APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY	
APPLICATION #:	OSP – 0379

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Johnson Controls, Incorporated (alternately branded as Enviro-Tec)

Manufacturer's Technical Representative: Scott Faland

Mailing Address: 507 E Michigan St. M-19, Milwaukee, WI 53201

Telephone: (414) 524-4330 Email: Scott.Faland@jci.com

Product Information

Product Name: VRU (VAV ready unit with piping)

Product Type: Mechanical Equipment

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

General Description: The certified units are variable air volume units with piping. Each unit comes pre-assembled with factory-installed piping and pre-commissioned, factory-installed controls. Seismic enhancements 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: Ceiling suspended

Applicant Information

Applicant Company Name: The VMC Group

Contact Person: John P. Giuliano, PE

Mailing Address: 113 Main Street, Bloomingdale, NJ 07403

Telephone: (973) 838-1780 Email: john.giuliano@thevmcgroup.com

I hereby agree to reimburse the Office of Statewide Health Planning and Development review fees in accordance with the California Administrative Code, 2016.

Signature of Applicant: Date: 6/28/19

Title: President Company Name: The VMC Group

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

Company Name: The VMC Group

Name: Kenneth Tarlow California License Number: SE-2851

Mailing Address: 113 Main Street, Bloomingdale, NJ 07403

Telephone: (973) 838-1780 Email: Ken.tarlow@thevmcgroup.com

Supports and Attachments Preapproval

☐ Supports and attachments are preapproved under OPM- _____
(Separate application for OSHPD Preapproval of Manufacturer's Certification (OPM) of Supports and attachments is required)

☒ Supports and attachments are not preapproved

Certification Method

☒ Testing in accordance with: ☒ ICC-ES AC156

☐ Other (Please Specify): _____

Testing Laboratory

Company Name: Dynamic Certification Laboratory

Contact Name: Josh Sailer

Mailing Address: 1315 Greg Street, Suite 109, Sparks, NV 89431

Telephone: (775) 358-5085 Email: josh@shaketest.com

Seismic Parameters

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

Design Basis of Equipment or Components (F_p/W_p) = 1.88

S_{DS} (Design spectral response acceleration at short period, g) = 2.50

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

R_p (Equipment or component response modification factor) = 6.0

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1

Equipment or Component Natural Frequencies (Hz) = N/A, ceiling suspended

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, 2015: ☐ 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, 2025

Signature: Timothy J. Piland Date: February 24, 2021

Print Name: Timothy J. Piland Title: SSE

Special Seismic Certification Valid Up to : S_{DS} (g) = 2.50 z/h = 1

Condition of Approval (if applicable):

Table 1: Certified Components

Manufacturer: Johnson Controls, Incorporated (alternately branded as Enviro-Tec)

Product Line: VRU (VAV ready unit with piping)

