the base rail to the raceway.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT25 (LG5-Bottom), XTI-90Hx120Wx87L, (VC-EH-XA)

Cabinet Construction Summary
Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.
Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.
Base Rails: None
Curb Support: Mounted directly to shaker table structural tubing test fixture.
Dampers and Louvers: None
Doors: (2) Door, Galvanized, No Viewport 84Hx18W, (1) Door, Galvanized, No Viewport 84x24W
Wall Location Summary
Side, Rear End, and Front End Panels, No Top Panel on VC segment

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	5.0	3.5	11.0		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed
	Length	Width	Height		Sds (g)
Cabinet	87	120	90	2,970	1.93
Electrical Enclosures					
Unit Disconnect Enclosure,Non-Fused, Nema 1, 100A	5.0	8.0	10.0	9	1.93
Electric Heater					
Electric heat open element, 75 kW 460/3/60, w/Protective Screen	8.0	101.25	81.0	2,150	1.93
Electric Heat Control Enclosure, 2 stage, Magnetic Disconnecting Contactors, Airflow Switch and Fan Interlock, 24 Volts Control Voltage	10.0	18.0	81.0		
Coils					
Water Coil, 1/2" dia, 6 rows, 0.016 TW, 2 stack	10	108	80	1,135	1.93

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.

Mounting to Shake Table:
A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT25 was attached directly to the structural steel tube interface frame with eight 3/8-inch diameter Grade 5 bolts.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT26 (MFA-P2), XTI-120Hx114Wx100L, (DP-FS)

Cabinet Construction Summary
Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.
Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.
Base Rails: 6" Gavanized 10 ga Steel
Curb Support: Mounted directly to shaker table structural tubing test fixture.
Dampers and Louvers: (4) Backdraft Damper With Counterbalance, 40.00hx40.00w, Airfoil extruded aluminum blades
Doors: (1) Door,Multi Latch,Galvanized,Out Swing, with Veiwport 78Hx24W
Wall Location Summary
Side Panels, No Front and Rear End Panels

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	3.5	3.5	11.3		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed
	Length	Width	Height		Sds (g)
Cabinet	100.0	114.0	120.0	7,030	1.93
Electrical Enclosures					
VFD without Bypass and with Fused and Non-Fused Disconnects (NEMA 1) Frame R6, Base G25, 460V, 100hp	16.9	16.0	48.0	260	1.93
Enclosure, MMP, 3 circuit, 16x20, 40 - 50 amp range, with (3) Manual Motor Protector, Range 40.0 - 50.0 amps	6.5	16.5	20.0	50	1.93
Enclosure, MMP, 6 circuit, 16x20, 150 amp, with (6) Manual Motor Protector, Range 25.0 - 32.0 amps	6.5	16.5	20.0	50	1.93
Fan	Length	Width	Height		
(4) Plenum Airfoil, Direct Drive, 270 Wheel, 284T Frame	40.5	114.0	120.0	1,227	1.93

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.

Mounting to Shake Table:
A structural steel tube interface frame was affixed to the shake table using M12 threaded rod. UUT26 was attached directly to the structural steel tube interface frame with twenty-eight 1/2-inch diameter Grade 5 bolts.

Additional "Seismic Kit" Utilized for Pre-Approval:
Four (4) 1/2-inch by 1-inch long Grade 2 bolts were installed at the base rail to the raceway through the corner connectors. At each of the four corners, a 1/4"x6" fillet weld was added connecting the base rail to the raceway.

UUT26 - MFA-P2 Re-Test Unit Strengthening Measures

Notes:

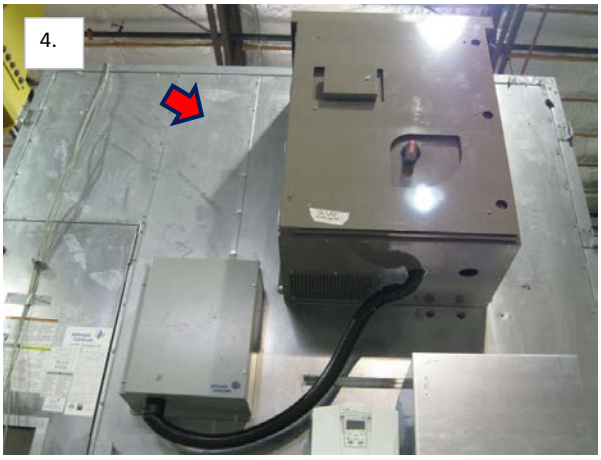
1. Added four 5/16-inch diameter rivet-nuts to the four corners of each of the hat channels
2. 3M VHB tape was used to connect the fan wall to the cabinet walls. The tape was used on the two vertical walls and the one horizontal wall across the top.
3. The fans were connected to the hat channels with 3/8-inch diameter rivet nuts.
4. The outdoor control panel was connected with six 3/8-inch diameter rivet nuts.
5. The indoor panel was attached with 3M VHB tape on the top and bottom edges.

1.

2.

3.

4.



5.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT27a, AYK550 Packaged Drive, Rigid Wall Mount					
Cabinet Construction Summary					
Enclosure material is 14 gage G90 galvanized steel					
Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	n/a	n/a	n/a		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
Electrical Enclosures	Length	Width	Height		
VFD with Bypass and Fused and Non-Fused Integral Disconnects and Service Switch (NEMA1) Frame R6, Base G25, 460V, 100hp	18	33	44	260	1.93

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.

Mounting: UUT27a was mounted to the DCL-provided steel stud wall shake table interface frame using four 3/8-inch diameter Grade 5 bolts and the manufacturer-provided mounting holes. Washers were required for attaching the VFD to back panel. The test wall was mounted directly to the shake table platen using M12 threaded rod.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT27b, AYK550 Packaged Drive, Flexible Wall Mount

Cabinet Construction Summary

Enclosure material is 14 gage G90 galvanized steel

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	n/a	n/a	n/a		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.93	3.09	2.32	1.29	0.51

Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
Electrical Enclosures	Length	Width	Height		
VFD with Bypass and Fused and Non-Fused Integral Disconnects and Service Switch (NEMA1) Frame R6, Base G25, 460V, 100hp	18	33	44	260	1.93

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.

Mounting: UUT27b was mounted to the DCL-provided steel stud wall shake table interface frame using four 3/8-inch diameter Grade 5 bolts and the manufacturer-provided mounting holes. Washers were required for attaching the VFD to back panel. The test wall was mounted to four Mason Industries 2A-2500 spring isolators using 1/2-inch diameter Grade 5 bolts (one bolt per spring isolator). The spring isolators were mounted to shake table interface plates which were then mounted to the shake table using M12 threaded rod.

UUT29, XTI-33Hx39Wx41L, (FS)					
Cabinet Construction Summary					
Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.					
Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.					
Base Rails: none					
Curb Support: n/a					
Dampers and Louvers: none					
Doors: (1) door, galvanized, with viewport 27Hx18W					
Wall Location Summary					
Side and rear end panels, no front end panel					
Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	23.0	29.2	17.5		
Fan Subassembly	6.0	7.9	7.2		
Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	2.50	4.00	3.00	1.67	0.67
Component Summary					
Item	Dimensions (in)			Weight (lb)	Passed Sds (g)
	Length	Width	Height		
Cabinet	41.0	39.0	33.0	502	2.50
Electrical Enclosures					
VFD,NF Disc,460V,5hp Grp11,Frame R1,Non-Fused Disconnect,80A, NEMA1	11.7	8.3	20.5	36	2.50
Fan	Length	Width	Height		
Twin City EPLFN 122 SWSI, Direct Drive	27.3	23.5	20.0	56	2.50
Motor	Length	Width	Height		
Teco-Westinghouse, TEFC Premium, 460-3-60, 5 HP, 3600 RPM	15.8	12.1	10.5	135	2.50
Shaft Grounding Ring	n/a	n/a	n/a	n/a	2.50

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.

Mounting to Shake Table:
The fan rested on four steel pads underneath each mounting bracket. UUT-29 was rigidly mounted to the pads using the (2) supplied brackets on each side of the skid, (4) total. The skid was attached to each pad using (2) grade 5, 3/8-11 UNC bolts. The brackets were located on opposite sides of the AHU module. The pads were welded to adaptor plates that also sat under the AHU module. Each of the (2) adaptor plates were mounted directly to the shake table using A325 5/8-11 UNC bolts.

Production Level Requirement: Two grade-five jam nuts shall be installed at the top of each isolator housing.

Solution Air Handling Units
Unit Under Test (UUT) Summary

UUT30, XTO-120Hx114Wx95L, (FS)

Cabinet Construction Summary
Side and Top Panel Construction: 2" Galvanized Steel Foam filled Panels with 20 ga Outer and 20 ga Liner.
Bottom Panel Construction: 2" Galvanized Steel Foam filled Panels with 24 ga Outer and 20 ga Liner.
Base Rails: 6" galvanized, 10 gage steel
Curb Support: n/a
Dampers and Louvers: none
Doors: (1) door, galvanized, with viewport 78Hx24W

Wall Location Summary
Side and rear end panels, no front end panel

Lowest Natural Frequency (Hz)	F-B	S-S	V		
Cabinet	4.4	3.1	5.0		
Fan Subassembly	4.6	3.1	5.0		

Seismic Test Parameters					
Building Code: CBC 2013	Sds	AflxH	ArigH	AflxV	ArigV
Test Criteria: ICC-ES AC156, Ip = 1.5, z/h = 1.0	1.60	2.56	1.92	1.07	0.43

Component Summary

Item	Dimensions (in)			Weight	Passed
	Length	Width	Height	(lb)	Sds (g)
Cabinet	95.0	114.0	120.0	4,400	1.60
Electrical Enclosures					
NONE	NA	NA	NA	NA	1.60
Fan	Length	Width	Height		
Twin City EPLFN 490 SWSI, Direct Drive	78.7	75.0	68.0	1,225	1.60
Motor	Length	Width	Height		
Teco-Westinghouse, TEFC Premium, 460-3-60, 75 HP, 1200 RPM	38.0	29.1	23.6	1,317	1.60
Shaft Grounding Ring					1.60

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.

Mounting to Shake Table:
The fan rested on two flat rails of steel plate that ran the axial length of the AHU module. UUT-30 was rigidly mounted to the rails using the (7) supplied holes on each side of the skid, (14) total. The (14) bolts used were a Grade 5, 5/8-11 UNC bolt. The holes were located on opposite sides of the AHU module and were oriented parallel with the axis of the fan shaft. The rails were welded to adaptor plates that also ran the entire axial length of the AHU module. Each of the (2) adaptor plates were mounted directly to the shake table using A325 5/8-11 UNC bolts.

Additional "Seismic Kit" Utilized for Pre-Approval:
Additional self-tapping screws were added to the front panels of the AHU. Two screws were added at the panel junctions near each corner of the fan inlet. Stiffener plates were added internally to the front panel of the AHU. A total of (4) 16 gauge mild steel plates were added, one at each junction of the AHU front panels. They were attached using (10) self-tapping screws.

UUT30 - Production Requirements

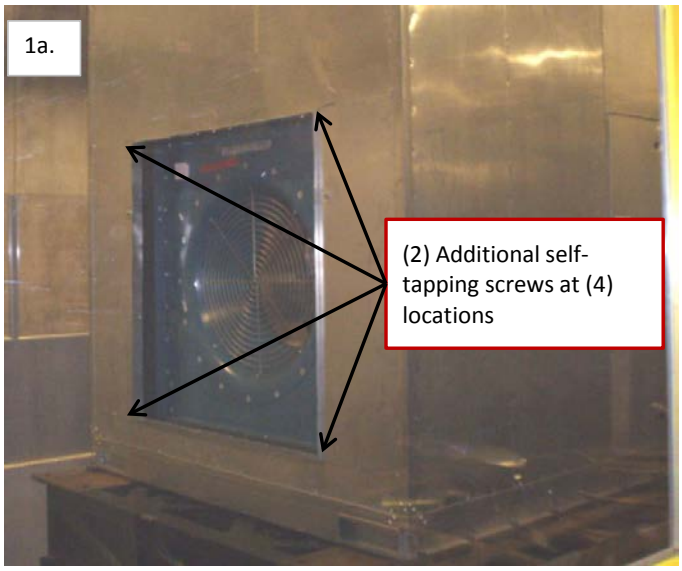
In between the resonant search testing and the seismic test, it was requested by the manufacturer to make alterations to the unit, listed in items 1 and 2 below. A third production level requirement is also listed in item 3. All three items noted below need to be incorporated as production level requirements for construction of certified units.

1. Additional self-tapping screws were added to the front panels of the AHU. Two screws were added at the panel junctions near each corner of the fan inlet. See photographs 1a and 1b below.

2. Stiffener plates were added internally to the front panel of the AHU. A total of (4) 16 gauge mild steel plates were added, one at each junction of the AHU front panels. They were attached using (10) self-tapping screws. See photograph 2 below.

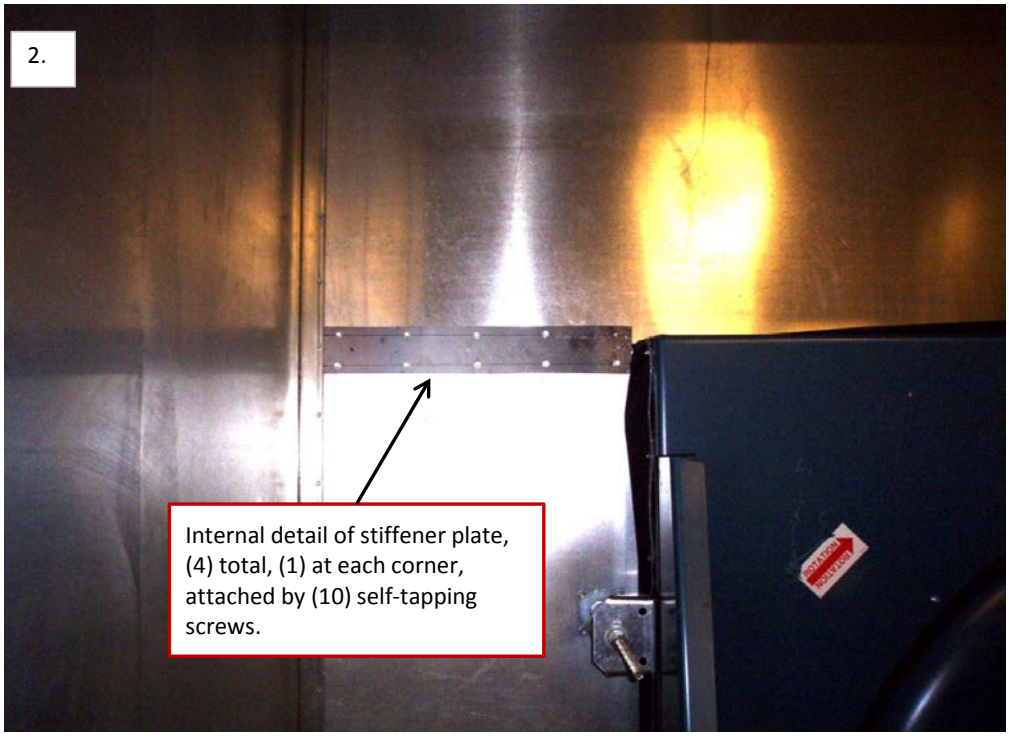
3. The shake test was performed in the original design configuration which used a single, grade-two nut on the top of each isolator mounting bracket. The assembly must now incorporate two grade-five jam nuts on the top of each isolator mounting bracket, as a production-level requirement.

1a.



1b.

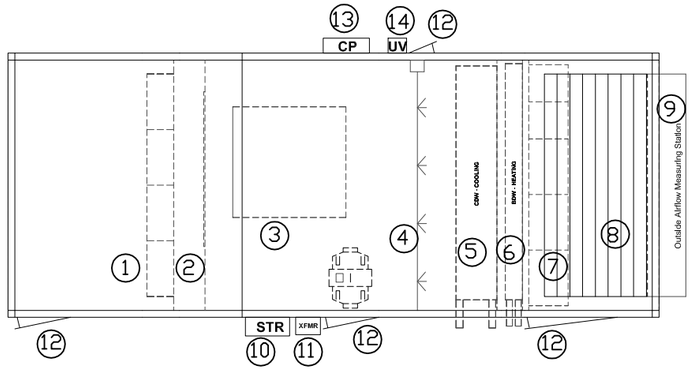
2.



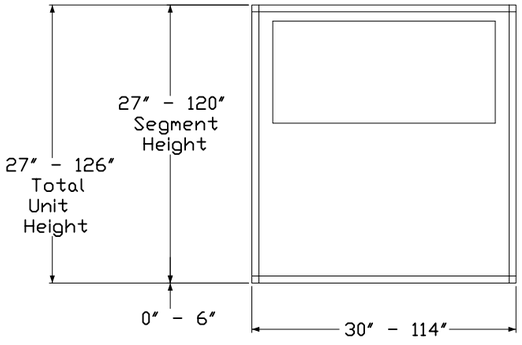
See Appendix A - Component List

1. HEPA Filter
2. Diffuser
3. Fan (DWDI Airfoil)
4. UV Light
5. Cooling Coil
6. Heating Coil
7. Angle Filter
8. Return Air Control Damper
9. Outside Air Airflow Measuring Station
10. Starter, Motor Control
11. Transformer
12. Access Door
13. FEC/NEC Control Panel
14. UV Light Control Panel
15. No Baserail

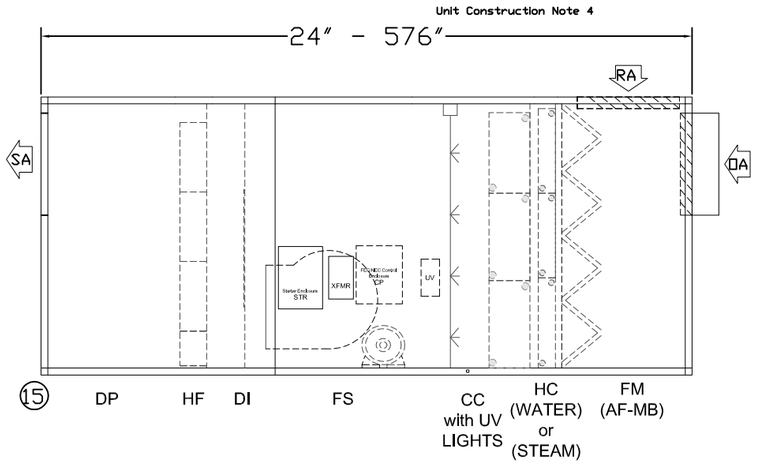
SINGLE TUNNEL UNIT



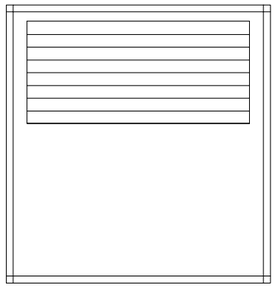
PLAN VIEW



REAR (OUTLET) END VIEW



ELEVATION VIEW



FRONT (INLET) END VIEW

Unit Construction Information:

1. Side and Top Panel Construction
Foam filled panels 2" thick.
Exterior : Galvanized Steel 20, 18, or 16 ga.
Interior: Galvanized or Stainless Steel 20, 18, or 16 ga

2. Bottom Panel Construction
Foam filled panels 2" thick.
Exterior: Galvanized Steel 24 ga.
Interior: Galvanized or Stainless Steel 20, 18, 16, or 14 ga

3. All Dimension are in inches unless otherwise specified.

4. Unit length may vary depending on the number of segments that are required to form the Air Handling Unit. Length shown is for single piece unit.

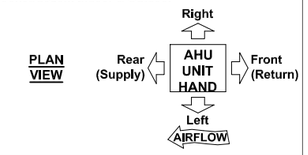
5. Doors are provided for access to segments. Maximum door height 117".

6. Seismic Construction Details
Baserail Assembly. See detail
Structural Bulkheads. See detail
Maximum distance between bulkheads: 60"
Bulkheads include fan wall, filter rack, coil rack,economizer wall, attenuator wall, and structural bulkhead.

UNIT CONSTRUCTION

Model: Solution-XT
Construction: Indoor & Outdoor

PLAN VIEW



NOTES

Units with a baserail and a bottom opening: Duct connection flush with the bottom of unit, not flush with bottom of baserail.

Refer to performance report for shipping split details.

Allow sufficient space around the unit for removing the access panels and various parts of the unit. A minimum clearance equal to the width of the unit must be provided on both sides of the unit for removing the coil or fan assembly.

Contractor responsible for penetrations and connections of all electrical boxes and internal coil connections.

Certain items may extend beyond cabinet dimensions including: door handles, light switches, electrical boxes, lifting lugs, etc.

Dimension tolerances: Unit (+/- 1/2"); Piping (+/- 2")

Drain pan connection size 1 1/4" MPT SCH 40

SEGMENT LIST

SEGMENT	DESCRIPTION
DP	Discharge Plenum
HF	Hepa Filter
DI	Diffuser
FS	Supply Fan
CC	Cooling Coil with UV Light Option
HC	Heating Coil
FM	Filter/Mixing Box

PRODUCT DRAWING
SOLUTION AIR HANDLING UNIT DETAIL
MODEL: Solution-XT
12/02/2013

Project Name: Typical Supply Fan with Inlet Mixing box Without Baserails

OSP-0147-10
UNIT TAG: OSHPD, Unit A

Date: 3/04/2011

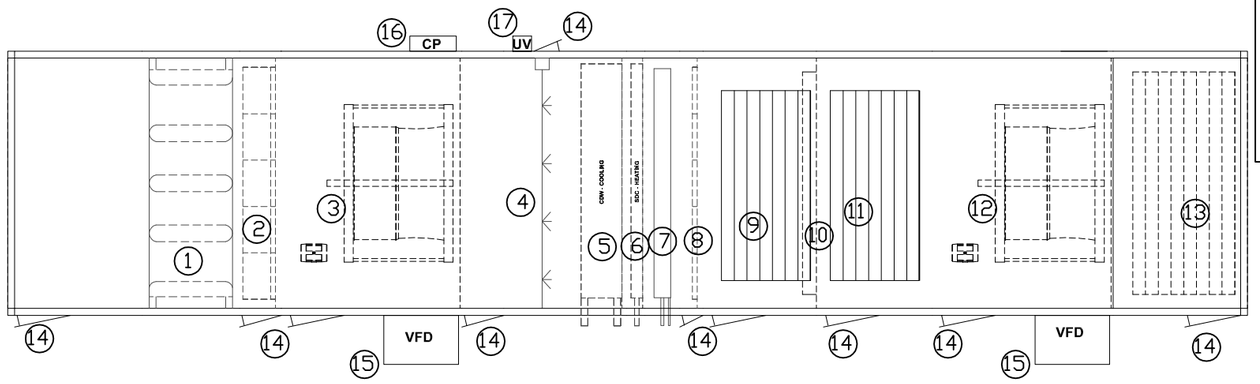
DRAWING NUMBER
134-007

Johnson Controls

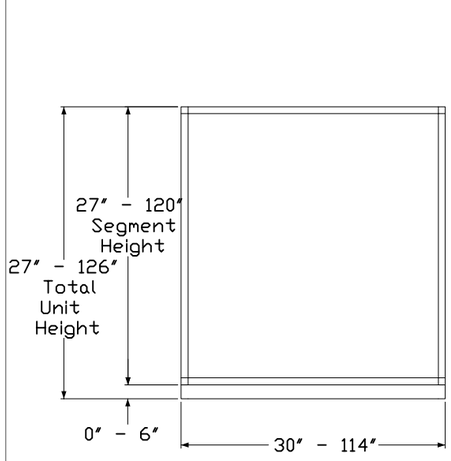
SINGLE TUNNEL UNIT

See Appendix A - Component List

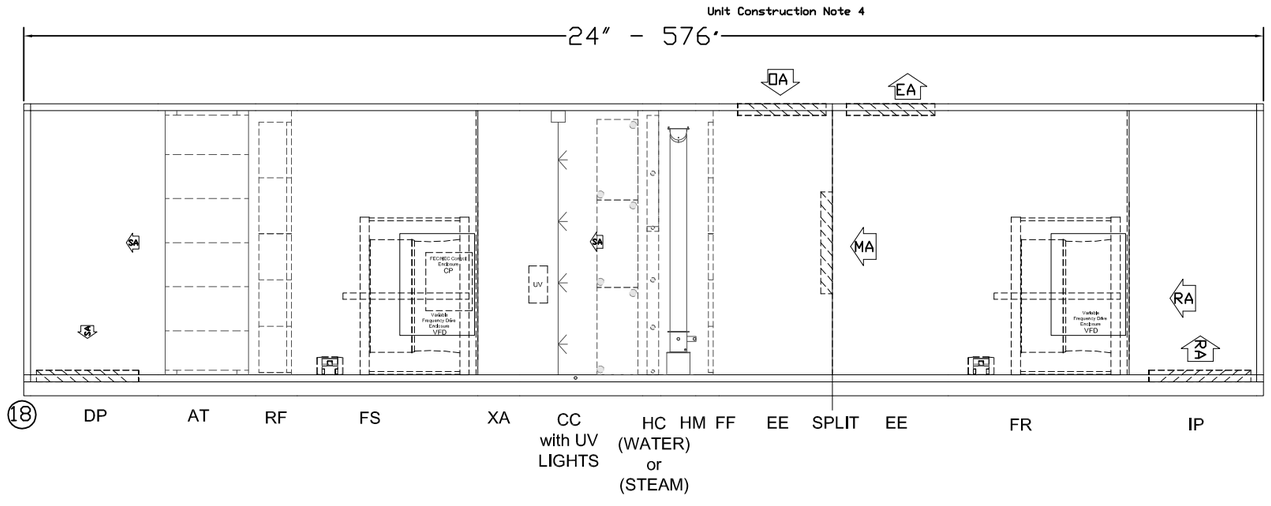
1. Attenuator
2. Rigid Filter
3. Fan (Plenum Airfoil)
4. UV Light
5. Cooling Coil
6. Heating Coil
7. Humidifier Grid
8. Flat Filter
9. Control Damper, Outside Air
10. Control Damper, Mixed Air
11. Control Damper, Exhaust Air
12. Fan (Plenum Airfoil)
13 Control Damper, Return Air
14. Access Door
15. VFD, Motor Control
16. FEC/NEC Control Panel
17. UV Light Control Panel
18. Baserail.