Mounting Description: Ceiling suspended

Product Line	Tag	Johnson Controls Model Number[1]	Enviro-Tec Model Number[1]	VAV Box Dimensions (in)			Max. Operating Weight (lb)	Optional Coils	Optional Sound Attenuator	Sds (g), z/h=1	Unit
				Max. Length[2]	Width[3]	Height					
VRU (Single Duct)	VAV-04	JHx0460x0xxx	SDR(WC)0460x0xxx	67.0	19.5	10.0	87	Yes	Yes	2.5	UUT1
	VAV-05	JHx0560x0xxx	SDR(WC)0560x0xxx	67.0	19.5	10.0	87 to 220	Yes	Yes	2.5	Interpolated
	VAV-06	JHx0660x0xxx	SDR(WC)0660x0xxx	63.0	19.5	10.0		Yes	Yes	2.5	Interpolated
	VAV-08	JHx0860x0xxx	SDR(WC)0860x0xxx	63.0	21.5	10.0		Yes	Yes	2.5	Interpolated
	VAV-10	JHx1060x0xxx	SDR(WC)1060x0xxx	63.0	23.5	12.5		Yes	Yes	2.5	Interpolated
	VAV-12	JHx1260x0xxx	SDR(WC)1260x0xxx	63.0	25.5	15.0		Yes	Yes	2.5	Interpolated
	VAV-14	JHx1460x0xxx	SDR(WC)1460x0xxx	63.0	29.5	17.5		Yes	Yes	2.5	Interpolated
	VAV-16	JHx1660x0xxx	SDR(WC)1660x0xxx	63.0	33.5	17.5		Yes	Yes	2.5	Interpolated
	VAV-19	JHx1960x0xxx	SDR(WC)1960x0xxx	64.5	39.5	17.5		Yes	Yes	2.5	Interpolated
	VAV-22	JHx2260x0xxx	SDR(WC)2260x0xxx	64.5	43.5	17.5	220	Yes	Yes	2.5	UUT2
VRU (Dual Duct)	VAV-04-04	JHx0410x00xx	DDR(WC)0410x00xx	41.0	35.5	10.0	82	Yes	No	2.5	Extrapolated
	VAV-05-05	JHx0510x00xx	DDR(WC)0510x00xx	41.0	35.5	10.0	82	Yes	No	2.5	Extrapolated
	VAV-06-06	JHx0610x00xx	DDR(WC)0610x00xx	37.0	35.5	10.0	82	Yes	No	2.5	UUT3
	VAV-08-08	JHx0810x00xx	DDR(WC)0810x00xx	37.0	39.5	10.0	82 to 163	Yes	No	2.5	Interpolated
	VAV-10-10	JHx1010x00xx	DDR(WC)1010x00xx	43.0	43.5	12.5		Yes	No	2.5	Interpolated
	VAV-12-12	JHx1210x00xx	DDR(WC)1210x00xx	43.0	47.5	15.0		Yes	No	2.5	Interpolated
	VAV-14-14	JHx1410x00xx	DDR(WC)1410x00xx	49.0	53.5	17.5		Yes	No	2.5	Interpolated
	VAV-16-16	JHx1610x00xx	DDR(WC)1610x00xx	49.0	63.5	17.5	163	Yes	No	2.5	UUT4

1. Units are certified with and without water coils.

2. Maximum length and maximum operating weights includes coils and/or sound attenuator. Dimension length is based on inlet collar + VAV casting + 6 1/2" water coil outlet casting.

3. Width is based on VAV casting + hydronic unit (piping).

Table 2: Certified Options - Johnson Controls Branding

Manufacturer: Johnson Controls, Incorporated (alternately branded as Enviro-Tec)

Product Line: VRU (VAV ready unit with piping)

Johnson Controls Branded VRU Model Chart

A-B-C-D-E-F-G-H-I

Variable	Definition	Allowable Value	Allowable Value Description	Unit
A	Brand	JH	JCI VRU (with or without water coils)	UUT1,2,3,4
B	VAV Type	1	TSS	Extrapolated
		3	TSS with water coil	UUT1,2
		2	TDS	Extrapolated
		D	TDS with water coil	UUT3,4
C	Inlet Size	04	4"	UUT1
		05	5"	Interpolated
		06	6"	Interpolated
		08	8"	UUT3
		10	10"	Interpolated
		12	12"	Interpolated
		14	14"	Interpolated
		16	16"	UUT4
		19	20"x16"	Interpolated
		22	24"x16"	UUT2
D	Liner	1	1" fiberglass	UUT3,4
		6	Metal w/1" fiberglass	UUT1,2
E	Fan Case Size	0	None	UUT1,2,3,4
F	Hot Water Coil Rows	0	None	Extrapolated
		1	1 Row HW Coil	Extrapolated
		2	2 Row HW Coil	Extrapolated
		3	3 Row HW Coil	Extrapolated
		4	4 Row HW Coil	UUT1,2,3,4
G	Fan Voltage	0	None	UUT1,2,3,4
H	Options	0	None	UUT3,4
		1	Sound attentuator	UUT1,2
I	LL/LR/RR/RL	RR	Right hand controls / right hand piping	UUT3,4
		RL	Right hand controls / left hand piping	Interpolated
		LL	Left hand controls / left hand piping	UUT1,2
		LR	Left hand controls / right hand piping	Interpolated