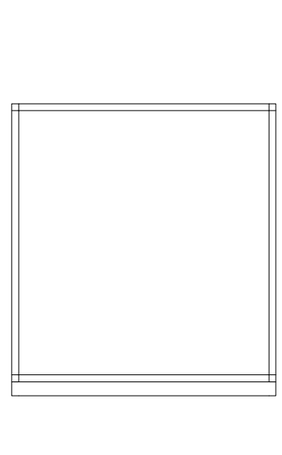
PLAN VIEW



REAR (OUTLET) END VIEW



ELEVATION VIEW



FRONT (INLET) END VIEW

Unit Construction Information:

1. Side and Top Panel Construction
Foam filled panels 2" thick.
Exterior : Galvanized Steel 20, 18, or 16 ga.
Interior: Galvanized or Stainless Steel 20, 18, or 16 ga

2. Bottom Panel Construction
Foam filled panels 2" thick.
Exterior: Galvanized Steel 24 ga.
Interior: Galvanized or Stainless Steel 20, 18, 16, or 14 ga

3. All Dimension are in inches unless otherwise specified.

4. Unit length may vary depending on the number of segments that are required to form the Air Handling Unit. Length shown is for single piece unit.

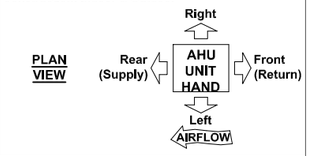
5. Doors are provided for access to segments. Maximum door height 117".

6. Seismic Construction Details
Baserail Assembly. See detail
Structural Bulkheads. See detail
Maximum distance between bulkheads: 60"
Bulkheads include fan wall, filter rack, coil rack,economizer wall, attenuator wall, and structural bulkhead.

UNIT CONSTRUCTION

Model: Solution-XT
Construction: Indoor & Outdoor

PLAN VIEW



NOTES

Units with a baserail and a bottom opening: Duct connection flush with the bottom of unit, not flush with bottom of baserail.

Refer to performance report for shipping split details.

Allow sufficient space around the unit for removing the access panels and various parts of the unit. A minimum clearance equal to the width of the unit must be provided on both sides of the unit for removing the coil or fan assembly.

Contractor responsible for penetrations and connections of all electrical boxes and internal coil connections.

Certain items may extend beyond cabinet dimensions including: door handles, light switches, electrical boxes, lifting lugs, etc.

Dimension tolerances: Unit (+/- 1/2"); Piping (+/- 2")

SEGMENT LIST

SEGMENT	DESCRIPTION
DP	Discharge Plenum
AT	Attenuator
RF	Rigid Filter
FS	Supply Fan
XA	Access Variable Length
CC	Cooling Coil with UV Light Option
HC	Heating Coil
HM	Humidifier
FF	Flat Filter
EE	Economizer
FR	Return Fan
IP	Inlet Plenum

PRODUCT DRAWING
SOLUTION AIR HANDLING UNIT DETAIL
MODEL: Solution-XT
12/02/2013

Project Name: Typical Return Fan Economizer With Baserail

UNIT TAG: OSHPD, Unit B

OSP-0147-10

Date: 2/10/2011

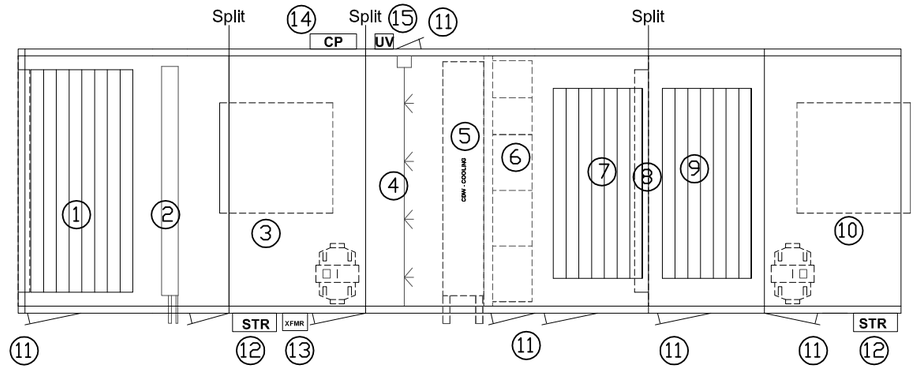
DRAWING NUMBER
134-008

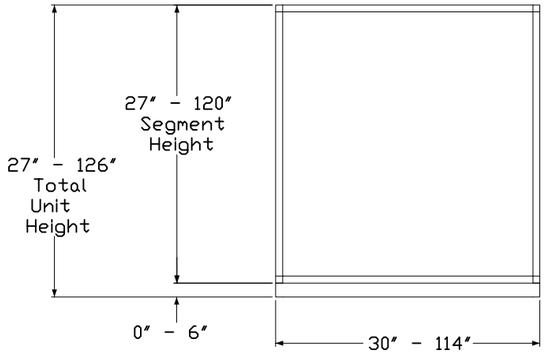
Johnson Controls

See Appendix A - Component List

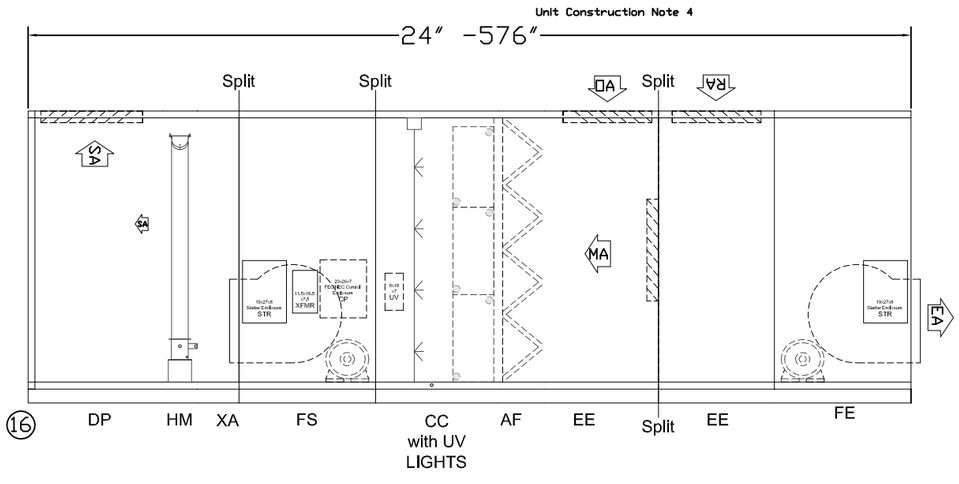
1. Control Damper, Supply Air
2. Humidifier Grid
3. Fan (DWDI Airfoil)
4. UV Light
5. Cooling Coil
6. Angle Filter
7. Control Damper, Outside Air
8. Control Damper, Mixed Air
9. Control Damper, Return Air
10. Fan (DWDI Airfoil)
11. Access Door
12. Starter, Motor Control
13. Transformer Panel
14. FEC/NEC Control Panel
15. UV Light Control Panel
16. Baserail

SINGLE TUNNEL UNIT WITH SPLITS

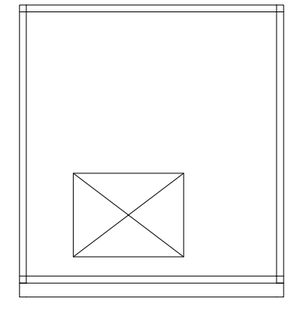




REAR (OUTLET) END VIEW



ELEVATION VIEW



FRONT (INLET) END VIEW

Unit Construction Information:

1. Side and Top Panel Construction
Foam filled panels 2" thick.
Exterior : Galvanized Steel 20, 18, or 16 ga.
Interior: Galvanized or Stainless Steel 20, 18, or 16 ga

2. Bottom Panel Construction
Foam filled panels 2" thick.
Exterior: Galvanized Steel 24 ga.
Interior: Galvanized or Stainless Steel 20, 18, 16, or 14 ga

3. All Dimension are in inches unless otherwise specified.

4. Unit length may vary depending on the number of segments that are required to form the Air Handling Unit. Length shown is for single piece unit.

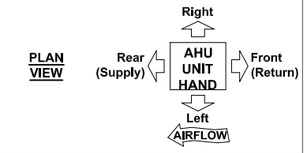
5. Doors are provided for access to segments. Maximum door height 117".

6. Seismic Construction Details
Baserail Assembly. See detail
Structural Bulkheads. See detail
Maximum distance between bulkheads: 60"
Bulkheads include fan wall, filter rack, coil rack,economizer wall, attenuator wall, and structural bulkhead.

UNIT CONSTRUCTION

Model: Solution-XT
Construction: Indoor & Outdoor

PLAN VIEW



NOTES

Units with a baserail and a bottom opening: Duct connection flush with the bottom of unit, not flush with bottom of baserail.

Refer to performance report for shipping split details.

Allow sufficient space around the unit for removing the access panels and various parts of the unit. A minimum clearance equal to the width of the unit must be provided on both sides of the unit for removing the coil or fan assembly.

Contractor responsible for penetrations and connections of all electrical boxes and internal coil connections.

Certain items may extend beyond cabinet dimensions including: door handles, light switches, electrical boxes, lifting lugs, etc.

Dimension tolerances: Unit (+/- 1/2"); Piping (+/- 2")

SEGMENT LIST

SEGMENT	DESCRIPTION
DP	Discharge Plenum
HM	Humidifier
XA	Access Variable Length
FS	Supply Fan
CC	Cooling Coil with UV Light Option
AF	Angle Filter
EE	Economizer
FE	Exhaust Fan

PRODUCT DRAWING
SOLUTION AIR HANDLING UNIT DETAIL
MODEL: Solution-XT
12/02/2013

Project Name: Typical Exhaust Fan Economize With Baserail

UNIT TAG: OSHPD, Unit C
OSP-0147-10

Date: 2/10/2011

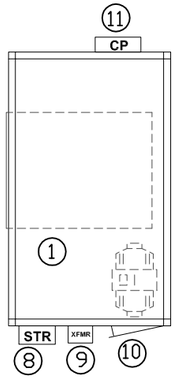
DRAWING NUMBER
134-009

Johnson Controls

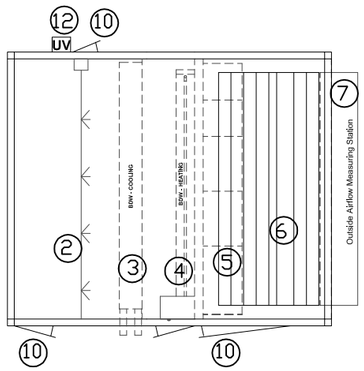
See Appendix A - Component List

1. Fan (DWDI Airfoil / FC)
2. UV Light
3. Cooling Coil
4. Electric heater
5. Angle Filter
6. Return Air Control Damper
7. Outside Air Airflow Measuring Station
8. Starter, Motor Control
9. Transformer
10. Access Door
11. FEC/NEC Control Panel
12.UV Light Control Panel
13. Baserail

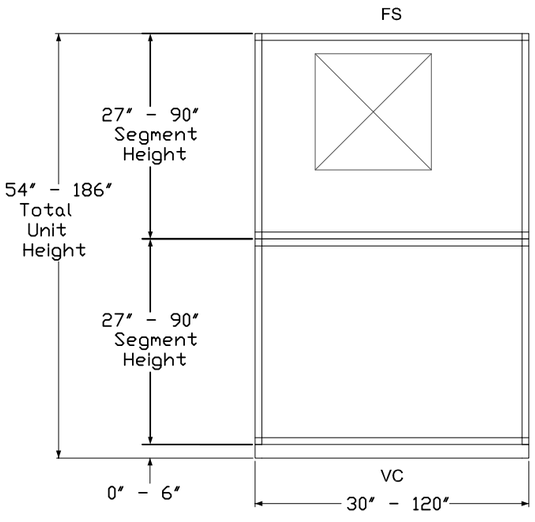
SINGLE TUNNEL STACKED SUPPLY FAN UNIT



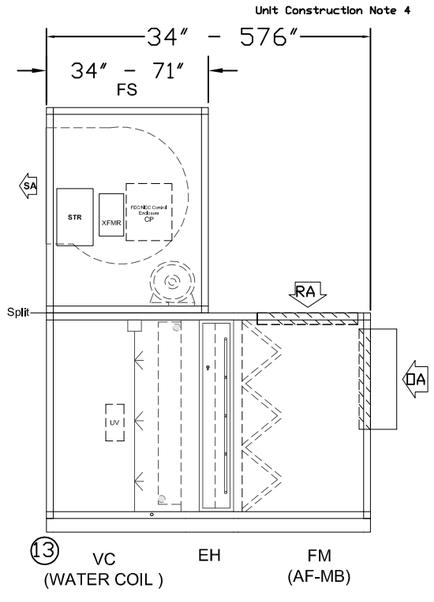
PLAN VIEW
TIER 2 - OUTLET END



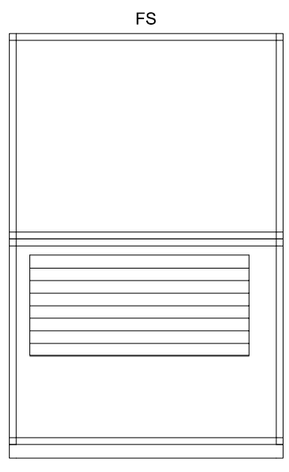
PLAN VIEW
TIER 1



REAR (OUTLET) END VIEW



ELEVATION VIEW



FRONT (INLET) END VIEW

Unit Construction Information:

1. Side and Top Panel Construction
Foam filled panels 2" thick.
Exterior : Galvanized Steel 20, 18, or 16 ga.
Interior: Galvanized 20, 18, or 16 ga

2. Bottom Panel Construction
Foam filled panels 2" thick.
Exterior: Galvanized Steel 24 ga.
Interior: Galvanized 20, 18, 16, or 14 ga

3. All Dimension are in inches unless otherwise specified.

4. Unit length may vary depending on the number of segments that are required to form the Air Handling Unit. Length shown is for single piece unit.

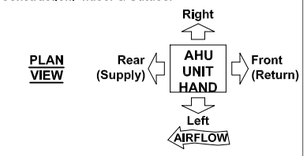
5. Doors are provided for access to segments. Maximum door height 117".

6. Seismic Construction Details
Baserail Assembly. See detail
Structural Bulkheads. See detail
Maximum distance between bulkheads: 60"
Bulkheads include fan wall, filter rack, coil rack,economizer wall, attenuator wall, and structural bulkhead.

UNIT CONSTRUCTION

Model: Solution-XT
Construction: Indoor & Outdoor

PLAN VIEW



NOTES

Units with a baserail and a bottom opening: Duct connection flush with the bottom of unit, not flush with bottom of baserail.

Refer to performance report for shipping split details.

Allow sufficient space around the unit for removing the access panels and various parts of the unit. A minimum clearance equal to the width of the unit must be provided on both sides of the unit for removing the coil or fan assembly.

Contractor responsible for penetrations and connections of all electrical boxes and internal coil connections.

Certain items may extend beyond cabinet dimensions including: door handles, light switches, electrical boxes, lifting lugs, gas fuel system, etc.

Dimension tolerances: Unit (+/- 1/2"); Piping (+/- 2")

Drain pan connection size 1 1/4" MPT SCH 40

SECTION LIST
(LENGTHS INCLUDE END CHANNELS)

SECT	DESCRIPTION
FS	Supply Fan
VC	Vertical Coil with UV Light Option
EH	Electric Heat
FM	Filter/Mixing Box

PRODUCT DRAWING
SOLUTION AIR HANDLING UNIT DETAIL
MODEL: Solution-XT
12/02/2013

Project Name: Typical Stacked Supply Fan with Vertical Coil, and Inlet Mixing Box With Baserails

UNIT TAG: OSHPD, Unit D
~~OSP-0147-10~~

Date: 7/21/2011

DRAWING NUMBER
134-012

Johnson Controls

ASSEMBLY NOTES:

1. WELD APPLIED TO CORNERS AND SPLICE ON A SKID.

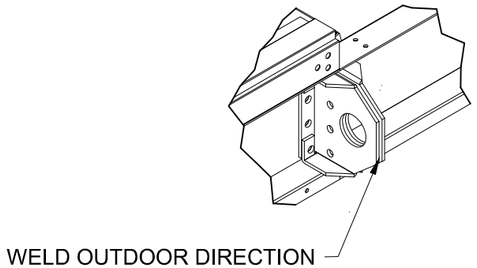
2. 1/2" HARDWARE MOUNTS TO ALL 4 CORNER CONNECTORS. SEE DETAIL A

SHIPPING SPLIT NOTES:

SPLITS >>>> SKID STARTS OR ENDS WITH BASERAIL

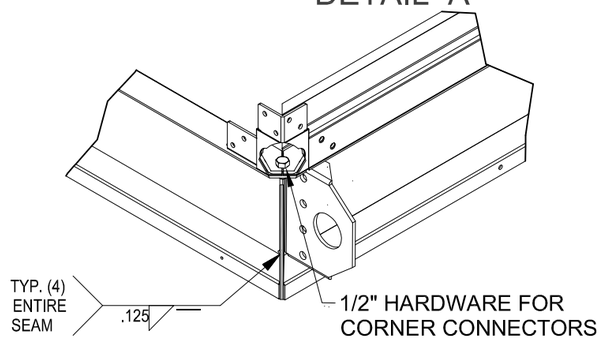
FIRST IN AIRFLOW SEGMENTS->>> SKID STARTS WITH BASERAIL

LAST IN AIRFLOW SEGMENTS ->>>> SKID ENDS WITH BASERAIL



DETAIL B

DETAIL A



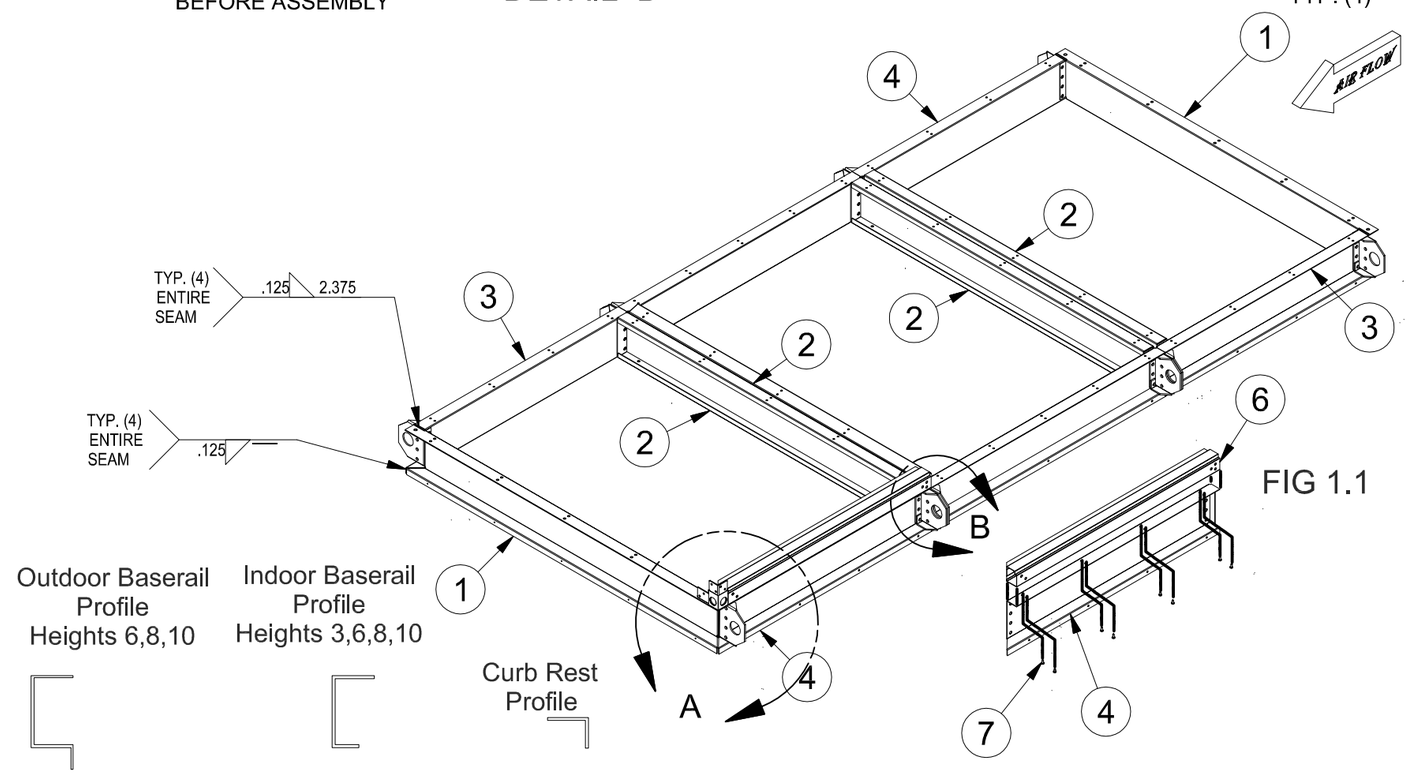


FIG 1.1

Parts List	
ITEM	DESCRIPTION
1	BASERAIL END
2	BASERAIL INTERMEDIATE
3	BASERAIL DIRECTION OF AIRFLOW
4	BASERAIL DIRECTION OF AIRFLOW
6	RACEWAY
7	SCREW, 1/4"-14
8	LIFTING LUG
12	NUT, HEX , 1/2" -13
13	SCREW, HEX, GR5, 1/2" -13
14	WASHER, LOCK, 1/2"
15	CONER CONNNECTOR

Johnson Controls

REV LEV	DATE	REVISION RECORD	DR.	CHG. NO.
-	3/04/11	NEW	AJM	11-2509
		OSP-0147-10		

DIMENSIONS ARE IN INCHES

TOLERANCES: PER ENG. SPEC. M-282

WELDING: PER ENG. SPEC. M-30

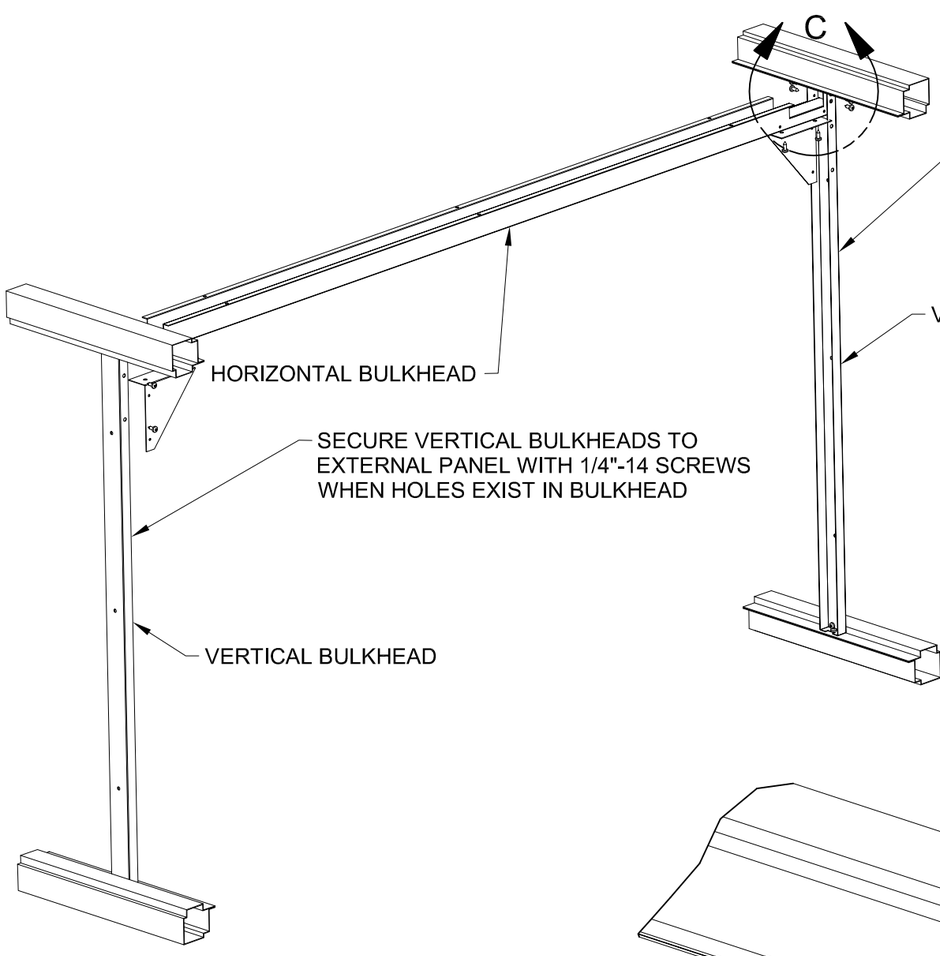
BASERAIL ASSEMBLY (ENHANCED SEISMIC CONSRTUCTION)

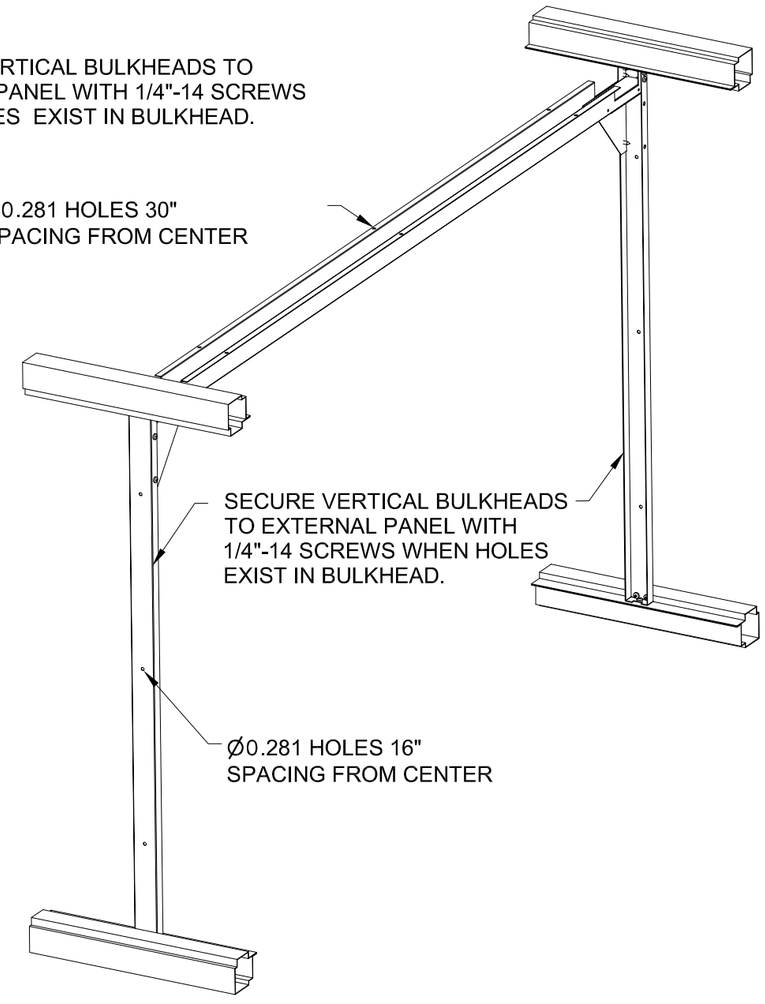
MATERIAL TYP: | THICKNESS:

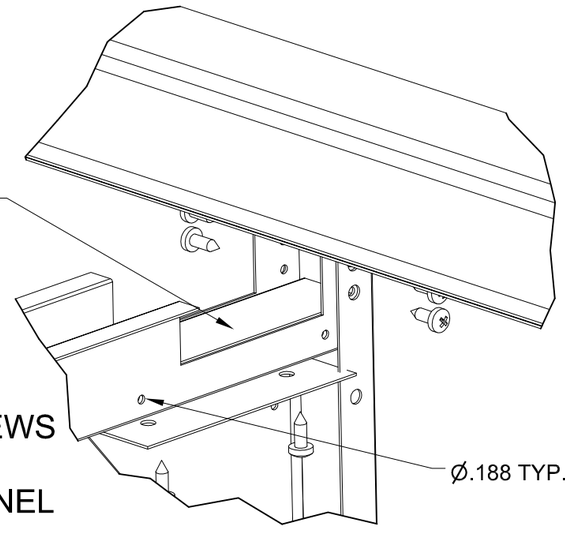
MASTER MODEL:

SIZE A | DRAWING NUMBER 134-010

SHEET: 1 OF 1







NOTES:
1.HORIZONTAL BULKHEAD SCREWED TO VERTICAL BULKHEADS WITH 1/4" -14 SCREWS

2.HORIZONTAL BULKHEAD TO CEILING PANEL WITH 1/4"-14 SCREWS.