Table 3: Certified Options - Enviro-Tec Branding

Manufacturer: Johnson Controls, Incorporated (alternately branded as Enviro-Tec)

Product Line: VRU (VAV ready unit with piping)

Enviro-Tec Branded VRU Model Chart

A-B-C-D-E-F-G-H-I

Variable	Definition	Allowable Value	Allowable Value Description	Unit
A	Brand	None	Enviro-Tec VRU (with or without water coils)	UUT1,2,3,4
B	VAV Type	SDR	SDR	Extrapolated
		SDR-WC	SDR with water coil	UUT1,2
		DDR	DDR	Extrapolated
		DDR-WC	DDR with water coil	UUT3,4
C	Inlet Size	04	4"	UUT1
		05	5"	Interpolated
		06	6"	Interpolated
		08	8"	UUT3
		10	10"	Interpolated
		12	12"	Interpolated
		14	14"	Interpolated
		16	16"	UUT4
		19	20"x16"	Interpolated
		22	24"x16"	UUT2
D	Liner	1	1" fiberglass	UUT3,4
		6	Metal w/1" fiberglass	UUT1,2
E	Fan Case Size	0	None	UUT1,2,3,4
F	Hot Water Coil Rows	0	None	Extrapolated
		1	1 Row HW Coil	Extrapolated
		2	2 Row HW Coil	Extrapolated
		3	3 Row HW Coil	Extrapolated
		4	4 Row HW Coil	UUT1,2,3,4
G	Fan Voltage	0	None	UUT1,2,3,4
H	Options	0	None	UUT3,4
		1	Sound attentuator	UUT1,2
I	LL/LR/RR/RL	RR	Right hand controls / right hand piping	UUT3,4
		RL	Right hand controls / left hand piping	Interpolated
		LL	Left hand controls / left hand piping	UUT1,2
		LR	Left hand controls / right hand piping	Interpolated

Table 4: Certified Subcomponents

Product Line: VRU (VAV ready unit with piping)

Certified Mounting Description: Ceiling suspended

Coils				
Model Number	**Component Manufacturer**	**Unit Type**	**Description**	**Unit**
4-row, Size 04	Johnson Controls	Single Duct	Aluminum fin with copper tubes	UUT1
4-row, Size 05 to 19	Johnson Controls		Aluminum fin with copper tubes	Interpolated
4-row, Size 22	Johnson Controls		Aluminum fin with copper tubes	UUT2
4-row, Size 04, 05, 06	Johnson Controls	Dual Duct	Aluminum fin with copper tubes	UUT3
4-row, Size 08 to 14	Johnson Controls		Aluminum fin with copper tubes	Interpolated
4-row, Size 16	Johnson Controls		Aluminum fin with copper tubes	UUT4

Note: Coils may be 1 to 4 rows. The worst cast (4 rows) was tested.

Controls			
Model Number	**Component Manufacturer**	**Description**	**Unit**
VMA-1630	Johnson Controls	Metasys Controller	UUT1, UUT2, UUT3, UUT4
PE-10-2105	Hartland Controls	120V Transformer	UUT1, UUT2, UUT3, UUT4
VA2104	Johnson Controls	24VAC Actuator	UUT1, UUT2, UUT3, UUT4

Airflow Sensor			
Model Number	**Component Manufacturer**	**Description**	**Unit**
Size 04	Johnson Controls	Flowstar airflow sensor	UUT1
Size 05	Johnson Controls	Flowstar airflow sensor	Interpolated
Size 06	Johnson Controls	Flowstar airflow sensor	UUT3
Size 05 to 14	Johnson Controls	Flowstar airflow sensor	Interpolated
Size 16	Johnson Controls	Flowstar airflow sensor	UUT4
Size 19	Johnson Controls	Flowstar airflow sensor	Interpolated
Size 22	Johnson Controls	Flowstar airflow sensor	UUT2