DETAIL C

REV LEV	DATE	REVISION RECORD	DR.	CHG. NO.
-	3/04/11	NEW	AJM	11-2509

OSP-0147-10

DIMENSIONS ARE IN INCHES
TOLERANCES: PER ENG. SPEC. M-282
WELDING: PER ENG. SPEC. M-30

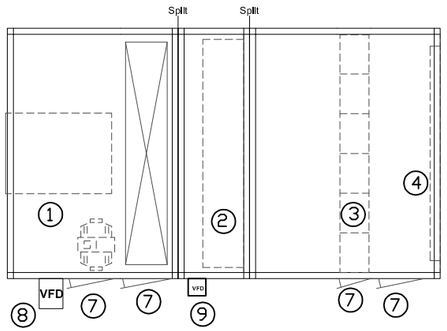
STRUCTURAL BULKHEAD ASSEMBLY (ENHANCED SEISMIC CONSTRUCTION)

MATERIAL TYP: | THICKNESS:
MASTER MODEL:
SIZE A | DRAWING NUMBER 134-011
SHEET: 1 OF 1

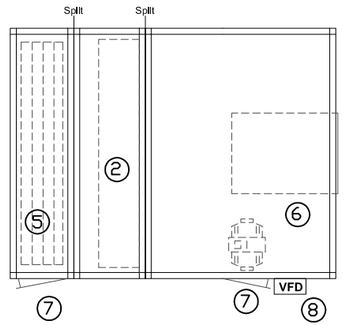
See Appendix A - Component List

1. Fan (DWDI Airfoil / FC)
2. Heat Wheel
3. Angle Filter.
4. Outside Air Control Damper
5. Mixed Air Control Damper
6. Fan (DWDI Airfoil / FC)
7. Access Door
8. VFD, Motor Control
9. VFD, Heat Wheel Motor Control
10. Baserail

SINGLE TUNNEL STACKED HEAT WHEEL UNIT



PLAN VIEW
TIER 1



PLAN VIEW
TIER 2 - INLET END

Unit Construction Information:

1. Side and Top Panel Construction
Foam filled panels 2" thick.
Exterior : Galvanized Steel 20, 18, or 16 ga.
Interior: Galvanized 20, 18, or 16 ga

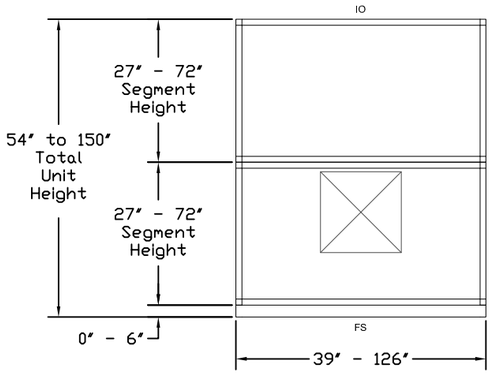
2. Bottom Panel Construction
Foam filled panels 2" thick.
Exterior: Galvanized Steel 24 ga.
Interior: Galvanized 20, 18, 16, or 14 ga

3. All Dimension are in inches unless otherwise specified.

4. Unit length may vary depending on the number of segments that are required to form the Air Handling Unit. Length shown is for single piece unit.

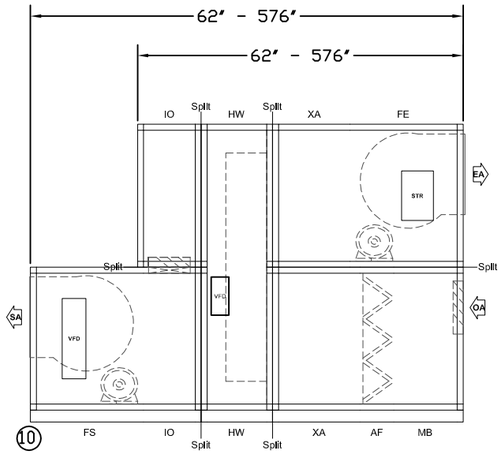
5. Doors are provided for access to segments. Maximum door height 117".

6. Seismic Construction Details
Baserail Assembly. See detail
Structural Bulkheads. See detail
Maximum distance between bulkheads: 60"
Bulkheads include fan wall, filter rack, coil rack,economizer wall, attenuator wall, and structural bulkhead.

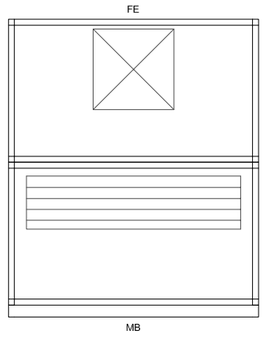


REAR (OUTLET) END VIEW

Unit Construction Note 4



ELEVATION VIEW

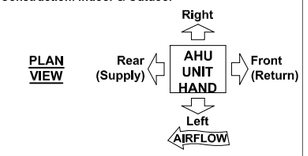


FRONT (INLET) END VIEW

UNIT CONSTRUCTION

Model: Solution-XT
Construction: Indoor & Outdoor

PLAN VIEW



NOTES

Units with a baserail and a bottom opening: Duct connection flush with the bottom of unit, not flush with bottom of baserail.

Refer to performance report for shipping split details.

Allow sufficient space around the unit for removing the access panels and various parts of the unit. A minimum clearance equal to the width of the unit must be provided on both sides of the unit for removing the coil or fan assembly.

Contractor responsible for penetrations and connections of all electrical boxes and internal coil connections.

Certain items may extend beyond cabinet dimensions including: door handles, light switches, electrical boxes, lifting lugs, gas fuel system, etc.

Dimension tolerances: Unit (+/- 1/2"); Piping (+/- 2")

Drain pan connection size 1 1/4" MPT SCH 40

SECTION LIST
(LENGTHS INCLUDE END CHANNELS)

SECT	DESCRIPTION
FS	Supply Fan
IO	Inlet/Outlet
HW	Heat Wheel
XA	Variable Length Access
AFf	Angle Filter
MB	Mixing Box
FE	Exhaust Fan - 32-32 DWDI - 30.00 HP
XA	Variable Length Access
HW	Heat Wheel
IO	Inlet/Outlet

PRODUCT DRAWING
SOLUTION AIR HANDLING UNIT DETAIL
MODEL: Solution-XT
12/02/2013

Project Name: Typical Heat Wheel, Supply Fan, Exhaust Fan, and Inlet Mixing Box With Baserails

UNIT TAG: ~~OSP-0147-10~~ OSHPD, Unit E

Date: 7/21/2011

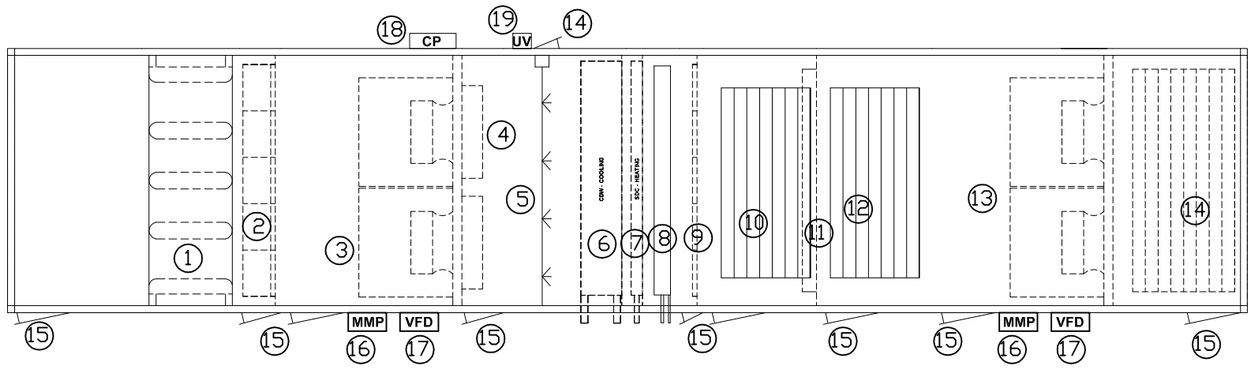
DRAWING NUMBER
134-013

Johnson Controls

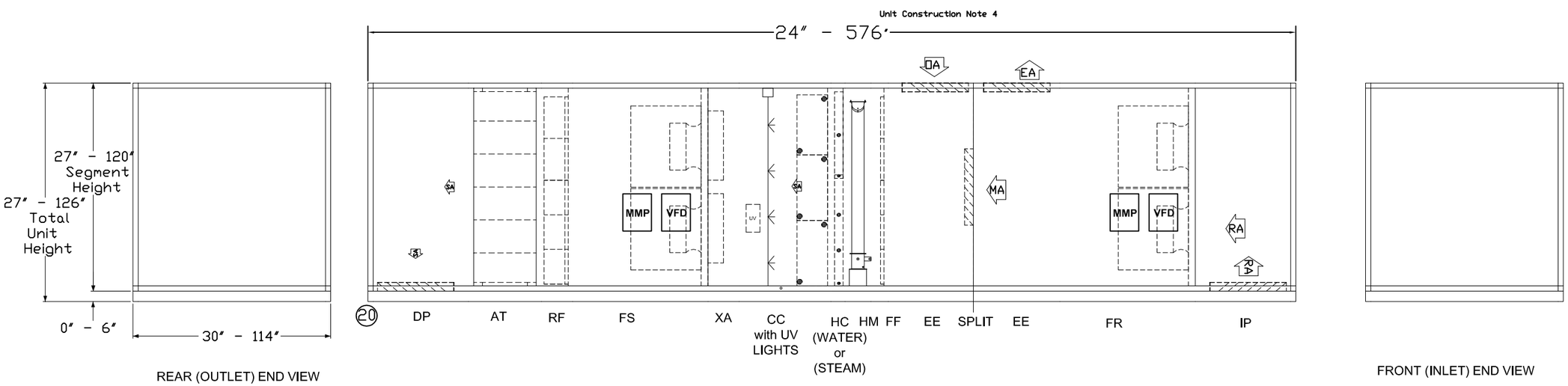
See Appendix A - Component List

1. Attenuator
2. Rigid Filter
3. Multiple Fan (Plenum Airfoil)
4. Isolation Damper
5. UV Light
6. Cooling Coil
7. Heating Coil
8. Humidifier Grid
9. Flat Filter
10. Control Damper, Outside Air
11. Control Damper, Mixed Air
12. Control Damper, Exhaust Air
13. Multiple Fan (Plenum Airfoil)
14 Control Damper, Return Air
15. Access Door
16. VFD, Motor Control
17. Manual Motor Protector Panel
18. FEC/NEC Control Panel
19. UV Light Control Panel
20. Baserail.

SINGLE TUNNEL
MULTIPLE FAN UNIT



PLAN VIEW



REAR (OUTLET) END VIEW

FRONT (INLET) END VIEW

ELEVATION VIEW

Unit Construction Information:

1. Side and Top Panel Construction
Foam filled panels 2" thick.
Exterior : Galvanized Steel 20, 18, or 16 ga.
Interior: Galvanized 20, 18, or 16 ga

2. Bottom Panel Construction
Foam filled panels 2" thick.
Exterior: Galvanized Steel 24 ga.
Interior: Galvanized 20, 18, 16, or 14 ga

3. All Dimension are in inches unless otherwise specified.

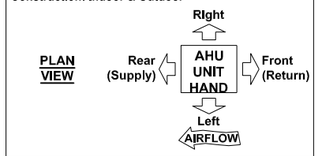
4. Unit length may vary depending on the number of segments that are required to form the Air Handling Unit. Length shown is for single piece unit.

5. Doors are provided for access to segments. Maximum door height 117".

6. Seismic Construction Details
Baserail Assembly. See detail
Structural Bulkheads. See detail
Maximum distance between bulkheads: 60"
Bulkheads include fan wall, filter rack, coil rack,economizer wall, attenuator wall, and structural bulkhead.

UNIT CONSTRUCTION

Model: Solution-XT
Construction: Indoor & Outdoor



NOTES

Units with a baserail and a bottom opening: Duct connection flush with the bottom of unit, not flush with bottom of baserail.

Refer to performance report for shipping split details.

Allow sufficient space around the unit for removing the access panels and various parts of the unit. A minimum clearance equal to the width of the unit must be provided on both sides of the unit for removing the coil or fan assembly.

Contractor responsible for penetrations and connections of all electrical boxes and internal coil connections.

Certain items may extend beyond cabinet dimensions including: door handles, light switches, electrical boxes, lifting lugs, etc.

Dimension tolerances: Unit (+/- 1/2"); Piping (+/- 2")

SEGMENT LIST

SEGMENT	DESCRIPTION
DP	Discharge Plenum
AT	Attenuator
RF	Rigid Filter
FS	Supply Multiple Fan
XA	Access Variable Length
CC	Cooling Coil with UV Light Option
HC	Heating Coil
HM	Humidifier
FF	Flat Filter
EE	Economizer
FR	Return Multiple Fan
IP	Inlet Plenum

PRODUCT DRAWING
SOLUTION AIR HANDLING UNIT DETAIL
MODEL: Solution-XT
12/07/2013

Project Name: Typical Multiple Return Fan Economizer With Baserail

OSP-0147-10

UNIT TAG: OSHPD, Unit F

Date: 2/09/2012

DRAWING NUMBER
134-014

Johnson Controls

Cabinets

Cabinets included in the OSP

Manufacturer				Cabinet Width (in.)											Unit
				Min										Max	
				30	• • •	39	45	60	• • •	84	• • •	114	120	126	
JCI	Cabinet Height (in.)	Min	27	X		X									UUT3, UUT4, UUT15*,UUT21*
			33			X									UUT1, UUT2, UUT5, UUT29
			39			X									UUT16
			45				X								UUT17
			60					X		X					UUT22, UUT26, UUT13
			72											X	UUT20*,UUT24*
			90										X		UUT14*, UUT18, UUT25
			• • • • • • • • • •	Side and top panel construction: 2” foam filled panels Exterior: galvanized steel 20ga., 18ga., or 16ga. Interior: galvanized or stainless steel 20ga., 18ga., or 16ga. Bottom panel construction: 2” foam filled panels Exterior: galvanized steel 24ga. Interior: galvanized or stainless steel 20ga., 18ga., 16ga., or 14ga.										Interpolated
			120									X			UUT7, UUT6, UUT9, UUT8, UUT10, UUT11, UUT12, UUT19, UUT23, UUT26, UUT30

***Stacked units tested - unit height is twice cabinet height**

UUT15: (2) Tiers of 27H x 30W without base rail = 54H x 30W x 40L/62L
UUT14: (2) Tiers of 90H x 120W with 6 base rail = 186H x 120W x71L/87L
UUT21: (2) Tiers of 27H x 39W without base rail = 54H x 39W x 62L/62L
UUT20: (2) Tiers of 72H x 126W with 6 base rail = 156H x 126W x 92L/92L
UUT24: (2) Tiers of 72H x 126W with 6 base rail = 156H x 126W x 96L/96L

Note: The length can be one or more certified segments added together to make up a complete air handling unit. Most segments include access doors. The maximum door height is 117". Units may be stacked in cabinets sized 27"H x 30"W (UUT15) to 90"H x 120"W (UUT14).

Pipe Chases

Pipe chases included in the OSP

Manufacturer		Height (in)	Length (in)	Depth (in)	Weight (lb)	Unit
JCI	Min	27	26	24	96	Interpolated
		⋮	⋮	⋮	⋮	
		45	46	36	231	UUT17
		⋮	⋮	⋮	⋮	Interpolated
	Max	120	71	48	672	UUT11

Base Rails

Base rails included in the OSP

Manufacturer	Base Rail Height (in)	Standard Construction	Options			Unit
			Curb Rest	Bolted Raceway	Welded Base Rail	
JCI	None	Formed raceway with bolted corners	X	X		UUT1, UUT2, UUT3, UUT4, UUT5,UUT15,UUT18, UUT21, UUT22
	3	Formed raceway with bolted corners and formed base rail		X		Interpolated
	6	Formed raceway with bolted corners and formed base rail	X	X	X	UUT6, UUT7, UUT8, UUT9, UUT10, UUT12, UUT13, UUT16 ,UUT17, UUT19, UUT20, UUT23, UUT24, UUT25, UUT26

Coils

Coils included in the OSP

	Steam Coils							
Manufacturer	Coil Height (in.)	Coil Length (in.)	Row Qty	Tube Thick (in.)	Tube Diam (in.)	Number of Coils, Stacked	Weight (lbs)	Unit
JCI	18	17.5	1	0.035	1	1	41	UUT4
	Coils with the following specifications are certified: Height: Minimum Fin Height 18" Maximum Fin Height 108" Width: Minimum Fin Length 17.5" Maximum Fin Length 101"							Interpolated
	108	101	1	0.035	1	2	706	UUT7

Coil Variables:

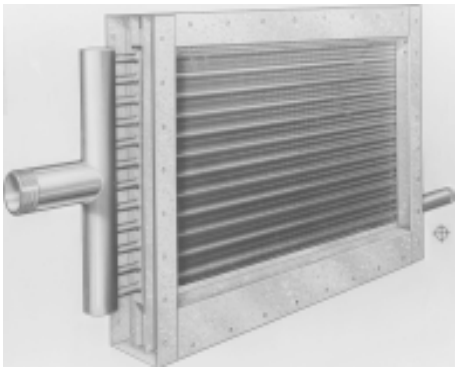
1. Fin Material: Aluminum
2. Coil Casing: Galvanized, Stainless
3. Fin Shape: Corrugated
4. Fins per inch: 6, 8, 9, 10, 11, 12, 13, 14
5. All steam coils are single row.
6. Tube Thickness: 0.035", 0.049"
7. Number of Coils Stacked: 1, 2

	Water and DX coils								
Manufacturer	Coil Height (in.)	Coil Length (in.)	Row Qty	Tube Thick (in.)	Tube Diam (in.)	Number of Coils, Stacked	Weight (lbs)	Weight w/ Fluid (lbs)	Unit
JCI	17.5	18	2	0.016	1/2	1	32	39	UUT15
	18	17.5	4	0.016	1/2	1	42	44	UUT4
	22.5	27	2	0.016	1/2	1	49	67	UUT2
	24.25	26	2	0.020	5/8	1	55	76	UUT2
	45	72	4	0.016	1/2	1	282	362	UUT13
	Coils with the following specifications are certified: Height: Minimum Fin Height 18" Maximum Fin Height 107.5" Width: Minimum Fin Length 17.5" Maximum Fin Length 102"								Interpolated
	80	108	6	0.016	1/2	2	803	1,135	UUT25
	107.5	102	2	0.016	1/2	3	634	793	UUT7
	105.75	101	12	0.049	5/8	3	4,807	5,687	UUT9

All coil weights with fluid are shown with water.

Coil Variables:

1. Fin Material: Aluminum
2. Coil Casing: Galvanized, Stainless
3. Fin Shape: Corrugated
4. Fins per Inch: 6, 8, 9, 10, 11, 12, 13, 14
5. Number of Rows: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
6. Tube Thickness: 0.016", 0.020", 0.025", 0.032", 0.035", 0.049"
7. Number of Coils Stacked: 1, 2, 3



Coils (Continued)

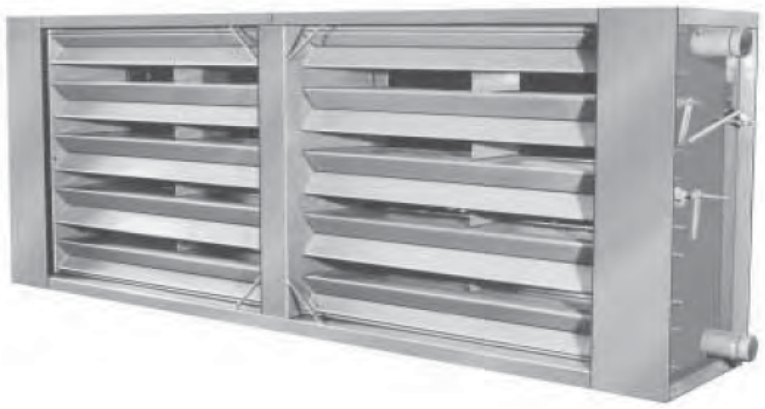
Coils included in the OSP

	Integral Face and Bypass Coils							
Manufacturer	Coil Height (in.)	Coil Length (in.)	Row Qty	Orientation	Coil Sections	Tube Thick (in.)	Weight (lbs)	Unit
LJ Wing	29	27	4	Horizontal	2	0.035	240	UUT16
	Coils with the following specifications are certified: Height: Minimum Fin Height 29" Maximum Fin Height 98" Width: Minimum Fin Length 27" Maximum Fin Length 101"							Interpolated
	98	101	3	Vertical	1	0.035	1,669	UUT19

All coil weights with fluid are shown with water.

Coil Variables:

1. Fin Material: Aluminum, Copper
2. Coil Casing: Galvanized, Stainless
3. Tube Diameter: 5/8"
4. Fins per Inch: 6, 7, 8, 9, 10, 11, 12
5. Number of Rows: 1, 2, 3, 4
6. Tube Thickness: 0.035", 0.049"
7. Orientation: Vertical, Horizontal

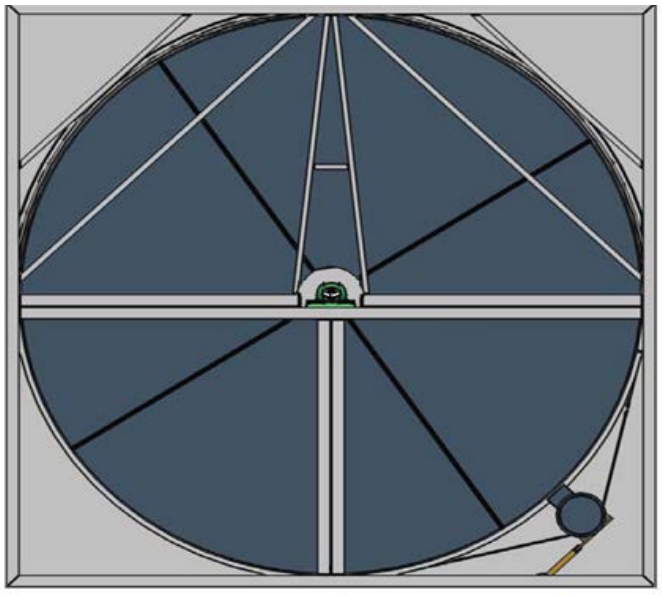


Energy Recovery Wheels

Energy wheels included in the OSP

Manufacturer	Model		Diam. (in.)	Depth (in.)	Face Area (ft^2)	Frame W&H (in.)	Frame Depth (in.)	Weight (lbs)	Unit
AirXchange	ERC-2510C	Min	25	3	1.7	29	6.97	36	UUT21
	⋮		⋮	⋮	⋮	⋮	⋮	⋮	Interpolated
	ERC-110290C	Max	110	3	33.0	115	20.5	1,100	UUT20