Temperature Sensor			
Model Number	**Component Manufacturer**	**Description**	**Unit**
TE-636GV-2	Johnson Controls	Flange Mount, 4" length, 10k ohm thermistor	UUT1, UUT2, UUT3, UUT4

Table 5: Tested Units

Manufacturer: Johnson Controls, Incorporated (alternately branded as Enviro-Tec)

Product Line: VRU (VAV ready unit with piping)

Tested Product Construction: Single duct units feature a double wall construction with 22 gage galvanized steel cabinet with 1.0" thick fiberglass insulation. Dual duct units feature a 22 gage galvanized steel cabinet with 1/2" thick fiberglass insulation.

Tested Options: Factory-installed piping, controls, coils. NOTE: sound attenuator for single duct box, standard casing for dual duct application.

Product Line	Tag	Model Number	VAV Box Dimensions (in)			Operating Weight (lb)	Coils (4-Row)	Sound Attenuator	Mounting: Ceiling Suspended		Sds (g), z/h=1	Unit
			Length[1]	Width[2]	Height				Threaded Rod Diameter (in)	Maximum Threaded Rod Spacing (in)		
VRU (Single Duct)	VAV-04	JH30460401LL	67.0	19.5	10.0	87	Yes	Yes	1/2	36	2.5	UUT1
	VAV-22	JH32260401LL	64.5	43.5	17.5	220	Yes	Yes	1/2	36	2.5	UUT2
VRU (Dual Duct)	VAV-06-06	JHD0610400RR	37.0	35.5	10.0	82	Yes	No	1/2	22	2.5	UUT3
	VAV-16-16	JHD1610x00RR	49.0	63.5	17.5	163	Yes	No	1/2	34	2.5	UUT4

1. Tested length and operating weight includes coils and/or sound attenuator, as indicated. Dimension length is based on inlet collar + VAV casting + 6 1/2" water coil outlet casting.

2. Width is based on VAV casting + hydronic unit (piping).

UUT1
UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Johnson Controls, Incorporated

Product Line: VRU (VAV ready unit with piping)

Model Number: JH30460401LL (Tag VAV-04)

Product Construction Summary:

Double wall construction with 22 gage galvanized steel cabinet with 1.0" thick fiberglass insulation

Options / Component Summary:

Ceiling suspended, single duct unit. Unit includes factory-installed piping, controls, coils and sound attenuator

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

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length[1]	Width[2]	Height	Front-Back	Side-Side	Vertical
87	UUT1	67.0	19.5	10.0	N/A	N/A	N/A

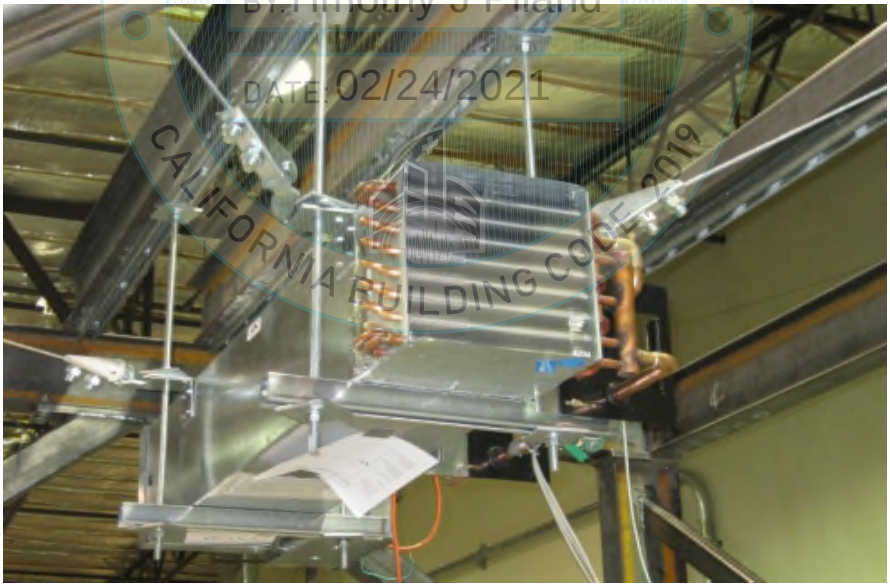
Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	1.5	4.00	3.00	1.67	0.67

1. Tested length and operating weight includes coils and sound attenuator. Dimension length is based on inlet collar + VAV casting + 6.5" water coil outlet casting.

2. Dimension width is based on VAV casting + hydronic unit (piping).

Unit Mounting Description:



UUT1 was ceiling-suspended from the DCL shake table interface frame using 1/2-inch diameter all-thread rod spaced approximately 22.5” widthwise and approximately 53” lengthwise and (4) manufacturer-provided 12-gage 90-degree brackets, each attached to the unit with (4) #14 sheet metal screws. Shear brackets were placed on top of each 12-gage, 90-degree bracket; each shear bracket was attached to the unit with (4) #14 sheet metal screws each. Lateral bracing consisted of 3/16-inch diameter steel cable and Mason SCBH-2/SSB-2 brackets. The bottom of the unit was supported by 12 gage unistrut, 3”x3”x1/4” plate washer, circular washer, and bolt. The 12 gage unistrut was attached to the unit with (4) #14 sheet metal screw. The Mason brackets were attached to the interface frame with 1/2-inch diameter Grade 5 bolts.

UUT2

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Johnson Controls, Incorporated

Product Line: VRU (VAV ready unit with piping)

Model Number: JH32260401LL (Tag VAV-22)

Product Construction Summary:

Double wall construction with 22 gage galvanized steel cabinet with 1.0" thick fiberglass insulation

Options / Component Summary:

Ceiling suspended, single duct unit. Unit includes factory-installed piping, controls, coils and sound attenuator

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

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length[1]	Width[2]	Height	Front-Back	Side-Side	Vertical
220	UUT2	64.5	43.5	17.5	N/A	N/A	N/A

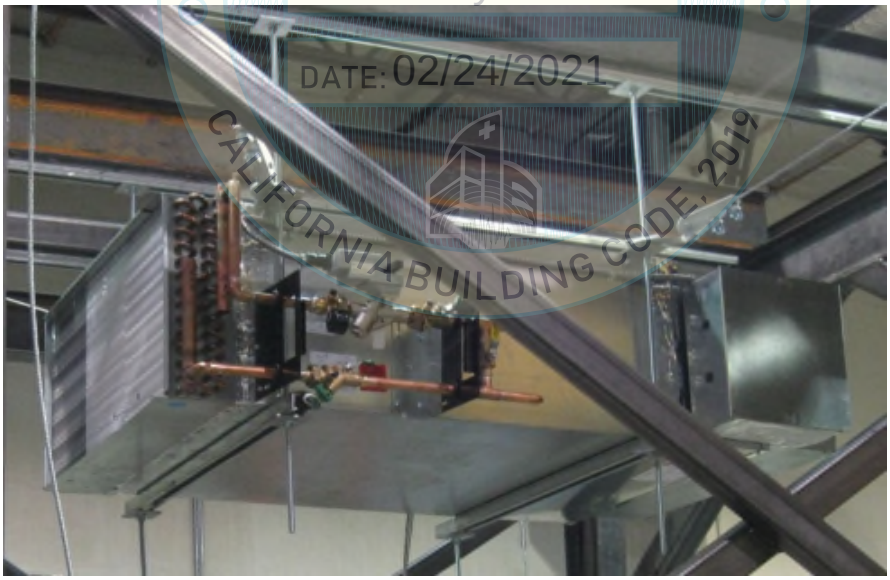
Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	1.5	4.00	3.00	1.67	0.67

1. Tested length and operating weight includes coils and sound attenuator. Dimension length is based on inlet collar + VAV casting + 6.5" water coil outlet casting.