Heat Wheel Media: Polymer, Molecular Sieve



Fans

Fans included in the OSP

Fan MFR	Type	Drive Arrangement	Discharge		Fan Wheel Diam (in.)	Material		Option	Motor MFR	Voltage	Minimum			Maximum			Unit
						Fan	Housing & Frame				HP	Frame	Weight (lbs) Wheel + Mtr+Skid	HP	Frame	Weight (lbs) Wheel + Mtr+Skid	
Twin City	DWDI, Airfoil	Belt Arr 3	Horizontal	Min	12.25	5052 H32 Aluminum	A 36 Steel	shaft ground ring	Baldor or Teco	200/208, 230, 460, 380, 575	5	184T	345	15	254T	573	UUT5
					13.5					200/208, 230, 460, 380, 575	5	184T	373	15	254T	603	Interpolated
					15					200/208, 230, 460, 380, 575	5	184T	411	20	256T	668	
					16.5					200/208, 230, 460, 380, 575	5	184T	450	20	256T	709	
					18.25					200/208, 230, 460, 380, 575	5	184T	499	25	284T	715	
					20					200/208, 230, 460, 380, 575	5	184T	638	30	286T	1,210	
					22.25					200/208, 230, 460, 380, 575	5	184T	776	40	324T	1,620	
					24.5					200/208, 230, 460, 380, 575	5	184T	848	40	324T	1,708	
					27					200/208, 230, 460, 380, 575	5	184T	998	50	326T	1,914	
					30					200/208, 230, 460, 380, 575	5	184T	1,325	60	364T	2,740	
				Max	33					200/208, 230, 460, 380, 575	5	184T	1,651	75	365T	2,900	UUT8
	Plenum, Airfoil	Direct Arr 4	Horizontal	Min	12.40	5052 H32 Aluminum				200/208, 230, 460, 380, 575	1.5	143T	145	5	184T	319	UUT1
					13.98					200/208, 230, 460, 380, 575	1.5	184T	174	5	184T	348	Interpolated
					15.75					200/208, 230, 460, 380, 575	1.5	184T	194	5	184T	368	
					18.25					200/208, 230, 460, 380, 575	1.5	184T	260	20	256T	804	
					20.00					200/208, 230, 460, 380, 575	1.5	184T	288	20	256T	829	
					22.25					200/208, 230, 460, 380, 575	1.5	184T	374	20	256T	901	
					24.50					200/208, 230, 460, 380, 575	1.5	184T	429	20	256T	951	
					27.00					200/208, 230, 460, 380, 575	2	213T	577	30	286T	1,243	
					30.00					200/208, 230, 460, 380, 575	2	213T	692	40	324T	1,402	
					33.00					200/208, 230, 460, 380, 575	5	254T	905	50	326T	1,857	
					36.50					200/208, 230, 460, 380, 575	10	284T	1,198	100	444T	2,671	
					40.25					200/208, 230, 460, 380, 575	10	284T	1,332	100	444T	2,845	
					44.50					200/208, 230, 460, 380, 575	20	324T	1,792	100	444T	3,259	
				Max	49.00					200/208, 230, 460, 380, 575	20	324T	1,989	100	444T	3,481	
		Direct bolted design Arr 4	Horizontal	Min	12.40	5052 H32 Aluminum				200/208, 230, 460, 380, 575	1.5	143T	123	5	184T	212	UUT29
					13.98					200/208, 230, 460, 380, 575	1.5	184T	208	5	184T	233	Interpolated
					15.75					200/208, 230, 460, 380, 575	1.5	184T	241	5	184T	266	
					18.25					200/208, 230, 460, 380, 575	1.5	184T	265	20	256T	550	
					20.00					200/208, 230, 460, 380, 575	1.5	184T	290	20	256T	575	
					22.25					200/208, 230, 460, 380, 575	1.5	184T	358	20	256T	643	
					24.50					200/208, 230, 460, 380, 575	1.5	184T	408	20	256T	693	
					27.00					200/208, 230, 460, 380, 575	2	213T	517	30	286T	902	
					30.00					200/208, 230, 460, 380, 575	2	213T	603	40	324T	1,180	
					33.00					200/208, 230, 460, 380, 575	5	254T	823	50	326T	1,363	
					36.50					200/208, 230, 460, 380, 575	10	284T	1,130	100	444T	2,125	
					40.25					200/208, 230, 460, 380, 575	10	284T	1,370	100	444T	2,350	
					44.50					200/208, 230, 460, 380, 575	20	324T	1,925	100	444T	2,640	
				Max	49.00					200/208, 230, 460, 380, 575	20	324T	2,012	100	444T	2,847	UUT30
		Belt Arr 3	Horizontal	Min	12.40	5052 H32 Aluminum	A36 Steel			200/208, 230, 460, 380, 575	2	145T	242	5	184T	297	UUT2
					13.98					200/208, 230, 460, 380, 575	5	184T	280	10	215T	443	Interpolated
					15.75					200/208, 230, 460, 380, 575	5	184T	314	15	254T	538	
					18.25					200/208, 230, 460, 380, 575	5	184T	378	25	284T	608	
					20.00					200/208, 230, 460, 380, 575	5	184T	440	30	286T	1,024	
					22.25					200/208, 230, 460, 380, 575	5	184T	499	40	324T	1,367	
					24.50					200/208, 230, 460, 380, 575	5	184T	545	40	324T	1,411	
					27.00					200/208, 230, 460, 380, 575	5	184T	684	60	364T	1,924	
					30.00					200/208, 230, 460, 380, 575	5	184T	811	75	365T	2,054	
					33.00					200/208, 230, 460, 380, 575	5	184T	953	75	365T	2,253	
					36.50					200/208, 230, 460, 380, 575	5	184T	1,138	100	404T	3,063	
					40.25					200/208, 230, 460, 380, 575	5	184T	1,251	100	404T	3,253	
					44.50					200/208, 230, 460, 380, 575	5	184T	1,660	100	404T	3,471	
				Max	49.00					200/208, 230, 460, 380, 575	5	184T	1,846	100	404T	3,926	UUT10

All fans are Internally Isolated

Fans (Continued)

Fans included in the OSP

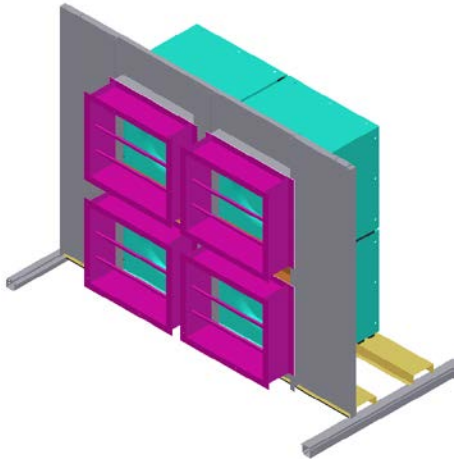
Fan MFR	Type	Drive Arrangement	Discharge		Fan Wheel Diam (in.)	Material		Option	Motor MFR	Voltage	Minimum			Maximum			Unit
						Fan	Housing & Frame				HP	Frame	Weight (lbs) Wheel + Mtr+Skid	HP	Frame	Weight (lbs) Wheel + Mtr+Skid	
Comefri	DWDI, Forward Curve	Belt Arr 3	Horizontal	Min	7-7	G90 Galv Steel	A 36 Steel	shaft ground ring	Baldor Or Teco	200/208, 230, 460, 380, 575	3	182T	127	5	184T	222	UUT15
					9-6					200/208, 230, 460, 380, 575	3	182T	136	5	184T	221	Interpolated
					9-9					200/208, 230, 460, 380, 575	3	182T	146	5	184T	243	
					10-7					200/208, 230, 460, 380, 575	3	182T	143	5	184T	237	
					10-10					200/208, 230, 460, 380, 575	3	182T	157	7.5	213T	322	
					12-9					200/208, 230, 460, 380, 575	3	182T	173	7.5	213T	336	
					12-12					200/208, 230, 460, 380, 575	3	182T	183	15	254T	435	
					15-11					200/208, 230, 460, 380, 575	3	182T	206	15	254T	462	
					15-15					200/208, 230, 460, 380, 575	3	182T	218	15	254T	474	
					18-13					200/208, 230, 460, 380, 575	3	182T	234	15	254T	501	
					18-18					200/208, 230, 460, 380, 575	3	182T	250	20	256T	555	
					20-15					200/208, 230, 460, 380, 575	3	182T	434	25	284T	913	
					20-20					200/208, 230, 460, 380, 575	3	182T	455	30	286T	956	
					22-22					200/208, 230, 460, 380, 575	3	182T	552	30	286T	1,096	
					25-25					200/208, 230, 460, 380, 575	3	182T	652	30	286T	1,207	
					28-28					200/208, 230, 460, 380, 575	3	182T	807	30	286T	1,373	
					32-32					200/208, 230, 460, 380, 575	3	182T	1,072	30	286T	1,693	
					36-36					200/208, 230, 460, 380, 575	3	182T	1,289	30	286T	1,912	
				Max	40-40					200/208, 230, 460, 380, 575	3	182T	1,443	30	286T	2,039	UUT18
	DWDI, Airfoil	Belt Arr 3	Horizontal	Min	12-12	A 572 Grade 50 Steel	A 36 Steel	shaft ground ring	Baldor Or Teco	200/208, 230, 460, 380, 575	3	182T	204	15	254T	450	Interpolated
					15-15					200/208, 230, 460, 380, 575	3	182T	249	15	254T	503	
					18-18					200/208, 230, 460, 380, 575	3	182T	301	20	256T	583	
					20-20					200/208, 230, 460, 380, 575	3	182T	473	30	286T	1,006	
					22-22					200/208, 230, 460, 380, 575	3	182T	586	30	286T	1,162	
					25-25					200/208, 230, 460, 380, 575	3	182T	673	30	286T	1,256	
					28-28					200/208, 230, 460, 380, 575	3	182T	869	30	286T	1,490	
					32-32					200/208, 230, 460, 380, 575	3	182T	1,157	30	286T	1,797	UUT 24
					36-36					200/208, 230, 460, 380, 575	3	182T	1,411	30	286T	2,052	Interpolated
				Max	40-40					200/208, 230, 460, 380, 575	3	182T	1,670	30	286T	2,252	

All fans are Internally Isolated

Multiple Fans

Multiple Fans included in the OSP

Fan MFR	Type	Drive Arrangement	Discharge		Fan Wheel Diam (in)	Max Fans High	Material		Motor MFR	Voltage	Minimum			Maximum			Unit
							Fan	Housing & Frame			HP	Frame	Weight (lbs)	HP	Frame	Weight (lbs)	
Twin City	Multiple fans, Plenum, Airfoil, Enclosed	Direct Arr 4	Horizontal	Min	12.40	2	5052 H32 Aluminum	A 36	Baldor	200/208, 230, 460, 380, 575	1	182T	241	7.5	184T	275	UUT22
					13.98	2				200/208, 230, 460, 380, 575	1	182T	265	10	213T	351	Interpolated
					15.75	2				200/208, 230, 460, 380, 575	1	182T	342	15	215T	481	
					18.25	2				200/208, 230, 460, 380, 575	1	182T	429	30	254T	592	
					20.00	2				200/208, 230, 460, 380, 575	1	182T	515	30	254T	678	
					22.25	2				200/208, 230, 460, 380, 575	1	182T	597	25	256T	791	
					24.50	2				200/208, 230, 460, 380, 575	1	182T	773	30	284T	1,160	
				Max	27.00	2				200/208, 230, 460, 380, 575	1	182T	902	30	284T	1,289	UUT23, UUT26



Filter Frames

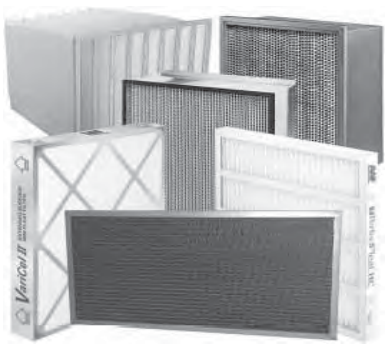
Filter frames included in the OSP

Manufacturer	Type	Cabinet			Weight (lbs)	Unit
		Width (in.)	Length (in.)	Height (in.)		
JCI	Aluminum Extruded	39	18	33	39	UUT2
		Minimum cabinet height: 27” Maximum cabinet height: 120" Minimum cabinet width: 30” Maximum cabinet width: 114” Frame used for flter types: rigid, bag, and mini-pleat				Interpolated
		114	18	120	235	UUT9
	Galvanized Steel Box	30	18	27	28	UUT3
		Minimum cabinet height: 27” Maximum cabinet height: 120" Minimum cabinet width: 30” Maximum cabinet width: 114” Frame used for flter types: rigid, bag, and mini-pleat				Interpolated
		114	18	120	291	
	Galvanized Steel Angle	30	18	27	33	UUT3
		Minimum cabinet height: 27” Maximum cabinet height: 120" Minimum cabinet width: 30” Maximum cabinet width: 126” Frame used for flter types: pleated, cleanable, and throwaway				Interpolated
		114	20	120	306	UUT7
		126	17	72	217	UUT24
	Galvanized Steel Flat	30	10	27	15	UUT3
		Minimum cabinet height: 27” Maximum cabinet height: 120" Minimum cabinet width: 30” Maximum cabinet width: 114” Frame used for flter types: pleated, cleanable, and throwaway				Interpolated
		114	10	120	156	
American Air Filter	Welded Aluminum-HEPA Filters	39	16	33	10	UUT1
		Minimum cabinet height: 27” Maximum cabinet height: 120” Minimum cabinet width: 33” Maximum cabinet width: 114” Frame used for flter type: HEPA				Interpolated
		114	16	120	104	UUT9

Filters

Filters included in the OSP

Manufacturer	Width (in.)	Height (in.)	Depth (in.)		Weight (lbs)	Depth (in.)		Weight (lbs)	Depth (in.)	Weight (lbs)	Unit
American Air Filter	Pleated					Cleanable			Throwaway		
	12	24	2	4	1.8	2	4	3	4	0.6	Interpolated
	16	20			1.8			6.5		0.6	UUT3, UUT7
	20	16			1.8			6.5		0.6	Interpolated
	20	20			2.1			8.1		0.6	UUT9
	20	24			2.5			8.4		0.6	UUT7, UUT9
	24	12			1.8			3		0.6	Interpolated
	24	20			2.5			8.4		0.8	
	24	24			2.5			10		0.8	UUT2
	Rigid					Bag			Mini-Pleated		
	12	24	12		11.5	22		4.5	4	3.3	Interpolated
	16	20			12			3.5		3.5	UUT3
	20	16			12			3.5		3.5	Interpolated
	20	20			14			4.8		4.5	UUT9
	20	24			16.5			5.5		5.3	UUT9
	24	12			11.5			4.5		3.3	Interpolated
	24	20			16.5			5.5		5.3	
	24	24			19			8		6.5	UUT2
	HEPA										Interpolated
	12	24	11.5		25						
	12	30			30						
	15	24	11.5		30						UUT9
	15	30			38						Interpolated
	24	12			25						
	24	15			30						
	24	24			40						
	24	30			45						
	30	12			30						
	30	15			38						UUT1
	30	24			45						UUT9
	30	30	11.5		50						Interpolated



Attenuators

Attenuators included in the OSP

Manufacturer		Bank Height (in.)	Bank Width (in.)	Weight (lbs)	Cabinet Size	Unit
Vibro-Acoustic	Min	17	20	42		Interpolated
		⋮	⋮	⋮		
	Max	110	104	1,127	120Hx114W	UUT12

Bank length options are 3', 5' and 7'