2. Dimension width is based on VAV casting + hydronic unit (piping).

Unit Mounting Description:



UUT2 was ceiling-suspended from the DCL shake table interface frame using 1/2-inch diameter all-thread rod spaced approximately 32.5” widthwise and approximately 54.5” lengthwise and (4) manufacturer-provided 12-gage 90-degree brackets, each attached to the unit with (4) #14 sheet metal screws. Shear brackets were placed on top of each 12-gage, 90-degree bracket; each shear bracket was attached to the unit with (4) #14 sheet metal screws each. Lateral bracing consisted of 3/16-inch diameter steel cable and Mason SCBH-2/SSB-2 brackets. The bottom of the unit was supported by 12 gage unistrut, 3”x3”x1/4” plate washer, circular washer, and bolt. The 12 gage unistrut was attached to the unit with (4) #14 sheet metal screw. The Mason brackets were attached to the interface frame with 1/2-inch diameter Grade 5 bolts.

UUT3

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Johnson Controls, Incorporated

Product Line: VRU (VAV ready unit with piping)

Model Number: JHD0610400RR (Tag VAV-06-06)

Product Construction Summary:

22 gage galvanized steel cabinet with 1/2" thick fiberglass insulation

Options / Component Summary:

Ceiling suspended, dual duct unit. Unit includes factory-installed piping, controls, and coils

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

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length[1]	Width[2]	Height	Front-Back	Side-Side	Vertical
82	UUT3	37.0	35.5	10.0	N/A	N/A	N/A

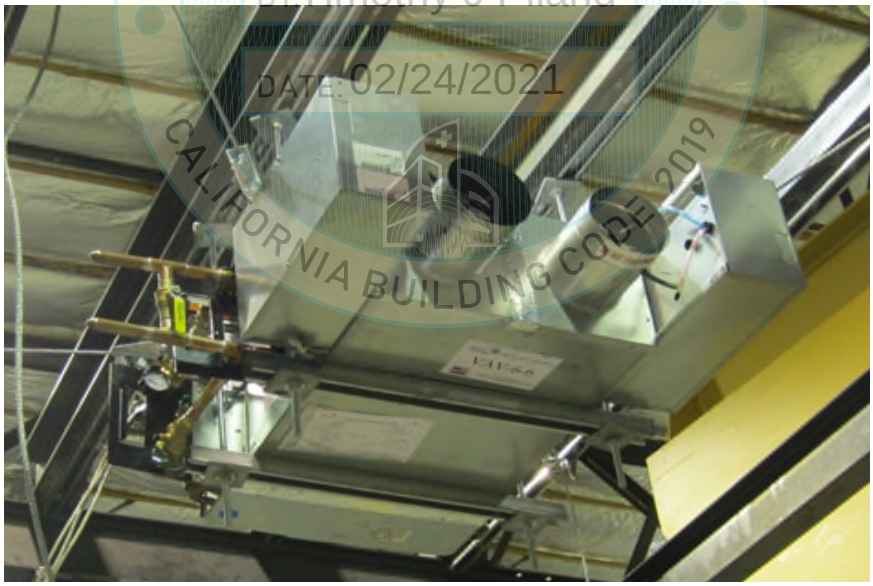
Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	1.5	4.00	3.00	1.67	0.67

1. Tested length and operating weight includes coils. Dimension length is based on inlet collar + VAV casting + 6.5" water coil outlet casting.

2. Dimension width is based on VAV casting + hydronic unit (piping).

Unit Mounting Description:



UUT3 was ceiling-suspended from the DCL shake table interface frame using 1/2-inch diameter all-thread rod spaced approximately 32.5” widthwise and approximately 12” lengthwise and (4) manufacturer-provided 12-gage 90-degree brackets, each attached to the unit with (4) #14 sheet metal screws. Shear brackets were placed on top of each 12-gage, 90-degree bracket; each shear bracket was attached to the unit with (4) #14 sheet metal screws each. Lateral bracing consisted of 3/16-inch diameter steel cable and Mason SCBH-2/SSB-2 brackets. The bottom of the unit was supported by 12 gage unistrut, 3”x3”x1/4” plate washer, circular washer, and bolt. The 12 gage unistrut was attached to the unit with (4) #14 sheet metal screw. The Mason brackets were attached to the interface frame with 1/2-inch diameter Grade 5 bolts.

UUT4

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Johnson Controls, Incorporated

Product Line: VRU (VAV ready unit with piping)

Model Number: JHD1610x00RR (Tag VAV-16-16)

Product Construction Summary:

22 gage galvanized steel cabinet with 1/2" thick fiberglass insulation

Options / Component Summary:

Ceiling suspended, dual duct unit. Unit includes factory-installed piping, controls and coils

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

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length[1]	Width[2]	Height	Front-Back	Side-Side	Vertical
163	UUT4	49.0	63.5	17.5	N/A	N/A	N/A

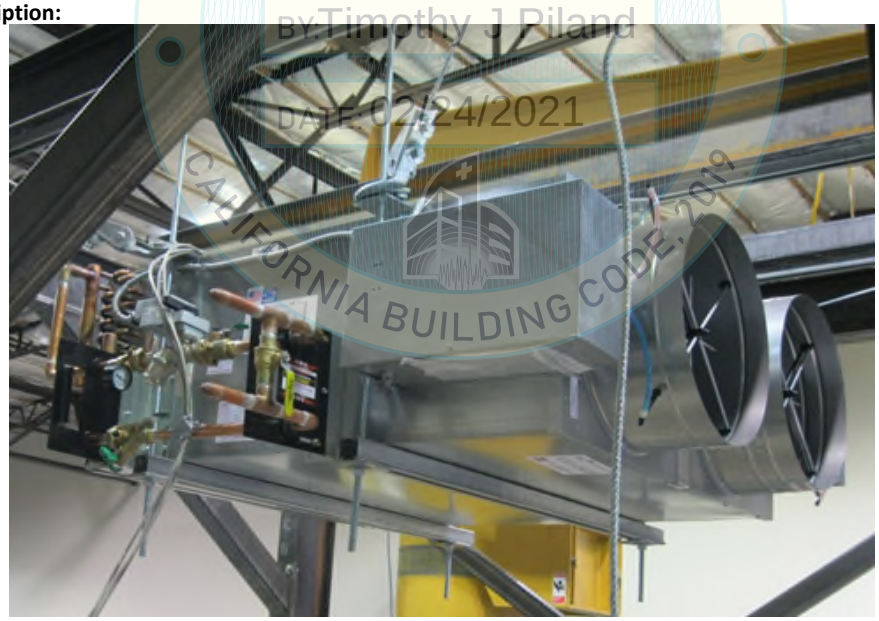
Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	1.5	4.00	3.00	1.67	0.67

1. Tested length and operating weight includes coils. Dimension length is based on inlet collar + VAV casting + 6.5" water coil outlet casting.

2. Dimension width is based on VAV casting + hydronic unit (piping).

Unit Mounting Description:



UUT4 was ceiling-suspended from the DCL shake table interface frame using 1/2-inch diameter all-thread rod spaced approximately 60.5” widthwise and approximately 20” lengthwise and (4) manufacturer-provided 12-gage 90-degree brackets, each attached to the unit with (4) #14 sheet metal screws. Shear brackets were placed on top of each 12-gage, 90-degree bracket; each shear bracket was attached to the unit with (4) #14 sheet metal screws each. Lateral bracing consisted of 3/16-inch diameter steel cable and Mason SCBH-2/SSB-2 brackets. The bottom of the unit was supported by 12 gage unistrut, 3”x3”x1/4” plate washer, circular washer, and bolt. The 12 gage unistrut was attached to the unit with (4) #14 sheet metal screw. The Mason brackets were attached to the interface frame with 1/2-inch diameter Grade 5 bolts.