Dampers

Dampers included in the OSP

Manufacturer	Damper		Height (in.)	Width (in.)	Weight (lbs)	Test Unit
Ruskin	Airflow Measuring Station	Min	9.5	16.0	16	UUT3
		⋮	⋮	⋮	⋮	Interpolated
		Max	44.0	96.0	440	UUT7
	Control Damper Aluminum	Min	9.5	25.0	5	UUT1
		⋮	⋮	⋮	⋮	Interpolated
		Max	38.3	82.0	147	UUT6
	Control Damper Galvanized Steel Blade	Min	6.0	25.0	8	UUT21
			9.5	16.0	8	UUT3
			9.5	25.0	13	UUT1
			15.3	93.0	79	UUT11
			21.0	112.0	131	UUT20
		⋮	⋮	⋮	⋮	Interpolated
			38.3	82.0	174	UUT6
		⋮	⋮	⋮	⋮	Interpolated
		Max	44.0	96.0	235	UUT7, UUT6
	Back Draft Damper Extruded Aluminum	Min	17.0	17.0	61	UUT22
		⋮	⋮	⋮	⋮	Interpolated
		Max	40.0	40.0	339	UUT23, UUT26

Actuators

Actuators included in the OSP

Manufacturer		Weight (lbs)	Test Unit
JCI	Min	2.9	UUT16
		3.4	UUT1, UUT13, UUT21
		⋮	Interpolated
	Max	6.4	UUT7, UUT6, UUT16, UUT19, UUT20

UV Light Ballasts

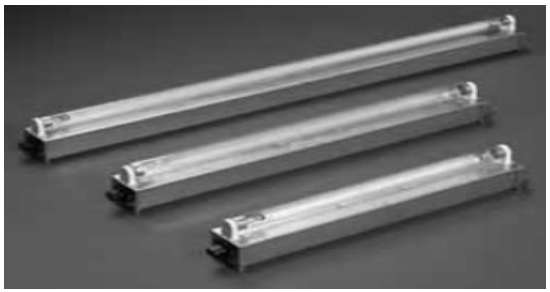
UV light ballasts included in the OSP

Manufacturer		Unit Height (in.)	Unit Width (in.)	UV Fixture Length in. (Qty)	UV Light Core Length (in.)	Weight (lbs)	Test Unit
JCI	Min	27	30	21(1)	10	36	UUT4
		27	42	33(1)		42	Interpolated
		27	45	36(1)		52	
		33	54	18(1), 24(1)		47	
		⋮	⋮	⋮		⋮	
		54	84	36(2)		61	UUT13
		⋮	⋮	⋮		⋮	Interpolated
		108	102	18(3), 36(6)		121	
		114	108	24(3),36(6)		130	
	Max	120	114	18(3), 24(6), 36(3)		138	UUT9

UV Light Controls

UV light controls included in the OSP

Manufacturer	Panel Description	Application	Height (in.)	Width (in.)	Depth (in.)	UV Light Core Length (in.)	Weight (lbs)	Test Unit
JCI	UV light control panel	UV Lights < 8 Amps	18	8	7	NA	29	UUT4, UUT9, UUT13
	UV light control panel	UV Lights >=8 Amps	18	12	7	NA	32	Interpolated



Humidifier Grids

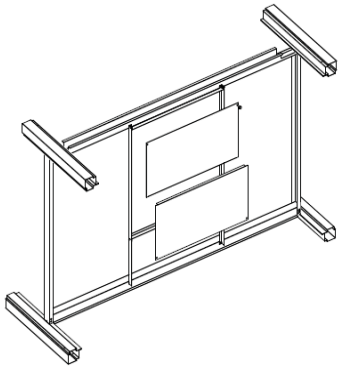
Humidifier grids included in the OSP

Manufacturer		Cabinet		Weight (lbs)	Test Unit
		Height (in.)	Width (in.)		
Nortec	Min	27	30	35	UUT4
	⋮	⋮	⋮	⋮	Interpolated
	Max	120	114	363	UUT10

Diffusers

Diffusers included in the OSP

Manufacturer		Fan Wheel Diam (in.)	Cabinet		Weight (lbs)	Test Unit	Cabinet Size
			Height (in.)	Width (in.)			
JCI	Min	12.3	39	39	19	Interpolated	
	⋮	⋮	⋮	⋮	⋮		
	Max	33.0	120	114	68	UUT12	120Hx114W



Transformers

Transformers included in the OSP

Manufacturer		Size				Test Unit
	Size (VA)	Height (in.)	Width (in.)	Depth (in.)	Weight (lb)	
JCI	500 VA	18.50	11.50	7.50	25	UUT15
	2 K	18.50	11.50	7.50	65	UUT5, UUT8

Factory Packaged Controls

Factory packaged controls included in the OSP

Manufacturer	Panel Description	Application	Height (in.)	Width (in.)	Depth (in.)	Weight (lb)	Test Unit
JCI	JCI Terminal Strip Panel	FEC / NCE configurable standards - Field mounted FEC app	18	8	7	25	UUT13
	JCI FEC / NCE 15x20 Panel	FEC / NCE configurable standards - Factory mounted	20	17	7	47	UUT1, UUT2, UUT5, UUT6
	JCI FEC / NCE 16.5x20 Panel	FEC / NCE configurable standards - Factory mounted	20	16.5	6.5	50	UUT20
	JCI FEC / NCE 20x25 Panel	FEC / NCE configurable standards - Factory mounted	26	20	7	59	UUT10, UUT8
	JCI FEC / NCE 24x37 Panel	FEC / NCE configurable standards - Factory mounted	38	24	7	109	UUT13

End Devices

End devices included in the OSP

Manufacturer	Unit Light Fixture	Description	Test Unit
Kenall Manufacturing	Fixture, Light, 75 Watt, Vr	Light	UUT2, UUT5, UUT8, UUT23
Leviton	Switch, 15 amp, 120V	Switch	UUT2, UUT5, UUT8
Leviton	Outlet, GFI, 15 amp	Outlet	UUT2, UUT5, UUT8
	End Devices		
JCI	Sensor, Avg, 8ft, 1k, Nickel	With Molex Connectors, No Enclosure	UUT1, UUT2, UUT13
	Current Switch, Spst Relay	1 Amp To 135 Amps,24vac 1/6hp	UUT1, UUT2, UUT5, UUT8, UUT10, UUT13
	Cable, End Dev Sig, Pigtail	Supply Fan Variable Speed Control Signal	UUT1, UUT2, UUT10, UUT13
	Wiring Only	Supply Fan VFD "Run" Contact - Fan Proving	UUT1, UUT2, UUT5, UUT8, UUT10, UUT13
	Wiring Only	Low temperature Status	UUT2, UUT13
	LTC, SPST, Fixed Reset, 20ft		UUT2, UUT13
	Cooling Valve Wiring	Wiring Only	UUT2, UUT13
	Heating Valve Wiring	Wiring Only	UUT2, UUT13
	Low Pressure Status	Wiring Only	UUT2, UUT13
	Switch, Diff, Press, Manual Reset	W/Molex Connectors	UUT10, UUT2, UUT13
	Sensor, 8in. 1K RTD Temp, Nickel	Temperature Sensor, Probe, 1k, Type 1, 8 in.	UUT10, UUT8, UUT2, UUT13, UUT20
	High Pressure Status	Wiring Only	UUT13
	High Static Pressure Switch (Manual Reset)	High Pressure Cutout	UUT2, UUT10, UUT13
	Relay, SPDT, 24vac, Coil, Indicator, LED		UUT10, UUT8, UUT1, UUT2, UUT5, UUT13
	Magnetic Proximity Sensor		UUT4, UUT13
	Switch, Diff, Press, 2CND, L-Bracket		UUT7, UUT9

Motor Controls

Motor controls included in the OSP

Manufacturer	Panel Description	Frame	Base	Voltage		Enclosure				Test Unit	
				200, 230, 460,575		Size					
				Min HP	Max HP	Height (in.)	Width (in.)	Depth (in.)	Weight (lbs)		
JCI	Motor Starters (NEMA3R)	R1	G20	1	15	17.00	10.00	10.00	22	UUT5, UUT15	Certified under OSP-0339-10 (Sds=1.93)
		R2	G21	7.5	60	25.00	24.00	12.00	56	UUT14, UUT18, UUT24	
		R4	G23	25	100	27.00	26.00	12.00	88	UUT8, UUT13	
	VFD without Bypass and with Fused and Non-Fused Disconnects (NEMA1)	R1	G11	1	7.5	20.50	8.25	11.74	36	Extrapolated	
		R2	G12	7.5	15	24.75	8.25	12.16	44		
		R3	G13	15	30	32.50	9.00	11.99	56		
		R4	G14	25	75	40.50	12.00	15.24	88		
		R5	G15	100	100	43.00	12.00	16.90	125		
		R6	G16	50	150	48.00	16.00	20.40	150		
	VFD with Bypass and Fused and Non-Fused Integral Disconnects and Service Switch (NEMA1)	R1	G20	1	7.5	23.00	16.00	16.00	70	UUT 31a-r	
		R1	G20	1	7.5	23.00	16.00	16.00	70	UUT 31a-f	
		R1	G20	1	7.5	23.00	16.00	16.00	70	UUT 31b-r	
		R1	G20	1	7.5	23.00	16.00	16.00	70	UUT 31b-f	
		R2	G21	7.5	15	26.00	16.00	16.00	89	Interpolated	
		R3	G22	15	30	27.25	19.00	16.00	111		
		R4	G23	25	75	39.50	30.00	18.00	215		
		R5	G24	100	100	44.00	33.00	18.03	278		
		R6	G25	50	150	44.00	33.00	18.03	376		
	VFD without Bypass and with Fused and Non-Fused Disconnects (NEMA3R Self-Ventilated)	R1	G11	1	7.5	22.42	15.19	14.44	62		
		R2	G12	7.5	15	28.42	15.19	14.44	76		
		R3	G13	15	30	35.10	18.52	14.44	112		
		R4	G14	25	75	45.57	18.02	16.50	170		
		R5	G15	100	100	49.68	21.77	18.50	216		
		R6	G16	50	150	56.76	23.27	21.50	335		
	VFD with and without Bypass Fused and Non-Fused Disconnect (NEMA3R Self Ventilated)	R1	G20	1	7.5	19.50	18.19	17.47	78		
		R2	G21	7.5	15	22.50	18.19	17.47	96		
		R3	G22	15	30	31.10	21.52	17.47	164		
		R4	G23	25	75	42.10	28.52	18.52	238		
		R5	G24	100	100	46.18	32.52	22.52	300		
		R6	G25	50	150	52.18	32.52	22.52	440	UUT 32a-r	
		R6	G25	50	150	52.18	32.52	22.52	440	UUT 32a-f	
		R6	G25	50	150	52.18	32.52	22.52	440	UUT 32b-r	
		R6	G25	50	150	52.18	32.52	22.52	440	UUT 32b-f	
	Manual Motor Protection Panel	N/A		1	30	20.0	16.5	6.5	50	UUT23, UUT26	
				1	10	28.0	16.5	6.5	60	UUT22	
				Min FLA	Max FLA	Height (in.)	Width (in.)	Depth (in.)	Weight (lbs)	Test Unit	
	VFD without Bypass for Energy Wheels	R0	N/A	1.2	1.9	19.20	9.00	8.70	3	UUT20	
		R1	N/A	2.4	8.8	19.20	9.00	8.70	4	Interpolated	

Factory Terminated Wiring

Factory terminated wiring included in the OSP

Manufacturer		Disconnect Size (A)	Height (in.)	Width (in.)	Depth (in.)	Weight (lbs)	Test Unit
JCI	Min	80	17.00	8.00	8.25	25	UUT15
		80/125	24.00	16.00	10.25	81	Interpolated
		200	27.00	19.18		105	UUT14
	Max	400	35.00	22.00		158	UUT13

Unit Disconnects

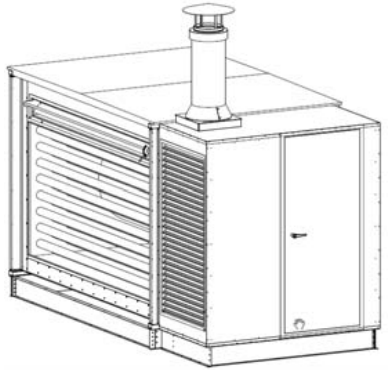
Unit disconnects included in the OSP

Manufacturer	Type	Disconnect	Enclosure Size				Test Unit
		Amp	Height (in.)	Width (in.)	Depth (in.)	Weight (lbs)	
RAM/ Schneider Electric	Non-Fused Disconnects (NEMA 1, 3R, 4, 12)	30/60	8.0	6.0	4.0	9	UUT15
		100	10.0	8.0	5.0	9	UUT14, UUT18
		125	14.0	12.0	8.0	20	Interpolated
		200	20.0	16.0	6.0	60	
	Fused Disconnects (NEMA 1, 3R, 4, 12)	30/60	10.0	8.0	5.0	12	Interpolated
		100	14.0	12.0	8.0	22	
		200	30.0	24.0	10.0	75	

Indirect Gas Heaters

Indirect gas heaters included in the OSP

Manufacturer		Furnace Output (BTUs x 10,000)	Furnace Dimensions			Total Furnace Weight (lbs)	Test Unit
			Length (in.)	Width (in.)	Height (in.)		
Jackson & Church	Min	15	42.00	40.13	30.00	580	UUT17
		⋮	⋮	⋮	⋮	⋮	Interpolated
	Max	200	64.13	100.00	50.00	3,075	UUT11



Electric Heaters

Electric heaters included in the OSP

	Element type	kW	Heater Dimensions		Total Heater Weight (lbs)	Test Unit
			Height (in.)	Width (in.)		
Min	Open	15	18	15.25	55.2	UUT15
		⋮	⋮	⋮	⋮	Interpolated
Max		75	81	101.25	2150.4	UUT14